

Summary

1. The century of the cities

The 21st century will be the century of the cities. Urban areas are becoming the central organizational form for almost all human societies. The global urban population could increase from just under 4 billion today to 6.5 billion people by 2050 – and urban infrastructures will grow with it. About two-thirds of humanity will then have their homes in cities. The force of the urbanization surge will primarily affect developing countries and emerging economies in Asia and Africa. Almost 90% of urban-population growth up to 2050 is expected on these two continents (UN DESA, 2014). Nearly three quarters of the global urban population will then be living there (UN DESA, 2015). The urbanization surge in the coming decades, and the character of the '*world cities society*' will thus not be driven and shaped by OECD societies – but these developments will have a huge impact on global and also on western societies.

Humanity is on the move. This manifests itself in demographic growth within cities, as a result of the influx of people from the countryside to the city and from small and medium-sized towns to the metropolises; of migration both between poor countries and between poor and rich countries; and of social advancement from shantytowns to middle-class neighbourhoods. This relocation of humanity could become the process of social change that has the most powerful impact in the 21st century. The problems experienced in coping with the sharp increase in the numbers of refugees in Germany and Europe in 2015/2016 show that rapid demographic changes and a fast influx of people into the cities pose enormous challenges even for wealthy countries. Public debates focus on the question of how quality of life, integration and social peace can be maintained and how, at the same time, ecologically sustainable urban development can succeed under conditions created by a rapid influx of people. Conditions in developing countries and emerging economies are considerably more difficult, however. Furthermore,

both the absolute figures and the growth rates are usually significantly higher than in Germany and Europe, so that national and societal limits are reached faster there.

Urbanization has a formative effect on the world economy and society, on people's quality of life, on the future of democracy, as well as on the global consumption of resources and energy – and thus on the future of the Earth as a whole. Cities offer many opportunities for cultural, social and economic development, and for improving resource and energy efficiency. But urbanization must be actively managed in order to counter the following risks: in developing countries and emerging economies, one third of the urban population do not have access to adequate housing; in sub-Saharan Africa, this figure is even higher at almost two thirds. In 2012 more than 850 million people were living in slums (UN DESA, 2015) without adequate access to vital infrastructures. How can the number of slum dwellers be prevented from doubling or even tripling? In sub-Saharan Africa, two-thirds of all new city-dwellers currently move into informal settlements or slums, and half of them are expected to remain there in the long term. According to UN forecasts, Africa's population could rise to a total of 4.4 billion people by 2100 (UN DESA, 2015). If the current urbanization trends were to continue in Africa, and, for example, 80% of the people in Africa were to live in cities by 2100 – and 60% of these in slums – this would mean about 2 billion people having to live in degrading city districts. Such a development must be prevented for reasons of social responsibility, but also from the perspective of security policy, since the massive social exclusion of people always carries with it the potential of societal destabilization.

A fundamental change of perspective is needed here, one that does not fight the symptoms but focuses on what causes the emergence of informal settlements with inadequate housing. In addition, what can be done to ensure that quality of life increases in cities, and people can make the most of their potential? What are the characteristics of cities worth living in? Cities and urban

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societies are responsible for the overwhelming majority of all worldwide resource consumption and greenhouse-gas emissions. How can the global urbanization surge be harnessed to ensure that efforts to improve quality of life are decoupled from environmental pollution – and that natural life-support systems are safeguarded? To achieve this, existing guiding concepts and strategies must be adapted (or new ones invented), developed and implemented. In view of the expected massive extension of the urban infrastructure, the challenge from the outset lies in avoiding path dependencies. If the new districts and cities were built according to the resource- and emissions-intensive models used in the last two centuries, global society would find itself in conflict with the planetary guard rails in the course of the 21st century. In other words, the spread of conventional urbanization on a global scale must be stopped. In this report, the WBGU describes transformation pathways to a sustainable form of urbanization.

Sustainable urbanization has become internationally established as a field of action for policy-makers. The topic is currently attracting a lot of attention because of the United Nations Conference on Housing and Sustainable Urban Development (Habitat III), prepared by the UN Human Settlements Programme (UN-Habitat), which is to be held in October 2016. The WBGU report looks at urbanization in the 21st century and its effects on human civilization, the diversity of the cities, the quality of life of the people, and the Earth system. The WBGU proposes a normative compass that could give orientation to urbanization in the coming decades. It also develops ideas on a polycentric urban development that tries to avoid, on the one hand, the disadvantages of a galloping densification of cities and difficult-to-govern megacities, and, on the other, the high social, environmental and cultural costs of a split between emptying rural spaces and growing, often overburdened urban agglomerations.

Urbanization and the Great Transformation

The WBGU has already examined the topic of urbanization in the context of the ‘Great Transformation’ towards sustainability, which it analysed in its 2011 flagship report (WBGU, 2011). The present report focuses on applying the Great Transformation towards sustainability to urban areas. It suggests that they should play a decisive role in the ‘century of the cities’ – as key drivers of the transformation towards sustainability. WBGU’s intention is to clarify where challenges and opportunities lie and to point out the areas where fundamental modifications and system changes are required. This is achieved by looking at three levels

together: *First*, the WBGU examines the transformation at the micro-level by looking at example cities, urban stakeholder groups and city dwellers. *Second*, the WBGU studies urbanization at the meso-level in exemplary transformative action fields, i.e. areas of urban development where the WBGU sees the greatest potential leverage effects for the urban transformation towards sustainability. *Third*, the WBGU identifies urbanization at the macro-level as one of the core trends of global change which triggers massive changes in global society, the world economy and the Earth system.

Cities and their populations are thus drivers of global environmental change, while at the same time being affected by it. In this context, mitigation of climate change is one of the greatest challenges of the transformation: unabated climate change would jeopardize humankind’s life-support systems. The extensive analyses conducted by the IPCC reveal the specific impact on cities. Many urban areas are situated in low-lying coastal zones, where there are particularly serious hazards – e.g. as a result of a combination of sea-level rise, the subsidence of land masses caused by the weight of buildings and groundwater depletion, storm events and flooding. Other risks are associated with the urban heat island effect, droughts and water scarcity. In order to achieve the target agreed at the UN climate conference in Paris in 2015 of holding the increase of global average temperature to well below 2°C above pre-industrial levels, fossil CO₂ emissions should be completely stopped by 2070 – or correspondingly earlier if the more ambitious limitation of the increase to 1.5°C is to be achieved. Consequently, the energy system in every city must also be decarbonized by that date. For this to happen, the dominance of the system of fossil-energy use must soon be overcome. Furthermore, both the mobility sector and systems for heating and cooling buildings will also have to get by without fossil CO₂ emissions in the future. There are encouraging signs that the international community is moving closer to this decisive turnaround. The public discourse on anthropogenic climate change has shifted significantly in just a few years and is now broadly anchored in society. The 2015 Paris Agreement is exemplary for the worldwide consensus on the need to mitigate anthropogenic climate change. Cities are the biggest consumers of energy and will thus play a key role in the implementation of the agreement.

This report also focuses on other planetary guard rails in addition to climate protection, e.g. the protection of soils and biodiversity (WBGU, 2014), as well as the requirements of local environmental protection, such as improving air quality or handling waste. The urban transformation towards sustainability requires

fundamental changes in land-use, energy and transport systems, in the management of materials and material flows, in urban settlement policies, and in the structural-spatial design of cities.

The progress of the Great Transformation will depend substantially on the decisions that will be taken in cities over the next few years and decades. There is a need for a paradigm shift away from incremental approaches that are essentially driven by short-term requirements, towards transformative changes with a strategic, long-term view of humanity's natural life-support systems and the creation of a form of urbanity that sustainably promotes human quality of life. In this context, it is not so important to look to the future from today's perspective, which usually makes the path already being followed look inevitable; rather, one should look back to the present from a desirable future: what paths should be followed and what dead-ends should be avoided today to make this sustainable future possible?

With this change of perspective, the WBGU places people, their quality of life, their capabilities and options for action, as well as their long-term future prospects, at the centre of its reflections on cities. There is a certain tradition in the idea that development concepts and strategies should be geared to people and their quality of life – and not only to growth prospects. Almost three decades ago, the United Nations Children's Emergency Fund (UNICEF, 1987) and the UN Economic Commission for Latin America and the Caribbean (UN CEPAL, 1996) were already calling for an economic "adjustment with a human face" in their criticism of the one-sidedly neoliberal structural-adjustment programmes of the World Bank and the International Monetary Fund. Securing a minimum of supplies and services (e.g. access to adequate housing, food, health, education) for all should be seen as a target system of development. This orientation can also be found in the documents of the Habitat II Conference (Istanbul Declaration and Habitat Agenda, 1996), as well as in the Millennium Development Goals (MDGs) adopted in 2000. In the last few years, it has become clear that even when these minimum standards are met, significant sections of the population often do not participate at all, or not enough, in the process of economic and societal development. Poverty reduction does not guarantee that all people are equal before the law and will not suffer discrimination. So the aim must also be to reduce the considerable social and economic inequalities and to prevent the social, political and cultural marginalization and exclusion of – in some cases sizeable – sections of the population in urban societies. The Sustainable Development Goals (SDGs) internationally agreed in 2015 lay down a framework for this, particularly SDG no. 10: "Reduce inequality within and among

countries" and SDG no. 11: "Make cities and human settlements inclusive, safe, resilient and sustainable".

Against this background, the WBGU, with its people-oriented view of urbanization, advocates a comprehensive concept of quality of life and prosperity which goes beyond minimum targets of substantive inclusion: e.g. overcoming absolute poverty and ensuring appropriate housing. It also contains comprehensive political and economic inclusion, i. e. the belief that the urban population should be enabled to take an active part in urban development. The WBGU's concept also aims to take into account essential preconditions for human quality of life, such as self-efficacy, identity, solidarity, a sense of belonging, trust and social networks. On the one hand, reversing the trends of growing inequality in people's living conditions and development opportunities, and realizing the transition from exclusion to inclusion are prerequisites and goals for human development; on the other hand, this is the only way in which risks for the stability of urban societies, nation states and ultimately also the global community of states can be contained. The current implosions and explosions of a rising number of societies in countries of north and sub-Saharan Africa, which are characterized by high levels of exclusion, are a warning signal to the international community that should not be overlooked.

The WBGU has developed a 'normative compass' to help shaping the massive changes in the 'century of cities' in a people-oriented way. This compass comprises three dimensions:

- *First*, sustaining natural life-support systems by complying with planetary guard rails and protecting the local environment.
- *Second*, ensuring substantive, political and economic inclusion for the city dwellers.
- *Third*, the WBGU draws attention to the socio-cultural and spatial diversity of cities and urban societies, as well as the resulting plurality of urban transformation pathways: every city must seek 'its own way' to a sustainable future. This *Eigenart* (a German word meaning 'character') is not only hugely important for creating urban quality of life and identity, it is also an indispensable resource in the sense of developing each city's specific potential for creativity and innovation. With the dimension of *Eigenart*, the WBGU is introducing a new category into the sustainability discussion.

The WBGU advocates paying greater attention to polycentric approaches to urban development. The concentration of the population in one or a few central locations and urban agglomerations, which can be observed in many regions of the world, coupled with simultaneous economic, social, political and cultural marginalization and discrimination against rural

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and small-town areas, leads to (mega-)cities ‘sucking in’ more and more people, resources and capital at the expense of their surrounding areas. The influence of cities, which will expand on a global scale by the middle of the century, now extends from the direct hinterland to remote regions. Brenner et al. (2013) have described this reach of the urban demand for resources as ‘planetary urbanization’.

Not infrequently, deserted, unattractive rural regions are left behind, while rapidly growing (mega-) cities emerge – especially in developing countries and emerging economies – with overtaxed infrastructures, overburdened municipal administrations, hostile-to-life settlement structures and socio-economically polarized urban societies. Thailand is an example. More than 80% of Thailand’s urban population live in the capital Bangkok (World Bank, 2015: 114). The WBGU recommends a change of direction. Polycentric approaches could make cities more attractive, avoid the disadvantages of excessive urban concentration and densification, and, at the same time, mobilize the advantages of decentralized settlement patterns. The conventional dichotomy between migration into and away from cities, and between the concentration and dispersion of settlement structures, is overcome by an approach which, instead of clearly separating ‘city’ from ‘country’ and ‘centre’ from ‘periphery’, systematically focuses on networking between poles of settlement and on the spaces in-between which connect small and large cities and rural areas.

Polycentric urban development is, for example, an EU policy framework and focuses on bridge-building between agglomeration and deconcentration, not on their polarization. By strengthening small and medium-sized towns and networking them with larger cities, it combines the advantages of agglomeration and decentralization.

Such a hybrid settlement strategy that emphasizes polycentric approaches is relevant for a number of dimensions in urban development.

- › With *polycentric spatial structures* better use can be made of resources if water, food and energy no longer have to be transported over long distances into the few centres. Decentralized provision of renewable energies and digital networking can support the advantages of polycentric spatial structures.
- › *Polycentric settlement structures and polycentric cities* promote the formation of cultural identity. They combine a diversity of urban societies with manageable settlement patterns and neighbourhoods, can restrict trends towards segregation, and open up spaces for connectivity and innovation.
- › *Polycentric urban structures* increase the absorptive capacity and resilience of urban societies vis-à-vis

shocks (such as climate-induced extreme events or waves of immigration).

- › *Polycentric decision-making and polycentric governance structures* in cities promote the participation opportunities of local civil society and collaborative governance.
- › Cities should furthermore be embedded in a *polycentric responsibility architecture*. Giving cities and their civil societies more creative freedom within their nation states to shape their development pathways (vertical embedding of the cities plus local scope for shaping and planning) and enabling them to network horizontally leads to the development of a governance and responsibility architecture that is tiered locally, nationally and globally. Here, responsibilities should be distributed among different, mutually (semi-)independent nodes over different levels of governance. This polycentric governance approach creates coordinating mechanisms and reflexivities that highlight the relative independence of cities (but also of nations), and a simultaneously high level of interdependence between them (Messner, 1997; Stichweh, 2004; Ostrom, 2010).

Diversity of the cities: challenge and opportunity

This report highlights the diversity of cities, urban societies and the related plurality of transformation pathways towards sustainability. Cities like Copenhagen are pursuing an ambitious road towards sustainability that is characterized by a linkage between economic dynamics and social inclusion, resource-protection management and mitigation of climate change. By contrast, cities like Cairo, Mumbai, Kigali and Guangzhou are confronted by very different challenges and starting conditions (e.g. a lack of established, substantive inclusion), making it much more difficult to take forward a form of urban development that is geared towards people and planetary guard rails. Sustainability is a universal target system; the ways of getting there will be many and varied.

The current diversity of cities and their actors, which has grown historically, is a decisive feature of global urbanization. On this basis, the WBGU attempts to develop an aggregated, synthetic approach by analysing the dominant dynamics of urban settlement and their drivers. For all the diversity, three essential ‘master builders’ can be identified among the different drivers of urban development: *power, hardship and time*. The influence of these three factors becomes clear by looking at three urban settlement patterns which the WBGU considers to be key – *newly planned, informal and mature urban structures*.

The power factor is decisive for the construction of many newly planned cities and city districts (e.g. in China and India). In a short period of time and on a large scale, settlements are planned and built top-down. In informal settlements, poverty, inadequate housing and inhumane living conditions are often the main problems: *hardship* is often the driver and characteristic feature of this settlement pattern. Historically grown, mature cities have often developed over centuries. They have a grown stock of buildings and urban infrastructures; these have created path dependencies that are difficult to reverse. In mature cities and city districts, *time*, therefore, was and is a key factor of urban development. All three constellations (*newly*

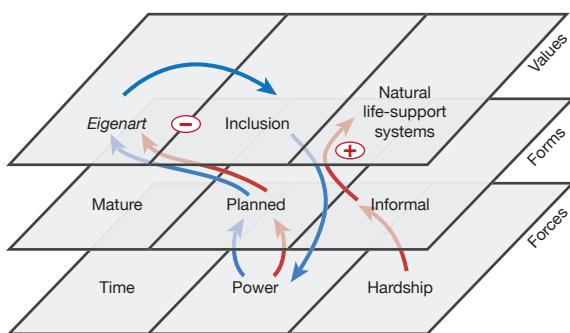


Figure 1

Schematic diagram showing dominant global settlement patterns (Forms), their drivers (Forces) and challenges in relation to the WBGU's 'normative compass' (Values). Three settlement patterns are particularly dominant in the global urbanization process: *first*: the historically grown, mature city or city-district pattern with a solid building stock, established infrastructure and a largely consolidated governance; *second*: the planned, often rapidly expanding, recent urbanization processes; and *third*: the informal settlements. Significant drivers (forces) of urbanization processes are time, power and hardship. The *time* factor takes into account the fact that evolutionary change, acceleration, regressions after major upheavals, and asynchronicity (e.g. of natural and cultural history) exert a strong influence on urban patterns. *Power* describes constellations in which the development process is enforced even against the wishes of others. *Hardship* in the sense of scarcity, danger or suffering shapes urban patterns by exclusion, for example as a result of poverty, oppression, crises or conflicts. The challenge for all settlement patterns lies in aligning their development with basic normative values. To this purpose the WBGU proposes a 'normative compass'. It is made up of three elements: (1) *Eigenart* (a German word meaning 'character'), i.e. the socio-cultural and spatial diversity of the cities, (2) *inclusion*, i.e. universal minimum standards for substantive, political and economic inclusion, and (3) *sustaining of the natural life-support systems*, i.e. forming and operating the urban substance in harmony with the planetary guard rails and the solution of the local environmental problems. The blue and the red arrows illustrate possible urbanization dynamics, feedback effects and points of intervention.

Source: WBGU

planned, informal and mature) are essential for urban transformation.

These thoughts are condensed into a three-level systems analysis that links the main drivers and forces of urbanization, their forms and archetypes, and the WBGU's normative compass (Figure 1).

The momentum of urbanization and its impacts are so massive that we must face up to this trend. In view of the existing cognitive, technical, economic and institutional path dependencies, a policy of business as usual – i.e. an unstructured, quasi-automatic urbanization – would lead to a non-sustainable 'world cities society'. It is likely that there will be about 2.5 billion more city dwellers by the middle of this century (UN DESA, 2014). At present, more than 850 million people live in inadequate housing without access to basic supplies and services. This number could increase by 1 to 2 billion by 2050 if no significant countermeasures are taken (UN DESA, 2013). This would mean up to 1.5 billion more people moving into new, rapidly planned and built city districts that will probably offer few opportunities to participate in their design. Developing *Eigenart* (i.e. 'character') in these new cities, which are being built at such breakneck speed, amounts to trying to square the circle.

This is not consistent with the normative requirements postulated by the WBGU: these people are being denied essential aspects of the quality of life. The considerable challenges involved here must be tackled by the international community, the nation states, the cities and their inhabitants. In this report the WBGU concentrates primarily on how the foreseeable dynamic can be managed with a view to people's quality of life. The decisions on the direction in which urbanization will develop will be taken over the next few decades. The WBGU is convinced that this represents a window of opportunity to lay the foundations for a development towards sustainability. However, this window could soon close again, so there is little time available for shaping or redirecting the urbanization process appropriately.

The WBGU's analysis supports the hypothesis that urbanization can be compatible with the Great Transformation towards sustainability, provided that courageous measures are taken at all levels. Referring to its report 'A Social Contract for Sustainability' (WBGU, 2011), the WBGU fleshes out the idea of a 'social contract for the urban transformation towards sustainability' and formulates the elements of such a social contract in the present report. It should be mirrored worldwide and at different levels of governance in the form of written charters. The United Nations Conference on Housing and Sustainable Urban Development, 'Habitat III', to be held in 2016, offers an opportunity

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to launch the negotiation process for such a charter at the global level. Urban societies, too, should discuss and agree common visions of the transformation process in a participatory manner, with each city codifying its vision in its own charter for urban transformation. Similar charters can also be useful at the regional and national level in order to place the new relationship between the cities and the nation states on a new footing. Only if cities and urban societies are sufficiently empowered can they make use of the opportunities for sustainability and successfully follow the urban transformation pathways. The success or failure of the Great Transformation will be decided in the cities.

2. Demands on the urban transformation

In September 2015, a new course was set for environmental and development policies in the coming decades. The international community agreed 17 new Sustainable Development Goals (SDGs) geared to the transformation of the world towards sustainability. Many of the SDGs are relevant to the shaping of urbanization, and one of these goals relates directly to cities. SDG no. 11 states: "Make cities and human settlements inclusive, safe, resilient and sustainable". Similarly, it will not be possible to achieve the objectives of the Paris Agreement of December 2015 – which relate to the mitigation of climate change, adaptation and resilience to climate change, and the consistency of finance flows with a pathway towards low greenhouse-gas emissions and climate-resilient development – without fundamental changes in the cities. The 2016 Habitat-III conference in Ecuador aims to flesh out these target systems and to develop a New Urban Agenda, a political strategy for the next two decades.

In the WBGU's view, an urban transformation towards sustainability that is oriented towards quality of life and human prosperity must be based on the following demands.

Demands on infrastructure

In the past, infrastructure development has failed to keep pace with the breakneck urbanization process. More than 850 million city residents live in inadequate housing. In cities around the world, approx. 750 million people have no access to adequate sanitation, and 150 million no access to clean drinking water (WWAP, 2015). In the low-income countries, about a third of city residents have no access to electricity and around three quarters lack access to modern energy sources for cooking (IEA and World Bank, 2015). Providing these

people with access to an adequate basic infrastructure will, in itself, be a major challenge.

In addition, new homes and urban infrastructure will have to be built at great speed for approx. 2.5 billion new city dwellers by the middle of the century (UN DESA, 2014). By 2050, the urban population alone will be larger than the current total world population. This will lead to considerable challenges for the construction sector, since roughly the same amount of infrastructure will be added in the next three decades as has been built since the beginning of industrialization. In addition, most of the existing infrastructure will have to be renewed in the same period. About 85% of the demand for new housing is expected in emerging economies, of which about 50% will be in China (McKinsey, 2011). The great challenge will be to make the right decisions now to ensure that this massive surge of urbanization follows the principles of sustainability.

The construction of this urban infrastructure will have a huge impact on resource consumption, greenhouse-gas emissions and the pressure on ecosystems, and will exert a massive influence on people's quality of life in the future. This accelerated infrastructure revolution will thus trigger disruptive global change. The time window up to 2050 opens up leeway to create sustainable cities for the 21st and 22nd centuries. However, there is a great risk that the newly emerging, long-lasting infrastructures will be largely modelled on the methods of past centuries, thus leading to undesirable and irreversible path dependencies. For example, if the expansion of infrastructure has a CO₂ footprint that is similar to that of the current infrastructure of cement, steel and aluminium in industrialized countries, the construction of new infrastructures in developing countries and emerging economies alone could lead to 350 Gt of CO₂ emissions (Müller et al., 2013). This already corresponds to around a third of the total available CO₂ budget, if climate change is limited to less than 2°C, and more than three quarters of the budget if the temperature increase is to be limited to 1.5°C. Other impacting factors are the further expansion of the infrastructure in industrialized countries, as well as the future emissions that are determined by this infrastructure. That would perpetuate resource-intensive and high-carbon urbanization processes in the coming years and decades.

The new SDGs, as well as the targets of the Paris Agreement, would be missed by a large margin and the climate-protection guard rail breached. For this reason, a departure from many conventional infrastructure patterns will be necessary. The accelerated reinvention of the cities is therefore a global challenge that cannot be met with incremental improvements, but requires transformative strategies with a leapfrogging effect.

Whether this reinvention will succeed, will depend partly on international cooperation (e.g. technology transfers or a greater focus on the topic of cities at the United Nations) and on the amount of autonomy that the nation states grant to the cities, but also and decisively on the actions of the urban societies themselves. The urban transformation towards sustainability will succeed or fail in the cities.

It becomes clear that transformative measures are needed that affect the form of cities, their materials, their operation and their functions. For example, low-carbon building materials are needed for the new cities and city districts, since steel, cement and concrete are drivers of global warming. In China alone, more cement was used in the three years from 2008 to 2010 than in the entire 20th century in the USA (Smil, 2014:91). Similarly, the designs and technology of buildings must also change, because a large proportion of global greenhouse-gas emissions are produced by systems for cooling and heating buildings. Furthermore, completely new patterns of urban infrastructures are needed, for example in the mobility sector, where the aim should be a change from a car-oriented city to a people-oriented city.

The transformation in the cities implies complex challenges, since the infrastructures for electricity, heating and cooling, water supply and sanitation, waste management, mobility and buildings must be transformed within a few decades and meet the requirements of urban quality of life. In view of the diversity of cities, there will be no universal concepts for this rapid change of course.

The demands on transformative urban governance are correspondingly high because the necessary fundamental changes will face blocking mechanisms, not only as a result of technical path dependencies, but also from static, long-established constellations of stakeholders and a lack of financial and institutional capacity. Over the next three decades, either the course could be set for a sustainable form of urbanization, or a cascade of erroneous – possibly irreversible – decisions might be set in motion that will lead humanity into a crisis of civilization.

Demands on urban quality of life

The process of the urban transformation is not only about urban design and infrastructure development within the planetary guard rails, but also about how adequate housing can be secured for over 850 million people who are currently living in slums and, furthermore, how urban quality of life can be improved for people. The question thus relates to the good life of

people in the ‘world cities society’ in the 21st century. In addition to the challenges of creating jobs in cities, there are two fundamental questions.

First: How must cities be designed for people to feel at ease and be able to develop their potential? For some time now, the awareness has been growing that quality of life does not only depend on a society’s gross domestic product and individual incomes. People need access to important services like education, health and housing. But quality of life and subjective well-being in cities must be seen in a more comprehensive way. What do people-oriented cities look like, and are there any universal standards? How do architecture, the design of spaces, squares, buildings and infrastructures, as well as building materials, impact on people’s quality of life? How do urban design, social networks, identification, ‘a sense of home’ and people’s scope for shaping their city interact? If people generate their quality of life primarily in their immediate living space, then the urbanization surge up to 2050 is a great opportunity to develop cities in a people-oriented way. But there is also a great risk of taking erroneous decisions that are difficult to correct. Quality of life in the ‘world cities society’ will therefore crucially depend on which decisions are taken worldwide on urbanization policies and strategies.

Second: How can people influence dynamic urbanization processes or participate in them, when many urban areas are passing through profound changes or are being built completely from scratch in a short period of time? People-oriented cities develop primarily if citizens can participate in their design. Two current trends that give cause for concern can be observed. On the one hand, the influence of large-scale real-estate investors in the metropolises of many industrialized countries and emerging economies is so dominant that a people-oriented, sustainable urban development and a good quality of life are no longer given sufficient consideration by local governments and other decision makers responsible. Despite a certain amount of participation of citizens in planning processes, public protests against urban development projects are on the increase (e.g. Gezi Park in Istanbul; large-scale construction projects relating to the FIFA World Cup in Brazil; ‘Stuttgart 21’ project in Germany). On the other hand, at the other end of the spectrum of development, in 2012 there were more than 850 million people who had to fend for themselves. They live in informal, often degrading settlements, and their number could more than double by 2050. In both cases, the issue is whether and how people can be appropriately involved in the shaping of urban development. From the perspective of a people-oriented, sustainable urban development in the sense of the WBGU’s ‘normative

compass', even the most ambitious programmes on energy and resource efficiency are no substitute for giving people opportunities to participate in designing their immediate living environment.

Demands on environmental protection

Cities should be environmentally friendly and offer people a healthy living space. This makes environmental protection in the cities one of the most important requirements with regard to quality of life and the prosperity of the urban population – and therefore also for the urban transformation.

- Indoor and outdoor *air pollution* is the biggest environmental health risk: it is blamed for approx. 7 million premature deaths per year worldwide, most of them in cities (WHO Europe, 2015: viii). In China, air pollution is one of the main causes of death; Indian metropolises are also severely affected. Even in industrialized countries where there has been a lot of investment in air quality, urban air-pollution thresholds are regularly exceeded. A total of about 600,000 premature deaths were caused by air pollution in Europe in 2010 (WHO Europe, 2015: viii). Worldwide, the number of premature deaths from outdoor air pollution could even double by 2050 (Lelieveld et al., 2015).
- Very many cities are already affected by *water scarcity and water pollution*: around half of all cities with more than 100,000 inhabitants worldwide are located in water-scarce basins (Richter et al., 2013). Water scarcity can be expected to get much worse as a result of climate change and the growth of these cities (e.g. Lima due to its dependence on glacier water, Mexico City and Lahore because of dwindling ground-water reserves). Water pollution is a typical problem of urban agglomerations, especially in developing countries and emerging economies, where water resources in urban areas are contaminated by untreated sewage. It is particularly risky if untreated industrial wastewater is added to urban sewage.
- *Waste disposal* is predominantly a problem of cities. Compared to other country groups, the cities in industrialized countries generate the most waste per capita, but the growth rates are declining. However, the quantities are increasing rapidly in developing countries and above all emerging economies. The quantities of waste could double worldwide by 2025 (Hoornweg et al., 2013). Many urban areas have no organized waste collection and disposal, which has a seriously negative effect on public health. About 70% of municipal waste, some of which is hazard-

ous, ends up on landfill sites, which often contaminate surface water, ground water or soils and emit greenhouse gases (ISWA, 2012:5). Decentralized waste incineration using inadequate technology exacerbates air pollution.

The requirements go far beyond local urban environment protection, because cities also contribute to global environmental problems which threaten the natural life-support systems in the long term and in complex causal relationships. Huge opencast-mining landscapes, the clearing of primary forests for palm-oil plantations and livestock, mountains of electronic waste in Africa and Asia, plastic vortices in the oceans, huge maize and soya monocultures, and last, but not least, climate change are mainly caused by consumption in the cities. This is where demand for resources is concentrated. Cities are the hubs of global material flows simultaneously for the construction industry, for consumer goods and for agricultural and forestry products.

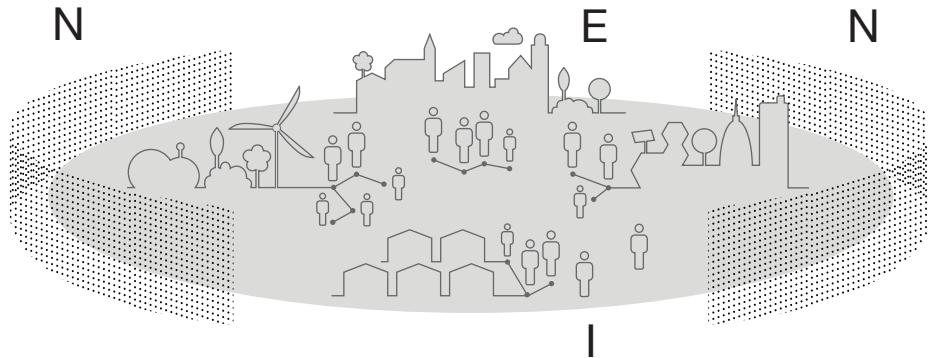
The related systemic long-distance effects or ecological footprints increase steeply with the level of development and urbanization and should therefore be taken into consideration in urban environment strategies from the outset. Urban areas also play a key role when it comes to the mitigation of climate change, because they are responsible for about 70% of global energy use and global, energy-related CO₂ emissions (Seto et al., 2014). The future of the world's climate will be decided in the cities.

At the same time, people in cities are affected by climate change. Many of the risks that arise as a result of anthropogenic global warming – e.g. more frequent, stronger or longer-lasting extreme events (extreme precipitation, heat waves, droughts, storm surges), sea-level rise and melting glaciers – have an impact on cities. This will have profound effects on a wide range of urban functions, infrastructures and services; the corresponding adaptation challenges and associated costs will be considerable.

3. A normative compass for the transformation towards a sustainable 'world cities society'

The WBGU has developed a 'normative compass' to provide orientation for societal action in the light of the above requirements (Figure 2). It describes the constraints within which cities' development pathways towards a people-oriented form of urbanization should be realized, and which, if breached, would put sustainable development at risk.

The key message of the present report is that the transformation can be achieved by a combination of three dimensions:

**Figure 2**

Normative compass for the transformation towards sustainability. The transformation of the cities towards sustainability can be achieved by an interaction and balance between the following three dimensions:

- 'Sustaining of the natural life-support systems' (N): All cities and urban societies should pursue development pathways that take the planetary guard rails into account and solve local environmental problems.
- 'Inclusion' (I): Universal minimum standards for substantive, political and economic inclusion should be met in all urban societies.
- 'Eigenart' (E): With the dimension of *Eigenart* (a German word meaning 'character'), the WBGU on the one hand recognizes the socio-cultural and spatial diversity of cities and urban societies (descriptive *Eigenart*). On the other hand, *Eigenart* is a target or orientation dimension of urban transformations (normative *Eigenart*); it emphasizes that conditions should be created in urban living environments which ensure (a) that people can develop self-efficacy in the spatial structures and can feel and create urban quality of life for themselves; (b) that local identity and social cohesion can develop; and (c) that there is a strengthening of the potential for social and economic creativity and innovation that is generated via local interactions (connectivity) between actors from different spheres of society.

Source: WBGU; diagram: Wernerwerke, Berlin

- *Sustain natural life-support systems*: all cities should pursue development pathways that take account of the planetary guard rails relating to global environmental change and solve local environmental problems to ensure sustainable urban development and the protection of the natural life-support systems. This involves, for example, meeting the 2°C climate-protection guard rail and combating health-damaging air pollution; further examples include ending land and soil degradation and stopping the loss of phosphorus, an essential resource for agriculture.
- *Ensure inclusion*: universal minimum standards for substantive, political and economic inclusion should be met in all cities and by all cities. The aim here is to give all people access to human safety and development, enabling them to evolve and implement their individual and collective ways of living. In this sense, inclusion is simultaneously a means and an end. Substantive, political and economic inclusion mirrors many human rights that have already been internationally codified or discussed. Furthermore, such inclusion is based on the idea that people need corresponding opportunities to realize and implement these rights. *Substantive inclusion* lays the

foundations: access e.g. to food, clean drinking water, sanitation, healthcare and education is the essential minimum standard for securing basic human needs. *Economic inclusion* entails, in particular, access to the labour and real-estate markets. When people are made the main focus, they must be granted electoral rights – as well as procedural rights of information and involvement – in order to achieve *political inclusion* and a right to judicial control. This ensures that any violation of these rights can be sanctioned.

- *Promote 'Eigenart'*: with the dimension of *Eigenart* (a German word meaning 'character'), the WBGU is introducing a new category into the sustainability discussion. According to the WBGU's normative concept, the first two dimensions – sustaining the natural life-support systems and ensuring inclusion – open up a framework for a wide variety of transformation pathways. Within this framework, every urban society can and must pursue its individual course towards a sustainable future. On the one hand, *Eigenart* comprises all that is typical of each particular city. This can be described on the basis of its socio-spatial and constructed environment, its socio-cultural characteristics and local urban prac-

Summary

tices (descriptive *Eigenart*). On the other hand, *Eigenart* is a target or orientation dimension of urban transformations: it emphasizes that socio-cultural diversity in and of cities, their urban form, and the autonomy of city residents are key components of people-oriented urban transformation in the creation of urban quality of life and identity (normative *Eigenart*). In this normative connotation of *Eigenart*, people are seen as actors who use their inclusion rights and thus design their cities in different and specific ways in order to realize quality of life. *Eigenart* thus enables and equips people to develop self-efficacy and to shape urban societies and urban spaces, in order to develop quality of life, trust, identity and a sense of belonging – and to design cities, infrastructures and spaces in a way that supports this. In the WBGU's view, two essential principles must be guaranteed to enable people and urban societies to develop *Eigenart* – and thus quality of life and sustainability: (1) the recognition of creative autonomy, i.e. that the residents themselves should shape and appropriate urban spaces, and (2) the recognition of difference, i.e. the recognition of the Diversity of Cultural Expressions (UNESCO, 1997) and the individual opportunity to appropriate cultural identities. The introduction of the concept of *Eigenart* draws attention to the spatial-social prerequisites for the appropriation of space, and thus for the creation of urban quality of life, social cohesion and local identity. It also makes it possible to take account of the diversity of cities and their transformation pathways. The spotlight is thus directed at the many and varied forms, designs and cultural manifestations of urban areas. The focus is also on the specific potential for social and economic creativity and innovation which develops as a result of local interactions (connectivity) between stakeholders from different societal spheres. Furthermore, the WBGU regards diversity in and of cities as an important resource for the urban transformation towards sustainability.

Cities should take their orientation from universal sustainability and inclusion goals, but keep their *Eigenart*. Universal inclusion rights, as described above, are a necessary prerequisite for people and urban societies to draft and manage their own development pathways – universal inclusion rights and the *Eigenart* of the cities are mutually dependent and generate interactions.

Complying with planetary ecological guard rails and ensuring substantive, political and economic inclusion represent global minimum standards for the 21st century's civilizational project for humankind. As concepts, '*sustainable development*' and '*inclusion*' each contain a dialectical principle. In the case of sustainable

development, the principle is the need to find a balance between conservation on the one hand, and, on the other, the facilitation of development, which historically is associated with 'growth', i.e. with 'having more and consuming more'. In the case of inclusion, it is the balance between the collective idea of 'sharing' and that of individual 'having' that needs to be found. Against this background, *Eigenart* becomes both a normative orientation and a source of innovative strength for a humanity on the move. The German word *Eigenart* (which means 'character', or more literally 'own way' or 'own type/kind') is itself characterized by the dialectic of *Eigen* ('own', i.e. individual, new, different, distinctive) and *Art* ('way' or 'type/kind'), as an expression of class, community, group, generalizability.

Sustainable, future-oriented societal development and quality of life can only evolve if these dialectics and tensions are balanced out in situations of dynamic equilibrium. Concepts of society that aim to overcome this dialectical complexity and the seemingly paradoxical contradictions of societal development – as expressed in the terms '*sustainable development*', '*inclusion*' and '*Eigenart*' – by propagating narrow-minded imperatives for unlimited growth or the primacy of the 'individual' or 'society'/'community' – are destined to fail. This applies to the radical capitalist concepts of the 'shareholder society' and to Milton Friedman's view that there are no societies, but only individuals; it also applies to community protagonists of right-wing, left-wing, and sometimes even religious provenance, where the rights of individuals are made subordinate to the 'greater whole'. The urban transformation towards sustainability can only succeed if transformation pathways are developed which balance out the ambiguity, dialectic and tensions expressed in the terms '*sustainable development*', '*inclusion*' and '*Eigenart*'.

Based on the interaction between the dimensions of sustaining the natural life-support systems, inclusion and *Eigenart*, the WBGU provides a compass for dealing with fundamental upheavals in the century of urbanization (Figure 2). With its normative compass for sustainable urban development, the WBGU tries to take the global diversity of cities into account.

Solidarity-based quality of life: transformation at the micro-level

The WBGU bases its normative compass on an extended understanding of quality of life and prosperity. This states that it is not enough to decouple environmental consumption and environmental destruction from the material/economic prosperity which can be achieved quickly and is characterized by such factors as growth, employment and infrastructure development ('decou-

pling of the first order'). Rather, quality of life and the definition of prosperity should also be at least partially decoupled from economic growth and monetary prosperity ('decoupling of the second order'). The starting point is an extended definition of quality of life and prosperity that goes beyond materially/eco-nomically 'objective' factors and also includes 'subjective' factors such as self-efficacy, identity, solidarity, a sense of belonging, trust and social networks, which simultaneously comprise the social capital of a society: the glue that holds societies together. Research shows that the more pronounced social capital and social cohesion are in a country (or in a city) and the smaller the social inequalities, the higher is people's average satisfaction with life and the less crime and violence, disease, anxiety and social mistrust, and hence risks to societal stability can be found.

Such an extended understanding of prosperity and quality of life should – in a similar way to the understanding of sustainability – be oriented towards the principles of intra- and intergenerational justice. An understanding of quality of life that is oriented towards the normative compass would, according to this definition, not only be oriented towards one's own needs and those of one's immediate environment (e.g. family), but also, in a broader sense, towards 'solidarity', i.e. taking into account the needs of currently living and future generations to the greatest extent possible. Accordingly, highly consumer-oriented and resource-wasting lifestyles that are harmful to the natural life-support systems would have to be changed, but also the kind of lifestyles which restrict the inclusion of other people, communities and societies in the present and in the future.

For this, the WBGU has developed the concept of 'solidarity-based quality of life', which means two things: a definition of quality of life that is oriented towards the principle of solidarity; and a quality of life that is made possible by solidarity and supportive communities. Solidarity-based quality of life focuses on the individual definitions of quality of life, which are developed in such a way that the prerequisites for the quality of life of other people (local and global, intra- and intergenerational) are not impaired. The Kantian principle of the categorical imperative thus becomes the basis of the WBGU's understanding of prosperity and quality of life, which takes on board global and intergenerational principles of fairness.

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4. The WBGU's approach on the urban transformation

Over the last four decades, sustainable urbanization has become internationally established as an action field for policy-makers. Accordingly, there has been an increase in the number of global, international reports on this topic, some of which are published regularly. Despite different approaches and priorities, the way in which the problems are described in these reports is largely similar. However, marked differences become apparent when it comes to the perspective on solving the problems. Many studies concentrate on technical analyses of the infrastructure, moving on to discuss investment requirements and issues of economic policy. A different approach is taken by reports that concentrate primarily on issues of governance or on an integrated combination with a sectoral issue (e.g. UCLG, 2013; World Bank, 2013; UN-Habitat, 2011; Corfee-Morlot et al., 2009), or are explicitly actor-oriented (e.g. Revi and Rosenzweig, 2013; UKAID and DFID, 2012; UN-Habitat, 2009). The latter concentrate mainly on strengthening the actors and on making them less vulnerable, for example in the field of disaster preparedness. Most of the reports give only marginal consideration to such issues as quality of life in the city, participation and justice, appropriation of public spaces, the socio-cultural identity and efficacy of the city residents, and the feedback effects of such challenges on sustainability issues. Participation by affected population groups and civil-society initiatives is usually described only as an additional option and not as their being consulted as equals on planning and implementation processes. In the WBGU's view, what is primarily lacking is the coherent embedding of the subject into a long-term strategic urban transformation concept that emphasizes the scale and urgency of the change, and the systematic derivation of action fields that pursue a transformative goal. It is against the background of this analysis that the WBGU develops its approach on the urban transformation towards sustainability.

Transformative action fields

In this report, the WBGU pursues a systemically integrated approach and dispenses with a narrow thematic focus. It begins by identifying exemplary *transformative action fields*, i.e. areas of urban development where the WBGU sees the biggest potential leverage effects for the urban transformation towards sustainability. First, there are five fields that are already being broadly discussed internationally, but which, against the back-

ground of the transformation, the WBGU places into a new context in relation to time horizons and scale: (1) decarbonization, energy and mitigation of climate change, (2) mobility and transport, (3) urban form, (4) adaptation to climate change, and (5) poverty reduction and socio-economic disparities. Second, it makes recommendations on three further transformative action fields that are examined in detail in this report and which, in the WBGU's view, are given too little attention internationally. These are (1) urban land use, (2) materials and material flows, and (3) urban health.

The choice of transformative action fields was made with a view to their importance for and effect on the transformation, their quantitative and systemic relevance, their urgency, their potential to prevent path dependencies, and maximum co-benefits. The challenge was to suggest the breadth of the subject – i.e. the city and urbanization – with a small number of transformative action fields, while avoiding anything that would narrow the perspective.

The WBGU uses the transformative action fields to outline approaches as to how cities can find development pathways that are in line with the normative compass. They cannot be considered in isolation; rather, they must be seen as part of a systemic development because they are so strongly interconnected. The close interconnection of the transformative action fields offers considerable potential for exploiting synergies and jointly pursuing different objectives by making systemic changes. One special opportunity lies in measures that have both short-term and long-term benefits. The most prominent example is the fight against air pollution. The transformative action fields are explained in greater detail in section 6, 'Core recommendations'.

The diversity of cities and transformation pathways

In its 2011 report 'A Social Contract for Sustainability', the WBGU developed universal pathways to sustainability, focusing in particular on energy systems. Cities, too, should take their orientation from universal social and environmental goals, like those agreed by the Rio Conventions (CBD, UNFCCC, UNCCD) or summarized in the SDGs. However, the transformations in the cities will not be able to follow a universal pathway because they are too diverse.

The great urbanization surge and the construction of new settlements for 2.5 billion people by 2050 will take place above all in Asia and Africa, while the issue in the western industrialized countries and Latin America will be the transformation of existing cities. The urbanization thrust in Asia and Africa is of paramount global

importance. Compliance with the planetary guard rails, the prosperity and quality of life of many people, and thus also stability and security in world society will depend on whether this can be achieved in a sustainable way. At the same time, it is crucial from the Asian and African perspective that wealthy OECD urban societies accelerate the transformation towards sustainability. Only in this way will it be possible to comply with those planetary guard rails, which, if breached, would hit vulnerable population groups in the developing countries and emerging economies particularly hard, because the 'world cities society' is, after all, a system of communicating tubes.

This report describes the diversity of cities and possible transformation pathways – against the background of the normative compass – on the basis of eight cities chosen as examples from different regions of the world (Box 1). This illustrates how historical developments and resultant path dependencies each create specific prerequisites and solution options for the urban transformation towards sustainability in the context of the complex interplay of historical, cultural, socio-economic and ecological contexts of origin. This can only succeed if this great diversity is taken seriously and time is not wasted searching for 'blueprints' or 'silver bullets'. Different transformation pathways to urban sustainability that are geared to the respective problems of the cities and their specific options will have to be found.

Urban designers: agents of urban transformation

The WBGU subsequently turns its attention to 'good practices' and 'change agents' within cities. The aim is to show that, at the local level, numerous approaches to transformative strategies based on the respective conditions, resources and *Eigenart* already exist. Their protagonists, the 'urban designers', try out building blocks and options; in this way they help develop new guiding principles or visions that can provide orientation for societal change. Being aware of analogous activities taking place in other cities can help them create and promote an understanding of transformative approaches. In this context, knowledge and collaboration are the framework in which good practices and change agents operate within the transformative action fields.

In its report, the WBGU presents a number of relevant examples. In view of the enormous diversity of cities and urban societies, it does not claim to be representative or complete in terms of regional distribution or thematic coverage. Taken together, these examples show that many top-down and bottom-up initiatives exist, which have taken action in the sense of a transformation agenda and have to some extent integrated

Box 1**Example cities****Mumbai: transformation of a colonial metropolis into a globally networked megacity**

In view of its need to catch up in its urban development and expectations of its future growth, the main transformation challenges faced by Mumbai lie in the provision of adequate housing and basic services, and in reducing socio-economic disparities. Up to now, the population's environmental footprint has been small by global comparison; nevertheless, the city should give a higher priority in urban planning to reducing resource use and emissions. Even when faced with multiple problems, important local resources, such as civil-society engagement and innovativeness, are available for a transformation.

Cairo: metropolis between an authoritarian state and weak governance

Greater Cairo has changed dramatically. The modestly sized city of the 1950s has developed into a metropolitan region characterized by a dualism of informal/unplanned settlements and newly planned desert cities. In the meantime, however, the first signs of a changed, integrated understanding of urbanism have begun to emerge. For example, the government supported the first Egyptian Urban Forum, and the state has also taken initial steps towards an energy transformation. However, these developments are being seriously threatened by inclusion deficits. At present, the Egyptian government grants few political freedoms, and the Cairo local government is regarded as inefficient and corrupt. Only if the inclusion of the population can be greatly scaled up, and existing rudiments of progressive urban-development strategies are further developed, can the transformation towards sustainability also succeed in Cairo.

Copenhagen: a people-oriented pioneer of sustainable urban planning

Apart from its globally renowned local and global initiatives on environmental sustainability, Copenhagen is also characterized by its people-oriented urban planning and design. Political inclusion and diversity are actively promoted by the local government. At the same time, this example shows that, despite ambitious courses of action in all three dimensions of the WBGU's normative compass, there is still a long way to go to succeed in the Great Transformation towards sustainability. This applies especially to achieving complete decarbonization without recourse to compensation mechanisms.

Guangzhou: opening-up policy, globalization and migration-driven mega-urbanization in the 'factory of the world'

Guangzhou in China's Pearl River Delta, the 'factory of the world', stands for numerous Chinese megacities that have experienced a profound upheaval in the space of three decades. In the course of the politically induced policy of opening up to a market-oriented economy, they have been strategically and specifically redesigned into global focal points of foreign direct investment. Global centres of industry and services, high-density megacities and centres of internal migration have developed out of core regions of intensive agriculture. Important objectives along the road to a trans-

formation towards sustainability include the preservation of the urban cultural heritage, improved social coherence, greater participation of all societal groups, and the solution of environmental problems.

The Ruhr area: the post-industrial metropolis – long-term viability thanks to a polycentric concept

The Ruhr area is the largest urban agglomeration in Germany. It is characterized by a polycentric structure and the remains of contaminated industrial sites left behind by a mature infrastructure now greatly in need of redevelopment. However, with the help of an emerging metropolitan governance that makes the most of the hitherto underused benefits of polycentrism, a model region could develop to follow the coal and steel industry.

Kigali: post-conflict city in sub-Saharan Africa

Kigali reveals the complex problems of rapid informal urbanization. Despite the terrible initial conditions after the 1994 genocide, the city's development has been peaceful and more economically sound than comparable cities. The transformation towards a knowledge-based economy controlled by the national government is dependent on development-aid funds, and political inclusion remains dependent on the support of the authoritarian government. Although this has prevented a renewed outbreak of ethnic violence, it remains questionable whether a transformation towards sustainability can be achieved without an open civil society.

Novi Beograd: 20th century socialist planned city district

Novi Beograd, built in the 1950s, is a top-down, planned city district that is partly made up of socialist elements and partly follows Le Corbusier's concept of functionality. Characterized by residential towers and extensive green areas, Novi Beograd served as a residential town for a rapidly growing population. The spaciousness of the area makes a polycentric, sustainable design of the area possible. However, existing patronage-based structures could restrict inclusion and participation in the future shaping of the city.

São Paulo: the fragmented metropolis

In terms of its socio-economic and spatial development dynamics, its socio-spatial structures and urbane living conditions, São Paulo is a deeply fragmented metropolitan region with marked socio-spatial segregation tendencies. Yet São Paulo has both the planning capacity and (albeit certainly insufficient) financial capacity to tackle these problems and initiate independent developments in the direction of the transformation process.

this agenda. These initiatives require recognition and support both at various levels and from other stakeholders and initiatives – not only to obtain a globally based feeling of self-efficacy, but also to make it easier, through practical networking and cooperation, for others to learn from them, and to boost their usefulness and value for urban design.

Urban settlement patterns and solution spaces

Building on the notion of diversity as a decisive characteristic of urban form and as the indispensable basis for urban transformation, the WBGU takes an aggregated, synthetic look at the dominant settlement dynamics (Figure 1). In this context, urban diversity forms three dominant patterns: *newly planned* or yet-to-be-planned cities or city districts, which are built according to traditional top-down master planning within a narrow time frame; *informal* settlements, where inadequate housing and living conditions are often the rule and have been (or are still being) built bottom-up with minimal or no state control; and existing, *mature* urban areas with a fixed stock of buildings and established infrastructures, served by a largely consolidated system of governance. These three patterns frequently exist within the same city in numerous variations and combinations side by side and at the same time. However, each city can be characterized more by the one or the other pattern.

For all the diversity, urban settlement dynamics are essentially determined by three central drivers or, metaphorically speaking, ‘master builders’: *power* (law, money, domination), *hardship* (poverty, exclusion, weak actors) and *time* (slow growth of cities, accelerated growth of cities, path dependencies, ruptures). For all three settlement patterns (newly planned, informal, mature) the interplay of power, hardship and time is of the essence.

The *power* factor is essential in the construction of newly planned cities and city districts. In this way (in some cases very large) settlements can emerge top-down in a short time (e.g. in China). Here, one of the most important aims is securing substantive inclusion, especially in the field of large-scale new residential construction. Another challenge and great opportunity in newly planned settlements lies above all in integrating all dimensions of sustainability into the objectives from the outset, making use of both technical and societal innovations and thus preventing path dependencies that are difficult to change. Especially suitable for this are modular and transitory building patterns that are adaptable and flexible, e.g. can react to new technical possibilities or climate-change-related adaptation requirements. The potential for leapfrogging

in urban development is particularly high in the case of this settlement pattern. Furthermore, an effective change of course in the transformative action fields is initially easier, provided that the planning is geared to it. Even so, there seem to be few successful examples of quickly planned and fast-growing ‘drawing-board cities’. The political inclusion and involvement of citizens, local ties, social cohesion, reversibility of urban developments, and not least the dimension of *Eigenart* (character) are often lost. This raises the question of how additional prerequisites can be created in the planning of new cities and city districts which make the inclusion of the urban population possible and promote the development of *Eigenart*.

In informal settlements, poverty, inadequate housing and degrading living conditions are often the dominant problems: *hardship* is the driver and main characteristic of this settlement pattern. The lack of substantive and economic inclusion involves risks for the inhabitants’ livelihoods and health, and prevents them from making the most of their opportunities to develop and participate. However, in addition to informal city districts where decay and violence dominate, there are also positive examples of informal settlements where the failure of public actors is partly offset by the creative self-organization of the inhabitants, and where the emergence of alternative district developments can be observed. Slum clearance and displacement are by no means adequate solutions. People living in informal settlements have usually contributed little to the causes of environmental changes, but are severely affected by their impact and risks. The challenge in both existing and future informal settlements lies above all in the creation of adequate living conditions with sustainable prospects. This ultimately also implies a strengthening of public institutions and corresponding investment. Informal settlements as a whole should be more closely integrated into overall city development and urban governance.

In mature cities and city districts, which have often grown over centuries, *time* is a key factor of development. The building stock, which has grown over a long period of time, and the urban infrastructure, which not least reflects the *Eigenart* of the communities and city districts, should be developed in such a way that they meet modern requirements in terms of environmental protection and mitigation of climate change, and not only do not diminish, but benefit inclusion. Here, too, transformative changes must be initiated, in particular to reduce urban energy and resource consumption. To achieve this, cities can initially have recourse to long-established governance structures, although these may also represent an obstacle to transformation, since rigid stakeholder constellations and institutional path dependencies may make it difficult to incor-

porate future interests. In this context, urban renewal must not rely solely on the support of economic stakeholders, but also secure the active participation of the population.

Shaping all three patterns is essential for the urban transformation, especially as the number of people in informal and new settlements could increase by about 2.5 billion. These dynamics are enormous challenges and simultaneously offer an important opportunity for the urban transformation towards sustainability.

Urbanization surge up to 2050 – six development risks of global change

Seen through the lens of the WBGU's compass, the sum and cumulation of urbanization dynamics in the three urban configurations lead to six global system and development risks which are of great importance, especially for decision-makers in international cooperation (Table 1). In the following list, N stands for sustaining the natural life-support systems, I for inclusion and E for *Eigenart* (character):

- **N_{Earth system}: Development within the planetary guard rails**

Whether the planetary guard rails can be complied with will be decided in the mature cities as well as in the fast-growing new city districts of Asia and Africa. Only if low-carbon cities are built there can dangerous global environmental change and an associated global threat to prosperity be prevented.

- **N_{local}: Local environmental conditions as a key condition for urban quality of life**

Good local environmental conditions (e.g. access to clean water and sanitation, adequate air quality and waste management) are prerequisites for human quality of life. In particular, the quality of life of 2-3 billion people who might be living in informal settlements by 2050 thus depends on effective local environmental policies.

- **I_{substantive, economic}: Substantive inclusion and socio-economic dimensions**

Socio-economic inequalities and exclusion dynamics that threaten the quality of life and stability of urban societies are on the increase in all urban configurations. This applies equally to Paris, Los Angeles, Cairo, Goma and Rio de Janeiro. The 2-3 billion people who might be living in informal settlements by 2050 are particularly threatened by these trends. These local exclusion dynamics can also set refugees in motion and pose an international security risk.

- **I_{political}: Political inclusion and participation as a prerequisite and goal for quality of life**

It will hardly be possible to realize political inclusion for the 2-3 billion people who might be living in precarious, informal settlements by 2050. These urban communities are dominated by hardship, often also by violence, sometimes by admirable self-organization as a reaction to the absence of basic public services. In the newly emerging, planned settlements, especially in Asia but also in Africa, new middle classes will demand political inclusion. Where this is not granted, there is a danger of political instability – corresponding dynamics in Turkey, Tunisia, Egypt and also China point to these interrelations.

- **E_{dependent/inclusion}: Eigenart as a dimension of urban quality of life and a resource of sustainability transformation – dependent on opportunities for inclusion**

The development of *Eigenart* as a condition for quality of life and a resource of sustainability transformation is dependent on the existing opportunities for inclusion. In the mature and newly planned cities and city districts, *Eigenart* is undermined by social and political inequalities, in the informal settlements by sheer hardship and precarious inclusion opportunities. As a result, *Eigenart* is threatened for over half of the world's population.

- **E_{dependent/time; hardship}: Eigenart in informal and newly planned cities – squaring the circle?**

Eigenart in the sense of creative, participatory urban development is very difficult to realize for the 1-2 billion people who will have moved into newly planned cities and city districts in Asia and Africa by 2050, because of the speed of the urban development and the usually prevailing top-down planning. *Eigenart* will hardly be able to develop in informal settlements where hardship – and more often than not violence – rules, where hardly any public institutions function, and where an additional 1-2 billion people might be living in precarious housing conditions by 2050.

Transformative urban governance

The urban transformation towards sustainability must be shaped. The concept of transformative urban governance developed by the WBGU consists primarily of a novel distribution of responsibility, principles, procedures and material criteria in order to successfully shape the transformation process in cities. The WBGU understands urban governance as acts of state and non-state actors and institutions with the aim of organizing the local affairs of a city and its urban society. The WBGU speaks of transformative urban governance when it comes to organizational and procedural structures and decision-making criteria based on the WBGU's norma-

Summary

Table 1

Urbanization surge up to 2050 – development risks of global change.

The table shows key risks of the global urbanization surge that is expected up to 2050. According to the WBGU's assessment, this urbanization surge will be characterized by three dominant settlement patterns: (1) mature cities or city districts, (2) newly planned cities or city districts, and (3) informal settlements. The three dimensions of the normative compass developed by the WBGU – sustaining of natural life-support systems (N), inclusion (I) and *Eigenart*, a German word meaning 'character', (E) – are used to estimate the risk dimension of each settlement pattern.

Source: WBGU

	Mature cities or city districts	Newly planned cities or city districts	Informal settlements
Natural life-support systems	N Earth system	 1	 1
	N local		 2
Inclusion	I substantive; economic	 3b	 3a
	I political		 4a
<i>Eigenart</i>	E dependent/inclusion	 5b	 5a
	E dependent/time; hardship	 6	 6

- 1 Whether the planetary guard rails, especially the 2°C guard rail for climate protection, can be observed will be decided in the mature cities or city districts and in the fast-growing planned new cities and city districts of Asia and Africa.
- 2 The well-being of the 2-3 billion people who might be living in informal settlements in 2050 is threatened by often precarious local environmental conditions (access to water, air quality, sanitation).
- 3a Socio-economic disparities and exclusion dynamics threaten the quality of life of the 2-3 billion people who might be living in informal settlements in 2050. Local exclusion dynamics could also trigger flows of refugees.
- 3b Socio-economic disparities are increasing in all urban configurations.
- 4a It will hardly be possible to implement political inclusion for the 2-3 billion people who might be living in precarious, informal settlements in 2050.
- 4b In the newly emerging, planned settlements of Asia, but also in Africa, several hundred million people will be joining the global middle classes and will demand political inclusion. Political instability threatens where this is not granted.
- 5a The development of *Eigenart*, as a prerequisite of quality of life and a resource of sustainability transformations, depends on the existence of prerequisites for inclusion. For the 2-3 billion people who might be living in informal settlements in 2050, precarious inclusion opportunities would undermine their chances of developing *Eigenart*.
- 5b *Eigenart* is being undermined by social and political inequalities in many mature and newly planned cities or city districts.
- 6 *Eigenart*, in the sense of urban development shaped by citizens, will hardly be feasible for the 1-2 billion people who will have relocated to newly planned cities and city districts in Asia and Africa by 2050, due to the speed of urban construction and the prevailing top-down planning. *Eigenart* will hardly be able to find expression in informal settlements, where hardship and often violence rule, where hardly any public institutions function, and an additional 1-2 billion people could be living in precarious living conditions by 2050.

tive compass, which aims at a comprehensive transformation of cities towards sustainability. Transformative urban governance must set dynamics of fundamental change in motion to cope with the impact and speed of the global urbanization process.

Because conditions in cities differ so much, it is impossible to develop blueprints that could be implemented everywhere. A core element of transformative urban governance is therefore that nation states recognize that cities are subjects of rights and obligations under constitutional law, grant them a right to self-government, and give them the necessary room for manoeuvre and financial leeway to be responsible for their own local transformation pathways. The distribution of responsibilities and tasks under this multi-level system of governance should be based on the subsidiarity principle, according to which a responsibility prerogative lies with the smaller unit depending on its capability. Furthermore, consultation processes should be established between local, regional and national levels to ensure that urban concerns are incorporated into national decision-making processes.

Even in cities where the local government has the necessary decision-making powers and financial resources, these are often not enough to successfully manage the transformation. In order to develop innovative approaches, implement and enforce future and present interests, and create legitimacy for the transformation process, a second core element of transformative urban governance is needed: to involve the inhabitants of a city through collaborative governance and to empower them to influence the transformation process. To this purpose, arenas for public discourse should be strengthened and spaces for experimentation created. Ultimately, a transformation in cities can only develop if they have sufficient financial resources at their disposal. This requires both guaranteeing solid basic funding by means of government transfer payments, and giving cities greater opportunities to generate their own revenue. In addition, incentives must be created to use private capital for the transformation. International financial institutions should develop coordinated and coherent approaches to provide cities with financial support.

Global governance structures should be modernized so that cities' transformative potential can also be used globally: cities should be given the right to participate and speak at relevant international forums. Cities should also be given an opportunity to develop 'urban foreign policies' in order to promote the international involvement of cities in transnational city networks.

If cities and urban societies take on more responsibility for the urban transformation process, a polycentric responsibility architecture develops. The structure

here is not exclusively hierarchical; rather, responsibilities are also distributed horizontally over several levels of the governance system.

5. Elements of a social contract for the urban transformation

The Great Transformation towards a sustainable society requires a cross-generational orientation framework to ensure harmonious coexistence among nearly 9 billion people. The WBGU speaks in this context of a 'new global social contract for a low-carbon and sustainable global economic system' (WBGU, 2011). In such an imagined agreement, individuals and civil-society groups, governments and the international community, businesses and academia pledge to jointly take on responsibility for the transition to a sustainable economic and social order.

For the worldwide urbanization dynamic, too, the WBGU recommends agreeing a global consensus on urban quality of life while simultaneously sustaining humanity's natural life-support systems. Elements of such an agreement have already been developed on the international stage. The course has been largely set with the adoption of the SDGs and the Paris Agreement of 2015. The Habitat III world conference, to be held in October 2016, offers an opportunity to make further progress with this global consensus and to operationalize it at city level.

Against this background it is possible to define the idea of a global social contract more precisely, and to formulate it in detail as a 'social contract for the urban transformation'. The prerequisite for such a social contract is that urban societies visualize a thrust of urbanization up to 2050 involving the six development risks of global change discussed above. The social contract itself would be virtual in the sense of a societal agreement on the urban transformation. However, it should be mirrored worldwide and at different levels of governance in the form of fully formulated charters.

The three key elements of such a contract, as listed in Table 2, are

- a polycentric responsibility architecture,
- transformative action fields in cities,
- consideration of the WBGU's normative compass.

Habitat III offers a chance to launch the negotiation process for a charter at the global level that reflects this social contract. In such a document, the states should stipulate the perspective of the transformation of the cities towards sustainability as a guiding concept, in order to offer the cities orientation for designing their specific transformation pathways. Urban societies, too, should make use of the opportunity to negotiate, in a

Table 2

Three key elements of a social contract for the urban transformation towards sustainability.

Source: WBGU

Key elements of a social contract for the urban transformation

Polycentric responsibility architecture

- Recognize cities in the constitution
- Grant the right to self-government in shaping local affairs
- Distribute decision-making powers according to the subsidiarity principle
- Secure funding
- Strengthen institutional and personnel capacity, establish effective planning structures
- Consult cities in national decision-making processes and in international negotiations
- Enable urban societies to influence the transformation process
- Agree charters for the urban transformation at the local, national, regional and global level

Transformative action fields in cities

Internationally discussed fields

- Decarbonization, energy and mitigation of climate change
- Mobility and transport
- Urban form
- Adaptation to climate change
- Poverty reduction and socio-economic disparities

Focal points: fields that are given too little attention internationally

- Urban land use
- Materials and material flows
- Urban health

Normative compass

- Sustaining natural life-support systems
- Ensuring inclusion
- Promoting *Eigenart*

participatory manner, a shared vision of the transformation process in their city, with each formulating its own charter. Similar charters can also be useful at the regional level (e.g. in the EU).

The idea of such charters for the urban transformation relates to a series of existing political statements and agendas that have been adopted at different levels by governmental and city alliances, mayors and non-governmental organizations. However, the existing declarations do not sufficiently address the challenges of an urban transformation towards sustainability in the global society. One prominent example is the Leipzig Charter on Sustainable European Cities of 2007, which focuses on integrated urban development policy and disadvantaged city districts, though not for the global but for the European level and without an explicitly transformative perspective. The experience that has already been made in negotiating such documents can be drawn upon in the formulation of the charters for urban transformation.

In the WBGU's view, the negotiations on the social contract for the urban transformation and its operationalization in the form of charters should not only take into account the normative compass, the transformative action fields and the polycentric responsibility architecture (i.e. the core elements of the contract),

as well as the six development risks of global urban change, it should also consider the following prerequisites for the ability of urban societies to transform, which have been developed in the present report.

Prerequisites for the ability of urban societies to transform

A paradigm shift must take place in cities in the space of a few years – away from incremental approaches and towards transformative changes – in order to sustain humanity's natural life-support systems and people's quality of life in the long term. The perspective used here is to look back to today from a desirable future. How can each urban society find a transformation pathway for itself that makes this sustainable future possible? To achieve this, the diversity of the cities and the potential of their actors must be taken seriously and used. Against this background, the WBGU identifies the following prerequisites for the transformation capability of urban societies:

- *Recognize and strengthen cities as key arenas of the transformation:* Key elements of the transformation are decided in cities (e.g. infrastructure development: energy, water and sanitation, waste management, mobility), and in many transformative action

fields, integrative solutions can be found at city level that use synergies between local development and global challenges. One prerequisite for the above-mentioned polycentric responsibility architecture is therefore to give cities sufficient local decision-making authority and, in addition, to enable them to play their role as players in international cooperation.

- *Re-establish public authority over shaping and planning urban areas:* The public sector should be strengthened. Authority over shaping and planning in the cities should be restored to the public sector where it is in the hands of other actors (e.g. strong investors, violent organizations). A weak local government also makes cities susceptible to corruption. The WBGU proposes a financial, institutional and political strengthening of the cities, so that they can take on more responsibility for urban development and infrastructure.
- *Cities should assume responsibility for their own transformation pathways:* Cities should increasingly take on responsibility both locally and globally for the Great Transformation towards sustainability. In this way they can become 'real-world laboratories' for their own transformative solutions, for which there are no generally valid blueprints. The specific process of designing the transformation pathway should be a joint search process involving local stakeholders. The diversity of transformation pathways offers opportunities for innovation and for learning processes between cities. Forums for the exchange of information already exist (e.g. ICLEI, C40, Compact of Mayors).
- *Create arenas for public discourse and experimentation; allow and encourage the inclusion of the urban population:* Transformation requires dialogue, joint learning processes and conflict management. Urban societies must agree on the objectives of their transformation and their long-term future, for example in the form of their own charters for the urban transformation. The prerequisite is the establishment of urban arenas for public discourse in which civil-society stakeholders, non-governmental organizations, the private sector and scientists can discuss and negotiate with the urban administration – in public, transparently and on an equal footing. Spaces for experimentation to create innovations in the field of urban design are essential for producing a wide variety of ideas and innovative solution approaches. This form of citizen inclusion simultaneously boosts the legitimacy of local governments. Urban societies should create suitable framework conditions (e.g. funding structures) and promote the skills needed to take action.

- *Use the normative compass to find integrative solutions to conflicts of objectives:* In the search for solutions to conflicts of objectives, an integrative approach should be pursued when designing urban development processes on the basis of the normative compass. In view of the complex challenges and time pressure from transformation, integrated, holistic, systemic solutions are required from the outset. Co-benefits should be exploited, because a sectoral approach or a sequential way of tackling individual objectives can trigger considerable conflicts of objectives. The aspect of *Eigenart* must not be neglected either; for example, identity-generating landmarks and parks should be preserved and social cohesion strengthened as an important resilience factor.
- *Inclusive growth – remove socio-economic disparities:* A key condition for the ability of cities to transform is the reduction of socio-economic disparities that have a negative impact on social cohesion, stability and security in urban societies. Cities can invoke SDG no. 10 "Reduce inequality within and among countries" and make their contribution, for example, to supplying housing, access to education, health services and public transport. In addition, all the inhabitants of a city, regardless of their income, should have a comparable chance to shape the development of a city.
- *Improve cities' adaptability to rapid changes:* The transformation of cities towards sustainability is a long-term process in which fundamental changes are made in the direction of urban development. The solution approaches are many and varied and depend on local conditions. Non-sustainable development pathways and associated path dependencies must be avoided by leapfrogging certain technological and institutional development stages. Furthermore, cities can be exposed to new dynamics that force them to act under great time pressure and uncertainty, e.g. the impacts of climate change or large refugee movements. Cities and city districts should therefore also be understood as transitory spaces in which structures that are needed today can be created, but must be modifiable over the long term. Thus, in future, architecture, urban development and urban governance must offer a framework that can tolerate and promote changes, additions and extensions. Leapfrogging, modularity, flexibility, adaptability and resilience can therefore be regarded as design features for 'urban development in transition'.
- *Regional planning should promote polycentric urbanization:* If spatial development concentrates on a small number of central locations, this usually exacerbates social disparities and disparities between

economic areas. National and regional planning should encourage the emergence of polycentric spatial structures, so that the area is dominated not by one, but by more than one central location. The guiding concept of 'decentralized concentration' is based on this principle; it pursues the goal of avoiding disparities between social and economic areas by promoting decentralized settlement structures and infrastructures and counteracting potential agglomeration disadvantages in growth regions.

- *Strengthen the role of science and education in the urban transformation:* Science and education contribute towards a broader understanding of the urban transformation; they make this knowledge accessible and help identify and implement suitable transformation pathways for the respective city. Inter- and transdisciplinary research is especially suitable for this, because the inclusion of urban stakeholders significantly improves the chances of implementation. In 'real-world laboratories', scientists and stakeholders can jointly acquire knowledge and problem solutions for the urban transformation by trying things out and experimenting.

6. Core recommendations

The WBGU's core recommendations for the urban transformation towards sustainability are presented in the following. The section begins by stating key objectives, as well as the most important measures and approaches, for individual transformative action fields. This is followed by measures and approaches that are particularly relevant for the transformation in terms of transformative governance and financing; each is differentiated according to local, national and global levels of action. These core recommendations are summarized in Tables 3 to 5.

Core recommendations for transformative action fields

Transformative action fields are areas of urban development where the WBGU sees the greatest potential leverage effects for a successful urban transformation towards sustainability. First, there are five fields that are already being discussed internationally, but which, against the background of the transformation, the WBGU places into a new context in relation to time horizons and scale (Table 3). Second, it makes recommendations on three transformative action fields that are examined in detail in this report and which, in the WBGU's view, are given too little attention

internationally (focal points in Table 3).

- *Decarbonization, energy and mitigation of climate change – improve urban decision-making skills and strive for zero emissions:* To achieve the urban transformation towards climate compatibility, direct CO₂ emissions in cities must be cut to zero and the demand for energy contained in order to make the global energy transformation towards CO₂-emissions-free energy systems possible. So-called 'grey energy' must also be taken into account, i.e. the energy that is expended directly and indirectly in the construction of buildings and the infrastructure. At the same time, access to energy and infrastructure is yet to be provided to hundreds of millions of present-day – and billions of future – urban dwellers. Cities need to develop the ability to respond systematically to these challenges and to make use of the many existing synergies, e.g. with the health sector.
- *Mobility and transport – overcome the dominance of motorized private traffic:* The objective should be accessible cities where certain locations (workplace, homes, etc.) are close together – pedestrian-friendly cities with safe cycle routes and affordable, low-carbon and good-quality public transport options accessible to all social groups. Transport planning should place cycling, walking and public transport at the centre of urban planning (transit-oriented development).
- *Link urban form to sustainability and adaptability:* Low-carbon urban and city-district planning and development need locally adapted urban planning strategies that observe not only the respective geographical and cultural context, but also technical possibilities of implementation and maintenance. In order to be able to respond better to population dynamics or climate change, flexible concepts in architecture and urban development should also be integrated. This applies particularly to cities in risk-exposed locations. Furthermore, greater flexibility makes it easier to integrate new knowledge and technical innovations into the urban infrastructure.
- *Adapt urban development to climate change:* In order to reduce the risks of climate change for urban societies, strategies should be developed to protect the population (awareness raising, disaster preparedness), to prioritize infrastructure investments, and to integrate the mitigation of climate change and climate adaptation into long-term planning. Adaptation to climate change is an iterative learning process that should be incorporated into urban development as a cross-cutting subject through both incremental and drastic measures (e.g. relocations, withdrawal from formerly populated areas).

- *Reduce poverty and socio-economic disparities in cities:* Local governments should ensure that not only the existing key actors, but also less well-organized, civil-society stakeholders have enough opportunities to help shape urban development and the improvement of their living conditions. In particular, local governments should make sure that urban poverty groups receive access to basic infrastructure and services. Here, a fundamental change of perspective is necessary that does not combat the symptoms, but focuses on the reasons why inadequate informal settlements develop. Conventional urbanization has mainly directed financial, personnel and creative resources into the development of residential areas for the upper 1-20% of the world's population. New priorities need to be set here if a situation is to be prevented in which 3 billion people will be living in unacceptable, inhospitable, informal city districts in 2050. Particular priorities include winning over the relevant urban actors – such as local governments, architects, city planners, investors, development banks and civil-society stakeholders – for the tasks of strengthening and developing informal, often precarious city districts, mobilizing extensive public and private financial resources, gearing planners and architects to the needs of transformation, reforming training systems in this direction, and also strengthening the necessary scientific resources in order to improve the quality of life for urban poverty groups.
- *Ensure that land use is oriented towards the common good:* Urban land use is the basis for the development of a city, exercising a decisive influence on its functionality and quality of life. Land use is therefore a decisive transformative action field. In order to avoid negative path dependencies, transformative land-use management should concentrate on key principles wherever possible. These principles include the reduction of land degradation, a low-carbon, environmentally acceptable and socially compatible densification, orientation towards the common good, and a policy of flexibility and adaptability in land use. To make this possible, cities need adequate land tenure systems. There are already many instruments available for controlling land use and strengthening urban land governance. Due to the great diversity of cities and their different (national) legal, cultural and socio-economic conditions, every local government must carefully examine which measures are most suitable. The prerequisites, however, are property rights and urban land tenure systems that are committed to the common good.
- *Promote the sustainable stewardship of materials and material flows:* Cities are hubs in the global flows of

materials and resources. The growth of these flows involves a number of undesirable side effects. These include the destruction of natural landscapes, the release of toxic substances, and greenhouse-gas emissions. Furthermore, important resources could become scarce in a few decades if their extraction continues unabated. The transition in this century to a sustainable circular economy that is as complete as possible is therefore a key element of the Great Transformation towards sustainability. Thinking in terms of material flows and life cycles, not only of products but also of (urban) infrastructures and buildings, and paying attention to the impacts of emissions or waste in the spheres of production, transport, consumption, and even waste treatment: these are all prerequisites for a sustainable circular economy. Starting points are the efficient use of resources, reducing material flows, minimizing ecological footprints and closing material cycles. The topics of building materials, phosphorus and electronic scrap are covered as examples of the diversity of the problems involved.

- *Strengthen resources and potential for healthy living in cities:* Depending, for example, on their location, size and level of development, cities harbour specific possibilities and risks in the field of health for the urban population. The WBGU identifies the following key challenges: the increase in non-communicable diseases and the spread of unhealthy lifestyles and habits, the increasing risk of urban epidemics and new infectious diseases, and health disparities in cities. In view of ongoing global urbanization, the promotion of urban health is essential, since this is both a goal and a resource for the urban transformation towards sustainability. In many cities, health-related interventions have hitherto been largely sectoral and pathogenic, i.e. disease focused, in orientation. The WBGU calls instead for a holistic, resource- and process-oriented approach to promoting urban health that places more emphasis on the conditions for a healthy childhood and life in cities. Because of the long-term consequences of factors that are beneficial or detrimental to health (e.g. use of toxic materials, high exposure to emissions in childhood, movement-impeding urban design), the path dependencies are very high here. Their prevention and the promotion of health are therefore essential as components of sustainable urban development. In addition, health promotion is an important cross-cutting subject that can generate a wide range of synergies if processed in a holistic way.

Summary

Table 3

Core recommendations for transformative action fields.

Source: WBGU

Goals	Important measures and approaches
Internationally discussed fields	
Decarbonization, energy, and mitigation of climate-change	
<ul style="list-style-type: none"> ➢ Replace all fossil CO₂ emission sources in cities with emissions-free alternatives by 2070 at the latest ➢ Ensure access to affordable, reliable, sustainable and modern energy for all by 2030 (SDG 7) ➢ Gear urban development towards limiting the demand for energy 	<ul style="list-style-type: none"> ➢ Compile decarbonization roadmaps for all cities ➢ Integrate air-pollution control and mitigation of climate change ➢ Informal settlements: take advantage of the opportunities of renewable systems ➢ In the long term, plan new cities exclusively emissions-free and ensure sustainable management of materials and material flows
Mobility and transport	
<ul style="list-style-type: none"> ➢ Achieve complete decarbonization of transport systems by 2070 ➢ Implement inclusive urban mobility by 2030 (SDG 11, target 11.2 'Provide ... accessible and sustainable transport systems for all') ➢ In the long term, allow only emissions-free mobility in inner cities 	<ul style="list-style-type: none"> ➢ Build and develop mixed residential and working city districts, and always within walking distance of public transport (transit-oriented development) ➢ Make public transport accessible to everyone and roads safer for non-motorized transport (pro-poor transport policies) ➢ Gradually reduce motorized individual transport in inner cities
Urban form	
<ul style="list-style-type: none"> ➢ Combine sustainability and adaptability in urban development ➢ Create inclusive city districts (people-oriented, climate-compatible) ➢ Provide buildings and spatial structures to create urban quality of life, e.g. easily accessible, safe spaces with niches for different user groups to allow interaction and relaxation 	<ul style="list-style-type: none"> ➢ Develop concepts for flexible and adaptable city districts ➢ Decelerate urbanization surges; polycentric spatial design instead of conventional rural-urban migration ➢ Seek a balance between densification and green/open spaces ➢ Increase incentives for passive energy-saving in city-district development and construction ➢ In new urban areas, implement planning strategies for sustainable city districts
Adaptation to climate change	
<ul style="list-style-type: none"> ➢ Reduce climate-change risks for urban societies ➢ Adapt urban development to climate change 	<ul style="list-style-type: none"> ➢ Integrate adaptation into urban planning as an iterative learning process: e.g. include scientific findings ➢ Integrate mitigation and adaptation when making long-term infrastructure decisions ➢ Improve skills of vulnerable groups to cope with climate change ➢ Improve local data availability
Poverty reduction and socio-economic disparities	
<ul style="list-style-type: none"> ➢ Inclusive growth: ensure above-average growth for lower income groups ➢ Reduce poverty and socio-economic disparities in cities ➢ Improve quality of life in informal settlements ➢ Implement the right to adequate housing and secure political inclusion rights ➢ Initiate a paradigm shift: strengthen initiatives for the poorest 40% of the world's urban societies 	<ul style="list-style-type: none"> ➢ Establish global initiative of UN-Habitat, UNDP, UNEP and World Bank for the additional 1-2 billion people expected to be in inadequate housing ➢ Counteract the growing concentration of property and land ownership ➢ Win over relevant urban actors (e.g. local governments, architects, planners) for efforts to improve the quality of life of urban poverty groups; mobilize comprehensive public and private financial resources ➢ Make the right to adequate housing a core element of bilateral and multilateral development cooperation ➢ Prioritize the poorest 40% instead of the richest 5% of the population in urban investment and architectural competitions

Goals	Important measures and approaches
	<ul style="list-style-type: none"> ➢ Upgrade urbanization to a priority area in the OECD's Development Assistance Committee (OECD-DAC) ➢ Initiate a priority programme 'Adequate Housing for All' at the World Bank, focusing on regional and medium-sized cities ➢ Secure access to basic infrastructure, education and health facilities for all
Focal points: fields that are given too little attention internationally	
Urban land use	
<ul style="list-style-type: none"> ➢ Ensure that land use is oriented towards the common good ➢ Use land more flexibly (i.a. risk adjustment and precaution) ➢ Minimize land degradation 	<ul style="list-style-type: none"> ➢ Introduce or strengthen social-impact analyses for land-use management ➢ Ensure a transparency and documentation requirement for land ownership and use (reform land law if necessary) ➢ Keep enough urban spaces in public or community hands ➢ Secure right of first refusal or veto right for municipalities for plots of land ➢ Establish locally adapted planning systems ➢ Fight corruption and stem land grabbing ➢ Stem land and property speculation ➢ Consider flexible management models (interim use, shared space, urban commons, etc.)
Materials and material flows	
<ul style="list-style-type: none"> ➢ Establish as complete a circular economy as possible in this century ➢ Substitute toxic or pollutant substances ➢ Ensure recovery of non-renewable resources <p>Examples:</p> <ul style="list-style-type: none"> ➢ Replace CO₂-emissions-intensive building materials (e.g. reinforced concrete) with low-carbon alternatives ➢ Stop the loss of phosphorus ➢ Organize sustainable recycling systems for electronic waste 	<ul style="list-style-type: none"> ➢ Promote product durability and reparability (e.g. resource taxation) ➢ Promote responsible management of waste and recycling and stem illegal waste trade (Basel Convention) ➢ Promote modular building and design methods, including making structures easy to dismantle or recycle, above all low-carbon building materials (building regulations) ➢ Manage materials and material flows sustainably in public procurement and works contracts
Urban health	
<ul style="list-style-type: none"> ➢ Target a global paradigm shift from fighting disease to promoting health by boosting resources and potential for a healthy life in cities ➢ Stabilize health promotion by means of cross-sectoral city planning and development, and by strengthening municipal responsibility for planning ➢ Promote the urban population's health competence and behaviour 	<ul style="list-style-type: none"> ➢ Secure substantive inclusion, improve food security ➢ Design cities in a way that promotes health, focusing on spaces for encounters and activities ➢ Strengthen the self-organization of urban residents; support small-scale health-promoting measures in city districts ➢ Stem urban epidemics and new infectious diseases by promoting the resilience of the population, health education and improved health reporting ➢ Promote health by means of cross-sectoral urban planning (synergies with mitigation of climate change and decarbonization)

Core recommendations for transformative urban governance: stakeholders of urban development

Use the transformative potential of cities at the international level and make urbanization a central theme in international cooperation

Hitherto, cities have hardly played any role in global governance structures, even though they are one of the most important stakeholders, for example, when it comes to avoiding global environmental change. To be able to use the transformative potential of cities, also at the international level, global governance structures should be designed in a way that meets present-day needs and opportunities. This initially means that nation states and international organizations recognize and foster ‘urban foreign policy’ – i.e. the international engagement of cities – and formulate rules in such a way that this policy is not obstructed (Table 4). Cities and cities networks should be given a right to participate in, and speak at, relevant international negotiations in order to improve exchanges between the different levels. Cities networks should raise their profile by bundling their activities.

In view of the dynamics of urbanization and the associated challenges, it is urgently necessary to reform and expand UN-Habitat. The WBGU discusses different options in this context. While recommending that UN-Habitat should be developed into a UN organization in the medium term, in the short term, the WBGU says, it should be strengthened in line with its programme status by management reforms, a stronger focus on thematic work, policy development, and the creation of a capable scientific department.

In addition, an international scientific panel on sustainable urbanization should be set up. Like climate change or gender, urbanization and sustainable urban development must become cross-cutting issues in all UN and multilateral organizations. The Habitat conferences should also be further developed. In view of the dynamics of urbanization, a 20-year cycle is outdated and should be shortened to 4 years.

In order to accelerate and intensify the global debate on urbanization and transformation, the G20 should take up the subject on a permanent basis. Germany’s federal government has a key role to play here, since it will be assuming the G20 Presidency in 2017. It should take this opportunity to put the topic on the agenda. Similarly, the federal government should use its influence and introduce elements of the social contract for the urban transformation towards sustainability developed by the WBGU to boost the status of UN-Habitat and help design the Habitat follow-up process. Furthermore, in view of the key role of cities in the task of

dealing with the key challenges of global development (refugees, climate change, limits to growth), the Federal Ministry for Economic Cooperation and Development (BMZ), the Ministry for the Environment, Nature Conservation, Building and Nuclear Safety (BMUB) and the Ministry of Education and Research (BMBF) should make urbanization a central cornerstone of German development cooperation, international environmental cooperation and international scientific cooperation. German involvement in these areas should be significantly expanded.

Strengthen cities' ability to shape and plan

In order to strengthen the ability of local governments to shape their city’s destiny, the principle of subsidiarity should be consistently implemented at the national level and cities given corresponding decision-making powers. Cities should be involved in the decision-making process wherever national decisions are relevant for them. The implementation of the principle of subsidiarity and urban co-determination should be secured by a constitutionally enshrined right to local self-government or self-administration, or the like.

The capacity of local governments should be improved by better training of urban planners and administrative staff – including the integration of environmental and social-scientific methods into the curricula. Appropriate IT and data resources should be developed to make the most of the possibilities offered by digitization. It is also expedient to grant local governments full responsibility for personnel management in the selection of qualified employees and the creation of attractive working conditions.

Furthermore, the fight against corruption should be stepped up and all local stakeholders integrated into anti-corruption strategies. This involves ensuring the transparency, integrity and accountability of administrations, introducing freedom-of-information laws and legal protection for whistle-blowers, and encouraging anti-corruption ethics and compliance programmes in the private sector.

In order to maintain the ability of urban societies to shape the development of their cities, the compatibility of private investments with the common good should be ensured and real-estate speculation restricted. To this purpose, policies are needed that expand social housing, promote alternative forms of ownership (e.g. cooperatives), strengthen rental markets with high standards of tenant protection, and introduce innovative and socially compatible property taxes and real-estate transfer taxes. These national and local measures should be supplemented on a global level by sustainable investment standards to which investors commit themselves.

Table 4

Core recommendations for transformative urban governance.

Source: WBGU

Goals	Important measures and approaches
Global/international level	
<ul style="list-style-type: none"> ➤ Make use of the transformative potential of cities at the international and transnational level 	<ul style="list-style-type: none"> ➤ Promote 'urban foreign policy' – the transnational engagement of cities ➤ Give cities and cities networks the right to participate in, and speak at, international negotiations ➤ Bundle the activities of city networks and strengthen networks
<ul style="list-style-type: none"> ➤ Make urbanization and sustainable urban development a central topic in international cooperation 	<ul style="list-style-type: none"> ➤ Pursue UN-Habitat reform: in the short term through management reform by focusing more clearly on content and policy development; create an in-house scientific department ➤ In the medium term, work for an upgrade to a UN organization ➤ Further develop Habitat conferences: shorten Habitat conference cycle to 4 years; New Urban Agenda should contain institutional architecture for implementation ➤ AA, BMUB, BMZ: promote upgrade of UN-Habitat and introduce the elements of the urban social contract into the Habitat III follow-up process ➤ UN, development banks, other multilateral organizations: establish urbanization as a cross-cutting topic ➤ Set up an international scientific panel on urbanization and sustainable urban development ➤ G20: make urbanization and transformation relevant topics – permanently and across the board; Germany's G20 Presidency should put the topic on the agenda in 2017 ➤ BMZ, BMUB, BMBF: make urbanization a central point of development cooperation, environmental cooperation and scientific cooperation
National level	
<ul style="list-style-type: none"> ➤ Equip cities with the necessary decision-making powers or strengthen these powers 	<ul style="list-style-type: none"> ➤ Consistently enforce the subsidiarity principle ➤ Enact legislation on local self-administration or some other form of constitutional recognition of urban autonomy
<ul style="list-style-type: none"> ➤ Integrate cities better into national and regional decision-making processes by giving them opportunities for consultation 	<ul style="list-style-type: none"> ➤ Improve training of city planners and urban administration staff: make environmental and social principles part of training ➤ Give cities autonomy in staff recruitment
<ul style="list-style-type: none"> ➤ Fight corruption 	<ul style="list-style-type: none"> ➤ Ensure the transparency, integrity and accountability of administrations ➤ Introduce freedom-of-information laws and legal protection for whistle-blowers ➤ Encourage anti-corruption pledges and programmes in the private sector
<ul style="list-style-type: none"> ➤ Ensure the compatibility of private investment with the common good and restrict real-estate speculation 	<ul style="list-style-type: none"> ➤ Promote social housing ➤ Strengthen rental markets with high standards of tenant protection ➤ Strengthen alternative forms of ownership ➤ Develop and introduce innovative, socially compatible approaches to property taxes and real-estate transfer taxes ➤ Establish sustainable investment standards worldwide
Local level	
<ul style="list-style-type: none"> ➤ Establish collaborative governance structures and integrate the entire urban population 	<ul style="list-style-type: none"> ➤ Use strong instruments of participation where appropriate
<ul style="list-style-type: none"> ➤ Strengthen informal settlements and city districts and incorporate them into urban development 	<ul style="list-style-type: none"> ➤ Create affordable housing ➤ Integrate existing, common-law procedures; suppress criminal practices
<ul style="list-style-type: none"> ➤ Support (transnational) civil-society networks 	<ul style="list-style-type: none"> ➤ Provide financial support ➤ Support capacity building
<ul style="list-style-type: none"> ➤ Improve connection to global issues 	<ul style="list-style-type: none"> ➤ Institutionalize advocates of global issues

Summary

Establish collaborative governance: empower and commit urban societies to shape their own cities

It is not only the normative compass that demands that all sections of the urban society should take part in shaping the transformation process. Without the necessary approval and support of the population, even local governments with comprehensive decision-making powers and sufficient financial resources would fail to meet the challenges of the transformation process.

To achieve this, it is necessary to establish collaborative governance structures. This involves strengthening arenas for public discourse in cities wherever feasible, using instruments of participation, and facilitating participatory processes in local governments. In highly regulated contexts, particularly in mature and in quickly growing, planned cities, it is necessary to create spaces for experimentation and development for trying out different forms of sustainable living. Where such spaces already exist, cities should consider how they can be supported. The transformative effect of civil-society and municipal activities can be reinforced by connecting them with scientific expertise. For this it is expedient to set up transdisciplinary research centres at the urban and regional level.

Especially in cities and city districts in developing countries and emerging economies, urban development takes place in informal urbanization processes, largely independently of governmental or regulatory control. Here it is crucial to raise the profile of informal governance structures that promote the common good and to give them more recognition. It is also important to repress criminal practices. In general more attention must be paid to the rights and needs of the population in informal settlements; they need help to articulate their needs and shape the development of their communities.

Since the efficacy of local civil-society stakeholders increases when they operate in regional, national and especially transnational networks, these networks should be supported. To this purpose, financing programmes that are adapted to the needs of these networks should be launched and capacity-building assistance provided for small organizations, so that they can apply for such funds.

Ombudspersons for global issues should be appointed at the local level to ensure that more consideration is given to – and more information provided on – global issues.

Core recommendations for financing

Many cities lack the financial capacity for the growing number of local tasks and the increase in infrastructure investment needs. In countries characterized by a

strong local level, such as Denmark, local governments account for 62% of total public expenditure and 32.9% of GDP. In developing countries like Kenya, for example, the corresponding figures are 1.2% and 0.06% (UCLG and Dexia, 2006). Estimates of financial needs for the modernization, expansion and construction of the infrastructure over the next 15 years lie in the high two-digit trillion range. In order to finance the transformation towards sustainability in cities, the municipal administration and the financial base must be strengthened, private capital for urban infrastructure must be mobilized, and the international financing of development and climate mitigation must be coordinated and geared more towards sustainable urban development (Table 5). In many cities in developing countries and emerging economies, it is initially a matter of building an administration that is capable of acting and getting things done effectively.

Goal 1: Strengthen the municipal administration and the financial basis

Nationally: Transfers by nation states to the local level should guarantee solid basic funding to ensure a minimum standard for the nationwide provision of public services (substantive inclusion). For this, a relative stability of annual allocations must be ensured to make long-term budget planning possible. The WBGU recommends using transfer payments – especially in developing countries and emerging economies – to strengthen the endogenous financial potential of cities. Opportunities of this kind are provided by tying transfer payments to reforms aimed at building new structures, such as efficient financial management systems, land registry offices and administrative capacities for charging for services or determining the market values of land and real estate. In highly developed countries that already have an extensive supply of public services, the distribution keys should support existing development potential.

Consideration should be given to granting easier access to the financial markets for those cities and municipalities that generate regular and comprehensive revenues of their own and can show that they have a successful system of financial management. In order to exclude reckless debt financing, it must be ensured that the borrowed capital is used for investment and not to finance current expenditure.

Locally: Better use should be made of existing financing instruments. This applies in particular to property taxes and real-estate transfer taxes, which represent a dynamic and regular source of income, especially in fast-growing cities. Local governments should use real-estate taxes not only to boost municipal revenues, but also to generate a transformative steering effect, for example through progressive tax rates or coupling the

Table 5

Core recommendations for financing the urban transformation. The measures mentioned must usually be taken up at all three levels and networked.

Source: WBGU

Goals	Important measures and approaches
Global level	
➤ Coordinate the international financing of development and climate mitigation and gear it more closely to sustainable urban development	<ul style="list-style-type: none"> ➤ Gear international collaborations to already agreed objectives on sustainable urban development ➤ Direct international financial resources to the municipalities as appropriate ➤ Clarify the rules on accounting with regard to the Green Climate Fund (GCF) to avoid double counting between development and climate financing
➤ Mobilize private capital for urban infrastructure	<ul style="list-style-type: none"> ➤ Take local factors into account when linking the financial sector with sustainable development objectives ➤ Have existing criteria and standards reviewed by external evaluators ➤ Develop binding criteria and standards for sustainable investment and extend them by adding city-specific criteria ➤ Introduce a global insurance mechanism for urban infrastructure and further develop innovative financing instruments
National level	
➤ Strengthen municipal administration and financial base	<ul style="list-style-type: none"> ➤ Ensure solid financing of cities through adequate transfer payments ➤ Use transfer payments to strengthen the endogenous financing potential and support existing development potential ➤ Consider making it easier for cities to use the financial markets
➤ Mobilize private capital for urban infrastructure	<ul style="list-style-type: none"> ➤ Work out a long-term and binding national transformation strategy ➤ Create inclusive financial institutions
Local level	
➤ Strengthen municipal administration and financial base	<ul style="list-style-type: none"> ➤ Make better use of the potential of existing financial instruments ➤ Create transparency with respect to municipal revenue and services ➤ Coordinate policies above and beyond local jurisdictions and, wherever possible, harmonize administrative and functional borders
➤ Mobilize private capital for urban infrastructure	<ul style="list-style-type: none"> ➤ Develop community forms of financing

tax rate to land use. In order to ensure transparency in relation to the use of the charges levied, the WBGU recommends that cities and municipalities should publicize information on public revenues and expenditures on infrastructure and public services. The pace of urbanization is leading to a change in the spatial expansion of the urban area. This can lead to coordination problems in local task management across municipal borders, as well as in the efficient use of local sources of finance. In order to maximize local revenue potential, cities and municipalities should coordinate their policies above and beyond local jurisdictions and, wherever possible, harmonize administrative and functional borders.

Goal 2: Mobilize private capital for urban infrastructure

Globally: The growing link between the financial policy framework and sustainable development objectives (UNEP and IEH, 2015), and a change in thinking and acting from the short term to the long term are trends that are moving in the right direction. The WBGU recommends paying more attention to local factors in this development and having external evaluators review existing criteria, such as the Green Bond Principles developed by the International Capital Market Association or the Principles of Responsible Investment, which are based on a UN initiative. In the long term, uniform, binding criteria and standards should be developed to generate transparency in relation to the social and environmental compatibility of investment and financial flows. In order to reduce risks to investment in cities, the WBGU recommends the introduction

of a global insurance mechanism for urban infrastructure and the further development of new innovative financing instruments, such as the pooling of urban investment in legally independent companies (special-purpose vehicles) and the placement of bonds or income rights in these companies (e.g. yield cos) on the capital market.

Nationally: The WBGU recommends defining a long-term and binding national transformation strategy in order to improve planning certainty and legal certainty and to lay the foundation for coordination at different administrative levels, as well as with private stakeholders. Local stakeholders should also be involved in the development of the national transformation strategy in order to take into account the diverse local situations and to be able to convert successful measures at the municipal level into a common action framework. In developing countries, the aim must be to develop inclusive financial institutions and to make financial services accessible to poor population groups. The WBGU recommends an increase in funding for these developments, both by international development cooperation and by public and international development banks.

Locally: The participation of the urban population is also pivotal in the financing of sustainable urban development, and existing engagement should be supported. In this context, the WBGU recommends promoting and disseminating community forms of financing, such as energy and housing cooperatives, and examining the potential of crowdsourcing platforms for financing neighbourhood projects.

Goal 3: Gear the financing of international development and climate mitigation more closely to urban development

Globally: The WBGU recommends gearing international cooperation to the already agreed objectives on sustainable urban development, e.g. the priority of 'creating climate-compatible cities' as identified by the Green Climate Fund. This orientation has already been laid down at the international level in the Addis Ababa Action Plan and should be consistently implemented. International financial resources should be directed to municipalities in an order of magnitude adequate to their problems; these resources should be used increasingly for developing and enhancing local administrative capacity. Accounting rules on the financing of development and climate mitigation should be reviewed to avoid double counting.

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7. Research on the urban transformation

Since the urban transformation towards sustainability is also a search process, research has a special role to play. Besides basic research, which is indispensable for an elementary increase in knowledge, research can advance transformation processes both by generating the innovations needed for the urban transformation and by contributing to a fundamental understanding of the processes of change. In order to determine the role of research in relation to the transformation, the WBGU returns to the distinction between 'transformation research' and 'transformative research', which it coined in the report 'A Social Contract for Sustainability' (WBGU, 2011). In this context, transformation research refers to the exploration of the factors, mechanisms and causal relationships of the transformation, while transformative research means the kind of research that supports the transformation by means of specific innovations – be they social, economic, technical or of some other kind.

The WBGU is aware that, in addition to the production of transformative knowledge, the aim must also be to anchor this knowledge in society and to make it available for societal transformation processes. Such a perspective extends beyond science and also includes general education processes through which an understanding of the options for action and solution approaches is created. For example, urban real-world laboratories are an important arena for linking transformative research processes with education processes. A comprehensive analysis of transformative education processes in the urban sphere is itself still a research desideratum.

In Germany and elsewhere, urbanization is an intensively researched field. Thus, building blocks already exist which can help answer many research questions on urban transformations. However, from the WBGU's strategic, global and long-term perspective of the sustainability of the urbanization processes, it becomes clear that both further transformation research and further transformative research are required. The WBGU's aim is to identify necessary future focal points of the urban research agenda against the background of its transformation analysis.

To this purpose, the WBGU outlines the key questions of the urban transformation towards sustainability, analyses existing research policies, programmes and institutions, and extrapolates the main elements and orientation guidelines for a new urban research agenda (Table 6).

Table 6

Research on the urban transformation: key issues of content, requirements and basic recommendations.
Source: WBGU

Key issues of content in research for the urban transformation	Requirements regarding transdisciplinary research on the urban transformation	Basic recommendations for further developed research on the urban transformation
<p>Systemic view, if possible considering all three dimensions of the normative compass:</p> <ul style="list-style-type: none"> ➢ Urban metabolism (e.g. building materials, phosphorus, electronic waste) ➢ Urban form ➢ Inclusion (urban quality of life, inequality) ➢ Urban health ➢ Mobility and transport ➢ Urban land use ➢ Governance (indicators, facilitating an urban ‘foreign policy’) <p>Cross-cutting issues of research for the urban transformation:</p> <ul style="list-style-type: none"> ➢ Pool of data available to global transformation research ➢ Meta-reflection on transdisciplinarity and participation ➢ Trade-offs and synergies between the sustaining of the natural life-support systems, inclusion and <i>Eigenart</i> in the urban space 	<ul style="list-style-type: none"> ➢ Normative orientation: guiding concept of sustainable urban development in the context of sustaining the natural life-support systems, inclusion and <i>Eigenart</i> ➢ Structural principles: orientation of research to societal needs by co-design and co-production of knowledge; solution orientation; reflectivity ➢ Results and effects: generation of sustainable alternatives to existing technologies and social practices by technological, social or governance innovation; development of capacity at the individual and institutional level; structure formation 	<p>Coordinate a participatory roadmap process, with the BMBF as the central player:</p> <ol style="list-style-type: none"> 1. Strengthen basic research on the urban transformation 2. Set up new data infrastructures as a basis for indicator formation and the monitoring of the urban transformation 3. Establish new forms of global agenda-setting processes for urban transformation research 4. Build long-term transdisciplinary research centres at the urban and regional level 5. Press ahead with international capacity development in the research field

Cities and the Great Transformation – an open research programme

To start with, the WBGU identifies key issues of transformative urbanization research along the three dimensions of the normative compass introduced in the report.

Research on the *natural life-support systems* in the context of the urban transformation focuses on the planetary guard rails and local environmental quality in cities, thus providing orientation for sustainable urban development. The mitigation of climate change and adaptation to climate change in cities has increasingly been at the focus of research in recent years. Nevertheless, there is a lack of consistent and comparable data on emissions at the city level. In addition, the WBGU believes that further research is needed in particular into the urban metabolism and the requirements of a complete circular economy.

Research on *inclusion* serves to explore the fundamentals of a people-oriented urban development. One of the key challenges is making research in this field transformative, i.e. actively promoting and internationally networking inclusion processes to make global learning possible. The WBGU is introducing a new

concept into the debate – ‘solidarity-based quality of life’ – which can generate stimuli for transformation research.

Research on *Eigenart* (a German word meaning ‘character’) emphasizes the focus on the diversity and the specific development dynamics of urban transformation processes, as well as the relationship between quality of life and urban design. The WBGU recommends gearing the study of urban prosperity and urban development more towards urban quality of life. Research on principles and indicators for *Eigenart* plays a special role here, because it has hitherto scarcely been part of common indicator systems. Research should develop a repertoire of categories for *Eigenart* which, while universally valid, are locally grounded and can also be combined in a locally specific way.

A future-proof urban transformation following the logic of the natural life-support systems, inclusion and *Eigenart* makes considerable demands on the governance of cities. Specific research issues on two major thematic constellations follow from this: (1) governance within the cities in informal contexts and (2) governance between cities at the global level. Furthermore, the WBGU sees an urgent need for research to further develop an index on the quality of urban

transformative governance.

In addition to the thematically defined constellations, which should be approached from the angle of transformative research, there are fundamental methodological and conceptual cross-cutting issues of transformation research. These include, in particular, reflexive research on the transferability of contextualized findings, on conflicts of objectives that arise from the dimensions of the normative compass, and on methods of urban transformation research. Furthermore, it is essential to achieve a general improvement in the pool of data available to global transformation research. This should include data on urban health, governance, inequality and the urban metabolism – both at the global and national level and at the regional and urban level – as well as data on social groups within cities.

Requirements regarding research for the urban transformation

Effective urban research in the sense of the Great Transformation towards sustainability should not only answer pressing questions of content; it should also be geared towards normative goals and be structurally organized in a way that can have a transformative effect. In its 2011 report 'A Social Contract for Sustainability', the WBGU already formulated general demands on research relating to the transformation; in the present report it has adapted these to the specific context of urban and urbanization research (Table 6). The WBGU's intention with this set of structural criteria is to make suggestions to scientists and research funders on how to make research and research programmes transformative.

These criteria include, in particular, societal relevance and problem orientation, which require inter- and transdisciplinary research that will ideally lead to new systemic and comprehensive solution strategies. Instead of following rigid guidelines, transformative research and research programmes should be reflexive and adapt flexibly to problem situations. In addition, the WBGU advocates testing innovative methods in urbanization research, since trying things out and experimenting play a key role in the shaping of urban transformation.

The urban transformation is a serious and global challenge; accordingly, research should be based on international cooperation and equipped with sufficient resources, both to boost research activities and to implement the findings.

Transformative research aims to effectively support the transformation towards a sustainable, liveable city. In addition to transformative technical or social

innovations, research can also strengthen transformative capacity at the individual and institutional levels. Especially with regard to cooperation between scientists from industrialized countries with scientists from developing countries and emerging economies, research cooperation can help strengthen educational, scientific and research structures.

Analysis of programmes and institutions

Sustainable urbanization is a prominent, integral part of many different national programmes and initiatives. For example, Germany's Science Year 2015 was devoted to the City of the Future; the BMBF and the BMUB promote city-related research in their research programmes, and several federal government ministries were involved in the National Platform on the City of the Future. At the regional level, Baden-Württemberg's real-world laboratory programme stands out.

Internationally, too, research on the city is prominently represented on the programmatic agenda. The EU funds research on 'Smart Cities and Communities' in various thematic programmes of Horizon 2020. The global research initiative Future Earth counts cities and urbanization among the key challenges of sustainability; intensive interdisciplinary research is planned in this field up to 2025.

None of the programmes or institutions studied can cover the entire spectrum of demands on transformative city research proposed by the WBGU. Although some programmes and institutions can be rated as exemplary in terms of their transdisciplinary structure (e.g. Academy for Spatial Research and Planning, ARL, or German Institute for Urban Studies, Difu), their innovative methods (e.g. Baden-Württemberg's real-world laboratories) or their participatory agenda process (e.g. the National Platform on the City of the Future), they lack international orientation and networking. Other programmes, by contrast, while internationally oriented, are too narrowly focused on technological development. The EU's Framework Programme for Research and Innovation, Horizon 2020, for example, places a great deal of emphasis on digitization and technology development. This means there is a risk of creating new path dependencies and losing sight of comprehensive sustainability objectives as defined by the normative compass.

The WBGU stresses, however, that several positive approaches are already present in existing institutions and programmes, and sees potential for supplementing these by adding further aspects of sustainable urbanization. For example, the research agenda and research funding of the European Joint Programming

Initiative Urban Europe show how holistic and reflexive research can be structured. The BMBF's Future Megacities research programme and other transdisciplinary BMBF calls for proposals in different areas of sustainability research can also be seen as examples of good practice in the field of systemic transdisciplinary and international research. The WBGU supports such integrated approaches and recommends incorporating not only socio-ecological aspects, but also, on a larger scale, social and cultural aspects into research programmes.

In addition, Future Earth also offers a chance to generate substantive and structural ideas thanks to its international and participative character, and to become an umbrella programme for international research activities. This would make it possible to improve the coordination and networking of research programmes and activities for sustainable urbanization.

Recommendations for a new research agenda on the urban transformation

The WBGU's analysis of ongoing changes in content, processes and institutions leads to five basic recommendations.

- **First:** The WBGU recommends institutionally strengthening basic research for the urban transformation towards sustainability and suggests setting up a separate Max Planck Institute for Urban Transformation as a hub for basic research on the urban transformation. Although today many substantive individual questions of urban transformation research are already being addressed in the research system, and interdisciplinary work on individual questions is proceeding successfully at a high level, understanding urban transformation processes still raises a wide range of basic research issues.
- **Second:** Sustainable urbanization requires the establishment of new data infrastructures for an effective urban transformation within the normative compass. The WBGU recommends setting up suitable data-collecting, monitoring and control structures in order to create social, political and economic indicators on urban transformation based on these data; these structures should relate especially to the transformative action fields identified in the report, such as materials and material flows, mobility and transport, urban health and urban land use. The collection of data could be supported by approaches of citizen science.
- **Third:** In future, agenda setting should be based on experience with participation gained in the context of the National Platform on the City of the Future. Future urbanization research should already get the

key actors of the urban transformation involved when conceiving research programmes. In international research programmes, particular value should be attached to setting a common agenda with the partner countries.

- **Fourth:** Transformative research needs long-term and stable structures. For example, urban real-world laboratories that act independently of short-duration projects should therefore be set up worldwide. The formula of '50 global urban real-world laboratories in 50 years' stands for this idea. The idea behind it is that 50 globally distributed, urban real-world laboratories should be created to increase knowledge of the transformation processes in an urban context, to exchange this knowledge amongst themselves, and to make it internationally available to cities. The structure and the financing of these real-world laboratories should be initiated through a joint effort – involving national research funding, financing from foundations, development-cooperation funds, and European research funding – and could be coordinated under the umbrella of Future Earth. 50 years stands emblematically for the fact that, from the outset, such a task must at all costs have a long-term orientation (as regards its institutions and funding).
- **Fifth:** Capacity development should be used to empower developing countries and emerging economies in particular to engage in transdisciplinary research and to accompany urban transformation processes on site in close cooperation with cities. This is also necessary for the implementation of transformative research for urbanization on a global scale. Existing approaches of international research cooperation funded by the BMBF and other ministries could be expanded, combined with the requirements of transformative urbanization research, and developed accordingly.

As regards the implementation of these fundamental recommendations – as well as the other, more specific recommendations in the present report – the WBGU proposes a participatory roadmap process with national and international contributions under the lead of the BMBF.

8. Epilogue

The present report outlines the special challenges and opportunities faced in this century by cities from the perspective of the necessary transformation towards sustainability. One characteristic feature of the debate on the search for solutions is the enormous diversity of instruments and solution pathways. Consequently, there can be no blueprint for sustainable urban

Table 7

Major risks of the global urbanization surge: superordinate objectives and problem-solving measures with a large leverage effect.

Source: WBGU

Urbanization surge up to 2050 – six development risks of global change	Goals	Measures and approaches
Development within the planetary guard rails: Whether planetary guard rails can be complied with will be decided in the mature cities, as well as in the fast-growing new city districts of Asia and Africa. Only if low-carbon, sustainable cities are built there can dangerous global environmental change and an associated global threat to prosperity and quality of life be prevented.	<ul style="list-style-type: none"> ➤ Replace all fossil CO₂ emission sources in cities with emissions-free alternatives by 2070 at the latest ➤ Gear urban development towards limiting the demand for energy ➤ Establish as complete a circular economy as possible in this century ➤ Replace CO₂-emissions-intensive building materials (e.g. reinforced concrete) with low-carbon alternatives 	<ul style="list-style-type: none"> ➤ Compile decarbonization roadmaps for all cities ➤ In the long term, plan new cities exclusively emissions-free and ensure sustainable management of materials and material flows ➤ Build and develop mixed residential and working city districts, and always within walking distance of public transport (transit-oriented development) ➤ Increase incentives for passive energy-saving in city-district development and construction ➤ Building regulations: promote modular building and design methods, including making structures easy to dismantle or recycle, above all low-carbon building materials
Local environmental conditions as key dimensions of urban quality of life: Good local environmental conditions are a prerequisite for human quality of life. In particular, the quality of life of 2-3 billion people who are expected to be living in informal settlements in 2050 depends on effective local environmental policies.	<ul style="list-style-type: none"> ➤ Reduce climate-change risks for urban societies ➤ Substitute toxic or pollutant substances ➤ In the long term, allow only emissions-free mobility in inner cities 	<ul style="list-style-type: none"> ➤ Integrate air-pollution control and mitigation of climate change ➤ Gradually reduce motorized individual transport in inner cities ➤ Promote responsible management of waste and recycling and stem illegal waste trade (Basel Convention) ➤ Design cities in a way that promotes health, focusing on spaces for encounters and activity facilities ➤ Integrate adaptation to climate change into urban planning as an iterative learning process: e.g. include scientific findings
Substantive inclusion and socio-economic dimensions: Socio-economic disparities and exclusion in cities are increasing worldwide and threatening the quality of life and stability of urban societies. Particularly threatened are the 2-3 billion people who might be living in informal settlements by 2050. Inequality and exclusion can trigger flows of refugees and thus pose a threat to international security.	<ul style="list-style-type: none"> ➤ Initiate a paradigm shift: strengthen initiatives for the poorest 40% of the world's urban societies ➤ Inclusive growth: ensure above-average growth for lower income groups ➤ Secure access to basic infrastructure, education and health facilities for all ➤ Implement inclusive urban mobility by 2030 (SDG 11, target 11.2 'Provide ... accessible and sustainable transport systems for all') ➤ Ensure access to affordable, reliable, sustainable and modern energy for all by 2030 (SDG 7) 	<ul style="list-style-type: none"> ➤ Establish global initiative of UN-Habitat, UNDP, UNEP and World Bank for the additional 1-2 billion people expected to be in inadequate housing ➤ Make the right to adequate housing a core element of bilateral and multilateral development cooperation ➤ UN, development banks, other multilateral organizations: establish urbanization as a cross-cutting topic ➤ Initiate a priority programme 'Adequate Housing for All' at the World Bank, focusing on regional and medium-sized cities ➤ Stabilize health promotion by means of cross-sectoral city planning and development, and by strengthening municipal responsibility for planning ➤ OECD-DAC: upgrade urbanization to a priority area

Urbanization surge up to 2050 – six development risks of global change	Goals	Measures and approaches
<p>Political inclusion and participation as a prerequisite for quality of life and a goal of transformation:</p> <p>It will hardly be possible to realize political inclusion for the 2-3 billion people likely to be living in precarious, informal settlements by 2050. These urban communities will be dominated by hardship, often also by violence, sometimes by admirable self-organization as a reaction to the absence of basic public services.</p>	<ul style="list-style-type: none"> ➤ Implement the right to adequate housing and secure political inclusion rights ➤ Equip cities with the necessary decision-making powers or strengthen these powers ➤ Integrate cities better into national and regional decision-making processes by giving them opportunities for consultation ➤ Establish collaborative governance structures and integrate the entire urban population ➤ Strengthen informal settlements and city districts and incorporate them into urban development ➤ Support (transnational) civil-society networks ➤ Improve connection to global issues 	<ul style="list-style-type: none"> ➤ Use strong instruments of participation where appropriate ➤ Fight corruption and stem land grabbing ➤ Stem land and property speculation ➤ Secure right of first refusal or veto right for municipalities for plots of land ➤ Establish sustainable investment standards worldwide ➤ Develop and introduce innovative, socially compatible approaches to property taxes and real-estate transfer taxes ➤ Institutionalize advocates of global issues
<p>In the newly emerging, planned settlements, especially in Asia but also in Africa, new middle classes will demand political inclusion. Political instability threatens where this is not granted.</p>	<ul style="list-style-type: none"> ➤ Ensure that land use is oriented towards the common good ➤ Provide buildings and spatial structures to create urban quality of life, e.g. easily accessible, safe spaces with niches for different user groups to allow interaction and relaxation 	<ul style="list-style-type: none"> ➤ Keep enough urban spaces in public or community hands ➤ Introduce or strengthen social-impact analysis for land-use management ➤ Strengthen rental markets with high standards of tenant protection ➤ Create affordable housing
<p>Eigenart as a dimension of urban quality of life and a resource of sustainability transformation – dependent on opportunities for inclusion:</p> <p><i>Eigenart</i> as a condition for quality of life and a resource for transformations is dependent on inclusion.</p>	<p>In mature and newly planned cities/city districts, <i>Eigenart</i> is undermined by social and political inequalities.</p>	
<p>In informal settlements, <i>Eigenart</i> is undermined by hardship and precarious inclusion opportunities.</p>	<p><i>Eigenart</i> is under threat for over 50% of the world's population.</p>	
<p>Eigenart in informal and newly planned cities – squaring the circle?</p> <p><i>Eigenart</i> – in the sense of creative and citizen-influenced urban development – is very difficult to realize for the 1-2 billion people who will probably be living in newly planned cities and city districts in Asia and Africa by 2050. Reasons: high speed of urban construction and the prevailing top-down planning.</p>	<ul style="list-style-type: none"> ➤ Decelerate urbanization surges; polycentric spatial design instead of conventional rural-urban migration ➤ Improve quality of life in informal settlements ➤ Place the lower 40% of income groups at the centre of urban development ➤ Create inclusive city districts (people-oriented, climate-compatible) ➤ Provide buildings and spatial structures to create urban quality of life, e.g. easily accessible, safe spaces with niches for different user groups to allow interaction and relaxation 	<ul style="list-style-type: none"> ➤ Establish locally adapted planning systems ➤ Initiate a paradigm shift: strengthen initiatives for the poorest 40% of the world's urban societies ➤ Counteract the growing concentration of property and land ownership ➤ Win over relevant urban actors (e.g. local governments, architects, planners) for efforts to improve the quality of life of urban poverty groups; mobilize comprehensive public and private financial resources
<p><i>Eigenart</i> will hardly be able to express itself in informal settlements where hardship – and more often than not violence – rule, where hardly any public institutions function, and where an additional 1-2 billion people could be living in precarious housing conditions by 2050.</p>		

Summary

development. Nevertheless, in Table 7 the WBGU dares to order, concentrate and emphasize the recommendations and prioritizes them in two ways:

1. Six key development risks can be identified in the global urbanization surge with its wide range of dynamics.
2. Necessary paradigm shifts, overarching goals, and appropriate measures with a particularly large leverage effect can be assigned to overcoming these major urban problems and managing the urban transformation towards sustainability. This is not only relevant for planning and governance issues, but also, in many ways, for the activation of the transformative potential of the urban societies themselves.

As a general measure, the WBGU recommends upgrading the topic of 'Urbanization and Transformation' to a permanent item on the agenda of the G20. Germany's Presidency of the G20 in 2017 should be used to put the topic onto the agenda. The WBGU also recommends that the federal government should advocate a reform of the UN-Habitat programme and the establishment of an international scientific panel on urbanization and sustainable urban development. Despite the broad portfolio of instruments that already exists, both international research and inter- and transdisciplinary methods should be strengthened in this field because, at the end of the day, the urban transformation towards sustainability also remains a societal search process.

Introduction: The Transitory Century

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What kind of homes should people live in? Where can they settle? How close may their neighbours encroach on them?

These questions are as old as our civilization, but in the 21st century they are being asked in a new way. Because this century is characterized by a *contradiction dynamic* that eclipses much of our previous experience of social change: rapidly growing populations in many developing countries versus shrinking populations in some industrialized countries; the enrichment of tiny elites versus the ongoing economic marginalization of the majority; guarded luxury real estate surrounded by squalid, poor neighbourhoods in many megacities; improved access to basic supplies and services for billions of Earth dwellers, while at the same time their long-term life-support systems are being destroyed by resource looting, climate change and environmental pollution.

Theoretically, the globalized economy generates unprecedented possibilities for prosperity for each and every one of us, yet only a minority of the world's population has the prerequisites, the skill and, in particular, the luck to take advantage of these opportunities. The global precariat still comprises over 700 million people living on less than US\$2 a day (Cruz et al., 2015). Furthermore, over 4 billion people have to get by on less than US\$10 a day (Kochhar, 2015). At the same time, the number of billionaires is growing at breathtaking speed. As a result, in the late modern age humanity is fanning out into countless factions, spread apart by the ultra centrifuge of accelerated 'progress', which is still being driven by the massive use of fossil fuels and is becoming more and more dominated by electronic information technology.

Nothing stands still on our planet any more, and above all, hardly anyone stays in the same place. In the Europe of the 19th century, many people who first saw the light of the world in their parents' home were also laid to rest there. Today, however, anyone who grows up in a residential block, hut or villa is highly unlikely to die there. He or she will move many times during their lifetime – from house to house, from countryside

to city, from village to metropolis, from home country to neighbouring country, from continent to continent. Places of residence, workplaces, holiday destinations and retirement homes are increasingly becoming stations on the road from cradle to grave, and even these episodic lodgings only serve as points of reference for the hyper-mobile individual, who is constantly commuting, travelling, roving, fleeing. These relocations of humanity are driven by the pursuit of happiness and self-fulfilment, by human curiosity, by the efficiency logic of global value chains, or by the harsh laws of poverty, violence and social disintegration. A *civilization of accelerated movement* has emerged from the culture of immobility.

Highly diverse pull and push factors are at work, as well as strong centrifugal and centripetal forces. In the course of thousands of years, such forces have brought people together and dispersed them again, created and concentrated settlements and caused them to fray, triggered, steered, inhibited and finally stopped migrations by individuals or entire peoples. In certain historical phases, the different forces push in the same direction; in others they are in conflict with each other. In the latter case, 'trapped communities' (Foresight, 2011) can emerge, i.e. groups of people whose will to migrate is politically, economically or ecologically blocked.

One decisive contributory influence behind the emergence of today's modern period, with its extremely rapid settlement dynamics, was what happened in the 17th to 19th centuries, initially in England, Scotland and Wales. Particularly during the Enclosure Movement, there was an extensive privatization and restructuring of rural areas, which led to a dramatic increase in agricultural production. The resultant population growth created not least an army of young, displaced workers, who headed for the expanding cities of the Industrial Revolution from the late 18th century onwards (WBGU, 2011).

This development turned the historical, demographic relationship between city and countryside on its head: in 1600 about 80% of the British population were still living in the country; in 1900, by contrast,

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about 80% were city residents. The population growth was accommodated by both a denser settlement of the urban cores and the planned extension and design of the suburbs (workers' settlements, social housing, garden colonies, etc.).

This process ran its course in a similar way in all classic industrialized countries, but in some cases resulted in intolerable humanitarian conditions, so that after the 1870s – and even more so after the First World War – architects, economists, moral philosophers and politicians began to think intensively about how these conditions might be improved. Among other things, the vision of the 'functional segregation' of urban residential, working and recreational areas was concisely laid down in the Athens Charter, which was the result of a Mediterranean cruise organized in the summer of 1933 by the avant-garde urban planners association Congrès Internationaux d'Architecture Moderne (CIAM) and dominated by Le Corbusier's powerful personality. The idea was to replace the overcrowded historical cities by settlements based on a modular system (*unités d'habitations*) that expanded linearly or concentrically into the surrounding countryside.

The Charter's ideas were bold, but naive and often lacking a 'human scale'. This was shown when the basic idea was implemented in many cities in the post-war period, but often in a modified or distorted form. In this context, a special pair of factors was of great importance in Europe: first, the large-scale destruction of old city districts in the Second World War, and second, the triumph of the automobile, particularly as a result of the availability of cheap oil for geostrategic reasons from the 1950s onwards. Post-war Germany in particular, where virtually all the major cities had been bombed to rubble, was very open to visions of 'modernism' and developed it further to fit into the misguided perspective of the 'car-friendly city'. After 1960 there was a strong development towards urban sprawl, both in the USA and in the entire western world, which put functional segregation into practice at enormous environmental cost, though largely in ways that were very different from those dreamt of by the CIAM protagonists. The resulting mixed structures of grown, planned and economically opportune neighbourhoods were not yet influenced, let alone characterized, by the guiding concept of sustainability.

However, in the last decades of the 20th century, and especially after the fall of the Berlin Wall, this guiding concept gained outstanding importance in public discourse in the highly developed industrialized countries. This led not least to a discussion on problematic aspects of the contemporary design of urban and rural spaces – from landscape destruction to the acceleration of climate change by greenhouse-gas emissions

in the construction and transport sectors. In addition, planners, architects and cultural scientists agreed that the spatial reintegration of the various urban services – from accommodation to active participation in policy-making processes – was urgently required for the recovery of identity and quality of life. Today, these two largely parallel movements are united in the general call for a renewed *densification and limitation* of city areas.

This would suggest that the Athens Charter has now been rejected, although the challenges of settlements in the 21st century are much too complex to draw any final conclusions on urban development. First, there is so-called globalization, i.e. the conquest of the entire planet by a highly networked, market-economy-based production-consumption system, which is kept going and further accelerated by the intensive use of fossil energy sources. However, the course of this development is asynchronous; countries like China are rapidly catching up with the western industrialized countries, while countries in central Africa are currently only just preparing to leave the pre-modern stage. Accordingly, some regions of the world are today re-enacting different phases of European and American urban history, even if these are only touched upon and greatly speeded up. In this respect, strong centring and suburbanization forces are at work world-wide, resulting not only in primary and secondary densification processes, but also in different kinds of functional segregation. The only difference is that everything is taking place on a scale that dwarfs the historical models, as illustrated by such examples as Mexico City, Lagos and Manila on the one hand, and Brasilia, Islamabad and Songdo on the other. In modern reality, everything that is described using the generic term 'urbanization' is a fragmented, hectic, time-delayed pulsating of the global urban fabric – with a basic tendency towards expansion. For overall, the world's population is still growing at a dramatic rate.

One can either helplessly take note of this development or try to exert a positive influence on it, even try to shape it. However, anyone who concentrates solely on 'densification' will fall short. To do a better job, it is necessary to understand 21st-century settlement dynamics in its entirety, while reducing its complexity to a level that can be analysed and developed into a strategy. This is precisely what the WBGU has set out to do in its flagship report. Accordingly, it introduces a three-level analysis which distinguishes between the fundamental *forces, forms and values* of the overall system (Figure 1).

Let us begin with the *forms*, meaning the large archetypal patterns of today's urban reality. The WBGU identifies the following as basic forms: (1) the *historically*

grown, 'mature' city, (2) publicly or privately planned urbanization (most of which today is rapidly expanding), and (3) the informal settlement, whose variants range from precarious shelters for refugees to illegally built villas for oligarchs and nomenklatura. It goes without saying that there are countless nuances and transitions within these basic patterns; moreover, as a rule, the three archetypes – similar to the aggregate states of a substance – appear together within an urban municipality and mix to form heterogeneous structures. Luxury neighbourhoods and slums can often be found in immediate proximity, sometimes only separated by rough concrete walls.

But what are the forces that create the basic patterns and their mixtures? Among the many active factors, the WBGU identifies the great 'master builders of the city', namely (1) *time*, (2) *power* and (3) *hardship* as fundamental forces. Initially, this is a metaphorical way of describing urban complexity, but it does offer significant heuristic potential. Of course, each category of master builders can be broken down into various types – for example 'time' into maturing, decay, acceleration or rupture; 'power' into actor groups like the state, elites, investors, revolutionary innovators or civil-society networks; and 'hardship' into hunger, violence, overpopulation or displacement. When a settlement entity and its rural hinterland are evolving, redeveloping and declining, there are usually constellations of actors at work with alternating common and conflicting interests.

The cities of the past were the cradles of human culture, the forums of political discourse, the engines of scientific and economic progress, the venues of social integration. Can these achievements be repeated in the transitory 21st century with its tumultuous urbanization dynamics?

Again the WBGU concentrates on three qualities of human settlements which deserve and require special efforts, namely (1) *Eigenart* (a German word meaning 'character'), i.e. the unmistakeable individual manifestations of the physical and cultural living environments created by urban societies, (2) *inclusion*, i.e. enabling citizens to use and further develop their city as equals, and (3) *sustaining of the natural life-support systems*, i.e. forming and operating the urban substance in harmony with local, regional and global ecological guard rails. The WBGU regards these qualities as urban basic values and goals which fit together to form a 'normative compass'.

This is the outline of the three-level approach that structures the report and provides the basis for systems analyses and intervention options. This can be exemplified by Figure 1. Power and hardship can, for example, expedite the massive construction of soulless,

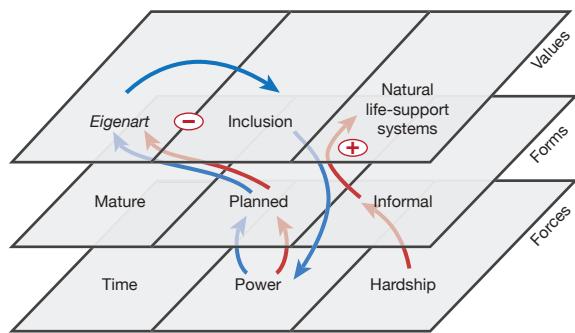


Figure 1-1

Schematic diagram showing dominant global settlement patterns (forms), their drivers (forces) and challenges in relation to the WBGU's 'normative compass' (values).

Source: WBGU

planned cities that are possibly more resource-efficient than historical city districts. On the other hand, a distinct sense of togetherness and uniqueness can rarely develop in functional, quickly built new cities that are designed on the drawing board. If, however, state control is weakened by external circumstances (such as the collapse of communism in central and eastern Europe after 1989), this can also open up opportunities for citizens to 're-conquer' the urban space, which strengthens the efficacy of civil society and with it the *Eigenart* of the respective city. The corresponding double causal network is characterized in the illustration by red/blue arrows and the +/- signs. The importance of feedback is also highlighted in this way. Proactive urban policy could use this systems perspective for orientation in order to recognize and implement effective measures for enhancing the desired qualities.

The WBGU's systems analysis also shows that there are no universal templates for the transformation towards sustainability in the highly diverse urban societies of, for example, Copenhagen, Mumbai, Kigali and Guangzhou. But, at the same time, predictable global systemic risks and regional problem centres – which should be of great importance, for example, for decision-makers in the field of international cooperation – can develop from the sum of local urbanization processes. Global settlement dynamics over the next three decades are therefore likely to influence the decision on whether critical planetary guard rails can be observed.

The poorer half of the soon-to-be 9-10 billion people on Earth are living in informal settlements, but also in mature cities, in developing countries and emerging economies, and their quality of life is massively impaired by local environmental degradation. Social exclusion and inequality, as well as the related local, national and transnational potential for instability, are on the increase in many urban formations and

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in very many societies. In the cities of Asia, and to a lesser extent in Africa, the approx. 2 billion people who will rise to the global middle classes by 2030/2040 will demand inclusion rights and could thus become engines of urban modernization. However, where these rights are not granted to them, there is a risk of political upheavals. This report examines potential ways in which these emerging undesirable developments of the global urbanization surge can be prevented as far as possible.

The WBGU's preferred way of shaping people's settlement areas *progressively as well as consistently* can already be clearly seen in the 2007 'Leipzig Charter'. The Leipzig Charter is more than a negative response to the long-discredited Athens Charter – it formulates a bright, guiding concept for the renaissance of the European city in the spirit of integration. In essence, the postulates of the Charter – i.e. "the city must be attractive"; "get the people on board"; "good governance in the city"; "climate-change mitigation is also an urban task" – precisely target the WBGU's demands for *Eigenart*, inclusion and the sustaining of natural life-support systems. However, in the WBGU's opinion the Leipzig Charter does not go far enough in at least two respects.

First, the corresponding discussions concentrate on the European city, which is largely already the product of the above-mentioned, centuries-old dynamics and where informal settlements play a marginal role in every respect. However, the future of urban civilization – indeed our entire civilization – will be decided on the *global stage* and in particular in the societies of the developing countries and emerging economies, where the majority of people currently relocating are to be found. In this respect, the Leipzig Charter must be reformulated on a global scale. How can humanity find again a guiding concept of urbanity that also corresponds to the cultural diversity of city drafts, i.e. that does not feel euro-centric but nevertheless discreetly shows the achievements of occidental cities?

Second, planetary crises – such as global warming, the scarcity of resources, social disparity and displacement – demand much faster and more profound interventions by public and private decision-makers than those proposed by the Leipzig Charter. This is why the *transformation* of modernity in its existential crisis is at the top of the global agenda. And only if the most important urban centres can marshal the strength for this transformation can it succeed worldwide. In this respect, the Leipzig Charter should be updated into a social contract for the comprehensive renewal of the global settlement system.

These are crucial and very explicit recommendations which the WBGU would like to advocate to city plan-

ners, architects, mayors and ministerial officials, but also to the national governments that make decisions on the proactive options open to cities and the directions they might take. In its report, however, the WBGU goes further and almost implicitly brings a notion into play which could help overcome the contemporary contradictions of the urban discourse: this refers to the vision of *polycentric integration*. In order to be able to understand this vision, we must return to the opposing forces of urban formation that were discussed at the beginning.

There is no doubt that, today, metropolises like London, Shanghai or Johannesburg are powerful attractors that draw resources from the broad hinterland, generate a considerable rural exodus, and expand with a growing number of suburbs and satellite settlements. The periphery, or 'urban fringe', becomes the decisive growth zone, while the centres are more often than not economically 'segregated' – and demographically and culturally depleted as a result. It is evident that there are limits to this growth – humanitarian, structural and ecological. Otherwise it would be conceivable that by the end of the 21st century there might only be about a hundred 'super cities' remaining, embedded in the global wasteland of the devalued rural areas, competing with each other for capital, talent and luxury.

But this is neither desirable nor realistic. Strong forces – such as the rapid digitization of society and the substitution of fossil fuels by renewable energy – can in fact counteract the megatrend of continuous agglomeration. A city like Hong Kong, with its enormous collection of skyscrapers, comes close to being a caricature of the 'modernistic' ideal of urbanization. Yet this structure is only viable if it constantly sucks in oil and metals, food and fibres from all over the world, digests it all on the spot, and disposes of it as metabolic residues in the surrounding area. It is impossible to imagine a less sustainable urban perspective. However, electronic communications and renewable energy from the sun, wind, waves and biomass can and should bring *space* back into the urban equation.

In order not to fall into the trap of 'functional segregation' again, and to make it possible to implement the urban qualities *Eigenart*, inclusion, and sustaining of the natural life-support systems, the ever deepening urban-rural gap must be further reduced and space created for a comprehensive polycentric perspective. This means, in a sentence, the creation of numerous networked cores of all sizes, where the generic services of the city can be combined in critical density. The polycentric renaissance of the Ruhr area is probably the best example here, but there are also many other regions and districts where this leitmotif is already operating – e.g. Emilia Romagna in Italy, the San Fran-

cisco Bay Area in the USA, Randstad in the Netherlands, the Pearl River Delta (Guangzhou) in China or the metropolitan region of Lima and Callao in Peru.

In its report, the WBGU not least submits this perspective for discussion by compiling a series of arguments and references. Two important aspects should be mentioned at this point. A more profound look into cultural history reveals that polycentric structures of settlement, the economy and governance have successfully advanced extraordinary creativity and productivity in some societies. Outstanding historical illustrations include Greek antiquity, which thrived in the Polis network and spanned the entire Mediterranean region and parts of the Orient, and the Renaissance, born in the cities of northern and central Italy, which pointed the way to modernity from the 14th century onwards. Also significant in this context was the multinuclear organization of the Holy Roman Empire of the German Nation before and especially after the Thirty Years War, where numerous small states and free cities became epicentres of progress. In an historic moment, when the ability of nation states to control and convince is on the wane, it might be useful to recall this ‘post-Westphalian’ perspective – where cities were the central places of human organization and quality of life.

Furthermore, an analysis of the present day puts the polycentric vision to a test that is related to specific crises of today. Also Germany, whose fateful ‘shrinkage’ and ‘ageing’ already seemed inevitable, has recently been directly confronted with the challenges arising from the growing influx of migrants from the Middle East and Africa. If we do not want to advocate the partitioning off of national territories in disregard of human rights (e.g. Article 16a(1) of the Basic Law, the German constitution: “Persons persecuted on political grounds shall have the right of asylum”) and humanitarian principles, we must give serious consideration to sustainable concepts for receiving and integrating millions of refugees. Initial observations and analyses suggest that – whenever they have a choice – migrants try to settle mainly in and around major cities, a fact that applies both to the migrants’ countries of origin (e.g. Syria or Ethiopia) and to the host countries (e.g. Germany or Sweden). However, there are many indications that a polycentric urban organization could significantly increase a society’s capabilities to absorb and integrate refugees and job-seekers. This should not least be a priority research topic.

Urbanization in a global context

2

In 2007, for the first time, more people worldwide lived in cities than in rural areas (UN DESA, 2015:7). This 'urban turnaround' represents a milestone in the history of human settlement and shifts the focus of policy-makers, academia, economics and society more strongly than before onto cities as the world's most important human settlement areas and habitats – and onto their importance as cultural centres, areas for creative development, political control centres and economic motors.

Cities are places where global change is both reflected and furthered. Cities and their populations are drivers of global change and, at the same time, affected by it. Particularly in developing countries and emerging economies, increasing global interdependence leads to disparate urban-development processes with heterogeneous development speeds and social fragmentation. Urban development is steered by the interaction between local, national and international actors, by economic and political processes (e.g. investments by international companies) and political restructuring (above all liberalization, participation and self-government). In addition, the internationalization of orientations, values and standards is increasingly influencing these processes and leading worldwide to a standardization of residential and building trends, as well as to networked socio-economic and politicized movements. Conversely, cities have a decisive influence on global processes. For example, some mega-cities are comparable to nation states in terms of the dimensions and effects of their CO₂ emissions or the amount of resources they consume; and, in view of their concentration and specialization in the international division of labour, some cities, like London, New York and Tokyo, have become critical hubs in the global economy (Kraas and Nitschke, 2006).

Economic activities in cities have a significant negative impact on the environment and the Earth system through both direct effects on the surrounding areas and remote effects in other regions (Section 2.3). Furthermore, global urbanization with its propagation and diffusion processes of urban ways of life triggers

irreversible changes in the societal orders of states. Cities are a key transformation field for the transformation towards sustainability (WBGU, 2011), because the structural and systemic design of present and future urban centres exerts a considerable influence on regional and global sustainability (Satterthwaite, 2003). The ecological consequences of, for example, a lack of sustainable urbanization strategies are already evident in many cities in developing countries and emerging economies, even though large sections of the urban populations have hitherto been unable to afford a consumer-oriented, resource-intensive life style (Satterthwaite, 2003:77).

Seen from a comprehensive sustainability perspective, not only the impacts on the local and global environment are relevant, but also the economic, social and political consequences. Cities have a key role to play in overcoming global poverty, in the realization of new forms of political participation and the reduction of socio-economic disparities. They offer growing populations non-agricultural employment opportunities and social advancement, improved healthcare services, social security, education and self-realization.

2.1

Current urbanization dynamics

2.1.1

Global and regional urbanization dynamics

The dynamics of the transition to an increasingly urbanized world vary from region to region. Europe, North and Latin America already experienced intense urbanization in the 20th century. The level of urbanization, i.e. the urban population as a percentage of a country's total population, is about 73% in Europe, 80% in Latin America and 81% in North America, whereas city residents still account for a much lower percentage in Asia (48%) and Africa (40%) (UN DESA, 2015;

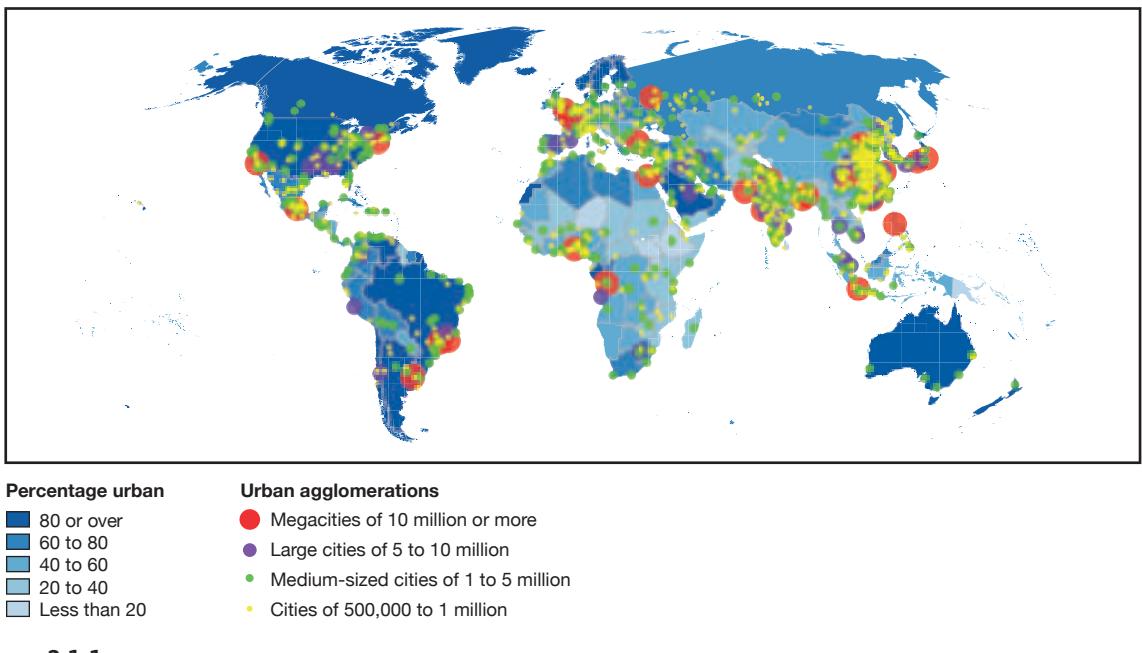


Figure 2.1-1

City dwellers as a percentage of the population by countries; global distribution of cities with more than 500,000 inhabitants (2014).

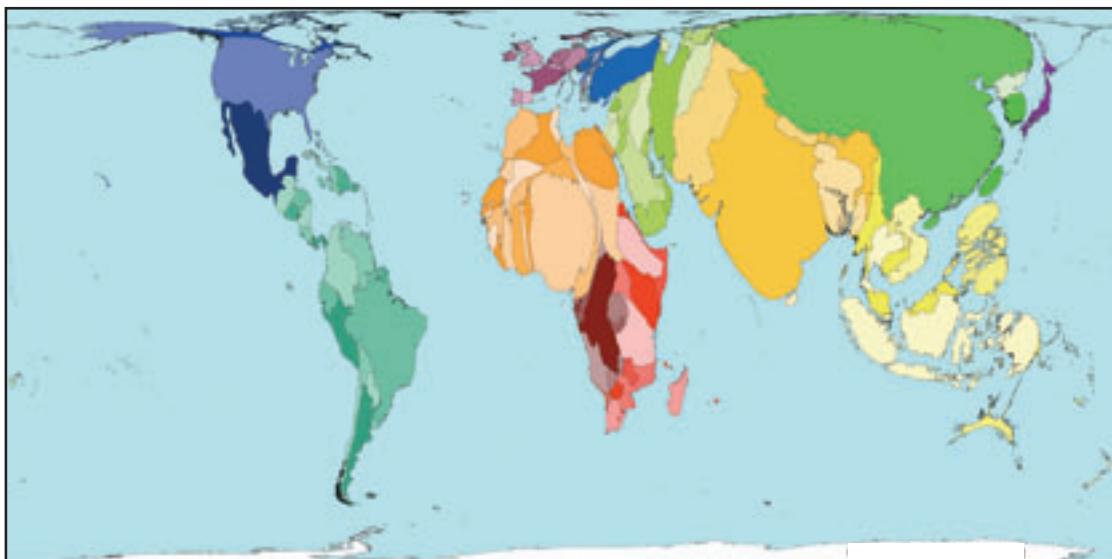
Source: UN DESA Population Division, 2014

Figure 2.1-1). In the 21st century, urban growth will be concentrated mainly in Africa and Asia (Figure 2.1-3). According to United Nations forecasts, the level of urbanization will rise to 56% in Africa and to 64% in Asia by 2050. The urbanization level in Europe, Latin America and North America is likely to rise only moderately. In 2050, 73% of the global urban population are expected to be living in Asia and Africa (UN DESA, 2015); today the figure is approx. 65% (Figure 2.1-4).

Large differences emerge when urbanization levels are studied in relation to a country's level of development: in industrialized countries the urbanization level is likely to increase from 78% in 2015 to around 85% in 2050; in developing countries and emerging economies, by contrast, an increase from 49% to 63% can be expected. Because of the higher population figures in Asia and Africa, this will involve a significantly higher absolute increase in the urban population (Figure 2.1-2). In India, for example, the level of urbanization only rose from 28% to 31% between 2000 and 2010, but that meant an absolute increase of 85 million inhabitants (UN DESA, 2015). About 90% of total world-population growth is expected to be in Africa and Asia in the period 2014–2050. This corresponds to approx. 2.2 billion people (UN DESA Population Division, 2015) who will be needing housing, work and supplies of basic goods and services. This will pose major challenges for many countries in the coming decades, particularly in the context of informal urbanization

processes (Box 2.1-1). Seven countries are expected to account for about half of urban growth (1.24 billion people): India (404 million), China (292 million), Nigeria (212 million), Indonesia, USA, Pakistan and the DR Congo (over 50 million each; UN DESA, 2014).

The shifts within the system of cities will continue in the coming years with a growing number of cities and mega-cities (Section 2.2.1). Until 1950, there were only two mega-cities with more than ten million inhabitants: New York and Tokyo. Up until today, the number of mega-cities has risen to 28 (Figure 2.1-5); by 2030 there are likely to be 41 mega-cities, which will then accommodate 14% of the urban population (730 million inhabitants). In 2030, about 434 million inhabitants (9% of the world's urban population) will live in 63 cities in the 'emerging mega-cities' size category of 5–10 million inhabitants. The number of urban residents living in cities with 1–5 million inhabitants (called 'medium-sized cities' by the UN) is expected to increase most in absolute figures from 128 million to 1.13 billion inhabitants in the period 1950–2030. The relative share of the population in cities with between 0.5 and 1 million inhabitants in 1950 only came to 8.8% and is expected to rise to 10.1% by 2030, which corresponds in absolute terms to slightly more than half a billion people worldwide. Cities with fewer than 300,000 inhabitants are home to the largest share of the global urban population. Although their relative share of 60% in 1950 will decrease to 38% by 2030,

**Figure 2.1-2**

Growth of the urban population (2002–2015): map of the world. The size of territories of the countries on the world map (a cartogram) is distorted. The country depictions are not based on land area, but on the number of additional city dwellers who moved to cities in the respective countries between 2002 and 2015.

Source: © www.worldmapper.org

approx. 1.9 billion people will be living in these cities in 2030 (UN DESA, 2015; UN DESA Population Division, 2014). While mega-cities and million-strong cities will thus experience most growth in relative terms, cities with fewer than half a million inhabitants will continue to be the most significant category in absolute population figures. The global distribution of different types of cities has important implications for the functioning of national and international city systems and is therefore much more than just a marginal statistic. The configuration of the national city systems is relevant, e.g., for local concentration overload, national decentralization and the centre-periphery divide, as well as for the global urban future (Section 2.2.1).

Urban shrinkage as a development trend

The opposite process to the global growth of cities and the urban population is that of urban shrinkage, which is neither a new nor a geographically limited phenomenon (Hollander et al., 2009; Martinez-Fernandez et al., 2012). Currently, large-scale shrinkage processes are to be found particularly in the USA (in the Rust Belt, e.g. Detroit), Europe (e.g. Ruhr area, Manchester, Liverpool) and Japan (Sorensen, 2006; Wiechmann, 2008), in the old industrial regions of China, and in the peripheral regions (i.e. predominantly rural areas) of many developing countries and emerging economies. For the decade from 2014 to 2024, the United Nations predicts a fall in population for 3% of cities (>300,000 inhabitants) worldwide (UN DESA Population Division, 2014). A decline in the absolute urban population is expected

in 19 countries up to 2050, including Japan, Russia, Germany and Cuba (UN DESA, 2015). In Germany, e.g., 23% of municipalities (with at least 5,000 inhabitants) recorded a decline in the population between 1990 and 2010; in the case of small and medium-sized cities, as many as 41% are shrinking (BBSR, 2015); in France this is happening in 18% of the municipalities, in Hungary in as many as 51% (Wiechmann, 2015).

Whereas the urban shrinkage of the 1980s and 1990s in Europe was due to sub- and exurbanization processes – i.e. migration from inner cities to the suburbs, or residential relocations from densely populated areas to neighbouring rural regions – urban growth and shrinkage can be observed today as parallel processes in some regions (Turok and Mykhnenko, 2007). These

**Figure 2.1-3**

Urbanization, a megatrend. Jakarta, Indonesia.

Source: Frauke Kraas/WBGU

2 Urbanization in a global context

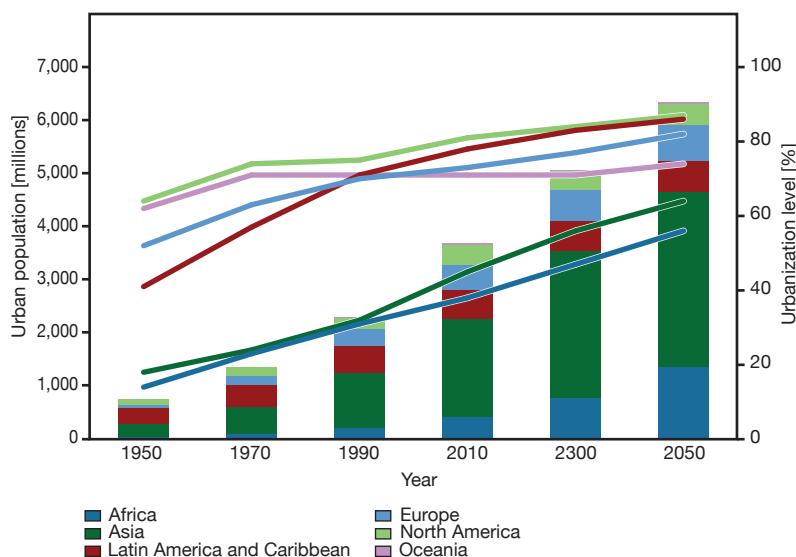


Figure 2.1-4

Urban population (columns) and level of urbanization (lines) by region (1950–2050).

Source: WBGU based on data from the UN DESA Population Division, 2014

are complex processes sometimes rooted in local production cycles with economic, demographic, spatial and social causes. In the former Eastern Bloc states, demographic effects (emigration and falling birth rates) were mainly responsible for urban shrinkage. In many old industrial cities and regions, de-industrialization processes are the primary cause of shrinkage processes. Especially cities with an import-competing economic structure that did not simultaneously initiate the switch to a service- and knowledge-based industry, are among the losers of structural change and the globalization of economic interdependency. These cities not only lost jobs as a result of the more favourable production conditions abroad; their relative economic importance also declined as a result of the success of the export-oriented cities. Today they are character-

ized by high unemployment and emigration (Ezcurra and Rodriguez-Pose, 2013; Daut et al., 2014). A further consequence is a high level of housing vacancies. Since buildings are durable goods, the excess supply of residential and commercial properties as a result of emigration manifests itself in the erosion of local real-estate prices. Despite far-reaching political interventions, such as subsidies and investment grants, it was almost impossible to stop the exodus from these structurally weak regions.

For a long time, in the context of a policy led by premises of growth, shrinkage processes were a phenomenon that was ‘not envisaged’ in urban and regional planning (Wiechmann, 2009). More recently, however, urban shrinkage processes have increasingly been addressed in urban planning, especially in Ger-

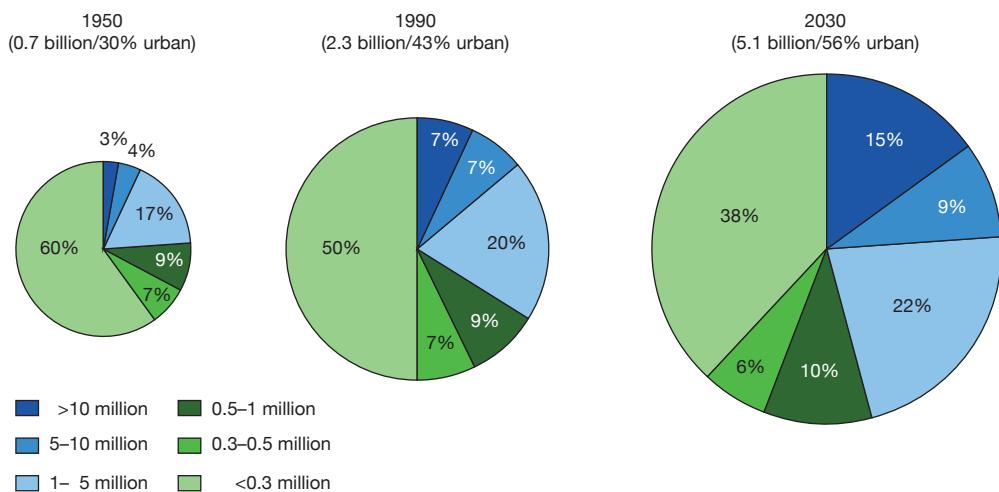


Figure 2.1-5

Global urban population distribution (absolute and relative) by city-size class (1950, 1990 and 2030)..
Source: WBGU, based on UN DESA Population Division, 2014

Box 2.1-1**Development of informal settlements worldwide: status quo and forecasts**

Informal settlements come into existence as a result of the rapid processes of urbanization, like those currently taking place especially in the cities of the emerging economies and developing countries (Davis, 2006:31). These processes have been intensifying since the 1940s in South America, since the 1960s in South Asia, and since the 1970s in Sub-Saharan Africa (Bähr and Mertins, 2000; UN-Habitat, 2003). Important reasons for this were, and still are, the lack of affordable, adequate housing created by both the public and private housing markets, poor governance, ineffective urban planning and low levels of investment in urban infrastructure. In addition, informal urbanization processes are reinforced by rapid population growth and migration, especially by people with a low socio-economic status (UN-Habitat, 2014b; Section 7.3).

There are considerable deficits as regards the data basis, due to differences in the definition of informality (Box 2.1-2), the diversity of informal settlements, and related delimitation difficulties, as well as the lack of data available on the number of residents of informal settlements and their living

conditions in many countries (UN-Habitat, 2015d). Although there are no estimates on informal settlements, nearly a third of all city dwellers in emerging economies and developing countries lived in slums in 2014 (UN, 2015d). The number of slum dwellers as a relative percentage of the urban population actually declined between 2000 and 2014 from 39% to 30%; in East, South-east and South Asia by more than 12 percentage points (Figures 2.1-6, 2.1-7). The highest percentage remains 55% in Sub-Saharan Africa. Overall, the living conditions of 320 million people were improved between 2000 and 2014 because they received access to either an improved water supply, better sanitation facilities, adequate housing or less dense living conditions (UN, 2015d:60). However, the absolute number of slum dwellers rose worldwide to a total of 850 million people in 2012 (UN DESA, 2015).

In view of the continuing high level of urbanization dynamics especially in African and Asian cities, a severe lack of adequate, affordable housing will continue there in the near future if there is no massive effort to counteract this problem (Section 7.3). Otherwise, the number of residents of informal settlements could grow by a further 1–2 billion people by 2050 (UN DESA, 2013), with considerable impacts on the urban transformation towards sustainability.

**Figure 2.1-6**

Approx. 850 million people currently live in inadequate housing conditions; informal settlement in Seelampur, Delhi, India.

Source: Frauke Kraas/WBGU

**Figure 2.1-7**

Informal settlements of temporary migrants near the Yamuna river, Delhi, India.

Source: Frauke Kraas/WBGU

many (BBSR, 2015). In addition to developing new economic locational strategies and concepts for the planned dismantling and conversion of abandoned residential areas, and the re-vegetation of formerly built-up areas, this requires a paradigm shift away from growth-oriented planning (Wiechmann and Pallagst, 2012). In view of generally declining tax revenues in shrinking cities, this conversion can pose great challenges for cities, but it also offers chances for sustainable development.

2.1.2**Drivers of urbanization**

The growth of cities worldwide is driven by different dynamics, which are influenced by the natural location, the availability of resources, demographic structures, local or national economies, political systems and infrastructures. In addition to quantitative growth of cities in terms of area and population (accompanied by urban redevelopment or densification, e.g. through high-rise development), the term urbanization also means the diffusion of urbanity, i.e. urban qualities, economic activities and characteristics as a social phenomenon

Box 2.1-2**On the (changed) understanding of informality**

The concept of informality has developed since the 1970s in the discourses on economic development in the developing countries (Hart, 1973; Schamp, 1989; Escher, 1999). The term was taken up and spread by the International Labour Organization in its studies on development economics. The concept of informality referred exclusively to non-registered economic activities by poor sections of the population, e.g. street traders, non-registered employees in the transport and repairs sector, or waste collectors in the cities of the emerging economies and developing countries. These areas were seen in contrast to formal, state-registered business activities. This narrow view of separate sectors was gradually extended to a study of two overlapping economic cycles (Santos, 1979). Prosperous informal sectors have only been taken into account in the more recent literature (Werna, 2001; Roy, 2009).

In the meantime, the interconnectivity of the formal and informal economies is hardly called into question, because a dichotomization of formality versus informality obstructs one's view of the many complex interactions between the actors involved. It therefore does not seem appropriate to classify the various transitions, mixed forms and entanglements of socio-economic, political or cultural activities, arrangements and procedures as formal or informal.

Bearing this in mind, civil-society networks and private

investors have increasingly been included in the discourse on informal settlements alongside state organizations (Mitlin and Satterthwaite, 2004). In addition, the rigid contrasting of formality and informality has been watered down. The various theoretical-conceptual developments that are merging the two dimensions are similar in this context. Terms used in the meantime include "informality-formality continuum" (Roy, 2005:148), "degrees of complementary and supplementary informalities" (Altrock, 2012:176f.) or "co-production by formal and informal actors" (Mitlin, 2008: 14). AlSayyad (2004) has even declared informality to be a new urban life form – based on Louis Wirth's article 'Urbanism as a way of life' published in 1939. Because of the remaining vagueness, other authors now question the benefits of the informality concept altogether, and refer to an analysis of 'negotiations of power, legitimacy and resources' for urban development that is independent of the concept (Herrle and Fokdal, 2011). This approach in particular points to the possibility or necessity of legitimizing urbanization processes outside the formal legal system (Herrle and Fokdal, 2011:11f.).

The term informality usually describes the grey zone of legal and illegal action (Section 2.5.2.2) and, in principle, covers both non-conforming, legitimate processes and illegal, criminal processes. Although the transitions are fluid, they can basically be distinguished by whether the non-conforming processes aim to promote the common good or, for example, secure the chances of survival, or whether individuals or groups exploit the precarious situation of poorer population groups to get rich (Wehrmann, 2001).

(Heineberg, 2014:31, 414f.; Figure 2.1-8). Attempts to explain urbanization relate primarily to demographic, economic or societal processes, all of which are closely interwoven.

2.1.2.1

Demographic factors

Urbanization is initially a demographic process. The (relative and absolute) growth of the urban population is based on natural growth or immigration, as well as changes in administrative borders through the incorporation of surrounding villages, etc. The importance of these processes varies over time and according to region (Jürgens and Bähr, 2009:43).

In the industrialized countries, after the first major urbanization and city-founding phases in Antiquity and the Middle Ages, there was a further urbanization phase with a strong growth in the urban population between 1750 and 1950. It was triggered by the first demographic transition, as well as national and international migratory movements from the country to the cities, caused by industrialization and structural change in agriculture. In Duisburg, for example, approx. 60% of the population in 1907 had relocated there, 13% of these from abroad (Stewig, 1983). According to estimates, 50-55 million Europeans emigrated over-

seas between 1820 and 1920 (net migration, i.e. taking return migration into account), approx. 60% of them to the USA (Bähr, 2010); many of these people settled in cities in search of work.

The pace of city growth in the developing countries and emerging economies, which, especially in Asia and Africa, did not begin until the second half of the 20th century in the course of decolonization, is currently much faster than in the industrialized countries (Section 2.1.1). The main factor here is the surplus of births over deaths because of the young age structure (Heineberg, 2014). Approx. 60% of urbanization in developing countries and emerging economies is due to natural growth, and almost all the remaining growth to migration (country-to-city and city-to-city); only a small percentage is a result of the reclassification of administrative units (UN DESA, 2015:24). However, the percentages vary regionally. While approx. two-thirds of the urban population increase in Sub-Saharan Africa is due to natural growth (Tacoli et al., 2015), the corresponding figure in many Asian countries has fallen below 50% since the 1990s (UN DESA, 2015:24). However, international comparisons are made difficult by incorporations of surrounding villages, etc., different definitions of the city, and a lack of data on migration at the city level (Tacoli et al., 2015). In addition,

**Figure 2.1-8**

Cities as socio-cultural, religious and economic centres of attraction, Dhaka, Bangladesh.

Source: Frauke Kraas/WBGU

migratory movements are difficult to quantify because they can be multi-local and/or temporary (e.g. seasonal). In Thailand, e.g., it is estimated that one third of all internal migrants migrate temporarily to Bangkok every year during the dry season (Tacoli, 2011).

The distance and duration of migration are closely connected with the causes of migration (Kraas and Bork, 2012). These can include voluntary migration into cities (e.g. in search of better job opportunities, education or healthcare), officially initiated and controlled labour migration, seasonal labour migration, and forced migration caused by crises and conflicts. In recent years, civil wars and conflicts in the Middle East and Africa (particularly Syria, Afghanistan, Iraq, Nigeria and Eritrea) and economic crises in the western Balkan states (especially Albania, Kosovo and Serbia) have triggered large waves of refugees to Lebanon, Jordan, Pakistan, Turkey and Europe. The number of asylum applications in Germany, for example, rose from 127,000 in 2013 to about 500,000 in 2015; there was a total of over a million registered refugees (BMI, 2016). Providing refugees with housing is a big challenge for cities and municipalities.

In addition to national and international migration, the ageing of the population associated with the demographic transition is a key challenge. While over-60-year-olds currently make up 12% of the population worldwide, in Europe the figure has already reached 24% (UN DESA Population Division, 2015). In the USA, this ageing process is still greatly mitigated by immigration. By 2050 – with the exception of Africa – it is anticipated that at least a quarter of the population in all regions of the world will be over 60 years old (UN DESA Population Division, 2015). Especially in regions with high emigration, it is the older people who remain behind. In these regions, shrinkage and ageing are closely related processes that make a transforma-

tion process more difficult due to a lack of financial resources (Sorensen, 2006:237). The rising average age of the urban population poses new challenges for many cities in the fields of housing, the residential environment, transport and social services.

2.1.2.2

Economic factors

One important attraction of cities for migrants is the larger and broader range of job opportunities. For example, industrialization was an important driver of urbanization in industrialized countries from the 19th century onwards (Section 2.2.2). Globalization and the revolution in transport and communications have led to a reorganization of global economies with ever-increasing links between markets and a growing global division of labour (Hall and Pfeiffer, 2000).

Cities with an export-oriented sector mix benefit from the increasing integration in the world market, since the additional demand from foreign markets strengthens the local economy and creates new jobs. Local economic activities that primarily manufacture goods for local and regional markets also benefit as a result of the more vigorous local consumption (Moretti, 2010) and from links along the value chain (Dauth et al., 2014).

Cities with an ample supply of building land and an unbureaucratic planning system or few regulatory restrictions respond to population pressure by building new houses and apartments. When there are supply constraints, the population pressure leads primarily to higher real-estate prices (Glaeser et al., 2005). In cities with a high proportion of poverty groups and a lack of affordable housing, it is primarily informal settlements that grow when housing is in short supply (Section 7.3). On the other hand, if affordable housing is available, this can lead to population growth in the respective cities. One example is city growth in the ‘Sun Belt’ in the USA (Glaeser and Gottlieb, 2009). The resulting urban sprawl, i.e. the expansion of a city’s area, leads to ecological sustainability deficits (Sections 4.2.3, 4.3).

In order to attract scarce know-how, more and more companies are taking the housing-location preferences of highly qualified employees into account when they make site-location decisions (Geppert and Gornig, 2010). A good range and quality of local assets such as cultural amenities, leisure facilities and shopping opportunities, which make a city more attractive and influence the migration decision of many households, are therefore a positive factor in attracting companies (Chen and Rosenthal, 2008; Partridge, 2010; Buch et al., 2013).

Particularly in the industrialized countries, economic growth, the availability of jobs, the regulatory require-

ments of the real-estate market, and the cultural attractiveness of a city are important drivers of urbanization. The number of inhabitants and the population density in turn affect productivity, local price levels and the attractiveness of a city. Agglomeration advantages are generated by the supply of specialized employees, larger local markets, easier access to suppliers and specialized service providers, lower transaction and information costs, and the fact that geographical proximity simplifies interaction, the exchange of information and the formation of networks. This releases innovation potential and efficiency gains, leading to improvements in productivity. Agglomeration disadvantages in highly densified urban areas arise as a result of a higher cost of living and smaller average residential and commercial units. The concentration of population and production sites in a limited space also leads to a higher level of environmental (noise and air) pollution, as well as higher crime rates (Rosenthal and Strange, 2004; Duranton and Puga, 2004; Section 2.3.4).

The picture in developing countries and emerging economies is more differentiated. Particularly in China and India, urban growth has been pushed forward by a globalization-driven liberalization policy (Kraas and Bork, 2012). In China, first the coastal cities, then the inland cities, were expanded into transformation centres during the transition to a market-oriented economy, and internal migrants were specifically (in some cases temporarily) recruited. 17-20 million migrants every year were registered in cities between 1982 and 2006 (Chan, 2011). In India, massive urbanization processes have accelerated across the country since 1991 in the course of the reforms of the 'New Economic Policy' (Gans and Tyagi, 2000; Nissel, 1999).

Particularly in the developing countries, moving to the city is associated with the hope of better job opportunities and adequate basic services. When a city grows without proper political or administrative control, and growth is decoupled from economic growth, the agglomeration disadvantages outweigh the advantages as a rule (Clark, 1998; Cohen, 2004; Fox, 2008). This is especially true of cities with fast, unplanned growth that already have a high rate of poverty (Moretti, 2014) and whose immigrants are largely concentrated in the informal housing and labour market (Box 2.1-3).

2.1.2.3 Societal factors

Socio-cultural and political factors are further important drivers of urbanization, and they are closely connected with demographic and economic factors. Socio-cultural factors, e.g. the attractiveness of a city, are difficult to define because they are very subjective. Nevertheless, it is possible to generalize that cities offer

a number of advantages (pull factors) in the socio-economic and cultural field, too. Secondary schools and universities, hospitals and highly specialized health facilities, public services and administrations are concentrated in urban centres; cultural amenities, creative urban milieus, an architecturally inspiring ambience, etc., make for attractive urban spaces. Generally, a city's position in the hierarchy of cities – measured in terms of its size and importance – correlates in most countries with the administrative and political hierarchy (from the national capital to the regional or provincial capital to the district and sub-district capital); the supply network is also geared to this hierarchy (Satterthwaite, 2005: 15f.).

Cities are regarded as pioneers of social change because of the mutually influencing socio-economic and cultural relations at the local level and the macroeconomic changes resulting from globalization (Hall and Pfeiffer, 2000: 140). Important mutually influencing factors are the role of the family, the integration of women into the labour market, and the movement from the formal to the informal economy (Hall and Pfeiffer, 2000). Increasing pluralization and individualization of life styles, often coupled with post-material values, are the consequence for the growing upper class in the cities in developing countries and emerging economies. Large sections of the population below the absolute poverty line remain primarily focused on the satisfaction of their basic needs.

2.1.3 Urban change processes

Different change processes can be observed in the above-mentioned urbanization processes – depending on the varying national and regional contexts and the respective size and function of the city. Some of these change processes are of a spatial and ecological nature, others have political, economic and social implications for urban society.

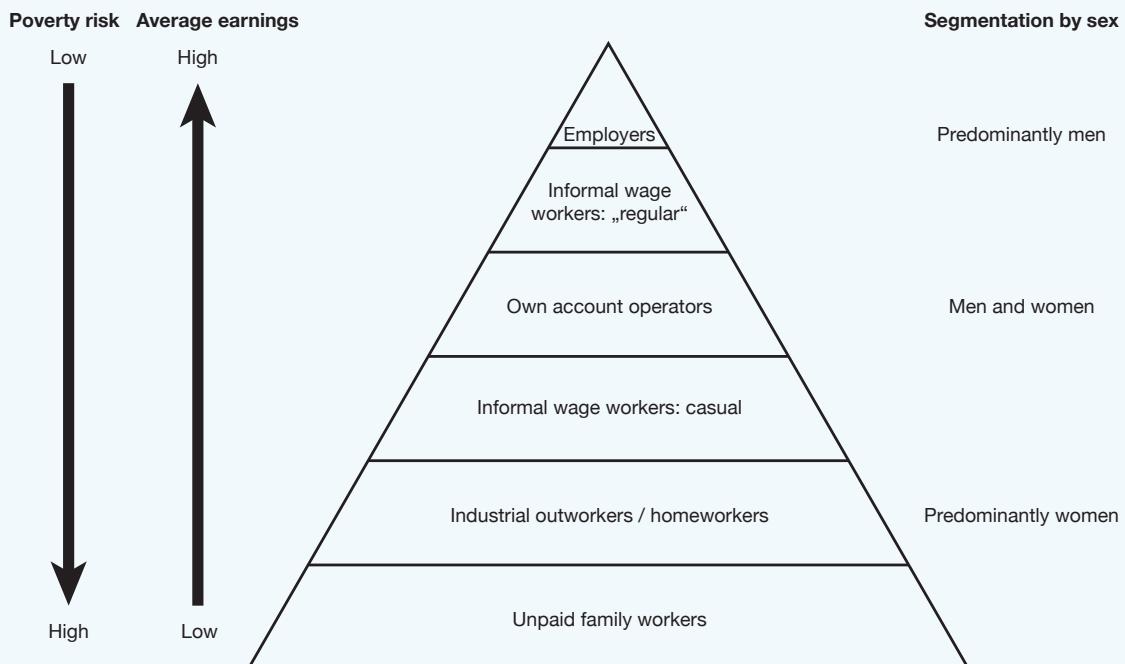
Spatial processes

The physical expansion of cities beyond their former building borders often follows key infrastructure lines or takes on the form of satellite cities, which gradually spread by accumulating new urban land uses. This development pattern increases land consumption and requires long lines of infrastructure. The emergence of 'extended metropolitan regions' (McGee, 1991) or 'mega-urban regions' (McGee and Robinson, 1995) leads to urban and rural elements and structures interacting in the 'urban fringe', i.e. the area directly surrounding the city (Figure 2.1-10). Furthermore, different complex situa-

Box 2.1-3**Informal economies in slums and informal settlements**

It is often assumed that slum residents are only employed in the informal economy. Yet some of these people have regular jobs in the formal sector, even though they live in an informal settlement. In many cases, people's income from formal work is not enough to finance a household in adequate housing. Overall, employment in the informal sector is not restricted to slums. While around a third of the urban population in emerging economies and developing countries live in slums (UN, 2015d), "for most countries of the global South, informal employment is the most common work relationship [...], which applies to far more than half of employees. In 15 of the

41 countries for which data based on the ILO definition of informal employment exist, more than two thirds of the employees can be assigned to the informal economy (ILO, 2013). 24 countries reach a percentage of more than 50%. The respective continental records are as follows: in Asia 84.3% (India), in Latin America 75.6% (Bolivia) and in Sub-Saharan Africa 82.7% (Mali)" (German quote translated from Schiller, 2015). The number of jobs in the informal sector is growing in many cities. In this way, the informal sector also supports the formal economy, which is not limited by national borders but is also part of the world economy. The economic risks are unevenly distributed in this context. For example, people working in the informal sector generally do not have any institutionalized social security, and disparities between the genders increase as a result of segmentation on the informal labour market (Figure 2.1-9).

**Figure 2.1-9**

Forms of informal employment and their effects on income and poverty.

Source: Chen, 2012b:9

tions become established from often unplanned or partially planned, incoherent or incompatible, privately or publicly owned islands of different uses, often without any economic, social or functional context (Coy and Kraas, 2003).

Ecological processes

The environmental problems related to cities manifest themselves in the city itself, in the surrounding region, and in the Earth system and are linked by complex interactions (Section 2.3). As centres of economic activity, cities are key drivers of local and global environmental changes. This is where the population, especially the

emerging middle classes, make their consumption decisions, which have a great impact on global resource use, waste production and greenhouse-gas emissions, and act as drivers of global environmental problems (e.g. changes in land use, ecosystem conversion, loss of biodiversity, and climate change; Section 2.3.3). Particularly in the case of climate change, cities are not only polluters, but also affected parties (Section 2.3.4.4). The climate risks include e.g. threats to cities by rising sea levels, water scarcity (as a result of glacial melt or changes in rainfall patterns), rising local temperatures or the threat of disasters as a result of more frequent extreme weather conditions (heavy precipitation events, severe storms).



Figure 2.1-10

Urban landscape, Phoenix, Arizona (2007).

Source: Frauke Kraas/WBGU

Technological transformation processes

The spread of digital media and new information and communication technologies also influences the way people live together in cities. In the urban context, the digitization debate and the increased networking of physical and digital infrastructure – e.g. smart grids, intelligent traffic control by means of information exchange in real time – is being held under the heading ‘smart city’.

As yet, there is no consensus on what exactly constitutes a smart city (Bieber and Bihr, 2015). Many definitions vie with each other, and specific projects at the city level subsumed under the smart-city concept are eclectic (Rohde and Loew, 2011). Nevertheless, the smart city is already being used in urban planning as a guiding principle of urban-development policy (BBSR, 2014b) and has found its way into political planning projects. For example, the Indian Prime Minister Narendra Modi announced India’s intention to build 100 smart cities in the next few years with the help of foreign investors in order to keep up with the rapid wave of urbanization (Ministry of Urban Development – Government of India, 2015). Since the current discourse is strongly influenced by the technology producers, technology-driven urban design also prevails in practice (BBSR, 2014b).

The hoped-for benefits of the smart city include e.g. a reduced consumption of resources by means of improvements in efficiency (Box 2.1-4), a more democratic design of government operations, and an optimization of administrative processes (Boxes 8.2-3, 8.3-1). At the same time, the smart city also involves risks, particularly with regard to the operational safety of cities, data privacy, and safeguarding personal rights (Box 2.1-5).

Economic transformation processes

The global restructuring of production processes within urban economic centres in the course of technological change and the international division of labour leads to globalization winners and losers, as well as to a worldwide increase in inequality within many nation states and cities (Box 2.1-6; Section 2.4.2.1). While global cities like London, New York, Tokyo or Hong Kong are flourishing economically and continue to gain in importance thanks to agglomeration advantages, old industrial cities in western Europe, the USA and China are battling to cope with structural change. Many processes have a self-reinforcing effect, as in the case of Detroit, where job losses led first to a population exodus, then to a decline in values on the local real-estate market and thus to a collapse of the municipal revenue base, and finally to municipal bankruptcy (Richardson and Nam, 2014). In addition, the public sector’s influence on the provision of the population’s needs declined, especially in the 1990s and 2000s, as a result of the privatization of formerly public services. In many cases, this has led to a less inclusive supply and to protests among the population, so that a growing remunicipalization can now be observed (Lobina et al., 2015).

The growing importance of the real-estate-investment market is also reflected in the urban structures (Box 2.1-7). In many cases, this represents a problem for urban development, since often incoherent, individual developments make it more difficult to find favourable solutions for all population groups. For example, the construction of shopping malls (for Asia see Hogan et al., 2012) and business improvement districts (Peyroux et al., 2012) increasingly shifts functions from the public sphere to private spaces, to which poorer population groups have only limited access.

Another important factor for economic transformation processes is the informal sector in the urban economies, especially in developing countries and emerging economies (Box 2.1-3). The informal sector there generates income for large sections of the population, but often eludes formal control processes and involves a wide range of partly legitimate, partly illegitimate or illegal activities (Altrock, 2012; Schiller, 2015; Baumgart and Kreibich, 2011; Etzold et al., 2009; Hackenbroch et al., 2009). It is important for the planning and design of urban management processes to take into account the often close interaction between formal and informal systems, e.g. in the case of municipal waste disposal, where the removal of recyclable material frequently takes place in the informal sector (Kraas and Kroll, 2008; Sections 2.3.4.3, 4.4).

Box 2.1-4**Smart cities: use of energy and resources**

One of the main motivations behind the idea of the smart city is to use resources more efficiently. This can be achieved via different concepts, such as smart electricity meters and smart lighting, the optimization of material flows, or the sharing economy – in which individual ownership and use is replaced by joint ownership and use. In the following, some examples are presented that use new or existing technologies to make resource-intensive living and working in the city more sustainable.

Smart meters

Smart electricity meters enable the user to read the energy consumption of an individual device or the entire household at any time. Such transparency aims, for example, to raise consumers' awareness of their energy footprint and thus to encourage more sustainable behaviour. However, experiments with smart meters (e.g. in Holland, England and the USA) have had little effect so far. The actual energy savings are about 1–4% (van Elburg, 2014; Allcott and Mullainathan, 2010).

The so-called 'machine-to-machine' concept (M2M), i.e. networked and communicating objects, goes one step further than simply reviewing energy consumption with smart meters. Networking the physical infrastructure ('internet of things') enables objects to collect information that lead to improvements in their operating efficiency. M2M is used e.g. in the energy sector (intelligent networks), in the infrastructure (heating and cooling systems, lighting) and in agriculture (irrigation, fertilization). According to a study by the Boston Consulting Group and leading information- and communication-technology companies, this technology promises emissions savings of up to 20% (BCG and GeSI, 2012). To date, however, there is little data and few forecasts from independent sources, so that a reliable assessment of future efficiency gains from M2M technology is not yet possible.

Smart lighting

Smart lighting is a further key technology of the digitally networked city and can be a component of an M2M network. Lighting public and private spaces accounts for about 10–20% of urban energy use (IEA, 2006). Switching from the permanent lighting of road crossings, billboards or public spaces to lighting only when it is required could significantly reduce

existing consumption levels. Studies on intelligent lighting control in cities show potential savings of up to 60% (Manville et al., 2014). There is thus great potential for energy saving here that is hitherto largely untapped; it can be implemented using today's technology and makes economic sense.

Car sharing

The term car sharing denotes the joint use of a car fleet. Future greenhouse-gas emissions could be avoided through car sharing because users of car-sharing services tend to drive about 30% fewer kilometres by car than people who have their own car (Martin and Shaheen, 2011). Furthermore, the capacity utilization of cars in car-sharing schemes is higher, which could shorten parking times and thus reduce the amount of space required for parking (Mitchell et al., 2010). Some of the people who use car-sharing services give up the idea of buying a car of their own altogether (Millard-Ball et al., 2007; Martin et al., 2010). Not least, the growing acceptance of electromobility could help increase the number of electric vehicles in car-sharing fleets.

Up to now, the savings generated by car sharing are still in the single-digit percentage range (Chen et al., 2015), because the service is only used by a small proportion of the population. However, car sharing in Germany has become a growth market in the last few years and is reporting double-digit growth rates in the meantime. Despite the low participation figures up to now, a car-sharing fleet equipped with electric cars could therefore contribute to avoiding greenhouse-gas emissions in the transport sector in the future.

Status quo versus future development

As yet, the current share of smart urban infrastructure is only having a negligible impact on global greenhouse-gas emissions and the prevention of environmental damage. The measurable effects of smart-city concepts are lower than expected, and conventional efficiency-improving solutions such as thermal insulation, compact infrastructures and switching to low-emission means of mass transport have so far shown higher energy savings potential (e.g. approx. 20% by 2050; Creutzig et al., 2015).

Even so, the smart city has great potential for raising efficiency, which could significantly lower the future demand for energy in cities worldwide. Many developments are currently on the verge of a technological breakthrough (Brynjolfsson and McAfee, 2014) or could lead to a change in the population's behaviour patterns.

Social transformation processes

As a rule, societal heterogeneity increases with the size of the urban population. In addition to ethnic and religious differentiations, a leading role in societal segmentation is played by socio-economic status, defined primarily by education, profession and income. Socio-economic disparities – especially in the metropolitan areas and mega-cities of developing countries and emerging economies – lead to a polarization of society. In many cases, socio-economically disadvantaged population groups who work in the formal low-wage sector or in the informal sector, seldom manage to gen-

erate enough income to subsist, so that they usually live in poor housing conditions, e.g. in formal or informal slums or degraded housing estates, and have inadequate access to physical infrastructure (e.g. water, sanitation systems) or services (e.g. healthcare, education; Section 3.4.1). Moreover, this group suffers in particular as a result of the deterioration of the urban infrastructure in the course of the rapid urbanization in developing countries and emerging economies. Worldwide, socio-economically disadvantaged urban residents have fewer resources at their disposal to protect themselves from urban risks such as environmental

Box 2.1-5**Smart cities: risks****Protection of privacy and personal data**

In the future, the collection of data will take on unprecedented proportions in terms of both the number of characteristics ascertained and the quantity and resolution of the data (Crawford and Schultz, 2014). More and more everyday actions, habits and movement patterns of urban residents are being digitally registered as a result of the increased networking of physical and digital infrastructure (Box 2.1-4) and the introduction of sensors, cameras and geo-localizable applications on smartphones. Residents have little chance of avoiding or monitoring the generation of data, because it is otherwise difficult to use municipal services or public spaces. This severely limits the right to informational self-determination. The sheer quantity of the available data also involves risks in relation to the anonymization of data. Exchanging and merging different data sets enables businesses and authorities to compile personality profiles and predictions on an individual's behaviour (Kitchin, 2016). Examples include predictions as to whether a prospective tenant or mortgage client will pay regular instalments or rent, or the classification of people as potential criminals using a data-based environment analysis (e.g. social networks, telephone data history) of convicted offenders (Crawford and Schultz, 2014; Stroud, 2014). A new dimension in the scale of potential monitoring and data abuse is being opened up particularly by the registration of people's location and movement patterns within a smart city.

Operational security, data security

As in all digital networks, there will also be security loopholes in smart cities, making them vulnerable to possible cyber-attacks. The number of possible targets for attack rises with the size of a network. The danger posed by cyber-attacks will therefore increase as the physical and digital infrastructures within a city become more closely connected (Kitchin, 2016). Nevertheless, security measures that are already technically possible, such as encryption and authentication, are not even being consistently applied now. For example, an IT team from IOActive recently demonstrated how an unencrypted

traffic-control system with 200,000 sensors can be manipulated (Cerrudo, 2015). Because of the high population density in cities, the danger for people will increase exponentially if security loopholes in the digital infrastructure lead to operational faults and failures or are exploited by cyber-criminals. 593 million database entries were stolen by hackers in 2013 alone (Risk Based Security and Open Security Foundation, 2013). The secure storage of data is also a prerequisite for the protection of personal data and people's privacy. Nevertheless, even when the highest digital security standards are maintained, there always remains a risk of data leakage or a targeted manipulation of the system.

Digital divide

Digitization creates many opportunities, but not all countries and population groups benefit equally from them. Differences in network access and/or media skills could further exacerbate the existing inequalities in income and education, as well as in political and economic inclusion (World Bank, 2016a). In addition to technical risks and the data-privacy problem, digitization therefore also entails social risks, particularly in relation to a possible digital divide.

Conclusions

"It is evident that the smart-city technologies make new demands on the legal and regulatory framework across all levels of governance, and challenge existing societal norms and expectations in relation to privacy" (German quote translated from Kitchin, 2016: 28). In the WBGU's opinion, an open and broad-based debate should be held on the impact of digitization in the urban context. This makes it necessary to strengthen IT and media skills within the population, as well as in public and private institutions. Since both the technical possibilities and the associated risks are advancing at a rapid pace, urban governance needs to be in a position to help shape the highly unpredictable digitization process in the city, and to create a socially compatible and sustainable digitized city (Boxes 8.2-3, 8.3-1). In view of the embedding of the city in international information and data exchange, multilateral actors are also called upon to develop global standards for dealing with digital risks.

pollution, natural disasters or crime. The growing economic middle class, by contrast, can offset the deficits of the public sector by using private services, above all in the fields of education, health and the water supply. As they become financially stronger, the middle classes in developing countries and emerging economies can overcome the classic problems of environmental health ('brown agenda'), but at the expense of regional and global ecosystems ('green agenda').

As a result, population groups with different origins, income levels and educational backgrounds form mosaics made up of different sub-societies within the city, who live together or side-by-side in a confined space and often have very different expectations concerning the amount of space and resources they need. The resulting fragmentation, new diversity and heterogeneity

make anticipatory urban planning and development difficult, but also lead to the development of new, in some cases self-organized supply and interaction structures and make urban innovation possible.

Political transformation processes

Growing challenges in the management of increasingly complex urban areas also lead to changes in the structures of governance (UN-Habitat, 2009b). Many urban actors from the fields of politics, business and civil society pursue different interests and use different resources in this context. The tasks of the governments have become increasingly complex over the last few decades, especially in fast-growing cities. Whereas the political and economic coordination of development projects used to be the main issue, ever since

Box 2.1-6**Inequality in the global distribution of income and wealth**

The growing inequality both in terms of income and assets and in terms of the resulting 'capabilities' (Section 2.4.2.1) is one of the greatest present-day challenges in many countries worldwide (Dabla-Norris et al., 2015; OECD, 2015b). Income inequality has risen sharply over the last 25 years, particularly in industrialized countries and the emerging economies of Eastern Europe and South-east Asia (Figure 2.1-1). This applies both to periods of economic recovery and to the duration of the global financial and economic crisis (OECD, 2015b). On the other hand, the trend is declining in South America, Africa and the Middle East, albeit from a very high level (Figure 2.1-11). Compared to income distribution, the distribution of wealth is much more uneven. Both in industrialized countries and in emerging economies, the Gini coefficient for wealth is twice as high on average as the figure for income (Dabla-Norris et al., 2015).

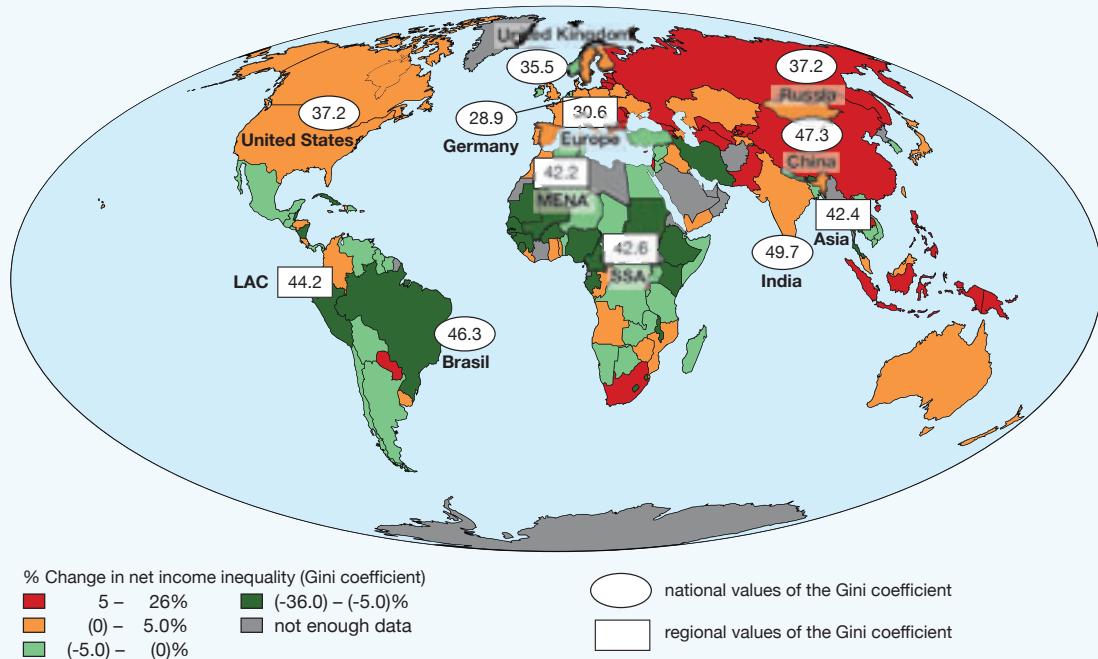
Global trends such as globalization and technological change are stated as reasons for the increase in inequality. According to this argument, new information and communication technologies increase demand especially for highly qualified workers, who have thus received relatively higher wage increases over the last few years than less skilled workers (Acemoglu and Autor, 2010; Berman et al., 1997; Katz, 1999). In addition, jobs involving a high proportion of routine tasks are more likely to be automated (GOOS et al., 2014) or relocated to countries with lower labour costs (Feenstra and

Hanson, 1999, 2001), leading to polarizations on the labour market.

In addition to market-driven processes, a strong influence is exerted on national income development by national framework conditions and reforms, particularly in relation to the labour market and to tax and social policy. For example, the decline in trade-union membership in many countries is reducing the relative influence of employees in pay negotiations for highly skilled and unqualified employees (Jaumotte and Buitron, 2015).

A much-noticed attempt at an explanation is based on a mechanical inequality dynamic (Piketty, 2014). This dynamic is created when the return on investment is higher than the rate of economic growth and the saving ratio rises with increasing income. Under these conditions, the earnings of people who already have assets and those who only earn a salary or wage drift further and further apart.

A high level of income inequality within a country can only be explained to some extent by income differences between regions with strong and weak economies. Rather, the differences in income are most striking in the cities of a country and are far above the national average in the larger cities (Rode et al., 2009; Behrens and Robert-Nicoud, 2013; UN-Habitat, 2010a). The urban level is also important when it comes to wealth inequality, since most people's assets are tied up in real estate (Davies et al., 2011), and changing prices on the real-estate markets consequently have a direct impact on private wealth. The current urbanization dynamic can therefore be expected to further exacerbate income and wealth inequalities within countries (Behrens and Robert-Nicoud, 2013).

**Figure 2.1-11**

National income inequality (2012) and changes in income inequality (1990–2012). Gini coefficient = 0: income is equally distributed; Gini coefficient = 100: income is concentrated in a single person.

Source: Dabla-Norris et al., 2015

Box 2.1-7

Increase in importance of the real-estate-investment market

Since the 1990s, the real-estate sector has been undergoing a process of professionalization, and the real-estate-investment market has been growing in importance. Apart from small private investors and companies that use real estate commercially, new institutional actors – such as public authorities, foundations and churches – are now operating in addition to the traditional institutional investors. The new institutional actors account for a growing share of real-estate transactions; they appear as non-listed companies – such as open-ended property funds and private equity companies – and as listed companies, such as real-estate corporations and real-estate-investment trusts. The companies issue shares to private or institutional investors, who participate in the performance of a diversified, professionally managed real-estate portfolio.

The real-estate market is divided into the housing market (owner-occupied, cooperative and rental apartments), the office real-estate market, and the real-estate market for commercial, industrial and retail companies. The transaction volume of the commercial real-estate-investment market in particular (defined here as commercial real estate and development properties) has been increasing steadily since 2001 (Figure 2.1-12). It peaked in 2007 at more than US\$ 1 trillion. In the subsequent years of crisis, the transaction volume fell by 65.5% to US\$ 366 billion in 2009. Investment now concentrated mainly on established locations in the global financial and economic centres; riskier investments in the emerging markets of Latin America, Europe and Asia were avoided after the real-estate bubble burst (Deutsche Hypothekenbank, 2013).

Global investment in real estate has been again rising continuously since then, partly due to the increasing importance of the Asian real-estate-investment market, which only experienced a slight fall in transaction volume during the crisis, and partly due to the recovery of the American market. The main investment incentive at present is the low level of interest rates, which favours bank loans to finance the purchase price. Investments outside Europe, Asia and North America still only make up a small proportion of total investment.

The increase in the importance of the real-estate-investment market has been accompanied by growing internationalization. The number of cross-border transactions as a percentage of the total volume of transactions fell disproportionately during the real-estate crisis, but has been rising continuously since 2009 (Spars and Busch, 2015). Cross-border real-estate investments concentrate on the internationally networked cities and urban regions. Only 300 cities accounted for 72% of global cross-border investment in commercial real estate ('Global300-Cities'; JLL, 2014). Within this group, 64% of cross-border real-estate investments are, in turn, concentrated on the top-30 cities; as much as 33% can even be assigned to the four main investment locations: London, New York, Tokyo and Paris (Spars and Busch, 2015).

Apart from commercially used property, cross-border investment in real estate also includes residential real estate. This applies, for example, to Germany, where large amounts of real estate have been sold to foreign investors over the last few years (e.g. 110,000 residential units by the Bundesbahnhofvermögen (Federal Railway Authority) in 2001, including 61,000 to Deutsche Annington; 82,000 units belonging to GAGFAH by the Federal Insurance Fund for Salaried Employees to Fortress in 2004; and 92,500 units belonging to LEG NRW to Whitehall/Goldman Sachs in 2008; Classen and Zander, 2010). It also applies to the USA, where the market segment of multi-family houses has a greater importance for foreign investors than for domestic investors, according to Mauck and Price (2014). According to Savills (2015), international investment in residential real estate flows into the global economic and financial centres, which, as in the case of commercial investments, are regarded as safe havens for capital. There they concentrate mainly in the best locations or are used to purchase luxury properties. This sometimes leads to considerable price differences between residential properties in the best locations and those in the average or less popular locations within a city. The most globalized markets have the biggest price differences.

In many countries, however, there are restrictions on purchases of residential property by foreign investors. China, for example, has its 'home purchase restrictions', and in Singapore and Hong Kong license fees ('additional buyers stamp') restrict foreign investment in residential real estate (JLL, 2014).

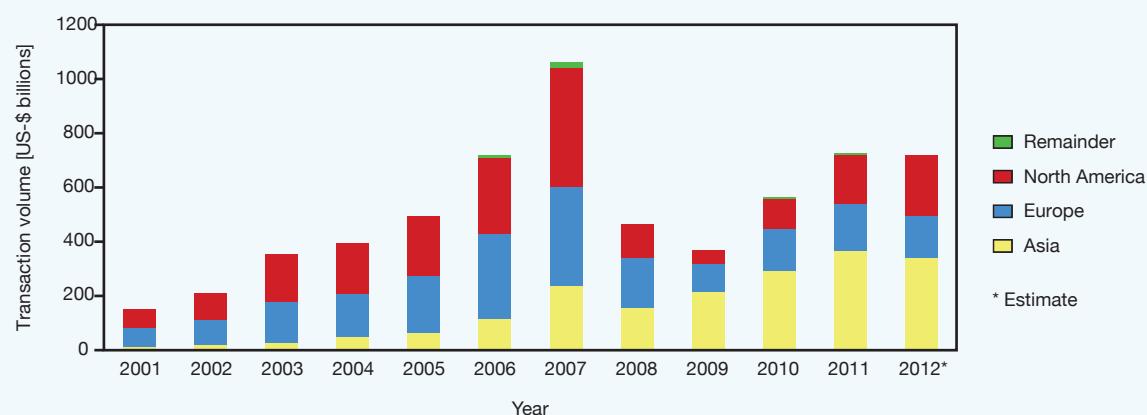


Figure 2.1-12

Transaction volume on the real-estate-investment market by region (2001–2012).

Source: Deutsche Hypothekenbank, 2013

Impact on financial stability

Since the subprime crisis, which triggered the bank crisis and the subsequent economic and government-debt crisis, the real-estate markets and their role in relation to global financial and economic stability have been at the focus of attention. In the last few decades, real estate has become transformed into a mobile asset class as a result of the real-estate industry's increasing capital-market orientation. Especially in combination with a strong increase in the availability of loans, sharp price rises on the real-estate market are regarded as a threat to financial stability.

Since 2007, work has been ongoing to reduce the vulnerability of the financial system. The aim is to minimize the systemic risk by means of macro-prudential stability measures – i.e. regulatory activities aiming to stabilize the financial system as a whole – and reforms of monetary and fiscal policy.

Impact on the urban structures

The supply and demand situation of several real-estate submarkets depends not so much on local factors as on the international capital-market situation. As a rule, the focus of international institutional investors is on dynamically developing locations (Heeg, 2003). Any segmentation or polarization trends have a negative impact on the future prospects of existing problematic locations in the cities (Spars and Busch, 2015) and can lead to the displacement of existing uses and user groups (Levasier, 2010; Pütz, 2001). The internationalization of local real-estate markets is also leading to changes in functional, urban and architectural design. On the one hand, a potential increase in international homogeneity of architecture and urban development is being discussed, because of institutional investors' penchant for established standard

concepts (Knox and Pain, 2010). On the other hand, innovative architectural concepts like The Gherkin in London or Marina Bay Sands in Singapore are being developed in order to attract international attention (Spars and Busch, 2015). The newly developing global cities of the emerging economies will therefore also be seen as laboratories for new architectural and structural concepts (Ren, 2011).

In many cities, the functional change initiated by real-estate investors in cooperation with the urban administrations is also affecting the use of public spaces. For example, popular places for spending time in European cities are shifting from public shopping streets to shopping centres, which are subject to the private house rules of the operators.

In English-speaking countries especially, cities are entering into targeted partnerships with private investors to provide public local goods and to relieve the municipal financial budget. For example, since 1961 a law in New York has been promoting the provision and maintenance of publicly accessible places by private property developers in exchange for a building permit for additional storeys. Today, New York has a total of 530 privately owned, publicly accessible places (Schmidt et al., 2011). A similar development can be observed in London. At least 16 publicly accessible places in London are in private ownership (The Guardian, 2012).

The privatization of public space has been criticized particularly in connection with the function of publicly accessible places as (political) public spaces (Nemeth, 2008). Protest meetings and demonstrations are not allowed at these places. This was shown, for example, in the course of the Occupy movement in 2011, when companies made use of their householder's right and prohibited the protests on their land.

the introduction of the concept of sustainable development, and as a result of the debate on the MDGs and SDGs, the focus has increasingly turned to social and ecological dimensions (Box 8.4-1). Modern urban systems are characterized by complex interdependences and interaction patterns involving different institutions, actors, functions and spatial levels. They therefore require constant adjustments on the part of institutions and new forms of interaction between the government and the urban society (UN-Habitat, 2009b: 73). In many cities in developing countries and emerging economies, however, an increasing loss of governability can be observed, which is undermining both a fair organization of municipal tasks and the local authorities' ability to plan and manage (Coy and Kraas, 2003:39). There are also key problems with regard to the integration of informal processes and structures into formal management systems (e.g. land-ownership titles in informal settlements). Furthermore, corruption, clientelism and autocratic forms of governance make sustainable urban transformation difficult.

Outlook

The rapid urbanization process in developing countries and emerging economies, and the urban-transformation processes in already highly urbanized regions, will have a major impact on the living conditions of the majority of the world's population in the future. They imply far-reaching ecological, political, social and economic changes. Especially in the growing cities of the developing countries and emerging economies, there is a window of opportunity to shape urban growth in a sustainable way by means of smart urban-planning and infrastructure concepts; for, after all, the high persistence of the built-up urban environment determines path dependencies that are difficult to reverse (Section 4.2.3).

Moreover, technological innovations such as increasing digitization are expected to cause disruptive changes affecting all aspects of societal coexistence. Today's dynamics are only just the beginning of potentially substantial changes, so that the consequences of digitization for society, politics and the economy are currently unpredictable. There is a considerable need for research.

2.2

Understanding the city

2.2.1

Definitions and characteristics: the city as a spatial organizational form for humankind

Since the ‘urban turning point’, cities across the world have become the predominant human habitat (Section 2.1.1). In view of their great complexity and diversity worldwide, however, there are different definitions, concepts of the city, designs and criteria for differentiating between the city and its environs.

2.2.1.1

Concepts of the city

Today, the statistical-administrative concept is the most important criterion for delimiting cities. It is determined using a nationally defined inhabitant threshold value, i.e. a minimum number of inhabitants, and relates to the population within certain administrative borders. These minimum population figures frequently lie between 2,000 (e.g. in Germany) and 10,000 (e.g. in Switzerland) inhabitants (Fassmann, 2009: 43); threshold values in other countries often deviate significantly from this range, e.g. in Japan with 50,000 inhabitants and Iceland with 200 inhabitants (Gaebe, 2004: 19). Cities are also defined by a minimum density; for example, a regional centre (Oberzentrum) in Germany must have at least 100 inhabitants per km² (Lichtenberger, 1998: 31). In addition, some statistics go beyond monocentric cities and also include polycentric agglomerations (e.g. in the USA or India).

Urban agglomerations are contiguous settlement areas that include the inhabitants of a centre or several urban centres and the areas situated adjacent to or between the centres (urban environs). Internationally, there is no uniform definition on classes of city size or for delimiting a city from rural areas (Heineberg, 2014). This makes it difficult to apply urban classifications based on inhabitant thresholds, e.g. small, medium, large cities, metropolitan areas and mega-cities (Fassmann, 2009). Moreover, the administrative border demarcations vary from country to country; for example, the population statistics for the Shanghai agglomeration include the rural environs, while in India in 2011 about 24% of the total population lived in medium-sized ‘villages’ of 2,000 to 5,000 inhabitants, which would elsewhere already be classified as cities (IIHS and IUC, 2011: 12).

The different statistical threshold values continue to prevent a uniform international classification of cities

today; this makes indicators very vague and ultimately non-comparable (Fassmann, 2009: 43) when contrasting different national urbanization levels (i.e. the urban population as a percentage of a region’s total population) and urbanization rates (i.e. the percentage rate of growth of the urban population), as e.g. in the case of the UN World Urbanization Prospects (Section 2.1).

2.2.1.2

Urban characteristics

Quantitative parameters, e.g. the number of inhabitants, the population density or the number of jobs, are not enough to understand urbanity. Cities have been and are marked by different functional demands in different epochs and cultures. They are cultural and political centres, trade hubs and production sites, centres of culture and art as well as of scientific and cultural progress. Different power and societal structures are reflected in different urban forms and in specific socio-economic phenomena, structures and processes. Because of this urban heterogeneity, it makes sense to use different characteristics to clarify the complex concept of the city (Heineberg, 2014; Fassmann, 2009; Zehner, 2001; Gaebe, 2004):

- *Minimum size and population density:* These parameters apply to a compact settlement area with a high level of development and population density (multi-storey buildings) and a decreasing density gradient towards the outskirts.
- *Functional structure:* Functions are spatially separated within a city. Especially in larger cities, the main business centre (City or central business district), residential districts, open spaces, local recreation areas, locations of manufacturing industries, etc., form a complex functional-spatial and often hierarchical structure of inner-city centres and sub-centres. The spatial distribution of economic sectors is influenced by real-estate and land markets.
- *Urban-rural linkages:* Cities usually have an ‘excess significance’ vis-à-vis rural settlements, i.e. they supply not only the local population, but also the hinterland with essential goods and services, e.g. in the fields of education, administration, retail trade or healthcare. They have a high proportion of employees in the secondary, tertiary and quaternary sectors. The excess significance of cities leads to complex interactions with their environs due to imbalances in the fields of jobs, housing and services. The range of functions can radiate internationally, e.g. in the case of important cultural and financial centres. Furthermore, cities are centres of innovation where new political and societal ideas evolve

- and technologies are developed, which then spread gradually or suddenly in the hinterland and beyond.
- *Societal plurality:* Compared to rural areas, cities have more social, religious and ethnic diversity, resulting in a broad range of economic activities, population groups, income and life-style groups, and the formation of social groups and milieus.
 - *Socio-economic disparities:* In cities there are usually greater disparities between socio-economic groups, which can also be reflected geographically by differences in inner-city design and the structure of land and rental prices, e.g. in gated communities (closed residential complexes or quarters with different kinds of access restrictions) or in slums.
 - *Artificial environmental design:* Cities are landscapes that have been reshaped and changed by people; as a rule they are subject to (excessive) ecological strain, e.g. by high emissions and soil sealing. Ecological problems are often externalized as a result of the city's resource-dependence on the hinterland, e.g. in relation to supplies of drinking water and food. The city environs thus have an ecological compensation function.
- The combination of these different qualitative and quantitative criteria makes the phenomenon of the city clearer, although the transitions and borderlines to rural areas remain fluid.

2.2.1.3

Urbanity

Urbanity is defined by urban ways of life, cultural diversity and the culture in a city: 'The generally accepted characteristics are the size, density and heterogeneity of the urban population. This results in physical proximity with simultaneous social distance and reticence between people, the anonymity of social intercourse, marked differences between the public and private spheres, distinct life styles, and ethnic, cultural and social diversity. Places are perceived as urban if they reveal certain elements of urban development and are equipped with cultural amenities and educational institutions. The societal differences between the city and rural areas are historically specific and connected with different emancipatory dimensions. Urban culture was only able to evolve after the idea of the city as self-cultivation had developed, i.e. after humanity became independent of the constraints of nature' (German quote translated from Brunotte et al., 2002:273).

Thus, cities are characterized by a diversity of social worlds, ethnic and religious groups and minorities, cultural scenes and moral milieus. Spatial and social concentrations of differently constituted population groups evolve in cities; they exist partly as interacting social groups, and partly as parallel cultures with

few or no links. A wide range of processes of integration and synergy, transnationalism, segregation, separation, fragmentation, diaspora and ghetto formation shape entire cities or specific city districts. Non-integration, segregation and spatial or socio-economic disparities lead to many different forms of urban competition, conflict, exclusion, poverty, and sometimes crime and illegality.

Urbanity is also influenced by the culture of a city, the totality of customs, traditions and entrenched attitudes that make up the specific character of an urban settlement.

2.2.1.4

Urban-rural linkages

Urban-rural linkages are characterized by different processes. Former, relatively inflexible spatial patterns are increasingly becoming less rigid due to the expansion of urban habitats and the distance-shortening effect of globalization-driven change processes. The shift of the main focus of growth (of population, production, trade and services) from the inner city to the environs is referred to as suburbanization, while the process of peri-urbanization refers to the structural and socio-economic transformation of the environs outside the suburban area (Heineberg, 2014). The dissolution of the historical, compact city by deconcentration, decentralization and urban-redevelopment processes is also described using terms like 'urbanized landscape', suburbia or 'in-between city' (in German 'Zwischenstadt'; Sievers, 1997). Further concepts of urban rural linkage include exurbanization (relocation of growth to rural areas), counter-urbanization (relocation to small and medium-sized cities) and reurbanization (relocation from the hinterland back to the inner city). Reurbanization as a phase of the urbanization cycle, which can currently be observed in Germany, is caused by an increase in the attractiveness of inner-city residential locations for young, but also for older people, e.g. because of easier daily mobility and better supply infrastructures (Matthes, 2014).

2.2.1.5

Types of city

Functional, qualitative and quantitative criteria are used to make distinctions between cities. A metropolis is 'a country's leading agglomeration(s) (...), where the most important political, social, economic and cultural facilities are concentrated' (German quote translated from Taubmann, 1996:5). The statistical threshold often used is 1 million inhabitants in a monocentric overall area with a minimum density of 2,000 inhabitants per square kilometre (Bronger, 2004:31). However, there is no generally accepted definition. The

term global city is primarily used to denote economically dominant cities of global importance, such as London, New York or Tokyo, which constitute international control and monitoring centres of the global economy in the economic-functional urban hierarchy (Sassen, 2002; Taylor, 2015). The definition of a 'world city' (in German 'Weltstadt') goes further in terms of content and refers to leading international cities with added cultural, political and social importance. Mega-cities are distinguished according to qualitative and quantitative criteria. Quantitatively, the threshold values are either 5 million inhabitants and a minimum population density of 2,000 inhabitants per square kilometre (Bronger, 2004), or 10 million inhabitants (UN DESA, 2015). However, purely statistical borderlines prove to be inadequate, so that qualitative characteristics are also added. These include e.g. intensive, globally induced concentration, reorganization, densification and expansion processes, functional primacy city dominance (i.e. a country's capital city completely dominating the system of cities with an above-average concentration of population and economic power and an absence of other large urban centres), diversification of inner-urban structures of centres, and symptoms of infrastructural, social, economic and ecological overload – especially in developing countries and emerging economies – the formation of polarized and fragmented societies, and the increasing loss of controllability and governability as informality grows (Kraas, 2007).

It is more difficult to find a quantitative and qualitative definition of small and medium-sized towns, where a majority of the world's urban population lives. On the one hand, the threshold values for inhabitants vary considerably depending on the national context. In Germany, 'medium-sized towns' (Mittelstädte) are defined as having a population of between 20,000 and 100,000 (Gatzweiler et al., 2012); the European Spatial Planning Observation Network defines 'small and medium-sized towns' as having 5,000 to 50,000 inhabitants (Servillo et al., 2014); the United Nations even calls cities with 1–5 million inhabitants 'medium-sized towns' (UN DESA, 2015). Due to advancing urban growth and generally rising population figures, spatial research now calls cities with 50,000 to 250,000 inhabitants medium-sized towns (Lindner, 2010). On the other hand, due to the large number of cities involved, heterogeneity is much greater in this category than in the case of mega-cities, because cities above a certain size have more things in common (Heineberg, 2014). The considerable heterogeneity of medium-sized cities, and the difficulties of generalizing beyond the national context, also partly explains the relative neglect of medium-sized cities in research and practice (Servillo et al., 2014; Gatzweiler et al., 2012).

In Europe there is a growing research interest in small and medium-sized cities (for Germany, see Gatzweiler et al., 2012; Kühn and Milstrey, 2015; Heinrich, 2013; for Europe: Servillo et al., 2014; Borsig et al., 2010).

Since cities are exposed to different problems – which vary according to the regional context, socio-cultural past, size and function – and have different solution strategies, drawing up a hierarchy based on quantitative and functional characteristics is important for understanding national urbanization processes (for functions of European metropolitan areas, see BBSR, 2011).

2.2.1.6

City systems and city networks

Cities form regional, national and international city systems, i.e. they are connected in a wide variety of ways through interrelations (e.g. positional, size-related, structural or functional relations), or interactions (e.g. transport routes, interaction and information flows, trade, capital transfers, power relations, migration flows). City systems have a marked influence on the development and transformation of individual cities via the contexts in which they were formed, their procedural changes and future priorities (Heineberg, 2014). City networks and voluntary intermunicipal forms of cooperation offer advantages for a balanced and fair spatial planning policy (e.g. deconcentration, centralization or decentralization of functions), for common, synergistic project planning, and for the improvement of locational and living conditions in the region. Regional and global city systems are involved in an ever-increasing exchange of services by means of a coordinated assumption of certain functions, through which economic and infrastructural synergy effects can be generated. This can be illustrated, for example, by analysing the relationships between global cities as nodes or control centres of the globalization process (Taylor, 2015). According to studies conducted by the Globalization and World Cities Research Network, London (as a transnational platform for global service operations) and New York (as an innovation centre for global service products) are the most intensively networked cities in the world, followed by Hong Kong and Paris. Leading global cities like São Paulo, Mexico City, Mumbai, Shanghai, Moscow and Beijing reveal a shift in the international hierarchy of cities from industrialized to developing countries and emerging economies (Taylor, 2015).

Also beyond the hierarchy of global cities, cities fulfil hierarchically different functions according to rank size and importance at the regional, national and international levels (Blotevogel, 2004; BBSR, 2011). A high concentration of functions in primate cities, as

for example in Paris or Bangkok, connected with major socio-economic disparities in the respective countries, contrast with more decentralized systems of cities, e.g. in the USA, Germany or Indonesia.

2.2.2

Historical processes, path dependencies and socio-cultural city types

2.2.2.1

Development pathways of global urbanization

Cities developed after the 9th millennium BCE, representing the most formative innovation of humanity in the Fertile Crescent, in Mesopotamia – the land between the Euphrates and the Tigris – at specifically selected locations of regional spiritual and cultural importance, as well as at points of contact and junctions of trade routes, river crossings, bays or ports. Further motives for founding cities included supraregional military, strategic or political importance, specialized societal functions (especially the specialization and stratification of skills, crafts and knowledge), as well as control of resources, populations, or transport, supply and defence infrastructures. Extended rights, in some cases privileges, widened the hierarchical gap between cities and the rural hinterland, but also generated mutual dependencies and interactions.

Ever since Antiquity, the term ‘city’ has stood above all for rights. From the establishment of the Greek city states until the early modern age, the citizens enjoyed special privileges and freedoms. In the Middle Ages in Europe, these freedoms were granted when the sovereign awarded city status, which gave the city privileges such as judicial, market or staple rights (‘Stadtluft macht frei’, ‘town air makes you free’). Alongside the city charter and the market and sovereign functions, town fortifications were the third key characteristic of European cities (Fassmann, 2009). With the formation of modern nation states, cities lost this special legal status and ‘city’ became an administrative category that has a certain planning relevance, e.g. when it comes to location issues (such as the ‘concept of central places’: Section 2.2.1).

In the following, the very different development pathways of urbanization and cities before, during and after industrialization are initially discussed in relation to the historical development of Europe; the focus is on areas from which a sustainable urban future might develop (see Section 2.2.2.5 on other regions of the world). In this context, global urban history reveals itself on the one hand as having an evolutionary, if not linear process structure with many pathways, and

on the other hand as an expression of incremental or targeted planning of urban infrastructures and spatial design, which are also the subject of urban utopias and dystopias.

In terms of global history, the phenomenon of the city can be understood as “a method for the societal organization of space” (German quote translated from Osterhammel, 2009:355). It is possible to identify different historical layers of development in its spatial design: “We can read time in space” (German quote translated from Schlägel, 2003). In this context, (urban) spaces form relational orders/arrangements of social goods and people; social goods are defined as products of (im)material action (Löw, 2001). The city thus forms a socio-spatial pattern which is continuously newly created by rearranging, i.e. by intentional and non-intentional dynamics and consequences. However, space only becomes effective when people and social goods are actively joined together through processes of perception, imagination or remembering (Steets, 2008).

2.2.2.2

First and second urbanization phase: pre-industrial cities and urbanization

The Neolithic Revolution, the period when humans first began to settle and make the transition to livestock farming and agriculture during the New Stone Age (i.e. Neolithic period), was followed in the 9th millennium BCE by a phase when the first cities were established. Cities began to differ quantitatively and qualitatively from the settlements of people who, while also sedentary, were more widely scattered. This involved not only the possibility of practising agriculture to jointly meet basic needs, but also cultural factors such as religious cults and the local setting. Military and political security were key motives for establishing cities. Urban centralization had economic functions from the outset. Cities were market places, nodes for the exchange of goods, and places of payment. Specialized occupations could only develop because the population densities reached in cities generated sufficient demand (Benevolo, 2010).

The geographical spread of cities was a fairly steady process during their first millennia. Cities increasingly appeared in Mesopotamia around 4000 BCE, soon afterwards in the Nile valley and finally in the Mediterranean region. This diffusion led to individual development pathways. For example, the city of Uruk was founded around 3000 BCE and was the largest city in the world at that time with a population of 50,000. Parallel to this, cities emerged in the Indus culture during the Harappan era between 2600 and 1900 BCE, as well as in China in large numbers around the 3rd millennium BCE. At this early stage, urbanization was mainly

driven by migratory movements of the rural population, surpluses from agriculture, greater political stability and the development of long-distance trading routes (Benevolo, 2010; Clark, 2013:6; Heineberg, 2014). Urban planning at this time can be understood as the manifestation of (religious-spiritual) cultural development, political and military power, production and trade, and responses to urgent environmental problems (e.g. own drinking-water supplies and sewers; Benevolo, 2010; Clark, 2013:8).

In the European context, the spread of cities as social innovations went hand-in-hand with an intensification of inter-city trade. Long before the emergence of the nation state, first Phoenician, then Greek, and finally Roman city networks formed around the Mediterranean; these can be seen as harbingers of today's globalization. Political stability was essential for trade; it encouraged migration and cultural exchange and thus the first attempts at trans-urban societies, i.e. societies whose inhabitants regularly travel between the cities, engage in trade, and are ultimately socially integrative or integrated members of several urban societies.

From the very beginning, globally speaking, urbanization has taken both similar and different paths, depending on economic dynamics, the availability of resources, political regimes and cultural characteristics. The special feature in the European context was a basic understanding of the city and urbanity as characterized by the polis, with the agora or forum, and later by the civitas. Looking at Pompeii, for example, a third of the city's area was taken up with public squares. A large proportion of the streets had stones that made access impossible for carts, so that they were only accessible as meeting points for pedestrians (Laurence, 2013:205ff.). Public squares and the evolving concept of the social and political public were primarily an invention and characteristic of Greek and Roman cities. It can be assumed that such squares were deliberately not included in the plans – in Han China, for example, for security reasons to prevent potential protest marches against the rulers (Laurence, 2013:201). Although other regions of the world had much larger cities in terms of population, the concept of a civitas, a combination of citizenship, civil law and settlement area, only developed in European cities (Groten, 2013:21). Right up to today, the public square has a much greater importance in western cultures than in the cities of other regions of the world (Burke, 2013).

The European city of the Middle Ages and the early modern age is often regarded as a special case in this context, as a “unique place of political, intellectual and economic dynamics” (German quote translated from Jochner, 2011:663). Ultimately, this form of urban development is seen as key for the rise of Europe in the

18th and 19th century. The guild-based, cooperative organization and the political autonomy of most cities became a prototype of the civil society.

European urbanism was given decisive stimuli by the intensive city-founding period in the high medieval to early modern period, when the most cities were established. The diversification, polycentricity and decentralization of the European system of cities can be understood against this background.

Between the 16th and 18th centuries, urbanization led to increasing inter-urban trade, in the course of which global trade routes were developed, city networks such as the Hanseatic League emerged, and port cities such as Havana, Manila, Guangzhou, Nagasaki, Batavia, Mumbai, Amsterdam, London and Philadelphia gained in importance. This increased the incipient industrial production and urban consumption (Clark, 2013).

During the colonial period, the conception of the European City was introduced in the colonies as the dominant urban model. For example, some 350 Spanish colonial cities were built largely on the same basic pattern, with a central square and central functions according to a European concept (Section 2.2.2.5). At the same time, the colonial cities in turn influenced the associated home cities and had a formative impact on them via trade, migration and culture. The emerging nation states had an additionally positive influence on urbanization. Many capital cities were founded, leading to gains and losses in importance as well as new hierarchies and functionalities for cities.

Early in the development history of the city, concepts and ideas of an ideal city were added to regionally typical features. This becomes clear, for example, from the fact that, at the time of the Renaissance in Europe, the spatial arrangements were determined by geometrically shaped city plans inspired by such ancient architects of the Roman Empire as Marcus Vitruvius Pollio (Smith, 2012). While planning was still based on optimism in Europe at the beginning of the 18th century, e.g. Louis Sebastian Mercier's idea that an ideal city was plannable, (Smith, 2012), the reality proved to be different. In a development reinforced in the course of industrialization, cities also increasingly became centres of poverty and exploitation for people who, although they had escaped serfdom and the despotism of landowners, had no resources or means of production at their disposal in the city. Supplying the workers with housing became a key task, as exemplified by the tenement buildings of New York or Berlin.

2.2.2.3

Third urbanization phase: industrialized urbanization and cities

The Industrial Revolution, which was accompanied by considerable growth in agricultural productivity, became a new key driver of urbanization. The emerging industrial cities were larger, more densely populated, reached a higher number of inhabitants and accommodated people with a huge range of different social, ethnic and religious backgrounds. Urban growth was also based on new transport options, such as the railways and motorized ships, which enlarged the cities' catchment areas and encouraged further links between them (McNeill and Engelke, 2013:450f.). Infrastructure and networking gained in importance. The population of London, the political and infrastructural centre of a global imperial power, grew from approx. 1 to 5 million inhabitants from the 19th to the 20th century. Most new cities in the colonies were founded in places considered favourable for expanding (harbour) infrastructures, but not necessarily where people were already living, e.g. in Mumbai, Singapore, Hong Kong and Nairobi.

Relations between the city and the hinterland became more important in the late 19th century. Power lines, gas and water supplies, drainage, traffic and industrialization all led to a huge increase in urban metabolism. The rapid urban growth caused problems such as trash, disease and hardship, because solutions could not be developed at the same pace. For the first time, in the mid-19th century, cities in North America and Europe established comprehensive sanitation infrastructures to curb epidemics; the first public healthcare facilities also emerged (Melosi, 2013). Examples include the development of sewage systems in London, the Haussmann boulevards of Paris, or investment in the water supply and sewer systems in American cities (McNeill and Engelke, 2013).

Simultaneously, a fundamental disposal problem for industrial waste emerged for the first time. Coal mines left behind slag, the rising number of animals contaminated the roads, and lakes were polluted with refuse. Modern landfills emerged in the United Kingdom in the 1920s (Melosi, 2013). Up until then, waste had been largely disposed of in rivers or the sea (Castonguay and Evenden, 2012; McNeill and Engelke, 2013). More environmental pollution was caused by the automobile, which initially celebrated its triumph in North America and reshaped cities there. It has since continued to be a major contributory factor in suburbanization (McNeill and Engelke, 2013).

From the late 19th century up to the Second World War, industrialization-driven urbanization was limited mainly to Europe and North America (Clark, 2013).

Urban planners like Canon Barnet and Ebenezer Howard tried out concepts of ideal cities and garden cities. The garden city movement was a formative force at the beginning of the 20th century (Smith, 2012). It emerged as an alternative to the urban spaces of industrialization, which were perceived as unfit for human habitation. New forms of city and suburbs emerged as pioneers of the 'placeless city' (Böhme, 2002:70). A pioneering stimulus for the design and appearance of cities, albeit problematic from today's (sustainability) perspective, came from the Athens Charter adopted in 1933 at the 4th Congrès International d'Architecture Modern (CIAM, International Congress of Modern Architecture; Section 2.2.2.6). This, too, sought to create an alternative to the poor living conditions in industrialized cities. One proposal was to dispense with the socio-economically integrated old city centres. Instead, there was to be urban zoning according to functions such as production, leisure time and housing; the individual function areas were to be connected by transport axes (Heineberg, 2014). In particular, the car-oriented city of the 1960s was based on this separation of functions – with far-reaching, negative path dependencies which are still noticeable today.

Although the highest urbanization rates were in other countries during this period, the (car-oriented) American city increasingly asserted itself after the mid-20th century as the new dominant pattern and had a retroactive effect on the European city. The zoning-based diffusion of the American city by suburbanization was reflected almost all over the globe (Lenger, 2013). Today, urban structures like shopping malls are shaped by the significant role of the automobile, and represent a specific style of consumption- and financial-market structure that distributes similar products everywhere. In this context, and in relation to further and increasing networking via information and communication technologies, Bourdin et al. (2014) speak of the 'placeless city'.

Today, the most dynamic urbanization processes are to be found primarily in developing countries and emerging economies.

2.2.2.4

Fourth urbanization phase: globalized urbanization

Urban challenges

Over the millennia it has been shown that cities create problems (e.g. lack of hygiene, violence, metabolism) and find solutions (e.g. social innovations, urban services). They grow and shrink and are characterized by local structures. At the same time, their place identity today is greatly endangered by globalization processes.

The interlinkage of the production of social space on the one hand and the spatial conditioning of social practices on the other is ubiquitous (Simmel, 1903; Lenger, 2013). Urbanity shows itself as a universal attitude towards life that exists regardless of ethnicity, climate or place (Kotkin, 2006; Section 2.2.1). As public spaces, cities allow a different quality of exchange and the coordination of individuals, groups and movements than is the case in non-urban areas. Cities have been and still are the source of innovations; they have been and still are frequently the experimental space in which knowledge accumulates and inventions become possible. City networks are the expression of 'glocal', i.e. global-local interconnectivity which shows that cities are actors of an international system.

The European and North American urbanization pattern has influenced the design and framing of today's urbanization processes in many parts of the world. The type of urbanity that develops around such concepts as *civitas*, the public and self-government is desirable as a special (and threatened) resource of cities. Accordingly, with a view to the urban transformation, it can be deduced from the outlined development pathways that the potential for the transformation that is present in cities must be structured and facilitated.

2.2.2.5

Socio-cultural city types

Societies influence urban spaces

In addition to time lines of development and path dependencies, the spatial dimension of highly diverse urban structures and development processes are of key importance for understanding the globally diverse urbanization dynamics. The great socio-cultural diversity is rooted in cultural-area-specific differences in the conditions under which the structures and processes emerged and developed. So-called cultural-genetic urban-development models have been devised for individual culture areas in order to be able to classify urban genesis and structure in the broader contexts of cultural-area development, and to make it possible to draw intercultural comparisons between urbanization processes (Heineberg, 2014; Jürgens and Bähr, 2009; Hofmeister, 1996). Alongside an ideal-typical representation of the urban structure, social, political, religious, economic and technical development processes are taken into account in these socio-cultural urban development models (Heineberg, 2014). They allow a comparative analysis of different urban structures and functions, which have influenced urban development up to the present time because of the strong path dependencies, and which lead to different opportunities and challenges for the urban transformation in dif-

ferent cultural areas. The models have an ideal-typical character, although, in reality, they are also influenced by many locally specific factors. In addition, post-modern globalization-driven processes are causing a growing global homogenization in urban development.

The literature distinguishes between up to twelve socio-cultural types (Jürgens and Bähr, 2009; Heineberg, 2014; Hofmeister, 1996), of which, in the following, four models are considered as examples: the European, the US-American, the Latin American and the Islamic-oriental city (Sections 5.3, 5.4, 5.8).

The European city

The European city is characterized by a great deal of heterogeneity as a result of Europe's territorially fragmented development. Most cities have a pre-industrial past. The first cities were already founded in Antiquity, but most in the Middle Ages. Numerous planned cities followed after the 15th century (e.g. Karlsruhe). More cities were founded and existing cities expanded during industrialization. Historical elements of the European city include a (medieval) compact old city, conceived as a spiritual and secular centre in the inner city, a relatively dense road network, and a mixture of working and housing functions, market squares and representative buildings, often with few green areas, few high buildings, but a high population density (Jürgens and Bähr, 2009).

The historical urban concept that developed from the medieval city charter included key legal features, among them the freedom of the citizens, the city's right to dispense justice, collect tolls, levy taxes, mint coins and hold markets, staple rights, the right to self-administration, the right to defence and to build a city wall. "The European city in the Middle Ages is a revolutionary place, a place of economic emancipation of the bourgeois allowing free exchange at the market, and a place of political emancipation of the citoyens allowing democratic self-government." (German quote translated from Siebel, 2010:3). Since the 19th century, urban expansion has been characterized by different guiding models for urban development, such as mixed usage, the garden city idea, satellite suburbs, suburbanization and decentralized concentration.

Today, most European inner cities retain their functions as centres and in most cases are not built very high. There is a large proportion of rental apartments, a differentiated spatial function structure, polycentrality and a project-oriented, indicator-controlled urban design. Ecological problems are caused e.g. by high levels of resource and land consumption as a result of suburbanization. However, environmental problems are declining in (formerly) industrial cities as a result of environmental regulations and de-industrialization

processes. By international comparison, the European city is less segregated and polarized than others, despite the existing social hotspots and socio-economic disparities. Nevertheless, there are increasing development disparities between prospering and shrinking or stagnating cities (Siebel, 2010). In some cases, urban-development processes are shaped by citizen-participation processes. The preservation of the cultural heritage is assured by the institutionalized protection of historic sites.

The US city

The first cities in the United States emerged in the 17th and 18th centuries on the Atlantic coast. Not until after 1820 did broadly based urbanization set in – largely driven by immigration. This city type is mainly characterized by the following physiognomic features: an orthogonal road network laid out in a grid pattern, high-rise developments in the central business district, a sprawling urban landscape caused by extensive suburbanization, and, more recently, edge cities (Heineberg, 2014; Holzner, 1996). Suburbanization and the formation of edge cities led to a loss of function for the central business districts in the 1980s, causing high vacancy rates. This loss of function has been successfully cushioned in many cities by revitalization programmes (e.g. urban enterprise zones, civic centres or mega-projects; Heineberg, 2014).

In addition to the strong functional differentiation, US cities are also marked by social segregation. In many cases, ghettos and slums have developed in residential districts adjacent to the central business districts as a result of filtering-down processes, i.e. a deterioration in the quality of housing by ageing and wear-and-tear processes, which are often reinforced by a lack of social security. Inner-city gentrification processes have been countering this process since the 1990s, but the privatization of public spaces has also generated displacement processes. Gated communities have intensified urban social segregation since the 1980s (Heineberg, 2014).

The urban physiognomy of US cities causes a range of negative ecological path dependencies, e.g. extremely long distances leading to heavy (motorized) commuter and shopping traffic and a high level of energy use and land consumption. Negative social path dependencies as a result of residential segregation hit people with a low socio-economic status particularly hard and affect e.g. access to social infrastructure and recreational areas.

The Latin American city

The main city-founding phase during the colonial period in Latin America was the 16th century. The Spanish colonial city is characterized by a grid-pattern

layout, square blocks of buildings and a main square (plaza mayor) as a planned centre, surrounded by the most important representative public buildings. Adjacent to this are the residential houses of the upper classes with a central-peripheral socio-economic gradient. Urbanization began to accelerate in the 1920s as a result of rapid country-to-city migration. While the upper-class residential areas relocated to the outskirts, filtering-down processes led to a deterioration of the inner cities and to a massive growth in marginal communities on the city outskirts (Jürgens and Bähr, 2009).

Since the 1990s, the various functions of cities have increasingly been expanding at different rates. New central business districts and sub-centres have been forming in easily accessible locations and new cores of growth in the periphery (e.g. around airports). High-rise developments and densification processes in marginal settlements and fragmentation processes are on the increase (Section 5.8). Issues of preserving urban cultural heritage are gaining in importance in the densifying inner cities (Heineberg, 2014; Jürgens and Bähr, 2009).

There are capacity shortfalls in the infrastructures of many Latin American cities, e.g. in relation to the supply of drinking water, waste and sewage disposal, traffic congestion and air pollution. Social polarization is magnifying the contrast between (in some cases large) gated communities on the one hand and marginal settlements on the other. Fragmentation processes have been more pronounced than in US cities, creating social tensions as a result of high unemployment, unequal access to services such as education and healthcare, and illegal or Mafia-like structures and crime. Neighbourhood self-help organizations have overcome or mitigated some abuses; however, they cannot replace an assertive and effective local government. Planning concepts are based inter alia on the rehabilitation of inner-city areas and the revitalization of public spaces (Heineberg, 2014; Jürgens and Bähr, 2009).

The oriental-Islamic city

The oriental-Islamic region, with a history of cities stretching back more than 9,000 years, has the oldest urban culture anywhere in the world. Key elements of the oriental-Islamic old city are the Friday Mosque (the religious, cultural and societal focal point), the suq or bazaar (the centre of business and commerce), and the separation of residential areas according to ethnic, religious and linguistic groups, each with their own local shopping centres and places of worship (mosques, synagogues, churches). As a rule, the city districts are characterized by a street pattern with winding culs-de-sac and few main roads, a city wall and a castle or palace situated on the edge of the city. The most important

principle of urban development is ensuring family privacy. This is structurally reflected in the atrium buildings, which isolate themselves from the outside world, and in the partially semi-private access roads. Traditionally, there are very few public spaces in the sense of civic participation in an urban community.

There is a striking dualism between the traditional old city and the modern city, whose central business district and residential areas were planned and built in the 19th and 20th centuries outside the old city with regular road networks, high-rise buildings, representative squares and exclusive residential areas based on European models, but also with architectural stylistic elements and religious institutions in the eastern tradition. Industrial and commercial areas and trading centres are usually situated on arterial roads.

Many Islamic-oriental cities, e.g. Cairo (Section 5.3) or Tehran, are today characterized by marked superimpositions on, or the destruction of, historical structures. Yet the old cities offer considerable potential in terms of social and ecological sustainability aspects. The traditionally constructed old cities (with courtyard houses, shadowy alleys, the use of clay as a raw material, wind towers, qanats, underground water basins, etc.) are ideally adapted to the dry, hot climate. Furthermore, the city districts are remarkable for their high levels of social coherence and well-functioning neighbourhoods; this is also the result of a religious and ethnic homogeneity, while the residential segregation in the new city is determined by more socio-economic characteristics (Wirth, 2000; Ehlers, 1993; Heineberg, 2014; Jürgens and Bähr, 2009; Figure 2.2-1).

Conclusions

The four examples of socio-cultural urban models illustrate important path dependencies laid down in a city's history and as a result of socio-cultural and climatic conditions. These path dependencies represent both opportunities and challenges for the urban transformation in different major regions of the Earth. This applies to many features – e.g. spatial-design concepts, building designs, construction materials or the spatial separation of urban functions – which exert a major influence on the consumption of resources, the quality of life of the residents, and evolved social structures. Another important aspect is the identity-defining impact of the urban cultural heritage and the culturally influenced city layout and building methods on the urban population, who have frequently been displaced by rapid urbanization and modernization processes in recent decades.



Figure 2.2-1

The old city of Sanaa has been a UNESCO World Heritage site since 1986. Since 2015, however, it has been on the List of World Heritage in Danger because of wars. Sanaa, Yemen.
Source: Gesa Schöneberg/WBGU

2.2.2.6

Guiding models in urban development

Guiding models take on the task of providing important anchor points in the search for a consensus and an action-guiding orientation framework (Schmitz, 2001) by means of a conceptual and “pictorial concretion of complex objectives” (German quote translated from Durth, 1987, based on ARL, 2005). The guiding concept in the field of spatial planning formulates “a desired future state as a goal to be reached by appropriate action. The time frame remains open, all measures are to be coordinated and geared towards the formulated guiding concept” (German quote translated from Brunotte et al., 2002:325).

Following on from such precursors as the Greek, Roman or Chinese city, the first systematic-complex models of urban development emerged in the second half of the 19th century (Section 2.2.2.1). The model of the garden city developed by Howard in 1899 combined creative and socio-economic dimensions of new urban design. Especially influential were the models of the Athens Charter, which called for a fundamental separation of the different urban uses of land according to the basic existential functions of housing, working, recreation and transport in order to achieve an orderly urban development (Heineberg, 2014). After the Second World War, models primarily for major city extensions followed; examples include the ‘spacious, structured city’ ‘urbanity through density’ or the ‘car-friendly city’ (Heineberg, 2014). In many cities in Europe and the USA, these models led to a rigid assignment of function and land area and a focus on individual traffic. This also caused ever-longer distances, e.g. between places of residence and workplaces, led to the construction of large ring and radial roads, and caused

an overall increase in land degradation (Heineberg, 2014).

A large number of models based on the concept of sustainable development have been developed since the 1990s, most of which can be assigned to one or several dimensions of sustainable development (ARL, 2005). Ecologically oriented models include, for example, the ‘ecological and resource-saving city’ (Rogers, 1997), the ‘resilient city’ (Jabareen, 2013) and the ‘low-carbon city’ (UNEP, 2013b). The ‘social city’, the ‘cultural city’ (Schmitz, 2001) and the ‘liveable city’ (Hall and Pfeiffer, 2000) focus primarily on the needs of the urban population. Economic models, such as the ‘competition-oriented city’ (Zehner, 2001), and political models, like the ‘inclusive city’ and the ‘accountable city’ (UN-Habitat, 2002), can also be found in the literature.

The model of the ‘compact and mixed-use city’ has attained key importance at the level of urban development. It is characterized by high building density, a mixture of uses, public spaces and ecologically upgraded areas as an important anchor of urban development (ARL, 2005). The Leipzig Charter on Sustainable European Cities was adopted by the EU member states in 2007 (Leipzig Charter, 2007). It calls for a strengthening of integrated urban-development policy, *inter alia* by creating and securing “attractive, user-oriented public spaces and [...] a high standard in terms of the living environment”, the modernization of the infrastructure networks, an increase in energy efficiency, and an active innovation and education policy. Furthermore, disadvantaged city districts are to be promoted in the overall urban context, e.g. by means of urban upgrading strategies, strengthening the local economy, active education and training policies, and efficient and affordable city transport. In an evaluation of the implementation of the Leipzig Charter, the German Institute of Urban Affairs has come to the conclusion that integrated city(-district) development measures have gained considerably in importance in many EU member states, in spite of the economic crisis and tighter budgets among the municipalities (BMVBS, 2012).

Assessments of the importance of models for urban development vary. For example, they cannot describe and take into account the heterogeneity of urban structures; furthermore, they sometimes make contradictory claims on urban development (ARL, 2005). The feasibility of models is also seen critically, since they often have a normative connotation and contain little concrete detail, which, in turn, often also leads to a high level of political acceptance (Brunotte et al., 2002). What is undisputed is that models generate heuristic and discussion-leading stimuli in urban development, and reflection and communication on goals in the con-

text of urban decision-making and design. They are also an important conceptual framework for development programmes (e.g. the EU’s Social City programme), because they offer a common target and orientation framework for a wide range of actor groups.

2.3

Cities and environmental change

2.3.1

Introduction

The environmental problems related to cities manifest themselves both in the city itself and in the surrounding region, as well as in the Earth system, and are connected to each other via complex interactions. The interactions can be roughly divided into four types:

1. *Cities as drivers of global environmental change:*
As centres of economic activity, cities are important drivers of global environmental change. The effects on the Earth system thus also affect the planetary guard rails that the WBGU has proposed (WBGU, 2014b). The main issue here is energy-related CO₂ emissions, over 70% of which are caused by cities (Seto et al., 2014; Section 2.3.3.1). The high resource use in cities has an indirect effect on worldwide land use and causes the loss of biodiversity; this interaction is often underestimated (Section 2.3.3.2). Cities also play a key role in emissions of persistent anthropogenic pollutants such as mercury, plastic and fissile material, which are relevant from the point of view of the Earth system (Section 2.3.3.3). As regards the sustainable use of the strategic Earth system resource phosphorus, which is of crucial importance *inter alia* for world nutrition, recovery from sewage and waste flows in cities is a key starting point (Section 2.3.3.4).
2. *Cities as drivers of local environmental problems:*
Local environmental problems are caused by cities, and their impacts primarily affect the respective city area. This includes, e.g., air pollution, groundwater depletion, contaminated industrial sites, pollution caused by sewage or waste disposal sites, and noise. In cities in industrialized countries, many of these environmental problems have been reduced by successful environmental-policy measures. However, local environmental problems, such as air pollution and noise, still cause considerable health problems and impair urban quality of life (Box 2.4-2). The situation is much worse in the cities of the developing countries and emerging economies. Section 2.3.4 deals with the most important of these local

2 Urbanization in a global context

- environmental problems: urban air pollution, depletion and pollution of urban water resources, and the problem of waste.
3. *Cities' effects on the regional environment in the hinterland:* A large proportion of the environmental problems caused in cities affect the surrounding countryside and the region (e.g. through air and water pollution, nutrient exports and eutrophication). Redirecting or overusing local water resources to supply water to many cities can lead to a shortage of water in the region. Supplying the city with food, bioresources and raw materials such as gravel or stone also affects the surrounding region. Urban-rural interactions and remote effects are covered in more detail in Section 2.3.3.2; this report, however, focuses on the local and global environmental changes.
 4. *Risks of global environmental change for cities:* Not only do cities cause a considerable proportion of global environmental change, global change also impacts on the cities via complex mechanisms. These include, in particular, the climate risks caused by greenhouse-gas emissions (Section 2.3.4.4): e.g. the threats to coastal cities from rising sea levels or the risk of disasters caused by extreme weather conditions (heavy precipitation events, severe storms, droughts). Such environmental risks, most of which occur with a certain time lag, and their complex cause-and-effect chains, are much more difficult to explain to the public and decision-makers than local environmental problems.

A city's environmental problems are strongly influenced by the regional climatic and geological conditions. One extreme example is the Peruvian capital Lima, which is almost entirely dependent for its water supply on glacial melt water from the Andes. The climate-change-related and foreseeable disappearance of these glaciers, combined with simultaneous, dynamic city growth, means an existential threat for the city (WBGU, 2008:87f.; Figure 2.3-1). The fact that many major cities are situated on rivers or on the coast is also of great importance for the specific manifestation of environmental impacts (e.g. floods, hurricanes). For example, the populations of cities in the humid tropics are exposed to particularly severe climatic health risks. The urban heat-island effect can greatly exacerbate heat waves. Unmitigated climate change will lead to an increase in the frequency of such extreme events (IPCC, 2012; Section 2.3.4.4).

Cities make a major contribution to national and global economic growth. In total, 80% of global economic output is generated in urban regions (World Bank, 2015a). The ecological footprint increases sharply with the level of development (measured according to

the Human Development Index – HDI) and degree of urbanization. However, substantial differences can be observed between cities with a high level of development (Figure 2.3-2a; UNEP, 2011b:461ff.). The dynamics of cities' environmental impact and urban environmental protection therefore often depends on economic strength or the local level of development (Figure 2.3-2b; UNEP, 2011b:461ff.).

Local environmental problems initially worsen in the course of economic development and increasing urbanization, but cities get better at solving them as time goes by (e.g. Copenhagen: Section 5.4). Urban air pollution is an example of such a development (Section 2.3.4.1). At present, the environmental effects of cities on the region or the Earth system (ecological footprints) are still increasing as economic development progresses, also in the metropolitan areas of industrialized countries. This applies with restrictions for greenhouse-gas emissions (Section 2.3.3.1), but above all for indirect changes in land use through the consumption of agricultural and forestry products (Section 2.3.3.2).

The economic productivity of cities therefore leads to resource consumption and environmental pressure, but it is also a prerequisite for solving environmental problems (Grimm et al., 2008). As a rule, there is no shortage of technical solutions, which can be adapted to local circumstances and implemented more and more cost-effectively as they proliferate.

2.3.2 Urban metabolism

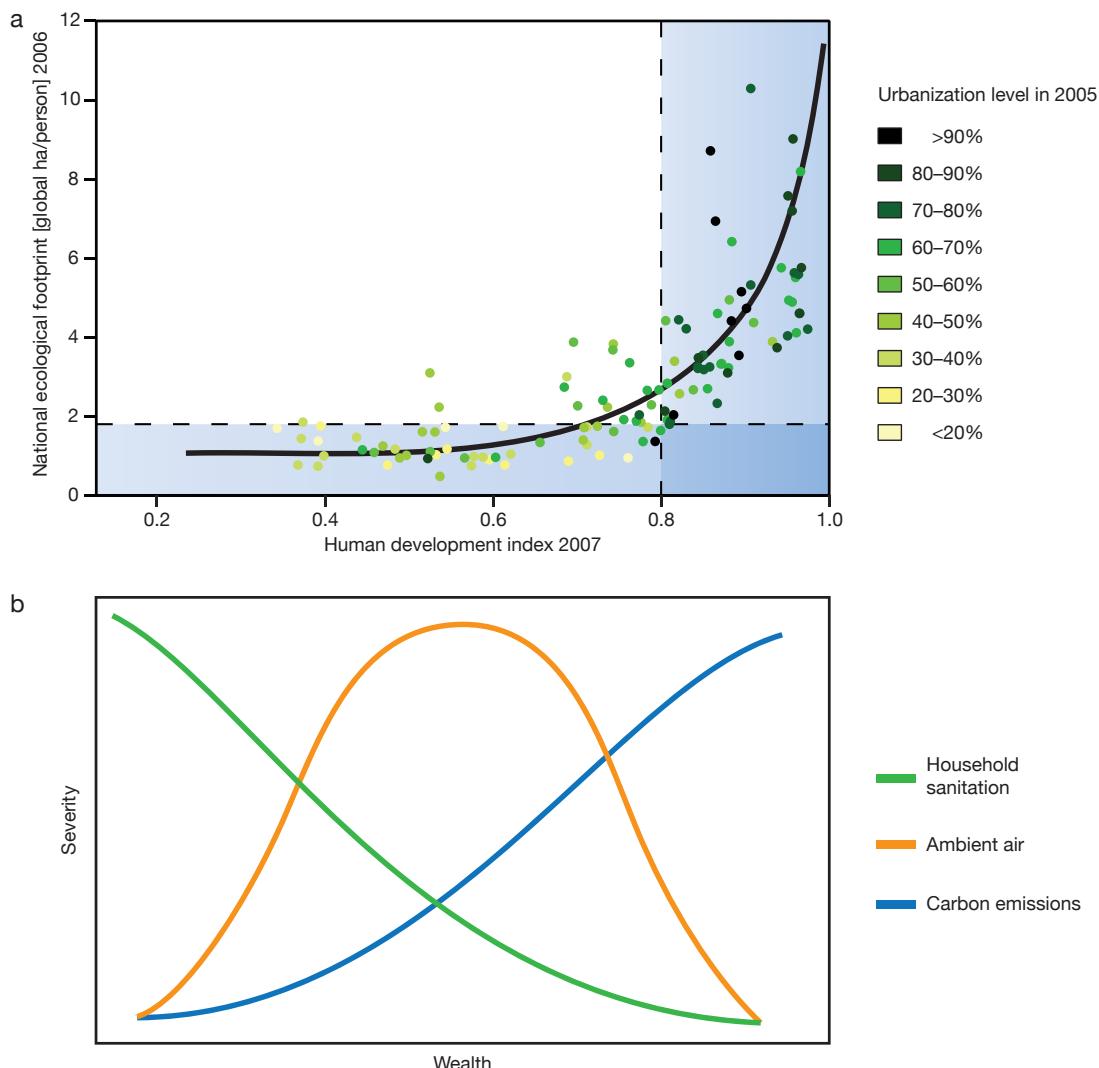
A city's development depends on its internal dynamics as well as the exchange of material and non-material goods with its surroundings. The exchange takes place partly with the immediate surroundings, but can



Figure 2.3-1

The climate in Lima is dominated by drought; the city is almost completely dependent on glacial water from the Andes. Lima, Peru.

Source: Anna Schwachula/WBGU

**Figure 2.3-2**

Relationship between environmental problems, urbanization and development: (a) Ecological footprint as a function of development and urbanization; (b) Schematic representation of the correlation between ecological footprint and level of development (environmental Kuznets curve).

Sources: UNEP, 2011b:461f.

also take on global dimensions. This footprint is a characteristic feature of a city's condition and changes with its development. The internal dynamics of a city and its supply and disposal systems can be described using the analogy of the metabolism of an ecosystem, which exchanges energy and material (nutrients and waste products) with its environment.

The first explicit use of the concept of metabolism in relation to cities goes back to Wolman (1965), who modelled the metabolism of a hypothetical US city. Wolman's innovation was to depict the city as an ecosystem. This was a paradigm shift in the field of urban ecology. It was no longer the ecology *in the city* that was studied, but the ecology *of the city*; the purpose is

not to explain how ecological processes in the city differ from those in other environments, but how the city, as a dynamic system, exchanges energy and material with its environment (Figure 2.3-3).

However, the city differs from natural ecosystems in that the material flows follow a 'linear metabolism', while the material flows in natural ecosystems can largely be seen as cyclical or closed. The challenge for cities, therefore, also lies in getting as close as possible to a circular model of metabolism, in which all kinds of waste are recycled, and making materials re-usable, in order to be sustainably embedded in the natural ecosystem in the long term. This is of great urgency because cities today are responsible for 70–80% of

global resource use (UNEP DTIE, undated). A circular economy would also reduce imports of raw materials and the concomitant adverse remote environmental impacts (Section 4.4).

Descriptions of metabolism take into account the different flows of water, materials or nutrients as material flow calculations. Figure 2.3-4 shows the metabolism of the city of Paris with flows of energy, minerals, materials, biomass, water, air – and the resulting emissions and waste. It is essential to understand the energy and material flows of cities to be able to shape their development in a sustainable way.

Urban scaling

Urban processes may be complex and multifaceted, but there seem to be globally valid rules of urban development. The theory of ‘urban scaling’ states that there is a fundamental connection between population growth and a large number of socio-economic variables (Bettencourt, 2013). The size of a city becomes the primary determinant of its socio-economic development. History, geography and design become secondary drivers. Urban scaling adapts the methods of urban metabolism by applying the theory of power laws in allometry (e.g. Kleiber’s Law), to the city. Following this approach leads to interesting correlations. The example of American metropolitan regions can be used to show that productivity (GDP) increases disproportionately – to the power of 1.15 – with the population, while at the same time making savings in the infrastructure (population to the power of 0.85; Bettencourt, 2013). Thus doubling a city’s population causes productivity to grow by a factor of 2.2, while the infrastructure costs grow only by a factor of 1.8. The latter leads to a reduction in per-capita energy use in large cities compared to their rural counterparts.

Bettencourt (2013) postulates that maximizing social interaction between residents is to be equated with the maximization of social benefits (e.g. GDP, innovation, culture). Cities are not seen as mere agglomerations of people, but rather as focal points of social interaction among residents.

The other side of the coin, according to Bettencourt, consists in the intensification of negative manifestations of social interactions (crime, traffic, diseases), which increase disproportionately with rising population density (Bettencourt et al., 2010). According to Bettencourt (2013), the aim of optimized urban planning is to favour social interaction while avoiding the negative effects of high population densities as far as possible. An analysis of the dynamics of productivity, energy intensity and social distortions as population increases in metropolitan regions can provide valuable insights into successful or failed urban planning.

If the negative consequences of the growing popu-



Figure 2.3-3

Dominant worldwide: car-oriented urban development; Riyadh, Saudi Arabia.

Source: Gesa Schöneberg/WBGU

lation can be avoided, then cities offer hope that global problems can be overcome. The best contribution cities can make to solving some of the environmental problems is to become more efficient in their use of energy and infrastructure.

2.3.3

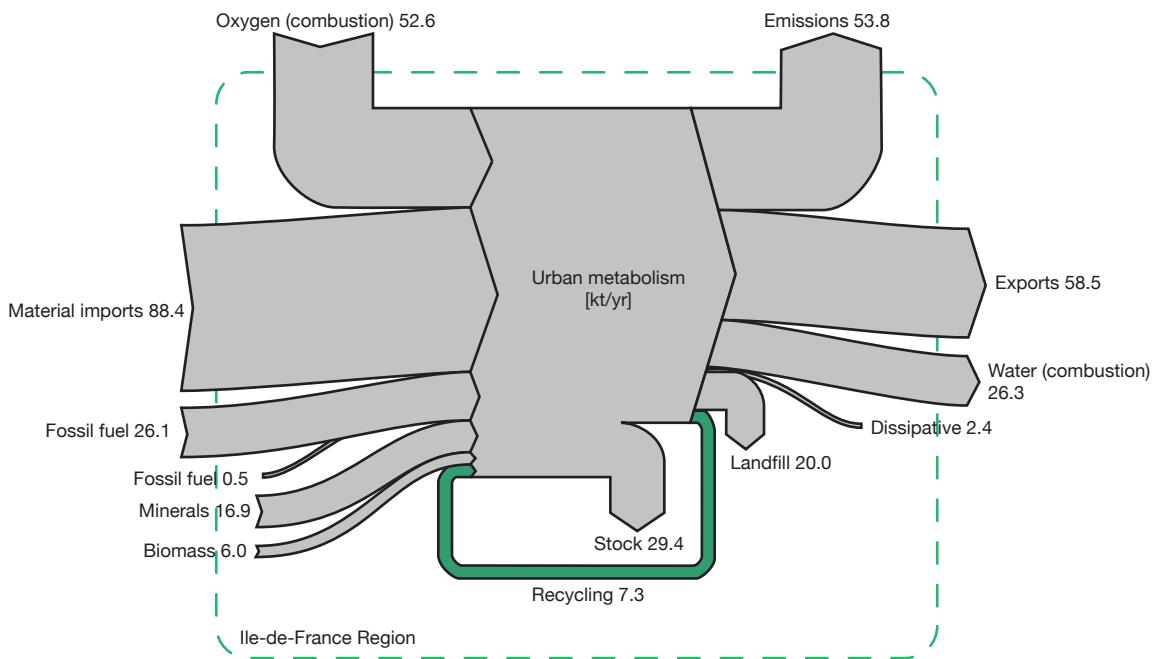
Cities as drivers of global environmental change

2.3.3.1

Cities as drivers of climate change and ocean acidification

The core of the climate problem lies with anthropogenic CO₂ emissions (WBGU, 2014a). A limitation of climate change requires a reduction of these emissions to zero (Box 2.3-1), i.e. the worldwide decarbonization of energy and transport systems. The more successful efforts at limiting the global demand for energy are, the faster such an energy transformation can be achieved and the sooner humankind can dispense with such risky technologies as nuclear energy and CCS (carbon dioxide capture and storage; WBGU, 2011: 133). Urban areas play a key role here because they are responsible for about 70% of global energy use and global energy-related CO₂ emissions (Seto et al., 2014).

Dense agglomerations and city centres tend to have a lower per-capita demand for energy and lower per-capita emissions than less dense cities and city districts (Hoornweg et al., 2011). In industrialized countries, per-capita energy consumption in urban areas is therefore often below the national average, reflecting the effects of the more compact design of urban areas, the settlement structures and the availability of public transport. In many developing countries, by contrast, per-capita energy consumption by city dwellers

**Figure 2.3-4**

Urban metabolism: Paris.

Source: Nelson, 2011; using data from Barles, 2009

is significantly higher than that of rural inhabitants, which is essentially an expression of the higher income in cities (Grubler et al., 2012:1310). In a growing number of cities in developing countries, the consumption of energy and resources and per-capita emissions have already reached the levels of industrialized countries (Seto et al., 2014:948).

The urban population is expected to increase by 2.5 billion people by 2050 (UN DESA, 2014). The next two decades are a window of opportunity for the mitigation of climate-change, since the overwhelming majority of urban areas and their infrastructures are only now being built. This offers, for example, a chance to build new cities with the appropriate density and mix of functions, thus avoiding the errors of the past with their negative consequences, such as urban sprawl, functional separation and concomitant high traffic levels. Such changes in urban form are much more difficult to achieve in existing cities, although they can be tackled in a targeted way by means of moderate densification (Seto et al., 2014; Section 4.2.3).

However, building and expanding cities involves the danger of extreme increases in energy demand and greenhouse-gas emissions. Urban population growth requires a massive expansion of the urban infrastructure, and such expansion is one of the main drivers of greenhouse-gas emissions in several sectors (Seto et al., 2014). Should the global population grow to 9 billion or more by 2050, just building the new, largely urban

infrastructure could cause around 350 Gt of CO₂ emissions (Section 4.4.1). This corresponds to almost half of the total emissions that are still sustainable if the 2°C guard rail is to be complied with (Box 2.3-1). Further impacting factors are the future emissions that will be determined by the infrastructure. The long life spans of infrastructures and buildings can lead to path dependencies (energy use, emissions, life styles and consumption patterns) which are difficult to change (Seto et al., 2014).

Infrastructure and urban development are closely linked and determine the patterns of land use, mobility, housing, employment and behaviour. For example, residents of suburbs walk less and drive cars more than the inhabitants of inner cities. This is partly due to the fact that it is more difficult to establish public transport in the less dense suburbs (Sims et al., 2014). According to a study by Davis et al. (2010), the use of the currently existing energy and transport infrastructure alone will already generate future global emissions of 127–336 Gt of CO₂ (energy infrastructure) and 63–132 Gt of CO₂ (transport infrastructure). A considerable proportion of these emissions is attributable to the demand in cities. This corresponds to about 20–45% of still-sustainable emissions (Box 2.3-1); the emissions counted in this context overlap partly with the 350 Gt of CO₂ for the construction of new infrastructures, since this figure also contains energy-related emissions that are generated by the use of existing infrastructure (Figure 2.3-5).

Alongside the transport and traffic infrastructure, another important factor determining future energy demand in cities is the building structure (Lucon et al., 2014). In 2010, buildings contributed 32% to global final-energy use. The differences are considerable here. Per-capita energy use in buildings in rich countries in temperate and cool climate zones can be 5–10 times higher than those in poorer countries in warm regions (Ürge-Vorsatz et al., 2012). Global building-related energy demand could double or triple by the middle of the century. There are several contributory trends here: e.g. creating adequate housing, access to electricity and improved cooking facilities for billions of people in developing countries. Further factors include population growth and migration to cities, changes in household size, rising prosperity and changes in behaviour. According to analyses conducted by the IPCC, however, considerable potential exists for stabilizing the building-related global energy demand despite the above-mentioned trends, if today's cost-effective good practices and technologies are disseminated (Lucon et al., 2014). The main factors here are measures to raise energy efficiency: e.g. building insulation, efficient lighting and low-energy household appliances. Changes in behaviour, too, can help limit the demand for energy; one example is the choice of room temperature in air-conditioned buildings, which is also influenced by dress codes and cultural expectations (Lucon et al., 2014). Furthermore, the urban form of cities has an impact on energy demand in buildings (Section 4.2.3); e.g. people in more compact urban areas tend to use less living space per capita, the ratio between outer surface and enclosed space is smaller, and there are more possibilities for district heating and district cooling systems (Lucon et al., 2014).

Another important factor that determines greenhouse-gas emissions and energy use in cities is the structure of their economic activities, the positioning of the cities in the international value chain, and the associated resource flows. For example, cities with energy- and emissions-intensive industries tend to have higher per-capita emissions than those with a service-based economy structure (Seto et al., 2014). This view, however, does not take into account the indirect emissions associated with imported products.

The various mechanisms through which cities directly and indirectly contribute to climate change also reveal the methodological problems of allocating greenhouse-gas emissions. A comparison of cities can reveal considerable differences depending on whether a study considers only the emissions generated within the city limits or also includes the emissions of the cities' extended catchment area (i.e. including supply infrastructures located outside the cities), or whether



Figure 2.3-5

High-rise construction in Doha, Qatar. 60 billion tonnes of cement were produced between 1945 and 2010 and used in construction in the form of 500 billion tonnes of concrete: 60% of this between 1990 and 2010 and 35% between 2000 and 2010.

Source: Omar Chatriwala/Flickr

an across-the-board consumer-based greenhouse-gas footprint is calculated (Chavez and Rama Swami, 2012).

Only some of the factors that are relevant to a city's emissions can be noticeably influenced at the city level. Climate-change mitigation can be promoted at the structural level in particular by pursuing dense urban development, mixing residential and working areas, improving public transport and carrying out demand-management measures (Section 4.2.1). Furthermore, life-style changes encouraging more sustainable forms of consumption can be initiated, particularly in cities. By limiting their demand for energy, cities can make a significant contribution to the global transformation towards a climate-friendly global economy. In order to reach the zero-emission target by 2070 at the latest, every single source of emissions within the cities must be replaced by emissions-free alternatives. This involves millions of distributed combustion devices such as individual vehicles, stoves and heaters. Improvements in efficiency can, at best, only be transitional solutions because, as an article in the Economist succinctly put it: "emitting less carbon is not a substitute for emitting none" (The Economist, 11 May 2010).

Cities are thus both significant causes and sufferers of climate change (Section 2.3.4.4). Accordingly, many cities have launched climate programmes to proactively reduce greenhouse-gas emissions.

2.3.3.2

Cities as drivers of land-use trends and biodiversity loss

Cities change not only the environment within their borders, they also impact on the regional, national and global environment through their physical expansion, their need for resources and their waste (Hardoy et al.,

Box 2.3-1**Planetary guard rails on climate change and ocean acidification**

As a guard rail for climate change, the WBGU has proposed preventing the global mean surface temperature from increasing by more than 2°C compared to pre-industrial levels (WBGU, 1995, 1997, 2004, 2009b, 2014a, b). At the session of the Conference of the Parties to the UNFCCC (COP21) in Paris in 2015, the international community set itself the target of holding the increase in temperature to well below 2°C, and pursuing efforts to limit the temperature increase to 1.5°C above pre-industrial levels.

If the 2°C guard rail is not to be exceeded, there remains only a limited budget of still-sustainable global CO₂ emissions. Other greenhouse gases also contribute to climate change, and their emissions should be reduced; however, it will not be possible to limit anthropogenic climate change without stopping CO₂ emissions (WBGU, 2014a). The Fifth Assessment Report of the IPCC has made it clear that, as from 2011, a total of only about 1,000 Gt CO₂ may be emitted from anthropogenic sources if global warming is to be kept below 2°C with a probability of two-thirds (IPCC, 2013). The WBGU's

estimates based on the work of, inter alia, Meinshausen et al. (2009) and Friedlingstein et al. (2010) showed a budget of 750 Gt CO₂ from fossil sources for the 2011–2050 period (WBGU, 2011). In order to keep below 1.5°C with a probability of more than 66%, the IPCC stipulates a total budget of about 400 Gt of CO₂ for the period after 2011 (IPCC, 2015).

The CO₂ released by humankind not only accumulates in the atmosphere, where the concentration has already increased by 40%, it also dissolves in the oceans, which to date have absorbed about 30% of anthropogenic CO₂ emissions (IPCC, 2013). Sea water becomes more acidic as a result of this input of CO₂; the pH value of the ocean surface water has already dropped by 0.1 units since the beginning of industrialization. Unchecked acidification poses a risk of far-reaching and irreversible changes to marine ecosystems (WBGU, 2013). As a guard rail for ocean acidification, the WBGU has proposed that the pH level of near-surface waters should not drop more than 0.2 units below the pre-industrial average value in any major ocean region (WBGU, 2006).

In order to have a realistic chance of reaching these targets, the WBGU recommends stopping global CO₂ emissions from fossil energy sources completely by about 2070 (WBGU, 2014a, b), and already reducing emissions to zero by 2050 at least in the electricity sector (Section 9.3.1.1).

2001:173ff.; Grimm et al., 2008). In particular, cities have considerable direct and indirect effects on land use and biodiversity (Box 2.3-2).

When cities grow in size, it is often at the expense of directly adjacent arable farm land, because cities often evolve in fertile regions. In China, for example, half of urban growth has been at the expense of valuable agricultural land (Bai and Liu, 2014). According to the FAO (2011), an additional 100 million hectares will be used for settlements and infrastructure by 2050. Agricultural production is displaced from this land and has to move elsewhere. Furthermore, the great demand for building materials, such as sand, gravel, stone and wood, is often met from the cities' environs, and the landscape is transformed accordingly. Extensive water resources are also developed to supply cities; rivers are straightened and canals built (Section 2.3.4.2). Not least, solid and liquid waste from the cities and urban air pollution (e.g. acid rain) damage the ecosystems in the environs (Section 2.3.4; Hardoy et al., 2001:173ff.).

Cities cover less than 3% of the land area on Earth (Grimm et al., 2008). Nevertheless, they have a considerable influence on global land use, because they are the places where most goods and services are produced and consumed overall. These products have an 'ecological footprint' (Wackernagel and Rees, 1997) on land use. For example, huge landscapes in distant regions are transformed for the extraction of mineral raw materials such as ores or mineral oil. The 'ecological hinterland' of cities, as a source of energy, raw materials and products, thus includes not only the surrounding region, but the

entire planet (Hardoy et al., 2001:195; Brenner, 2014).

The demand for products from agriculture and forestry is particularly relevant to indirect effects on land use and biodiversity. The goods produced range from foodstuffs to industrial raw materials such as cotton or wood, and products with a wide variety of uses both in industry and in food production, such as palm oil or bioenergy products. Most of these biobased products are consumed in cities: e.g. 76% of timber is used in cities (Grimm et al., 2008). The reasons for this are not only that most people live in cities, but also that people in cities have a resource-intensive life style due to higher incomes and better supplies. This is especially true when it comes to nutrition. Cities are characterized by a higher consumption of meat and dairy products (Kastner et al., 2012), which have a significantly larger ecological footprint than vegetable products. Since cities are associated with an intensive energy consumption, they are at least indirectly a driver of the increasing use of bioenergy, which also triggers direct and indirect changes in land use (WBGU, 2009a). For example, the growing use of European agricultural land for bioenergy production means that the agricultural products previously grown on this land have to be grown elsewhere (indirect changes in land use: WBGU, 2009a:74f.). Many of these demand-induced and displacement effects on land use therefore impact on remote regions and continents. Another effect of the increased global competition for land use is that well-funded investors are increasingly trying, e.g. in Africa, to gain access to large areas of fertile land

Box 2.3-2**Biodiversity and ecosystem services in cities**

The relationship between urbanization and biodiversity is complex and does not allow simple generalizations (OECD, 2015a:107). The expansion of cities into the surrounding areas and the creation of new settlements destroys near-natural ecosystems and their biodiversity. Conversely, the diversity of habitats in many cities offers a basis for a surprisingly high level of biodiversity, whose value is often underestimated. For example, half of the plant species indigenous to Belgium can be found in the city area of Brussels (van Ham, 2012). City environs are primarily characterized by native species, while both domestic and non-native species can coexist in cities with a medium degree of urbanization. Especially in temperate latitudes, the species diversity of birds and vascular plants can be even greater in the city than in the surrounding countryside (McDonald et al., 2013). Diversity declines

as the density of settlement increases (Gómez-Baggethun et al., 2013). The ‘green infrastructure’ or ‘urban green’, i.e. the network of urban near-natural areas, is very important for the conservation of biodiversity in cities. The design of the green infrastructure has an influence on the potential for biodiversity. Similarly, the procedures followed when extending urban areas into the countryside can be organized in such a way that more biodiversity is conserved (Müller et al., 2013).

Moreover, the urban green infrastructure provides important ecosystem services. It improves water management in the event of extreme precipitation, has a positive effect on air quality, reduces extreme summer temperatures and noise, offers aesthetic gains and recreational areas, and is thus relevant for quality of life in cities (Gómez-Baggethun et al., 2013; Bolund and Hunhammar, 1999, Section 2.4.1.1). An urban environment with a poor green infrastructure, or none at all, accordingly has a lower quality of life and greater environmental problems and costs.

(land grabbing) in order to operate intensive industrial agriculture for export, often with bioenergy products (WBGU, 2011:62).

Cities are therefore contributing to a considerable future increase both in the demand for agricultural goods, and thus in the negative effects on ecosystems and biodiversity (WBGU, 2011:299). The growing demand can essentially be met either by expanding the amount of land used for agriculture or by intensifying land use on existing land. The expansion of agricultural land into previously uncultivated natural ecosystems or extensively used near-natural landscapes is one of the main causes of the loss of biodiversity and ecosystem services (MA, 2005); furthermore, it contributes significantly to anthropogenic climate change (IPCC, 2014c). One target of the Biodiversity Convention is, therefore, to at least halve the rate of loss of all natural habitats and, where possible, to bring it close to zero by 2020 (CBD, 2010). Today, the intensification of cultivation using modern agricultural methods usually involves large-scale monocultures and the liberal use of fertilizers (e.g. nitrogen: SRU, 2015:177ff.) and pesticides. These are important factors both in the loss of biodiversity and in land and soil degradation. An intensification of agriculture using sustainable methods, while maintaining soil quality and biodiversity, is therefore one of the key challenges of the Great Transformation (WBGU, 2011:299). The guard rails proposed by the WBGU call for a halt in the loss of biodiversity and ecosystem services and an end to land and soil degradation (Box 2.3-3).

Cities are therefore important drivers of global land-use trends. With regard to a transformation of the cities towards sustainability, therefore, the hypothesis can be advanced that there will be no sustainable cities without sustainable agriculture (Ajl, 2014).

2.3.3.3**Cities as a source of persistent anthropogenic pollutants**

Anthropogenic emissions of persistent pollutants have increased sharply since the beginning of industrialization. In its policy paper on the Sustainable Development Goals (WBGU, 2014b), the WBGU stated its position on the risks posed by these persistent anthropogenic pollutants; the following text refers to this paper, in some cases verbatim. Long-lived pollutants accumulate in the environment and cause significant risks to human health and the environment (ECHA, 2014). The WBGU has an especially critical view of chlorofluorocarbons (CFCs), persistent organic pollutants (POPs), mercury, plastics and fissile materials. These substances are emitted not least in cities and in the environs of cities. In the WBGU’s view, their production and use should be halted as quickly as possible (Box 2.3-4; WBGU, 2014b). The reduction of CFC emissions (to protect the stratospheric ozone layer) and a number of POPs such as DDT (to protect the environment and people’s health) has already been regulated in separate international agreements. At the urban level, the WBGU sees an urgent need for action particularly in the case of mercury, plastic and fissile materials.

Mercury

Mercury is a toxic heavy metal that is fatal in high doses and accumulates in fish and seafood via the food chain. In urban areas, the waste gases from coal-fired power plants are by far the largest source of mercury pollution (UNEP, 2013a). Filters can reduce the mercury content of waste gases from coal-fired power plants by up to 95%. However, other industrial manufacturing processes, such as cement production, also cause mer-

Box 2.3-3**Planetary guard rails on biodiversity, ecosystem services, and land and soil degradation****Stop the loss of biodiversity and ecosystem services**

Humankind has dramatically changed the biosphere and thus triggered a substantial loss of biodiversity in a process that is a hundred to one thousand times faster than the average natural extinction rate during the Earth's history (WBGU, 2011:41ff.). However, human societies are dependent in many respects on biodiversity, the associated ecosystem services and products from nature (WBGU, 2014b). This is not only a matter of food, fibres, building materials, bio-based products and the necessary genetic resources, it is e.g. also about coastal protection, pollination and the maintenance of soil fertility (WBGU, 2011:41).

The WBGU considers halting the anthropogenic loss of biodiversity and ecosystem services to be a meaningful planetary guard rail (WBGU, 2014b). This is in line with a broad political consensus of international environmental policy and with the objectives of the Convention on Biological Diversity (CBD), which has been ratified by 192 countries and the EU. In the CBD's strategic plan, the goal is differentiated with 20 'Aichi Targets' (CBD, 2010). As a political objective, the WBGU (2014b) has proposed that "the direct anthropogenic drivers of biodiversity loss (and especially the conversion of natural habitats into cropland, pasture or plantations) should be stopped by 2050 at the latest. This target must consequently apply to all countries, regions and sectors of society (in particular also to industrial agriculture and forestry)."

Furthermore, the WBGU considers it necessary to designate 10–20% of the area of the world's terrestrial ecosystems as parts of a global, ecologically representative and effectively managed system of protected areas, thus withdrawing this land from intensive agricultural use (WBGU, 2014b).

Stop land and soil degradation

Land and soil degradation are global environmental changes which are still being given too little attention (WBGU, 1994). Protecting soils and land from overuse and degradation is a key prerequisite for supplying the increasing world population with food in the long term, not least in the cities (WBGU, 2014b). This applies in particular to erosion and salinization, which cause irreversible damage to soils and restrict productive capacity in the production of food and other bio-based products. Approx. a third of arable land worldwide is already affected by degradation (WBGU, 2011); soils in arid regions are considered particularly at risk (IAASTD, 2009). These ongoing trends can threaten food security in many developing countries (WBGU, 2011:44). Land and soil degradation also lead to a reinforcement of global climate change because of the loss of soil carbon; conversely, restoration measures can contribute to the sequestration and long-term storage of CO₂ (MA, 2005).

The planetary guard rail proposed by the WBGU requires that the loss of land and soil degradation must be stopped. As a political objective, the WBGU recommends stopping net land degradation worldwide and in all countries by 2030, and reaching the trend-reversal stage in land and soil degradation by 2020 at the latest (WBGU, 2014b).

cury emissions. Mercury can be released into the environment from household waste, too, if there is insufficient recycling of e.g. batteries or energy-saving lamps. Outside cities, artisanal and small-scale gold mining in Latin America and Africa is by far the largest source of emissions. In 2013, 140 states adopted the Minamata Convention, which aims to reduce mercury emissions. In the WBGU's opinion, to date the Convention is not stringent enough to completely stop mercury emissions in the long term. Up to now, the required number of state ratifications has not yet been reached for it to come into force. The Minamata Convention should be ratified and implemented quickly. The WBGU proposes that the substitutable use of mercury and anthropogenic mercury emissions into the air, water and soils should be stopped by 2050 (WBGU, 2014b). Certainly, in the WBGU's opinion, measures to reduce mercury emissions are essential; these include converting energy supplies to renewable energy sources, avoiding mercury emissions in industrial production processes, the substitution of mercury in consumer goods, and the development of recycling systems.

Plastic

The production of synthetic materials and plastics has increased more than a hundredfold worldwide since the 1950s and totalled more than 299 million tonnes in 2013 (Plastics Europe, 2015). In developing countries and emerging economies, economic growth, as well as changing life styles and production methods, have caused a considerable increase in the use of plastic and thus also in plastic waste. The amount of plastic waste generated in developing countries with no waste-management systems can be very large, and it will increase with economic development, growing urbanization and population growth.

Every year, large amounts of plastic waste end up in the oceans for lack of reliable disposal and recycling strategies. Jambeck et al. (2015) estimate the annual amount of plastic waste dumped into the seas at 4.8–12.7 million tonnes. Approx. 80% finds its way there through sewers, sewage-treatment plants, industrial discharges, or from waste disposal sites, agriculture or polluted beaches (Cole et al., 2011); urban sources account for a considerable proportion of this.

Plastic is distributed all over the world by rivers and ocean currents. It collects mainly in five major oceanic gyres, as well as on beaches, in the deep sea and in

Box 2.3-4**Planetary guard rails on persistent anthropogenic pollutants**

The WBGU has proposed limiting the risks posed by persistent anthropogenic pollutants as a planetary guard rail (WBGU, 2014b). In particular, the WBGU recommends the following policy objectives:

- Mercury: The substitutable use of mercury and anthropogenic mercury emissions into the air, water and soils should

be stopped by 2050. In this context the Minamata Convention should be ratified and implemented quickly.

- Plastic: The release of plastic waste into the environment should be stopped worldwide by 2050. Prevention, reusable packaging systems and biodegradable plastic should go hand in hand.
- Fissile material: The production of nuclear fuel for use in nuclear weapons and civilian nuclear reactors should be stopped by 2070. Top priority should be given to destroying nuclear weapons and transferring stocks of radioactive material to places where they can be safely stored.

inland lakes. The effects of larger pieces of plastic on marine organisms and the environment are well documented. Plastic parts strangle and injure dolphins, seals, turtles and sharks, among others. Birds can eat the plastic and either die themselves or feed their young with it (Wilcox et al., 2015). Microplastics (particles between 1 µm and 5 mm) are also absorbed by marine organisms and are suspected of accumulating in the food chain. They can now even be found in Chinese sea salt (Yang et al., 2015). Microplastics can bind and further transport endocrine disruptors and carcinogenic substances such as POPs (Kershaw et al., 2011; UNEP, 2014:48ff.) and thus represent a threat to human health. Negative effects of plastic on marine ecosystems and their biodiversity have thus already been proven (SCBD and STAP, 2012), but it is currently difficult to foresee the full extent of their effects on humanity's natural life-support systems, or to predict any socio-economic consequences.

The amount of plastic in the oceans will increase further if no action is taken (Jambeck et al., 2015). The WBGU recommends halting the release of plastic waste into the environment worldwide by 2050 (WBGU, 2014b). Prevention, reusable packaging systems and biodegradable plastic should go hand in hand. In view of the ubiquity of plastic waste, its long lifespan and the medium-term irreversibility of the pollution, the precautionary principle should be followed and measures taken – also at the municipal level – to reduce plastic waste, set up plastic-disposal systems, and establish recycling systems (Section 4.4).

Fissile material

Since most energy is used in cities, nuclear power – and thus the planetary guard rail on fissile material proposed by the WBGU – is also relevant to cities. In order to limit the long-term effects of dangerous exposure to radiation, the WBGU recommends reducing its anthropogenic sources to zero by 2070 (WBGU, 2014b; Box 2.3-4). Nuclear fuels – i.e. fissile material such as enriched uranium-235, plutonium-239

and other radioactive fission products with long half-lives – accumulate due to their persistence. Stocks and the associated hazards therefore continue to grow as long as production is continued. In the WBGU's opinion, a nuclear moratorium is necessary to limit the dangers involved. As a political objective, the WBGU recommends that the production of nuclear fuels for use in civilian nuclear reactors should also be stopped by 2070. Until then, all uses and stocks of fissile material, as well as the sensitive steps in the nuclear fuel cycle, should be subjected to strict and permanent control by the International Atomic Energy Organization. Top priority should be given to destroying nuclear weapons, reducing weapons-grade stocks and transferring stocks of radioactive materials to places where they can be safely stored (WBGU, 2014b).

2.3.3.4**Cities and the use of phosphorus**

Phosphorus, one of the three main components of chemical fertilizers, is an indispensable resource for the agricultural cultivation of food and feed, as well as the production of biobased products. Phosphorus is a scarce, finite resource, since it cannot be replaced by other substances or manufactured artificially; it can only be mined from highly concentrated phosphate rock deposits (WBGU, 2011:43). Estimates of phosphate rock reserves are subject to great uncertainty and the figures given in the literature vary considerably (Reijnders, 2014). According to recent calculations, the reserves amount to between about 47 and 67 billion tonnes (van Kauwenbergh, 2010; Heckenmüller et al., 2014). Depending on demand dynamics, different estimates say stocks will last for 30–300 years (Cordell and White, 2011; WBGU, 2014b).

Because phosphorus is a non-substitutable Earth-system resource of strategic importance, e.g. for world food security, the WBGU has proposed a planetary guard rail on halting the loss of phosphorus (Box 2.3-5). Because of the finite nature of phosphate-rock deposits and their geographically uneven distribution, the sharp

price fluctuations for phosphate, and unequal access to artificial fertilizers in different countries, the WBGU believes that it already makes sense to take measures worldwide to ensure the efficient use and recycling of phosphorus (WBGU, 2014b).

Cities are of great importance for phosphorus recycling due to their high volumes of sewage and waste. The WBGU has therefore added a special section on handling phosphorus in the 'Materials and Material Flows' transformation field (Section 4.4.2), which also discusses solution approaches in cities.

2.3.4 Local environmental problems in cities

2.3.4.1 Air pollution

Exposure to air pollutants is one of the most important urban environmental issues worldwide and one of the most pressing problems in the rapidly industrializing developing regions. In 2012, a total of approx. 7 million premature deaths worldwide were attributed to indoor and outdoor air pollution, mainly as a result of circulatory and respiratory diseases (WHO, 2014a, b; WHO Europe, 2015a: 3; Section 4.5.4.3). This means that air pollution is the biggest environmental health risk of all (WHO, 2014c). Cities, especially large cities, are particularly affected (WMO and IGAC, 2012). Particulate matter is the most important problem (Figure 2.3-6), but also emissions of various gases (e.g. CO, SO₂, NO_x, ground-level ozone) are damaging to health. The emissions are created by combustion processes, especially in energy generation by fossil-fuel power plants, in transport and industry, but also by building-heating systems and open fires of all kinds. Only about 160 million city dwellers worldwide breathe clean air (GEA, 2012: 1380). The follow-up costs are extremely high. The economic costs of the effects on health and of deaths caused by air pollution were estimated at US\$ 1,575 billion for the WHO European Region in 2010 (WHO Europe, 2015a). UNEP (2014: 43) estimates the costs for the OECD countries at US\$ 1,700 billion for 2010 and at US\$ 1,400 billion for China alone.

The effects extend far beyond the cities and also influence the ecosystems of the surrounding region, e.g. as a result of nutrient inputs or acid rain (Grimm et al., 2008). Exposure to ground-level ozone also reduces the yields of important food crops such as wheat or rice; about 40% of the losses are recorded in China and India (van Dingenen et al., 2009).

A classic example is the air pollution in London, which increased sharply from the 19th until the mid-

Box 2.3-5

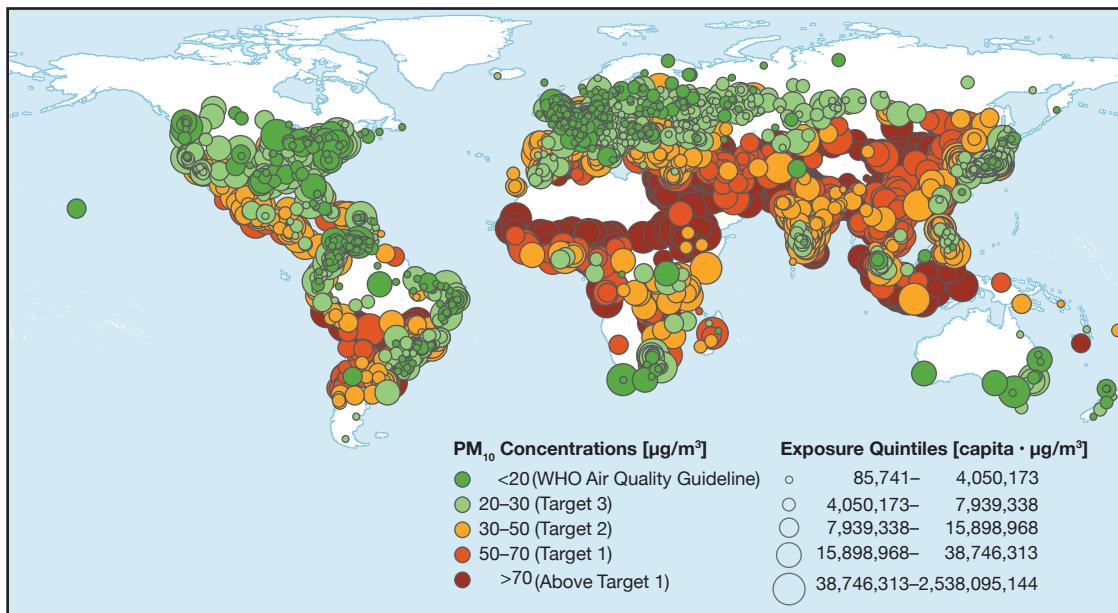
Planetary guard rail on the loss of phosphorus

As one of the planetary guard rails, the WBGU proposes stopping the loss of phosphorus (WBGU, 2014b). In terms of implementation, the WBGU proposes the site-specific optimization of global primary fertilization with phosphorus by 2030. The release of non-recoverable phosphorus into the environment should be stopped by 2050, so that its global recycling can be achieved.

20th century, primarily due to the combustion of sulphurous coal, culminating in the 'Great Smog' or 'Big Smoke' in December 1952 (with PM₁₀ concentrations of about 3,000 µg per m³ – PM₁₀ are particles with a diameter of less than 10 µm; Figure 2.3-4), which darkened the streets and caused several thousand deaths in the space of a few days (Davis et al., 2003). The air quality in London today is significantly better because the coal ovens and burners in factories, power stations and heating systems have been replaced by oil and gas or fitted with filters. Present-day air pollution is mainly caused by emissions from road traffic. But, from the health point of view, its intensity is still too high in London: particulate matter and nitrogen oxides, for example, caused more than 9,400 premature deaths in 2010 (Walton et al., 2015).

Today, the problem of extreme air pollution has shifted to the fast-growing metropolitan areas in the emerging economies (particularly in Asia and partly also in Latin America). All megacities exceed the values for particulate matter proposed by the WHO (PM₁₀; WMO and IGAC, 2012). Especially the large cities in China and India are today making very similar experiences to London 70 years ago. Air pollution in Chinese and Indian cities is often far in excess of values that are not harmful to health (Section 4.5.4.3). In Beijing in winter, for example, extreme values are repeatedly measured that are twenty times the value for PM_{2.5} recommended by the WHO (The Lancet, 2014). In the last ten years, air pollution in China has increased by about 50% and continues to rise despite new standards and countermeasures. Air pollution is one of the most common causes of death in China (Yang et al., 2013; Lelieveld et al., 2015) and is therefore certainly one of the most pressing political challenges. The Chinese government has responded with strategies and clean-air measures (Qiu, 2014).

The relative importance of the individual substances depends on the cities' level of development. For example, lead and sulphur dioxide are still a major problem in developing countries, but no longer in industrial-

**Figure 2.3-6**

Human risk exposure to particulate matter pollution (particle diameter smaller than 10 µm – PM₁₀) in 3,200 cities worldwide. Exposure [capita · µm/m³] = PM₁₀ concentration · urban population. The size of the circles shows the extent of the exposure (quintiles), the colour of the circles corresponds to the PM₁₀ concentration (range: 7–358 µm/m³).

Source: Seto et al., 2014, based on data from GEA, 2012:1381

ized countries. Air pollution roughly follows an environmental Kuznets curve (Figure 2.3-2b); i.e. in OECD countries the levels tend to decline with increasing development, while the fast-growing developing countries are still experiencing a rapid increase in urban air pollution (Figures 2.3-2b, 2.3-7, 2.3-8). In Europe, exposure to air pollution has been significantly reduced after decades of successful environmental policy (e.g. in Germany: SRU, 2015:106). Even so, the limits e.g. for nitrogen oxides and particulate matter are still regularly exceeded in many large cities, so that there is still need for action (Langrish and Mills, 2014).

Combating air pollution is a strategy that pays off in more ways than one. Many premature deaths and serious societal health costs are avoided and the quality of life in the cities significantly improved. At the same time, the phase-out of coal is not only indispensable for the fight against air pollution, it also brings co-benefits for the mitigation of climate change. Similarly, the switch of urban traffic away from fossil fuels to electromobility means improvements in the fields of air pollution, noise, climate-change mitigation and quality of life. These positive interactions, which are highly welcome from the systemic perspective, are discussed in Box 4.5-4.

2.3.4.2

Overuse and pollution of water resources

Hydrological footprint of cities

About half of all cities worldwide with more than 100,000 inhabitants are located in regions affected by hydrological water scarcity (Richter et al., 2013:335; Figure 2.3-9). In total, around 30% of the global demand for water stems from urban settlements (WWAP, 2009). Urban regions frequently cover their requirements from areas far beyond the urban densification zones. This is also called a city's hydrological footprint or 'city blueprint' (van Leeuwen, 2013).

The largest water-transfer project in the world is currently under construction in China. Starting from the Three Gorges Dam, gigantic quantities of drinking water are to be pumped from the Yangtze River to the northern provinces, where many cities, including Beijing with 25 million inhabitants and seven other cities with more than 2 million inhabitants, suffer from a shortage of water. The central section of the canal system with a length of 1,400 km was inaugurated in January 2015. By 2050, all the canals of the south-north water-transfer project are expected to transport about 45 billion m³ of water per year to the north and supply more than half a billion people with water (Lee, 2015:9). However, Webber et al. (2015) point out that the scarcity of water in the north of China represents

**Figure 2.3-7**

Air pollution caused by automobile traffic in Manila, Philippines.

Source: Frauke Kraas/WBGu

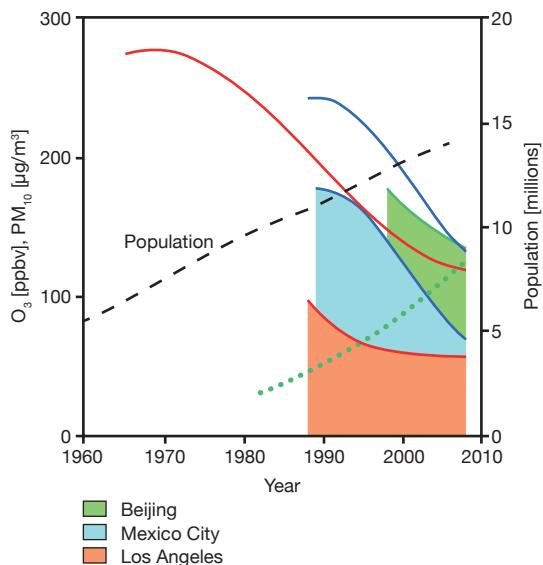
a management problem rather than one of the availability of natural water deposits. A similar mega project is under discussion in India: the River Interlinking Project.

A phenomenon that has attracted little attention up to now, because it does not have a local or regional effect, is the (in some cases far-reaching) hydrological footprint of European and North American cities through the use of 'virtual water' in imported products. The term 'virtual water' refers to the amount of water used in a product and its production, or in a service. For example, when an orange is imported from an arid Mediterranean region, the water that was used in the production of this orange is also virtually imported from this region.

Groundwater

Groundwater resources are tapped for the urban water supply in cities without sufficient surface water resources. The quantity removed very often exceeds the natural regeneration rate. This leads to falling groundwater levels, salt-water intrusion and a subsidence of land masses. Urban surface sealing reinforces this effect, because it promotes the rapid drainage of precipitation and thus impedes water absorption in the city (Oberndorfer et al., 2007).

Particularly high growth rates of groundwater extraction can be observed in India, Pakistan and Iran, while rates in the USA and China have stabilized at a high level after a period of high growth (WWAP, 2012:90). In Mexico City, for example, about 72% of the drinking water comes from aquifers which only refill very slowly and in some cases have already fallen by up to 10 m (Benton-Short and Short, 2013:201). At the same time, the land masses have subsided by up to 9 m (WWAP, 2012:89). In China's Hai River Basin, too, the groundwater level has fallen by 50–90 m as a

**Figure 2.3-8**

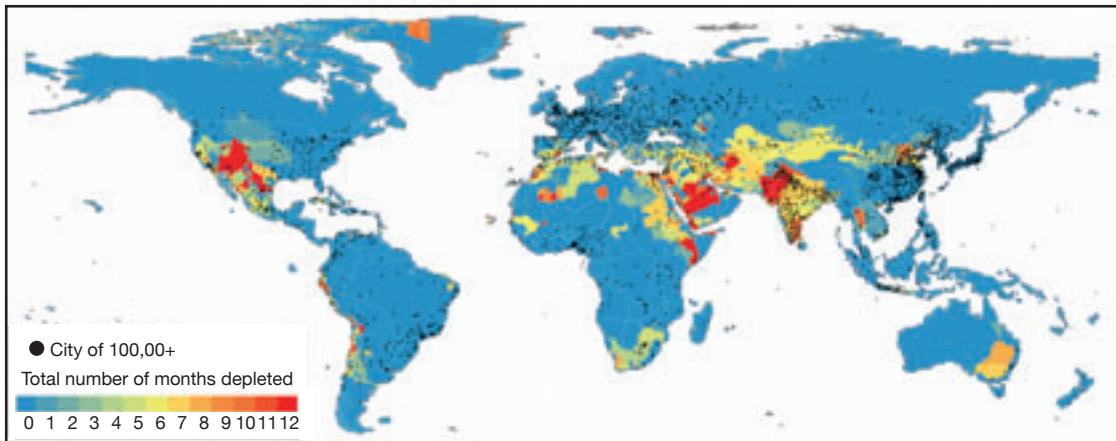
Development of air pollution in three approx. equal-sized megacities (Beijing, Mexico City, Los Angeles), based on the example of particulates (PM₁₀: thin, shaded lines) and ground-level ozone (O₃: thick, solid or dotted lines). Black, dashed line: average city size (number of inhabitants) of the three cities.

Source: WMO and IGAC, 2012:290

result of overuse in recent decades, leading to salt-water intrusion and a subsidence of the land masses by several meters in Beijing, Shanghai and Tianjin (UNDP, 2006:144). According to the UNDP, in Europe 53 of 126 coastal groundwater-catchment areas are affected by salt-water intrusion.

Water pollution

Since future urbanization will take place primarily in developing countries and emerging economies, and as a rule the cities' sewage infrastructures there are already inadequate today, the risks to people and the environment can be expected to increase markedly if no immediate countermeasures are taken (Corcoran et al., 2010). In Jakarta, for example, a city with more than 9 million inhabitants, less than 3% of the sewage generated daily passes through a treatment plant (Corcoran et al., 2010:26). In Lahore and Karachi, too, most of the sewage (Lahore: 60%, Karachi: 80%) enters the environment untreated. Water-borne diseases are widespread here (UNDP, 2006:50). It is particularly risky if untreated industrial waste water is added to urban sewage (WWAP, 2012:89). The discharge of untreated waste water and sewage has led to considerable contamination of water resources in the catchment areas of cities like New Delhi, Lagos, Cairo or Mexico City (Benton-Short and Short, 2013:311). As a result of discharges from the waste water of Buenos Aires, the

**Figure 2.3-9**

Cities affected by water scarcity worldwide. Cities with more than 100,000 inhabitants in regions with temporary or permanent hydrological water scarcity. About half of all cities with more than 100,000 inhabitants are situated in water catchment areas affected by hydrological water shortages in the course of a year.

Source: Richter et al., 2013

Riachuelo river contains concentrations of zinc, lead and chromium that exceed Argentina's threshold value 50-fold; only about 5% of waste water is treated (Engel et al., 2011:6, 26). Untreated sewage leads not only to health problems, but also to the contamination of groundwater, eutrophication and the development of low-oxygen zones (dead zones) in seas and freshwater lakes and rivers.

In view of this precarious situation, UNEP and UN-Habitat point out that completely new dimensions of investment are needed in the sanitation infrastructure, and that this investment must be made as quickly as possible (Corcoran et al., 2010:11). In the WBGU's opinion, building efficient urban sanitation infrastructures is therefore one of the challenges that needs to be addressed with transformative measures in order to effect a fundamental system change.

2.3.4.3

Waste

The handling of waste is one of the greatest challenges faced by cities (UN-Habitat, 2010b). The annual quantity of waste generated by settlements and industry, as well as hazardous substances, totals more than 4 billion tonnes (ISWA, 2012). Industrial waste must be considered separately on a case-by-case basis depending on the origin and production process; the same applies to hazardous materials (e.g. toxic waste) and radioactive pollutants (Section 2.3.3.3). However, since municipal and industrial waste streams are in practice often mixed and landfilled or incinerated together, it is hardly possible to describe each stream separately (UNEP, 2012b: 168). This also applies to the growing new problems caused e.g. by electronic waste (e-waste; Section

4.4.3) or by endocrine disruptors. This section focuses primarily on municipal waste (Figure 2.3-10).

The global amount of municipal waste has increased tenfold in the course of the last century and is currently estimated at 1.3 billion tonnes per year (Hoornweg and Bhada-Tata, 2012); other sources put the figure at 1.6–2.0 billion tonnes per year (ISWA, 2012). The trend is expected to continue, so that the quantities involved could double by 2025 and even triple by 2100 (Hoornweg et al., 2013). The OECD countries generate most waste: 1.75 million tonnes per day (Hoornweg et al., 2013). The trend towards waste reduction and recycling means that the amount of waste generated per person is expected to peak in this group of countries before 2025; in the USA, this 'peak waste' has already been reached (Benton-Short and Short, 2013:381). Although the per-capita amounts of municipal waste are still significantly lower in developing countries and emerging economies (Figure 2.3-11), they are expected to continue growing for some time with rising incomes and the trend towards increased consumption. Therefore, according to Hoornweg et al. (2013), the global peak of municipal waste will probably not be reached in this century.

Waste is primarily an urban problem; the quantities are more concentrated in cities due to the high population density (Hoornweg and Bhada-Tata, 2012). Furthermore, the average quantity of waste per person in the city is higher than in rural areas because urban incomes are above the national average and more can be consumed. Organic waste accounts for a greater proportion of waste in the country, making decentralized recycling easier.

Waste management is a globally relevant economic

sector with a global annual value of US\$433 billion (ISWA, 2012). The waste industry is frequently the largest item of expenditure in the budgets of the major cities in developing countries and emerging economies (Hoornweg and Bhada-Tata, 2012) and often part of the informal economy; about 15 million people find work there (UN-Habitat, 2013a; Figure 2.3-10). Reusable material is removed from the waste stream and recycled using simple techniques – often under risky and unhealthy working conditions (Box 5.3-2). This work is usually done by the poorest sections of the population, significantly jeopardizing their health (UNEP, 2012b:175). In this field there are opportunities for improving living conditions while simultaneously developing an effective recycling system (ISWA, 2012).

Waste has long since become an international trading commodity as a result of the ever closer integration of cities into the global economy; e.g. ships are scrapped in India, and sharply increasing amounts of e-waste are being exported to Africa (e.g. Accra: Bullinger and Röthlein, 2012:221). Section 4.4.3 deals in more detail with the especially critical topic of e-waste. There is also a world market for secondary raw materials from recycling (e.g. paper, sorted plastic). The value of traded metals from scrap and recycling, as well as paper and cardboard, amounts to at least US\$30 billion per year (Hoornweg and Bhada-Tata, 2012:27). In 2010, China imported more than 7.4 million tonnes of plastic waste, 28 million tonnes of waste paper and 5.8 million tonnes of scrap (ISWA, 2012).

Environmental problems caused by urban waste

In particular the total absence of a waste infrastructure, especially collection and transportation services, has considerable negative effects on public health. In most regions, solid waste is dumped in landfills outside or on the fringes of the cities. Such sites are often unprotected and lead to the contamination of surface water or groundwater (Hoornweg and Bhada-Tata, 2012:25ff.). Environmental problems with remote



Figure 2.3-10

Informal waste collectors search the landfill site in Urali Devachi near the Indian city of Pune for recyclable materials to sell to intermediary traders.

Source: Mareike Kroll/WBGU

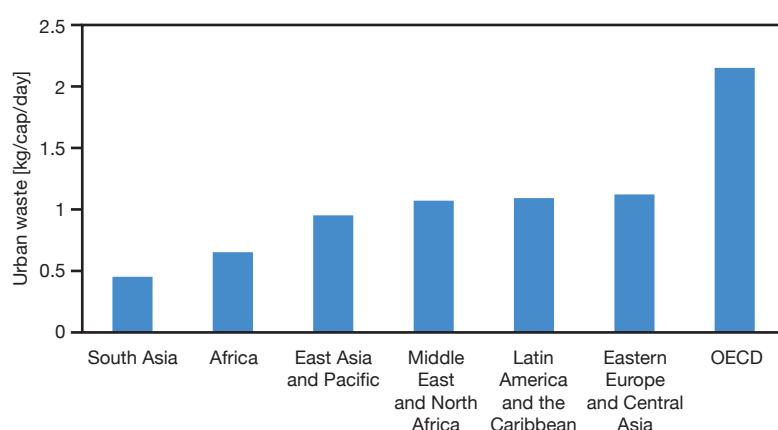
effects are caused by the emissions of CO₂ and methane from landfills, which accounted for about 3% of total global greenhouse-gas emissions in 2010 (Section 2.3.3.1, IPCC, 2014c:385). In many cities in developing countries and emerging economies, it is normal practice to reduce the amount of waste by decentralized incineration, for example in open fires at the side of the road or on landfills (Box 5.3-2). The smoke and combustion gases are highly hazardous to health (Section 4.5.4.3, UNEP, 2012b:184). Similarly, when the waste is thermally treated in incineration plants under inadequate environmental standards, air pollution and toxic substances in the exhaust gas and ashes can lead to environmental problems. Last but not least, as a result of inadequate waste treatment, millions of tonnes of plastic waste end up in the seas and cause damage to the marine environment (Section 2.3.3.3; WBGU, 2013).

Options for dealing with waste

It is estimated that more than half of the world's population has no access to even an elementary waste-dis-

Figure 2.3-11

Worldwide distribution of municipal waste per person.
Source: Gardner, 2012



posal infrastructure, e.g. regular collection and controlled landfill sites (ISWA, 2012). About 70% of globally collected municipal waste is landfilled, 11% is incinerated and the remaining 19% recycled, composted or otherwise re-used (ISWA, 2012). As a rule, the three methods are combined in different proportions. Landfills can reach enormous dimensions. The now closed Fresh Kills landfill on Staten Island, where up to 17,000 tonnes of waste from New York City were stored daily, today covers 890 hectares and is considered to be the largest man-made structure ever created (Benton-Short and Short, 2013:384). Even within the OECD, about three times as much waste is disposed of in controlled landfill sites with groundwater barriers or in waste incineration plants, than is recycled. Recycling also exists in developing countries and emerging economies, where marketable residual materials are sorted out by hand (e.g. aluminium, glass; Box 5.3-2). These often informal waste systems can be very effective; they should be used and improved (UN-Habitat, 2010b: xix). From a sustainability perspective, the different options for dealing with waste can be categorized in a ‘waste hierarchy’ (Figure 2.3-12).

In the WBGU’s view, the goal in sustainable waste management must ultimately be to achieve the transition to a circular economy that is as complete as possible within this century. It is technically possible to implement the virtually complete recycling of waste and largely do without waste incineration and landfill sites. Long-term, integrated strategies will be needed if this is to become a reality (Section 4.4.4, 9.3.2.2).

2.3.4.4

Climate risks

Many of the risks that arise as a result of anthropogenic global warming affect cities (Revi et al., 2014a). Climate change will lead to more frequent, more severe or longer-lasting extreme weather events such as heavy precipitation, heat waves, droughts and floods. It causes sea levels to rise and glaciers to disappear.

This will have profound effects on a wide range of urban functions, infrastructures (e.g. cascading effects on water, energy, sanitation, transport and communications infrastructures) and services, and could further exacerbate existing problems. The potential effects of climate change in cities depend on the geographical location of the agglomeration areas, resilience (e.g. of the infrastructure) to weather extremes, the fabric of the buildings, the population’s vulnerability and the capacity for crisis response.

Rapid urbanization and the rapid growth of large cities in developing countries and emerging economies are leading to an increase in the number of vulnerable urban communities in informal settlements (Revi et al.,

2014a). The urbanization trend therefore often exacerbates the risks to cities from climate change. Moreover, the risks in cities are unequally distributed. Poorer sections of the population are often less well equipped to adapt to changes in environmental conditions and often live in threatened areas.

Table 2.3-1 shows an overview of the impacts of climate change that can have a negative effect on urban needs.

Rising sea levels, floods and glacial melt

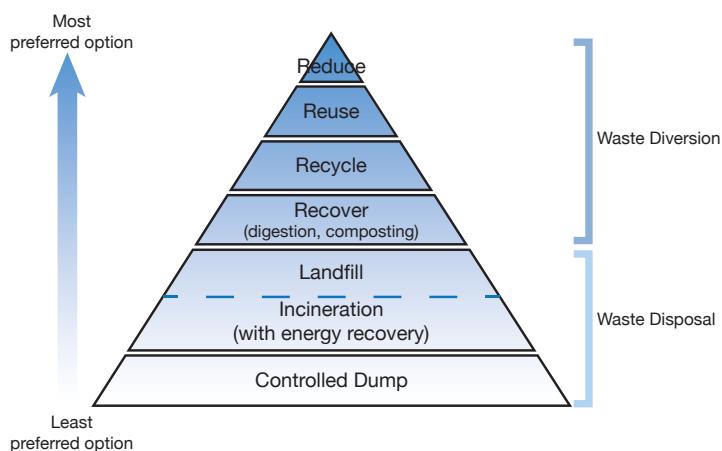
Large cities in low-lying coastal areas and river plains are seen as being particularly at risk in the next few decades; many of these are located in Asia (Revi et al., 2014a:552). If temperatures rise by 3–5°C, sea levels can be expected to rise by 0.45–0.82 metres (mean value = 0.63 m; scenario RCP 8.5; IPCC, 2013) by the end of the century. Since many urban densification areas are situated in low-lying coastal zones, they are exposed to particularly serious hazards through a combination of a rise in the sea level, subsidence of land masses caused by the weight of buildings, groundwater depletion, storm events and flooding. Harbour cities, petrochemical industry sites and power stations are particularly threatened. Flooding of sanitary facilities can lead to health risks from water-borne diseases.

It is estimated that a sea-level rise of only half a metre could already more than triple the number of vulnerable people and increase the amount of assets at risk more than tenfold in value terms (Hanson et al. 2011). Rising sea levels would destroy large amounts of assets along densely populated coastal zones and particularly in harbour cities, which are important trans-shipment points for goods, or the sites of major industrial plants. According to Hanson et al. (2011), the 20 most vulnerable cities (in terms of people and assets) include Mumbai, Guangzhou, Shanghai, Miami, Ho Chi Minh City, Calcutta, New York, Osaka-Kobe, Alexandria, Tokyo, Tianjin, Bangkok, Dhaka and Hai Phong. Focusing only on assets as the criterion, cities like Miami, New York, Tokyo, New Orleans, Guangzhou, Shanghai and Tianjin are at the top of the risk list. Substantial increases in flood damage are to be expected if no adaptation measures are taken. Timely adaptation can at least temporarily prevent most damage here. If climate change continues unabated, however, withdrawal will be the only remaining adaptation option in many of the above-mentioned cities. Many European countries (the Netherlands, Germany, France, Belgium, Denmark, Spain and Italy) will also have to reinforce their coastal protection measures. In some coastal zones of Europe, managed retreat is probably (i.e. with a likelihood of more than 66%) unavoidable (IPCC, 2014b).

Many cities in mountain foothills source water from

Figure 2.3-12

Hierarchy of waste-treatment options from the sustainability perspective.
Source: Hoornweg and Bhada-Tata, 2012:27



glacial areas. Glacial melt can lead to flooding and landslides and, in the long term, to a loss of drinking-water resources.

Temperature rise, urban climate and heat islands

Cities have a modified microclimate because of their dense building development (which reduces reflectivity and changes wind conditions, among other things), as well as the reduced vegetation compared to the surrounding areas, and a higher energy turnover per unit of area. One feature of this microclimate is higher temperatures (Oke, 1987, 1997; Rosenzweig et al., 2011). This effect, called the urban heat island (UHI) effect, can be reinforced by global warming. Urban warming is therefore often higher than the regional average. According to analyses conducted by the IPCC, even in a scenario with strong mitigation (scenario RCP 2.6), in which average global warming remains below 2°C, a local urban warming of up to 4°C can be expected by 2100 in a number of major cities, taking the UHI effect into account. In a business-as-usual scenario (scenario RCP 8.5), most cities can expect a temperature increase of at least 2.5°C, and some cities a warming of more than 5°C, when the UHI effect is taken into account (Revi et al., 2014a:554). More frequent heat waves will reinforce these heat islands, and this can lead to considerable health problems. For example, temperature extremes like heat waves can have a directly negative effect on human health, e.g. by heat stress or even death through heat exposure; the higher temperatures can also have an indirect effect by intensifying air pollution or lengthening the period during which pathogens can spread diseases. One extreme example was the heat wave in the summer of 2003, which caused tens of thousands of deaths in Europe, mainly among older and debilitated persons (Robine et al., 2008). Furthermore, high summer temperatures increase the demand for air-conditioning systems and with it power consumption (Santamouris, 2014).

Droughts and water scarcity

Droughts, too, can have many and varied effects on cities. A scarcity of water can lead to rising food prices and supply bottlenecks. The failure of hydroelectric power stations and a lack of cooling water from rivers can restrict power generation. The use of contaminated water, e.g. as a result of a shortage, can cause illnesses and restrict the availability of food. Moreover, droughts in rural areas can intensify internal displacement and migration to cities (Revi et al., 2014a; Box 2.3-6).

Today, approx. 150 million people are already living in cities threatened by water scarcity (i.e. these cities have less than 100 litres of surface or ground water sustainably available per person per day); demographic effects alone could cause this number to increase to one billion people by 2050. Climate change could raise it by a further 100 million people (McDonald et al., 2011). About half of all cities with more than 100,000 inhabitants worldwide are located in areas already affected by chronic water scarcity (Richter et al., 2013:335; Figure 2.3-9).

Cities with insufficient surface water resources use groundwater supplies and aquifers, and the quantity withdrawn very often exceeds the natural regeneration rate (Section 2.3.4.2; WWAP, 2015:42). In dry regions, where groundwater resources are frequently used due to a lack of sufficient surface water, the already usually low rainfall is expected to decline further as a result of climate change. The long-term overuse of groundwater resources results in falling groundwater levels (also outside the city limits, directly threatening subsistence farmers in particular), salt-water intrusion in the case of coastal cities, and a subsidence of land masses. Cities in South Asia, parts of China, in Europe and North America are especially affected. Climate change will also have an adverse effect on the quality of groundwater and the water stored in aquifers (Revi et al., 2014a:557).

2 Urbanization in a global context

Table 2.3-1

Overview of different climate risks to urban needs.

Source: WBGU; image sources: symbol for rising sea levels: <http://www.climatedots.org/>, all other symbols: <https://openclipart.org/>

Urban needs	Risks
(Fresh-)water supplies	Water scarcity
	Contamination after floods
Food security	Rising food prices after crop failures
Energy supply	Floods
	Hydropower failures
Physical integrity/health	Extreme events, floods, heat waves, storms
	Waterborne diseases after floods
	Insufficient medical services because of interruptions of value chains after extreme events
Transport routes and buildings	Floods
	Storms
Political stability	Migration flows after extreme events, erosion and insufficient supplies in rural areas
	Social unrest caused by particular climate vulnerability in poor districts
Financial stability	Storm damage
	Reduced production capacity
 Sea-level rise	 Glacial melt
 Extreme rainfall	 Droughts
	 Storms
	 Heat waves

Storms and extreme weather events

The areas prone to flooding as a result of tropical cyclones are growing as a result of the rise in sea levels. Extreme weather events can claim many deaths, cause many injuries and inflict a great deal of damage on urban infrastructure, particularly in the absence of adaptation or disaster-preparedness measures (Revi et al., 2014a).

2.3.5 Conclusions

Systemic complexity and feedbacks offer opportunities

Urban environmental problems are often interlinked and tend to be mutually reinforcing (e.g. waste, contamination, water supply and sanitation). Self-reinforcing feedbacks arise, for example, when local manifestations of global environmental change are combated using measures that further intensify the underlying problem. One example is the use of air-conditioning units in cities during heat waves, since their waste heat and power consumption exacerbate the original problem. Conversely, the solution to local environmental problems can lead to co-benefits that reduce other negative environmental effects. Sewage treatment – carried out for reasons of hygiene and preventive healthcare – simultaneously reduces the input of pollutants and nutrients into the waterways and thus counteracts eutrophication trends there. The introduction of electromobility avoids not only air pollution, but simultaneously also noise and greenhouse-gas emissions during use (co-benefit in combating air pollution: Box 4.5-4). Modern ways of treating municipal waste reduce climate-related emissions of methane, can generate energy and save resources by recycling. Such systemic co-benefits offer interesting and promising action options. Cities are important fields of action in efforts to stop self-reinforcing feedback loops and reversing the direction of dynamics (Section 9.3).

Cities are not islands

The impact of systemic environmental interactions reaches far beyond the city limits. Cities are embedded in cross-cutting dynamics, whether it is the relations between cities and their surrounding region or the development of the Earth system. Cities externalize a big proportion of their environmental impacts and leave ecological footprints in the environs and in the Earth system. Even a ‘green’ city that sets great store by urban environmental protection and quality of life can cause a large ecological footprint. The huge

opencast mines of the mining corporations, the clearing of primary forests for palm-oil plantations and livestock breeding, the mountains of electronic waste in Africa and Asia, the plastic vortices in the oceans, and the maize and soya monocultures in agriculture are all caused primarily by consumption in the cities. These systemic remote effects should be taken very seriously and always be borne in mind in urban environmental strategies, even though integrating these global, complex and sometimes abstract impacts into urban policies is a major challenge. There is a great opportunity here for the Great Transformation, because systematically conceived sustainability strategies for cities have a very large leverage effect for sustainability as a whole because of the great importance of cities for material and energy flows (Section 2.3.2). This approach is examined in greater depth, using a number of examples, under the ‘Materials and Material Flows’ transformative action field (Section 4.4). It is taken up again in the Recommendations (Section 9.3).

2.4

The city as a habitat

Many recent publications on urbanization refer to the 21st century as the ‘urban century’ (e.g. Brown et al., 2014; Nijkamp and Kourtit, 2012), and accordingly to present-day humankind and above all future generations as the ‘urban species’ (Glaeser, 2011). Since 2007, cities have been the everyday living environment or habitat for the majority of human beings (Section 2.1). Most of the children born since then will grow up in urban surroundings, and an ever-increasing proportion of the population will spend the final years of their lives in cities. For this reason alone, growing up, living and dying in urban surroundings deserves special attention in science and politics. A number of push and pull factors (Chen and Coulson, 2002; European Committee, 2000) can be distinguished that indicate some global similarities (Section 2.1.2). For example, the attraction of cities is frequently related to the promise of more diverse opportunities (for gainful employment, education, social contacts, culture) and improved access to food or infrastructures. But do cities deliver on this promise? This question must be answered individually for every city in the world. Many of the fastest-growing cities worldwide are in developing countries and emerging economies, quite a few of them in countries with ongoing social conflicts or even civil wars. What awaits people in these cities after their migration tends to be poor housing and supplies, an overtaxed or barely existent city administration, and a tense social atmosphere.

Box 2.3-6

Drought, internal displacement and urbanization in Syria

The number of Syrians who have become refugees since 2011 as a result of the ongoing civil war is high. In addition to the approx. 4 million people who have left Syria as refugees since the beginning of the civil war, the UNHCR counted approx. 6.5 million internal refugees inside Syria at the end of 2015 (UNHCR Syria, 2015). However, displacement and migration also played a role before the violent conflicts in Syria, and there is a discussion on whether this contributed to the escalation. One question being discussed is the extent to which the extreme drought in the previous years had an impact on the events.

In its report 'Climate Change as a Security Risk', the WBGU (2008:187f.) pointed out the uncertainties when studying the relationships between environmental change and migration decisions. In particular, the interaction between environmental change and other migration-causing factors usually takes place in a complex situation in which the key individual factors are difficult to identify. Against this background, the following sections summarize the main points of a study by Kelley et al. (2015) on the role played by the severe drought from 2007–2010 in Syria in the emergence and dynamics of the ongoing civil war since 2011, and the subsequent scientific discussion (Brzoska and Fröhlich, 2015; Fröhlich, 2016).

The drought in Syria from 2007–2010 was one of the worst since temperature records began (Kelley et al., 2015). The likelihood of such an event was increased two or three-fold by the anthropogenic influence on the climate system (Kelley et al., 2015). Cook et al. (2016) also refer to the exceptional nature of this drought event. Based on an analysis of tree rings, they show that, with 98% probability, the 1998–2012 drought in the Middle East was the driest period in the last 500 years, and with 89% probability in the last 900 years. Kelley et al. (2015) point out that there had already been similar long-lasting (though not quite so serious) droughts in the 1950s, the 1980s and the 1990s. They cite three reasons why the effects of these droughts were less dramatic: (1) the increased use of resources caused by the population increase from 4 million to 22 million since the 1950s; (2) the overexploitation of the groundwater; (3) the

fact that the latest drought came only shortly after a severe drought in the 1990s.

The 2007–2010 drought led to a sharp increase in migration from rural areas to urban peripheries. According to Kelley et al. (2015), approx. 1.5 million Syrians became internal refugees. Almost as many Iraqi war refugees had already sought refuge in Syria between 2003 and 2007. These two groups temporarily made up approx. 20% of the urban population in Syria, which increased by half between 2002 and 2010. Kelley et al. (2015) hypothesize that this development contributed to the emergence of the unrest that developed into the civil war: "The rapidly growing urban peripheries of Syria, marked by illegal settlements, overcrowding, poor infrastructure, unemployment, and crime, were neglected by the Assad government and became the heart of the developing unrest."

The scientific debate to date on the connection between the Syrian conflict and climate change has not concentrated so much on the link between drought, migration and the formation of informal settlements; rather, criticism centres on whether these internal migrants contributed to the rebellion against the ruler Assad. There is also criticism of the isolated way the Kelley study focuses on the drought factor and neglects other societal and political factors in the history of the Syrian conflict (Brzoska and Fröhlich, 2015; Fröhlich, 2016). De Châtel (2014) regards the overuse of resources as a more important factor than the influence of climate change on water supplies: "Climate change may cause more frequent and harsher drought in Syria, but the ongoing failure to rationalize water use and enforce environmental and water use laws certainly constitutes a much greater threat to the country's natural resources." In addition, de Châtel continues, the Assad regime must not be absolved of responsibility for internal policy failures by citing external factors such as climate change (de Châtel, 2014).

Irrespective of future political developments, the study by Kelley et al. (2015) confirms that the models projecting a further desiccation of Syria and the area of the Fertile Crescent are reliable, and that water security in the region could therefore worsen even further as a result of global warming.

The debate on the role of climate change in the Syrian civil war illustrates the need for further, especially interdisciplinary research on the highly complex ramifications of historical factors in the emergence of conflicts, and on the impacts of environmental change on regions that are already unstable.

Apart from such regional-specific cases, people in urban habitats are usually confronted with a higher social density and a greater concentration of stressors such as noise and environmental pollution than in rural areas. At the same time, urban areas have the potential for greater diversity, more closely linked communication facilities, and thus better access to information of all kinds. In a best-case scenario, life in the city can involve more social capital, more room for personal development, variety and innovation, and improved opportunities for inclusion (Frey, 2009; Florida, 2008).

The following section considers cities as living environments, as habitats that people choose for entirely different reasons, or into which they are born. Cities have a great influence on their lives and daily routines,

but they can also be changed by the people living in them. One principle in this context is the idea that people and their urban environments are connected to each other in a wide range of interactions and transactions (Saegert and Winkel, 1990). The term 'environments' refers here both to ecological and to social, technical and urban-form-related aspects and elements of the surroundings. Studying the city as a habitat thus means observing how physical-material conditions are appropriated and become habitats for people; how urban practices – i.e. meaningful action patterns, interactions between people and their environment, and urban life styles – develop and mutually influence each other; how certain ecological conditions relate to actions and life styles and how the latter, in turn, have an effect

on the environmental status (Marzluff et al., 2008). For example, intensive use of cars in ‘car-friendly cities’ causes noise and congestion, both of which affect people in the form of stress. Furthermore, they have ecological and health-related consequences, e.g. in some cases even life-threatening air pollution (Section 2.3.4.1), which can, in turn, restrict the options for desirable urban mobility such as walking or cycling.

This section examines the quality of cities as a habitat and thus the quality of urban life. The WBGU’s perspective is that urban quality of life is not a static condition that people reach at some point in objectively ‘suitable’ habitats (Box 2.4-1). Rather, it is assumed that people actively create quality of life for themselves, i.e. they can experience quality of life even under very different, sometimes very difficult conditions, but that there are spatial and social factors that make this more, or less, likely. Research in the field of environmental and urban psychology on urban quality of life (Leppert et al., 2008; Pol et al., 2002; Seligman and Csikszentmihalyi, 2000) shows that people can usually deal well with individual stressors that threaten quality of life – e.g. noise, high work load, social stress – if they have coping resources such as social networks or places of retreat at their disposal, and are not burdened with too many stressors at the same time (Section 2.4.1). However, if stress increases and endures, people’s coping abilities are eventually exhausted. It is hardly possible to predict how a complex of stressors in urban areas will affect an individual person. However, in relation to entire populations, the prerequisites and supporting factors for urban quality of life certainly can be identified. In this context, urban areas are primarily understood as social spaces in which social life and social interactions and relationships take place.

Proceeding from the individual person and individual human-environment interaction, Section 2.4.1 first considers how urban habitats impact on quality of life and what role is played by environmental stressors and recreational areas. There is a focus on place identity and place attachment as important factors for urban quality of life. It is shown that both the effect of environments on the individual and the individual’s identification with the environment are closely related to social processes and interactions. Section 2.4.2 therefore concentrates on urban coexistence and the social level of quality of life. Social inclusion, environmental justice and social cohesion are considered here. Section 2.4.3 looks at urban life styles, non-sustainable urban consumption patterns and urban potential for sustainable consumption. In Section 2.4.4 some conclusions are drawn on shaping more liveable cities, which are of particular relevance to this report.

2.4.1

Urban quality of life and human-environment interaction

For a long time, it was assumed that quality of life is largely influenced by material prosperity and that societal progress can be measured primarily by material welfare indicators. However, empirical research reveals different results concerning the influence of income and economic growth on quality of life (Easterlin and Sawangfa, 2010; Layard, 2006; Helliwell and Putnam, 2004; Stevenson and Wolfers, 2008; Deaton et al., 2008). Overall, happiness research shows that the conditions for subjective life satisfaction vary greatly, and that social networks, education and future prospects have significantly more influence than material prosperity (Seligman and Csikszentmihalyi, 2000; Kahneman and Krüger, 2006).

In the urban context, too, a positive development is, in the meantime, no longer only measured using purely economic indicators such as GDP. Instead, *urban quality of life* is increasingly becoming the focus of interest as a key indicator (Eurostat, 2015; UN-Habitat, 2013a; OECD, 2011b; Marans and Stimson, 2011). Especially in view of the great strain caused by the various environmental stressors in cities (e.g. noise, air pollution, social density, social dynamics, income disparities, the threat of climate risks, crime), subjectively perceived quality of life is also of considerable importance as a resource for psychological resilience, i.e. for people’s fortitude and their coping strategies for dealing with crises (e.g. Wu, 2011).

Material aspects are only partially suitable as indicators of quality of life. In the housing environment in particular, the so-called ‘satisfaction paradox’ or ‘well-being paradox’ (Diener and Diener, 1996; Herschbach, 2002) shows that quality of life cannot be deduced one-dimensionally from objective spatial or environmental conditions. People are even able to experience housing satisfaction when their environmental conditions are rated by experts as bad (Dieckmann et al., 1998). This can be explained by the findings of resilience research (Antonovsky, 1997), according to which people have the ability to adapt to sub-optimal circumstances in their lives and to individually and actively *create* quality of life, if at least certain basic conditions are met. These include social networks, the facilitation of creativity, autonomy and self-regulation, and the existence of future prospects. Overall societal conditions, too, impact on individual quality of life. People who live in societies with a relatively equal distribution of wealth show a higher level of life satisfaction than people in economically unequal societies (Leppert et al., 2008; Seligman and Csikszentmihalyi,

Box 2.4-1**Definitions of quality of life**

There is no uniform and cross-(sub)discipline definition of quality of life in the social sciences. Terms such as quality of life, life satisfaction, well-being and happiness are sometimes used synonymously. Despite great heterogeneity as regards details, quality of life is understood relatively consistently as a multi-dimensional construct that brings together physical, psychological, social and ecological aspects and takes into account both subjectively perceived well-being and objective conditions (e.g. welfare aspects such as inclusion opportunities; Randall and Williams, 2001; Rogerson, 1999; WHO, 1997). Studies on well-being concentrate mostly on subjective assessments and ascertain an overall indicator on the basis of questions of the frequency and duration of positive and negative emotions, general life satisfaction and satisfaction with various areas of life (Diener et al., 2003). By contrast, happiness is mostly understood and measured one-dimensionally as a short-term or long-term positive affective state. In more comprehensive surveys on quality of life or well-being, happiness is categorized under subjective assess-

ments and here, in turn, under positive emotions (Diener and Lucas, 2000).

Environmental psychology places quality of life and well-being in the context of different environments, meaning on the one hand the spatial and social environment, but also environmental perceptions, e.g. in relation to environmental degradation and climate change (Perlaviciute and Steg, 2012). Research on urban quality of life focuses on urban residents as a specific target group. It is interdisciplinary in orientation and includes urban planning, geography, urban sociology, economics, medicine and other disciplines of spatial and urban research (e.g. El Din et al., 2012; Kabisch, 2011; Krämer et al., 2011; Manderscheid, 2004; Pacione, 2003; Blomquist et al., 1988; Lynch, 1960). Urban quality of life is not seen solely as the evaluation and perception of certain characteristics of the environment and the subjective assessment of their effect on perceived quality of life, but also as a consequence of human-environment interactions in which human and environmental characteristics work together (Jaeger-Erben and Matthies, 2014; Pol et al., 2002). Urban quality of life thus refers both to the (socio-)spatial prerequisites for the creation of quality of life in the city and to the active appropriation of urban spaces by people.

2000; Kahneman et al., 1999; Kahneman and Krüger, 2006; Siegrist, 2005). This influence can be seen not only among underprivileged people, but also among those who are economically well off. Wealthy people within a less equal society show a lower level of life satisfaction than wealthy people within an economically more equal society (Picket and Wilkinson, 2010).

Ideas on actively created quality of life which cannot be fully deduced from objective conditions stem from the concept of salutogenesis (Box 4.5-1). If they are applied to cities, the question arises as to which conditions favour individually and socially created urban quality of life and the resilience of city residents. These conditions include, on the one hand, creating space for recreation and activity and, on the other, creating space to make diverse social encounters and interactions possible.

2.4.1.1**Urban stressors and socio-spatial prerequisites for stress management**

On the one hand, urban environments offer potential for stress and overload; on the other, urban design can also provide spaces and possibilities for reducing and coping with stress. The following section deals both with urban stressors that restrict quality of life and health, and with urban resources for generating health and quality of life.

Stressors and stress management in urban spaces

Concepts and theories of (environmental) psychology formulate general and universal correlations between

environmental stressors and human sensibilities, health and actions. However, empirical research is primarily focused on cities in western and industrialized countries. Despite the focus on cross-cultural contexts, socio-cultural aspects are believed to play an important role in the perception, evaluation and processing of stress (Kuo, 2011). For example, there are cultural differences in the perception of stress, e.g. noise levels, and in the coping strategies that are chosen. Socially-oriented strategies in dealing with stress, such as withdrawal into the family or religious faiths are more likely to be found in cultures that tend to be collectivist, while self-related forms of coping (self-assertion, recovery of autonomy) are more likely to be found in individualistic cultures (Kuo, 2011). In general, it can be said that the high stimulus density in cities all over the world results in a wide variety of stressors that can lead to sensory and information overload, e.g. noise (Box 2.4-2), density, lack of road safety, crime or air pollution (Misra and Stokols, 2012; Srivastava, 2009; Gifford, 2007). In general, the available coping strategies are more likely to become exhausted the more these potential stressors and the fewer control options are present (Evans et al., 2002).

As far as possible consequences of perceived stress are concerned, the literature discusses higher susceptibility to disease and aggressiveness, a reinforcement of social tensions and social withdrawal (Gifford, 2007; Gray, 2001; Kirmeyer, 1978; Gump and Adelberg, 1978). Analysing such relationships is complicated by the fact that people process high stimulus density or sensory overload differently, depending on what other

stressors are simultaneously having an effect, e.g. critical events in their lives or onerous life circumstances. It also depends on whether and which 'resistance resources', e.g. social networks or places of retreat, are available (Taniguchi and Potter, 2015). Accordingly, coping with stress caused by density is easier if there are few other stressors and if sufficient resistance resources are available. Both vary depending on the socio-cultural and local context. Studies with residents in slums, for example, show that they are affected by a very high exposure to stressors, and that there are potentially fewer resources available for resisting, or for creating quality of life. In addition to density and noise, the main stressors are litter, air and water pollution, lack of access to infrastructures, violence, crime and legal uncertainty (Gruebner et al., 2014; Subbaraman et al., 2014; Rishi and Khuntia, 2012).

In developing countries and emerging economies, as well as in industrialized countries, potential stressors include a feeling of insecurity and a fear of crime; these are influenced by spatial aspects such as the design of streets and squares, the level of urbanization and the extent of the degradation of residential neighbourhoods (Rolfes, 2015; Häfele, 2013; Belina, 2011; Blöbaum and Hunecke, 2005). Just as important as spatial aspects are social factors and interactions between social and spatial characteristics (Pain, 2000). The stress caused by fear, for example, is greater when people feel they do not belong and there is little social cohesion or a high level of exclusion. Furthermore, insecurity is more likely to be felt by people with a low socio-economic status. There is also a link between insecurity in urban spaces and gender. In all cultures, women are more frequently exposed to violence in public places; at the same time, women feel fear and insecurity more intensely and feel more stressed than men as a result (Pain, 1997).

Partly for these reasons, gated communities are springing up in many cities in developing countries and emerging economies. These communities cut themselves off from the rest of the city and its inhabitants and, from the outside, look self-contained and protected (Breitung, 2012). However, this does not solve the overall problem, but rather tends to aggravate it (Section 2.4.2.1). At the same time, people sometimes deliberately look for the greater anonymity and stimulus density that can be found in urban areas (Flade, 2015). Potential stressors, therefore, actually lead to stress above all if they are subjectively perceived and assessed as stress (Ruback et al., 1997; Lazarus and Folkman, 1984).

Recreational facilities and socio-spatial facilitation of stress management

Processing the high stimulus density and potential stressors in a city requires cognitive resources that can lead to mental fatigue; they can be restored by recreation (Allmer, 2002). In addition to the reduction of stressors, it is therefore of great importance for quality of life in the cities whether recreational facilities are available and can be used accordingly (Figure 2.4-1). Recreational facilities in the city can take many different forms. Not only green spaces, but also built-up environments can offer opportunities for stress reduction and relaxation. However, green spaces and urban 'nature' have a special status.

Research on the importance of green spaces for city residents deals mainly with the effect of green spaces on well-being and health – at the physical, mental and social levels (for an overview, see van den Berg et al., 2013; Abraham et al., 2009). In this context, 'nature' is a generic term for such leisure and recreation areas. They can, of course, contain elements designed by people, but contain few buildings and are predominantly 'green', i.e. they have a high proportion of vegetation (parks, forests, lake landscapes, etc.). The stimulus density of urban environments can increase people's need for recreation (Guit et al., 2006; van den Berg et al., 2007). Both laboratory experiments and field studies confirm the relaxing effect of experiences in nature, particularly in the context of active exercise in the countryside. This can be proven both subjectively (well-being, reduction of stress and negative emotions) and objectively (reduction of high blood pressure, increased concentration; e.g. Hartig et al., 2003) and can exert a positive influence on the lifespan of city dwellers (Takano et al., 2002).

The availability of green spaces is important even if the recreation areas are not actively used (Bonnes et al., 2011). Urban green spaces and also waterways (Völker and Kisteman, 2011) give people opportunities for relaxation just by looking at them. The effect can be shown empirically: physically (Ulrich, 1983; Verra et al., 2012), mentally (e.g. cognition and positive mood: Laumann et al., 2001; Hartig et al., 2003; van den Berg et al., 2003) and socially (e.g. aggression reduction: Kuo and Sullivan, 2001; reduction of social isolation: Milligan et al., 2004; Sempik et al., 2005; Kuo et al., 1998). Children's development in particular is positively influenced by the presence of a natural environment in the city. Compared to the built-up or social environment, the natural environment does not emit any negative feedback; it is a basis not only for relaxation, but also for learning, especially for children (Exenberger and Juen, 2014; Gebhard, 2009; Knopf, 1987). The human need to experience nature and its

Box 2.4-2**Noise as a stressor in urban spaces**

Noise is one of the most common stressors in the urban environment (EEA, 2014; Yu and Kang, 2014). Noise is often defined as unwanted sound that is characterized by various components such as intensity (volume measured in decibels, dB), frequency, pitch, prevalence and duration (Bilotta and Evans, 2012; Guski, 2002, 2003) and has both physiological and psychological effects. In addition to the above-mentioned parameters, whether the sounds heard are defined as noise depends to a large extent on personal factors (such as sensitivity to noise), social factors (such as socio-economic and cultural background) and situational factors (such as predictability, controllability, time of day or interaction with other stressors; Welch et al., 2013; Schreckenberg and Guski, 2005; Hume et al., 2003a, b; Evans and Cohen, 1987). In addition, distinctions are made between different 'conduits' through which noise affects the organism and of which people are aware to varying degrees: sound masking, i.e. the interruption of communication by noise; the interruption of concentration and attention by disturbing noise; physiological excitement and finally affective-emotional effects such as aggression or fear (Miedema, 2007). Despite the relevance of subjective factors, research shows that objective thresholds do exist and that a person's health can be impaired if they are exceeded. For example, permanent exposure to a sound level of 40 dB during the night is a health hazard, according to the WHO (WHO, 2009). The orientation for European noise guidelines is that continuous noise at the first noise level of 30–65 dB (quiet conversation to office noise) can already lead to psychological reactions; physiological reactions are possible above 65 dB, e.g. continuous road noise; and volumes of 90–120 dB can already cause hearing loss. The pain threshold is 130 dB: at this level a short period of exposure is already enough to cause permanent hearing damage (BMUB, 2014).

Noise is one of the most frequently mentioned environmental stressors. About 40% of the European population report adverse effects through noise (WHO, 2009), most commonly as a result of street noise. A fifth of the population is considered affected by noise classified as a health hazard (EEA, 2014). The main effects of noise are as follows (listed in order of the number of people affected: Babisch, 2002): restricted quality of life, e.g. as a result of perceived disturbance, sleep disorders and increased aggressiveness, particularly as a result of traffic noise (road, rail, airports;

Dzhambov and Dimitrova, 2014; Miedema and Vos, 2007; Jannsen and Vos, 2009; Bronzaft et al., 2000); physical stress reactions such as high blood pressure and the release of stress hormones (van Kempen and Babisch, 2012) and therefore an increase in risk factors; and finally an increase in mortality and morbidity as a result of cardiovascular diseases and heart attacks (Vinneau et al., 2013; Floud et al., 2013; Sørensen et al., 2011). Continuous exposure to noise also impairs children's development; this has been demonstrated in particular in relation to concentration and reading ability (Clark et al., 2006) and to long-term memory and motivation (Evans and Hygge, 2007).

Although there are great similarities internationally in the effects and perceptions of noise, it is important to take individual and cultural aspects into consideration when it comes to noise-reduction strategies. For example, the importance attached to different sources of noise (traffic, nature, social environment) varies from culture to culture, and the related disturbance is assessed differently by city residents (Yu and Kang, 2014; Zannin et al., 2003). Important factors here include the pleasantness of noises, their compatibility with current activities, and their identifiability (Guski, 1997). Furthermore, the noise sources can be very different. In the Indian context, for example, the use of fireworks, loudspeakers or honking cars are also considered relevant urban noise sources (Singh and Davar, 2004; Ghosh, 2008).

As regards mitigation strategies, these findings of noise research mean that the primary aim should not be a reduction, in the overall noise level, but rather the targeted reduction of sources in the urban soundscape that are perceived to be disturbing (Kang, 2006). In addition to objective measurements, therefore, the participation of the affected population in noise-reduction strategies, for example in the field of transport, is considered very important (for the EU level: EEA, 2014; UBA, 2013; on the 'Mach's leiser' project in Leipzig: Section 6.5.2). Citizen participation also increases the controllability of the situation by the people concerned, which can have a positive impact on the perceived disturbance. Participatory urban planning is thus also a form of preventive medicine (Corburn, 2015).

While extensive data and maps on noise pollution are available for cities and municipalities in Europe and North America (EEA, 2014; WHO, 2011a; Chepesiuk, 2005), which can form a basis for noise standards and noise-reduction strategies, there are only a few studies and also fewer targeted political activities for noise reduction in the fast-growing metropolitan regions in developing countries and emerging economies.

social and health-related effects takes on a special relevance against the background of a decline in the proportion of green and recreational areas in the context of urbanization, inner-city densification or urban sprawl (Kraas and Butsch, 2014; Degenhardt and Buchegger, 2008; Bauer and Degenhardt, 2009). In the cities of the tropics and subtropics, parks, sports facilities or places for meditation play a similarly compensatory role.

The way in which streets and buildings are designed is also of great importance for recreation, and therefore for the quality of life of urban residents. The deci-

sive factor is what messages are sent by built-up and designed environments when they 'invite' people to use and interact with spaces. For example, the 'walkability' of the environment has a great influence; the ability to reach locations within the neighbourhood on foot not only increases physical activity (Bell et al., 2007) and directly improves people's health, it also enables social encounters and interactions. This is particularly important for people who tend to live alone (e.g. older people). Here, walkability potentially supports the development and maintenance of social capital (Rogers et al.,

2011; Leyden, 2003). Good accessibility of local attractions on foot or by bicycle can also represent a successful compensation for potential stressors in high-density urban environments (McCrea and Walters, 2012).

While such aspects as the aesthetics or beauty of buildings and ensembles are perceived differently, both culturally and individually, several constants can be named in people's perception of the built-up environment. For example, buildings of medium complexity are preferred, as are buildings whose function is clearly recognizable (Gifford and McCunn, 2012; Lynch, 1960). Run-down and abandoned buildings, on the other hand, increase people's feeling of insecurity in urban areas, as does wasteland with similar characteristics (Garvin et al., 2013; Kremer et al., 2013). When the surroundings are perceived as unattractive, run-down and unsafe, they are used less frequently, which has an effect both on physical activities and on social interaction and social capital (Bennet et al., 2007; Harrison et al., 2007; Figure 2.4-2).

Built-up areas should facilitate not only encounters and activities, but also the opportunities for withdrawal and privacy. In this context, privacy refers not only to protected spaces where people can be alone, but also to the possibility of self-determination and control over one's personal boundaries (Altman, 1975). Public spaces can offer such spaces by providing niches (shielded, almost hidden places for spending time, partitions). Increased video surveillance in urban areas is a challenge in this context, however (Zurawski, 2014).

Liveable spaces can thus also be characterized as spaces that make different forms of use possible – walkability, social encounters, relaxation – and offer them a secure framework. Urban spaces must therefore be conceived primarily as social spaces and planned accordingly, a perspective aligned, for example, to Jan Gehl's people-oriented urban planning (Box 2.4-3) or the concept of 'social design' developed in the 1980s (Sommer, 1983). It is above all the design of the built-up environment that is at the centre of attention; it should become more responsive to the needs, interpretations and habits of building users. According to Sommer, social design begins with an analysis of the users' needs. Subsequently, future or potential users are involved in the planning, for example by being shown drafts and being given a say. Finally, during the use phase, a further evaluation should take place to make it possible to still make readjustments to the building.

Different population groups are exposed to the social and physical conditions of their immediate environment to different extents, depending on their day-to-day activities. Children, low-income earners, old and unemployed people are less mobile and therefore more dependent on social support in order to make active use



Figure 2.4-1

Use of inner-city green spaces in Berlin.

Source: Gesa Schöneberg/WBGU

of facilities for relaxation and encounters (Sugiyama and Thompson, 2007). It should be taken into account during the design process that easily accessible and safe green areas and spaces for encounter in the city are a particularly important resource for activity and health (Nilsson et al., 2007; Evans and Foord, 2007; Kuo and Sullivan, 2001; Siegrist, 2005).

2.4.1.2

Place attachment and place identity

Whether people feel and can create quality of life for themselves in their habitats depends not only on the current material-spatial conditions, but also on their relationship with the environment. In the best-case scenario people develop *place identity*: i.e. their habitat and the memories, ideas and feelings associated with it play an important role for their self-image (Fuhrer, 2008; Proshansky et al., 1983), and they also show a willingness to take responsibility for their habitat.

Place attachment is part of place identity and emphasizes the positive connection, the interaction and the perceived proximity between an individual and a certain place (Lewicka, 2013). This underlines the fact that a person's identification with a place is developed in particular via the use or specific appropriation of the environment (Korpela, 1989). One determining factor is familiarity with the local circumstances, i.e. 'knowing your way around'; social bonds are another, e.g. relations with neighbours, friends and colleagues (Hidalgo and Hernandez, 2001). Various studies show that neighbourhood relations, duration of residence, access to infrastructure and social capital (the more the stronger) and socio-cultural heterogeneity and density (the larger the weaker) are of importance for place attachment (Lewicka, 2011). What is important here is a differentiated way of coming to terms with the effect of socio-cultural heterogeneity. Despite a general appreciation of diversity in one's own environment, it

is essential for the development of place attachment – irrespective of the individual person's social milieu – that similarities with the people in the neighbourhood are also noted. On the micro-level of the neighbourhoods, a certain social and cultural homogeneity is therefore also desirable (Lewicka, 2011). Homogeneity promotes above all 'bonding social capital', i.e. a form of social capital that is generated from similar life circumstances and values. In extreme cases, too much homogeneity can also lead to exclusion and isolation (Section 2.4.2.1). 'Bridging social capital' is therefore also important, as are connections forged between people that go beyond cultural and social differences (Schnur, 2013).

In addition to promoting social capital and quality of life, place attachment has a positive effect on local engagement (Lewicka, 2005). The people who live in a neighbourhood are empowered to deal successfully with negative factors particularly by forming social and spatial networks. Social cohesion (Section 2.4.2.2) and social resilience are developed at this micro-level.

The development of place attachment is a long-term process (Hernandez et al., 2007). A high degree of spatial mobility or migration and rapid urban growth can therefore prevent or hinder positive place identity and attachment. Place identity, however, is also 'relocalizable', especially when people move to city districts with similar spatial and social structures (Feldman, 1996). The reason for a change of residence or for migration also plays an important role. In what is known as life-style migration – moving in order to increase one's comfort and quality of life – it is less difficult for the person affected to identify relatively quickly with the new habitat (Torkington, 2012). People who spend little time in one place, for example because they have to commute long distances, feel less emotionally tied to their local area (Gustafson, 2009); the same applies to people who live in the suburbs (Nation et al., 2010). Both effects can be explained by having fewer social contacts in the area and the not-so-close social ties. Place identity and attachment should therefore not be interpreted purely individually; they are also the result of group processes (Devine-Wright and Lyons, 1997; Figure 2.4-3).

Place identity and attachment are thus not purely mental constructs that people develop in isolation and individually. They are based on specific interactions both with the surroundings and with the social milieu. For example, place identity can also be seen as part of the 'narrative of yourself', i.e. part of self-presentation in social interactions and people's self-perception (Dixon and Durheim, 2000). The transition between the individual appropriation of, and identification with, space on the one hand and urban coexistence on the other is therefore fluid.



Figure 2.4-2

Green swathe in the concrete jungle: Seoul, South Korea. The Cheonggyecheon River urban-renewal project turned a former main road into an inner-city recreation area.

Source: Frauke Kraas/WBGU

2.4.2

Urban quality of life and urban coexistence

Urban quality of life is a multi-dimensional construct (Box 2.4-1) and also includes objective factors such as income and substantive inclusion (Section 3.4.1). Even if these aspects have no direct causal relationship to subjectively perceived quality of life, they play a role in social comparison processes and raise or lower the level of aspiration or expectation as regards the standards of living regarded as 'normal' in the respective culture (Keul, 1995). In the following, urban quality of life is embedded more into social contexts. First, inclusion in cities is examined together with some factors such as social inequality and spatial segregation, which can potentially interfere with quality of life. Subsequently, attention switches to social cohesion, i.e. a sense of community resulting from social interactions and affiliations, which can, in turn, increase urban quality of life.

2.4.2.1

Inclusion in cities: social inequality, spatial segregation and environmental justice

The inequality that exists in cities in relation to income and assets, and which is intensifying in many countries (Box 2.1-6), has a direct impact on spatial structures, social justice and environmental justice – the latter being defined as the fair distribution of environmental resources (e.g. green spaces) and environmental stressors, which include social inequality (Rode et al., 2009; Figure 2.4-4).

Numerous studies illustrate the fact that the level of income, as well as socio-demographic characteristics such as educational and occupational status, the number of children or ethnic origin, have a decisive influence on where people settle within a city (Musterd and

Box 2.4-3**Jan Gehl: 'Cities for People'**

In his book 'Cities for People', the architect Jan Gehl develops the vision and the urban-planning implications of a lively, safe, sustainable and healthy city (Gehl, 2010). In his view, all these characteristics are closely related, and his core concepts are his thoughts on the lively city and on human scale. The starting point is that urban areas are lively if they are actively used in the context of everyday activities, and if they enable people to make contact with the society around them. According to Gehl, this is not solely a question of quantity, i.e. the number of people in a certain place. The main thing is, rather, that something 'happens', that people go about meaningful activities and like to spend time at a location. Liveliness cannot be planned. Nevertheless, on the basis of empirical observations and studies, Gehl deduces some features that favour the emergence of liveliness in urban neighbourhoods. For example, spatial relationships should be characterized by

compact, direct and logical routes that lead from one important place (in everyday life, leisure etc.) to another and can preferably be covered safely on foot. Everyday routes should be lined by facilities for meeting everyday needs (e.g. shopping opportunities) and should also offer visual variety (open façades, vertical lines). Spaces along everyday routes should invite people to linger for a while, e.g. with shop windows and seats that can be used for resting and interacting. A city should also not be built too high. Low buildings permit lighter, welcoming spaces. People who live on upper floors tend to take part less in city life.

For Gehl, urban design that takes people into public spaces where a high-quality stay is possible, generating liveliness with them and through them, is the starting point of a form of holistic urban planning that ultimately also makes a sustainable city possible. Lively spaces are more likely to motivate people to sustainable mobility; furthermore, active participation in city life potentially also increases people's willingness to get engaged in local affairs.

Ostendorf, 2011). Since local attributes, such as good transport links, access to green areas or a low crime rate, are reflected in local housing prices (for studies on air pollution: Graves et al., 1988; on the quality of schools: Gibbons and Machin, 2003, 2006; Bayer et al., 2007; on crime: Gibbons, 2004; Linden and Rockoff, 2008), higher income groups are primarily found in the better-quality residential areas. At the same time, the socio-demographic mix has an influence on the quality of a city district. The poorer sections of the population are more concentrated in less up-market residential areas because of the lower prices, e.g. in neighbourhoods with a higher crime rate, poorer schools, or along arterial roads where there is a lot of noise and air pollution. For one thing, they are thus more exposed to health-impairing environmental impacts (Classen et al., 2011; Claudio, 2007). For another, people living in socially disadvantaged urban areas have below-average access to good-quality public services and facilities such as semi-natural green and recreational areas (Dai, 2011). The lack of environmental justice in the sense of equal access to environmental resources and burdens is therefore a major problem, not just globally, but also at the local level in cities; it has negative effects especially for socially and economically disadvantaged people and ethnic minorities. One extreme example was Hurricane Katrina in 2005, which had a disproportionately large effect on the black working class in New Orleans, who subsequently had less access to support from insurance companies and the healthcare system (Hahn, 2005; Cook and Swyngedouw, 2014).

Inequalities in inclusion can also be found in cities when it comes to inclusion in economic development (Grant, 2006). The local settlement of companies and

the creation of highly qualified jobs, for example, stimulates the local economic power of a town or city. However, increased economic power is also reflected in a higher cost of living and higher rents, so that displacement processes of poorer sections of the population can be set in motion (Salvesen and Renski, 2002; Wong, 2001; Figure 2.4-5).

Based on their density and the physical proximity between poorer and richer sections of the population, cities would theoretically be in a better position than rural regions to counteract social inequality and



Figure 2.4-3

Designing a public space with tiles by artists from all over the world. Rio de Janeiro, Brazil.

Source: Anna Schwachula/WBGU

offer all population groups good public services, e.g. by means of cross-financing or skilful spatial arrangements (Rode et al., 2009). However, this does not happen very often. Rather, social inequality is increasing, particularly where municipal actors are weak and either unable or unwilling to offer public services; private, profit-oriented actors then assume this role (UN-Habitat, 2008).

Moreover, close proximity to social services is not synonymous with their effective use by all population groups. The poorest sections of the population often seem to gain better access to public services only after the needs of the middle and upper classes have already been satisfied (Ajwad and Wodon, 2008 in Rode et al., 2009), or else they cannot afford them – e.g. private healthcare services – so that access is ultimately blocked for them (Butsch, 2011). Moreover, geographic proximity between poorer and richer population groups in a city does not necessarily mean that there are mixed and heterogeneous city districts. When faced with major social differences, privileged social groups (emerging middle classes, societal elites) tend rather to withdraw from poverty and from people of other cultures and seal themselves off spatially in order to increase their quality of life (DeFrances, 1996; Ellin and Blakely, 1997; Dinzey-Flores, 2013; Billing and Churchman, 2003). As a result, among other things, gated communities – i.e. residential areas with restricted access from the outside, which are secured by fences and in some cases by professional monitoring – are on the increase in cities worldwide, particularly in countries with large disparities (discourse on an “architecture of fear”: Blakely and Snyder, 1997). This increases socio-spatial segregation between different economic strata (Le Goix and Vesselinov, 2015), which, in turn, cements or even exacerbates poverty and social inequality (Huster et al., 2008). Studies on gated communities in different parts of the world, such as the USA or South Africa, reveal that it is particularly the residents’ subjective feeling of security that increases in the fenced-off and closely monitored residential blocks, while the actual level of crime is often not reduced at all (Blakely and Snyder, 1995; Breetzke et al., 2014). The negative social side effects include a reduction in spontaneous contacts and a decline in the sense of community and social cohesion (Dinzey-Flores, 2013; Wilson-Doenges, 2000), and thus the chances of social networks developing. It is also possible that the fear of crime and a need for security only develop when people live in gated districts, that these factors are only stated in retrospect as the reasons for moving, while previously the prevailing reasons had been ones of status (Obeng-Odoom et al., 2014).



Figure 2.4-4

Appropriation of public space by urban residents. Under a shady overpass, the public space is used for street art and a flea market. Rio de Janeiro, Brazil.

Source: Anna Schwachula/WBGU

2.4.2.2

Social cohesion

Social ties, a sense of belonging and interpersonal trust are key prerequisites for perceived quality of life (Diener and Seligmann, 2004; Kahneman and Krüger, 2006; Section 2.4.1). These aspects are frequently subsumed under the term social cohesion, which generally denotes cohesion among members of a social structure and refers to the relationships among the group members, their willingness to cooperate, common values and ideas, and the identification of the individual with the group. A high level of social cohesion is often seen as an indicator of an intact community (Forrest and Kearns, 2001).

According to Wilkinson (2007), it is possible to distinguish between three levels of social cohesion among localizable (as opposed to virtual) communities: *first*, the sense of community, i.e. the perceived sense of belonging of the members of a community and the existence of common values and a common identity; *second*, place attachment and, in this context, especially the willingness to remain spatially connected with a place or a community; *third*, the social interactions in the neighbourhood, mutual assistance, and the social networks between members of communities that share spaces. Social cohesion can be seen on the one hand as a process; i.e. togetherness has to be continuously updated and generated by social interaction and communication (Berger-Schmitt, 2002). On the other hand, social cohesion can also be regarded as a state that is influenced by different interaction and communication processes and socio-structural conditions (Chan et al., 2006). Both perspectives are important when social cohesion is studied in the context of the city.

From a process perspective, it is possible to study how essential elements – community feeling, place

**Figure 2.4-5**

The city as a space for the economic activities of informal street traders in Tbilisi, Georgia.

Source: Gesa Schöneberg/WBGU

attachment and neighbourhood – are facilitated or prevented by socio-spatial structures. The key element is the facilitation of positive social interaction (Section 2.4.1.2). Studies on social cohesion as a state show that it is often perceived as less pronounced in cities. City residents do not know each other as well as people who live in the country, see fewer similarities with others, and show and expect less willingness to cooperate (Lev-Wiesel, 2006). In this context, spatial segregation and socio-spatial disparities have a negative impact on social cohesion (Cassiers and Kesteloot, 2012), as does too much ethnic heterogeneity in the neighbourhood (Gijsberts et al., 2011; Dinesen and Sonderskov, 2015; Section 2.4.1.2 on heterogeneity and place attachment).

2.4.3 Urban life styles

As explained in Section 2.3.2, understanding urban metabolism is essential in order to identify the drivers and causes relating to the size of the ecological footprint of cities. In the following, this perspective is extended by the addition of socio-cultural and psychological factors that have an important influence on materials and material flows in the urban metabolism (Orzanna et al., 2015).

Current urban life styles are repeatedly cited as key challenges for sustainable urban development. The

focus here is primarily on the consumption styles of the global middle and upper classes in cities. In many of these cities, high values of urban well-being and liveability are accompanied by a high level of resource consumption (e.g. direct and indirect energy consumption; Newton, 2012, UNEP and The Cities Alliance, 2008). However, a differentiated analysis is important here. If the ecological footprint is calculated per capita, inhabitants of urban areas in industrialized countries tend to have better results than the average in the same country; this is primarily due to the smaller housing-unit sizes and the smaller proportion of people using individual automotive transport (Dodman, 2009). Urban and rural life styles hardly differ in many industrialized countries, so that the higher level of density in cities and the better availability of public transport reduces the urban ecological footprint.

However, a study of developing countries and particularly emerging economies, where rural and urban life styles are still very different, reveals three consumption and life-style trends that can be termed global environmental challenges.

1. Overall, a higher consumption of products and services, i.e. life styles characterized by ‘consumerism’ (Knox and Pinch, 2006), can be found more frequently in cities. This is often associated with higher comparative incomes, rising expectations as regards comfort, and the high density and availability of consumer goods (Newton, 2011). The ubiquity of consumption opportunities leads to the development of specific urban consumption practices – like coffee-to-go or take-away food – which are also taking hold in Asian cities, following the example of western cities (Lebel et al., 2007). The consequences are particularly noticeable when considering the quantity of waste produced; worldwide comparisons show that in some cases it is twice as high in cities as in the country (Section 2.3.4.3; Hoornweg et al., 2013; Hoornweg and Bhada-Tata, 2012).
2. In the field of mobility, particularly the increasing level of motorization in cities in emerging economies is causing considerable local and global environmental problems (Section 4.2.2). Here, too, individual aspects interact with social and structural aspects. For example, at the individual or social level, developments like rising prosperity, more leisure time and changes in life styles lead to an increase in mobility and a diversification of mobility needs, often leading to more motorized individual transport (Galling and Friman, 2014; Williams, 2005). In many cities in emerging economies, urbanization and globalization, supported by car-friendly urban planning, have led to a development away from a walking- and bicycle-centred form of mobility towards

- individual car transport (e.g. for China: Pan et al., 2009) and the development of car-dependent settlement structures in urban suburbs (Naess, 2006; Gutsche, 2003). But also in industrialized countries like the USA, the volume of traffic in cities and its ecological and social consequences have remained at a high level for several decades – despite efficiency gains and planning measures aimed at reducing traffic volumes and their environmental consequences (Schrank et al., 2012). The reasons for this include continuing urban sprawl and the desire to live in urban peripheral areas, which to some extent continues unabated.
3. Urbanization is also discussed as one of the main conditions promoting the ‘nutrition transition’ (Popkin, 1999). This term refers to the change in eating habits in developing countries and emerging economies – away from a vegetable-based diet to more energy-rich, high-carbohydrate and animal products, which already cause environmental problems during production and, epidemiologically speaking, have a negative impact on health (on India: Chrispin et al., 2013; on Tanzania: Mazengo et al., 1997; on China: Zhou et al., 2012; Sections 2.3.3.2, 4.5.4.1). The causes that are discussed include easier access to ready-made high-calorie food and the effect of targeted marketing for highly processed products (Hawkes, 2007; Caballero, 2007).

The trends described are not specific problems of urban areas, i.e. non-sustainable patterns of product consumption, waste production, mobility and nutrition are not caused by life in the city. It is rather a matter of correlative relationships, which can be explained by intermediate factors; e.g. the higher average incomes in cities, the better availability of consumption options and the social importance and symbolism of certain non-sustainable consumption patterns (e.g. car ownership, shopping, food- and drink-to-go), which are linked to modernity and status (Hawkes, 2007).

Globally speaking, such urban life styles are still in the minority, despite their widespread impact; however, they are spreading worldwide. The great challenge thus lies not only in changing non-sustainable life and consumption styles, but also in stemming their global proliferation, and specifically in motivating the rising middle classes in emerging economies to leap-frog to more sustainable ways of living (Schäfer et al., 2011). The task here is not only to uncouple urban life styles and urban quality of life from their consumption of resources, e.g. by more efficient technologies, but also to change the conception that quality of life involves resource-intensive life styles (Schneidewind and Zahrnt, 2013; Section 3.2).

It is therefore important to consider where urban

areas offer potential for promoting sustainable life styles. There is much discussion on the effects of higher residential density (to reduce the use of space and energy consumption), improved access to public transport, and being closer to infrastructures that are relevant to people’s everyday routines. A lot of attention has also been paid recently to social innovations, which develop best in urban areas (Evers et al., 2014). These include, for example, ecologically oriented building, sharing and exchange communities, or initiatives for urban gardeners (Section 6.4.2).

On the basis of closely integrated communication facilities and the improved accessibility of large target groups for structural and communicative strategies, good conditions can also be found in cities for strategic interventions to promote sustainable consumption. Many approaches have been developed since the 1970s, particularly in the cities in industrialized countries, for example to improve the resource efficiency of urban consumption. Alongside structural approaches (such as improvements in public transport or the introduction of waste separation), attempts have also been made here to integrate competencies and motives for environmental protection (Abrahamse and Matthies, 2013). It became clear in this context that motives, actions and contextual conditions must interact and structural strategies be combined with communicative strategies (information, targeted feedback; Bolderdijk et al., 2013) and that group or community-oriented measures in particular have a permanent impact (Keizer and Schulz, 2013).

Many studies in the field of mobility show that different behaviour-related methods and instruments for reducing individual automobile traffic (Section 9.3.1.2) – such as higher gasoline prices, improved conditions for pedestrians and cyclists, better public transport and the promotion of green technology – do not have an effect when pursued separately, but do when combined; then they can reduce car usage by 5–30% (Garling and Frimann, 2014). Although highly intrusive structural measures for reducing automotive traffic (e.g. dismantling roads or raising prices for parking) are frequently rejected in advance by the population and therefore avoided by the administration, they are often accepted after implementation. For example, a fee for private cars in the Stockholm inner-city area, called the ‘congestion tax’, which was introduced in 2007, has significantly reduced inner-city traffic and thus led to lower CO₂ emissions and better air quality. The majority of residents in the greater Stockholm area, most of whom were initially sceptical, now appreciate the improved quality of life and like to spend more time in the city (Borjesson et al., 2013). The example of the Embarcadero Freeway in San Francisco also shows how

quickly transport and mobility patterns can adjust to apparent losses. The freeway used to be one of San Francisco's main traffic arteries, with 70,000 vehicles a day. Its dismantling, already planned in 1985, was prevented by protests from the population. When the freeway was destroyed by an earthquake in 1989, there was no traffic chaos, as had been expected. The volume of traffic declined, and the freeway was finally redesigned and turned into a boulevard that is still popular today (Agnos, 2009).

2.4.4 Outlook: perspectives for liveable cities

The following conclusions can be drawn from the analysis of the city as a habitat:

1. Urban quality of life and liveable cities are important orientation dimensions for sustainable urban development. On the one hand, people in urban areas are subject to multiple stresses, and these stresses can potentially increase as a result of the global challenges of climate change, the worldwide migration movements into the cities, and the shortage of resources. On the other hand, perceived urban quality of life and related aspects, such as place attachment, social cohesion, inclusion and local engagement should also be regarded as a resource for societal transformation processes. The WBGU is therefore of the opinion that strategies to promote quality of life also equip societies for dealing with the challenges mentioned (Section 9.2).
2. Important resources for increasing resilience and quality of life lie in the urban form of cities (Section 9.3.1.3). In the WBGU's opinion, a significant role can be played in this context by approaches to a people-oriented urban design that are founded on an orientation towards the 'human scale', and that offer stimuli, vitality and recreation, and make both individual appropriation and social interaction possible (Gehl, 2010; Jacobs and Appleyards, 1987).
3. To ensure that the spatial possibilities for resilience and urban quality of life can have their full effect, their participatory planning and development are important elements of urban design. One essential point of orientation for this flagship report is therefore how human health and urban quality of life in cities can be promoted by ensuring inclusion and active participation (Section 3.4). In this context, cities should be regarded as places for living, communicating and meeting, which people can appropriate, help shape and share. This report develops a perspective for the way the diverse needs and crea-

tive rights of residents from different social milieus can be sufficiently taken into account in urban design policy and urban governance (Chapter 8).

4. Urban life styles are not primarily a problem to be fixed. Rather, a closer look at the complex relationships between individual, social and spatial-structural factors shows that it makes no sense to assume a direct link between urban life and non-sustainable consumption. Rather, a differentiated analysis reveals many areas that can be used as starting points for attempts to promote sustainable consumption in urban areas (Figure 2.4-6).

Further potential lies in the study and targeted promotion of social innovations. Cities can offer a fertile medium for developing creative approaches to changing consumption patterns (Bell et al., 1996:371; Flade, 2015). Social innovations play a key role in societal change processes (Section 3.5.3.3). One search direction pursued by the report therefore deals with urban transformation approaches that take their orientation from social-innovative processes and actors and integrate them into strategies for sustainable (urban) development (Chapter 6).

2.5

Urban governance: actors, structures, processes

Urban governance is one of the key starting points for making cities inclusive and sustainable and for realizing the Great Transformation in cities. At this point in the report, we first provide an overview of actors, structures and processes of urban governance. Building on this basis, the WBGU develops the concept of transformative urban governance in Chapter 8.

Multifaceted and very different governance structures are to be found in cities as a result of their diversity. The various actors involved are part of a complex, multi-level system and thus integrated in and dependent on higher levels – in federal systems, these are the regional and national levels. In addition, there are supranational structures such as the EU, or international structures such as the UN or other international negotiation contexts. Cities also become active themselves on an international level (e.g. in the field of climate policy); city networks form, leading to a global urban governance (Section 2.5.6).

Since the 1990s, not only the social, economic and legal sciences, but also political discussions have been greatly influenced by the concept of governance. Attempts to define the term are correspondingly diverse and sometimes contradictory. As in the literature on global governance, distinctions can also be made between analytical-empirical and normative defi-



Figure 2.4-6

Breaking up the path dependencies of a car-oriented city.
Portland, USA.

Source: Mareike Kroll/WBGU

nitions in the debate on urban governance. The former are used as an impartial analytical framework in the study of municipal control and regulation processes; the latter bear normative labels such as good or sustainable governance. These concepts describe how governance should be in order to achieve certain objectives – e.g. better democratic inclusion or more sustainability. With a view to the Great Transformation, the WBGU has developed a concept of transformative urban governance, which is presented in Chapter 8. In order to be able to understand and classify the different facets and elements of urban governance better, this section begins by introducing an analytical and empirical definition of urban governance. The findings on good governance in cities are summarized in Section 2.5.5.

Urban governance consists of the actions of state and non-state actors and institutions aimed at organizing the joint affairs of a city. It is an ongoing process, by means of which conflicting interests can be reconciled and cooperative action promoted. Urban governance comprises both formal institutions and instruments and informal arrangements, irrespective of whether they are the result of a parliamentary legislative process or of self-organization within civil society (UN-Habitat, 2002:19). In addition to this internally oriented dimension, there is an externally oriented dimension of urban governance. It comprises the actions of state and non-state actors with the aim of shaping national and global governance processes and structures for and by a city.

2.5.1 Actors

Actors of urban governance can be classified as state and non-state actors. The relevant state actors include mayors, municipal councils and municipal admin-

istrations, but also – depending on the country – regional and national administrations and ministries, all of which influence the development of cities. Non-state actors are made up of businesses and civil-society organizations – non-governmental organizations (NGOs), community-based organizations (CBOs), scientists, churches and other religious organizations.

2.5.1.1

State actors

A comparison of decision-making and administrative structures in cities yields a very diverse picture. Major differences emerge not only between different countries, but in some cases also within a country. In many developing countries and emerging economies, both traditional, pre-colonial structures and the lingering influence of the former colonial powers are still clearly visible. Despite their diversity, local governments and administrations can be studied in a structured manner from two angles: on the one hand, the extent to which higher levels exert direct influence on local governments and administrations, and on the other, how relations between the mayor and the city council – if there is one – are regulated (Table 2.5-1; Devas, 1999; Berg and Rao, 2005; Sud and Yilmaz, 2013).

In cases where higher-level sovereign actors – i.e. regional or national administrations and ministries – have direct influence, a comparison between municipal administrative apparatuses reveals considerable international differences in efficiency. These can be a result of the level of staff training, the kind of financing instruments that are used, or how much power a city administration has to choose suitable staff autonomously and pay them a competitive salary. Especially in many developing countries and emerging economies, city administrations do not have this power. Furthermore, in such countries it is often not the cities, but regional or central governments that are responsible for personnel management, organization and finance in municipal administrations. Administrative staff are appointed by higher levels of government and then delegated. Even when local governments have the power to recruit staff themselves, the income level is usually determined centrally and is generally lower for municipal employees than for corresponding positions in the national administration. This means that the municipality is less attractive as an employer and makes it difficult to find suitable administrative staff. Furthermore, poor payment makes the administration more susceptible to corruption (Sud and Yilmaz, 2013:120f.; UN-Habitat and TI, 2004).

There are also countries where the mayor is not elected, but appointed by higher-level political authorities. Particularly in authoritarian systems, there are

no city councils to control the appointed officials. For example, the Egyptian president appoints the governor of Cairo, who presides over the urban administration and holds executive decision-making powers, but does not have to work together with a city council (Section 5.3). In other countries, although mayors are appointed, they are subject to parliamentary control by an elected municipal council.

In addition to the possibility of mayors being appointed, the diversity of urban-governance structures stems mainly from the differences in the distribution of tasks and decision-making powers between urban councils and mayors. Four ideal-typical models can be identified here (Table 2.5-1). The main differences lie in whether the mayor is elected directly by the population or indirectly by the city council, and who – the mayor or the council – has which decision-making powers and executive tasks.

Over the last 25 years, more and more European countries have adopted the model of the directly elected mayor (Moonen et al., 2014:15). The most prominent example is the UK, where there had not been any directly elected mayors until 2000. The office of Mayor of London was only created as a result of legislative reform. Since directly elected mayors usually have considerable decision-making powers, these systems allow more efficient governance and facilitate reforms and innovations. Michael Bloomberg, the former Mayor of New York, or Ken Livingstone, the former Mayor of London – both directly elected mayors with wide decision-making powers – are often mentioned with reference to progressive changes in the field of transport or environmental measures. The strengths of this model are simultaneously its weaknesses. In this system, newly elected mayors tend to promote different developments than their predecessors, in order to dissociate themselves from them in election campaigns. This can weaken continuity in urban development. A mayor with strong decision-making powers who has no interest in actively promoting progressive changes can hinder or undo the necessary transformations (Devas, 1999:7; Sud and Yilmaz, 2013:119ff.).

However, countermovements can also be observed. After 1998, Denmark returned to the mayor-in-council model in which the city council holds significant executive powers (sometimes also called weak mayor/strong council; Table 2.5-1). This model relies especially on informal social relations and contacts. It works particularly well in small, homogeneous cities or in districts where there are few contradictory views on key issues of urban development. By returning to this model, it is hoped in Copenhagen and other Danish cities that the city councils will be better able and more willing to respond to the needs of the citizens (Section 5.4.4.2;

Berg and Rao, 2005; Sud and Yilmaz, 2013:115ff.).

2.5.1.2

Business actors

Companies are a further key actor group in urban governance. Many companies produce their goods in cities or sell them there. The private sector is usually by far the biggest employer in a city. Worldwide, more than 80% of economic output is generated in cities, although only just over half the population lives there (World Bank, 2015a). Companies that manufacture their products or provide their services in a city have an interest in good infrastructure, suitable suppliers and skilled labour.

Moreover, there are business actors whose business is the city itself: real-estate investors, planning offices, construction companies, or firms that offer services such as waste disposal, local public transport or car sharing. They have a great interest in how a city develops and how its day-to-day operations are designed.

In addition to the formal sector, the informal sector also plays an important role, especially in the urban economies of the developing countries and emerging economies (Feige, 1990), although the transition between the ‘formal’ and ‘informal’ sectors is often fluid. The term ‘informal economy’ originally referred only to unregistered economic activities by poor strata of the population in the cities of the developing countries and emerging economies. It applied above all to street traders, unregistered workers in transport and repair services, hawkers or waste collectors. In the 1970s, the informal sector was initially seen as being separate from formally registered businesses; but now it has become clear that these are closely interrelated economic and interaction cycles. Specifically, actors from the wholesale trade, finance, construction and transport interact in a fluid transition between formal and informal activities (Section 7.3; Roy and AlSayyad, 2004; Escher, 1999; Kappel, 1996; Schamp, 1989). Cities in industrialized countries also have informal economies. In addition to moonlighting, the biggest are drug trafficking and prostitution (Venkatesh, 2013).

2.5.1.3

Civil society

NGOs, CBOs, scientists, churches and other religious organizations are the key actors within civil society.

The characteristic feature of CBOs is that they have their roots in city districts. Most of the organizations were founded there and focus on topics such as housing, mobility or education, which are specific to cities, municipalities and neighbourhoods. In terms of organizational structure and finance, CBOs vary greatly from strongly institutionalized registered associations to informal alliances. While some organizations are able

Table 2.5-1

Comparison of mayor/city council models.

Source: WBGU, based on Sud and Yilmaz, 2013; Berg and Rao, 2005; Devas, 1999

	City council elects mayor and retains executive functions				
	Mayor is directly elected	Mayor and city-council cabinet	City council and city manager	City council as executive (mayor-in-council)	Mayor is appointed
Electing/voting out mayor	Mayor is directly elected; cannot usually be removed by the city council	City council elects mayor and can vote him/her out of office	City council elects mayor and can vote him/her out of office	City council elects mayor and can vote him/her out of office	Mayor is appointed and dismissed by a higher level (regional or national)
Tasks of the mayor	Mayor has extensive executive powers; chairs the city administration, tables legislative initiatives in the city council; proposes the budget	Mayor forms a cabinet out of council members	Mayor has a representative function; day-to-day business and necessary executive powers are delegated to a city manager by the city council	Mayor's function is almost exclusively representative	Distribution of tasks between the mayor and city council varies; it resembles one of the four other models ('Mayor and city-council cabinet', etc.), depending on the country
Tasks of the city council	Monitors the mayor; must agree to laws and budget	Council monitors mayor and cabinet, can vote them out of office	City council retains political control and lays down the political framework for the city manager	City council forms specialist committees and appoints spokespersons responsible for executive tasks in these areas	In some authoritarian states there is no parliamentary control of the mayor
Advantages	Is regarded as an efficient model in which the mayor has a lot of power to plan and there is no doubt who is politically responsible		A professional city manager hired for a long period can lead the city more efficiently and is (theoretically) not subject to short-term political objectives	Decisions can be better adapted to the needs of the population – several city councillors are easier to reach than one mayor	
Disadvantages	Concentration of power in the hands of one person makes compromises unnecessary; radical change of direction possible after transition of power	Regarded as unstable, because mayors can be quickly voted out of office if there are no clear majorities in the city council	Critics complain that the important task of political leadership is underestimated	Only works well in small, homogeneous cities where there are no controversial urban-development issues	
Regional distribution	Germany, many large cities, e.g. New York, London	Many cities in UK (except London)	Small and medium-sized cities in the USA	English-speaking Africa; Denmark	Netherlands, Indonesia, parts of India, large parts of French-speaking Africa

to finance full-time employees, others are made up of volunteers. Many are based on elected, legitimated structures and have specific, defined tasks and missions; others are self-appointed groups strongly influenced by individual interests that only come together temporarily and do not have a broadly based legitimacy (UN-Habitat, 2011a).

Then there are NGOs, which usually concentrate on specific topics and whose action radius extends beyond an individual city. Examples include national or trans-national environmental organizations dealing with topics such as urban mobility or low-carbon building, but also networks like Shack/Slum Dwellers International, which interconnect local initiatives in informal settlements at the international level (Herrle et al., 2015b).

Churches and religious organizations are also important actor groups in many cities. Their role differs significantly depending on the religious and societal context. In the urban context of their engagement, they take on many important services – especially in the social sphere – which are of importance for elementary basic services (e.g. soup kitchens, educational projects, child care, care of the elderly). Furthermore, they are often actors who own their own land or real estate, enabling them to play a part in shaping urban development. This is reflected in the role of the Christian churches in Europe, the influence of waqfs – foundation-like institutions under Islamic law – in Muslim-influenced cities (Wirth, 2000), and the activities of temples and monastic buildings, monastery schools or accommodation for pilgrims in the cities of Buddhist-influenced societies.

Scientists are also important civil society actors with respect to urban development. Urban administrations often use the expertise of scientists to help them understand and control urban-development processes better. At the World Urban Forum there is an exchange platform between practitioners and scientists at the international level. Within the framework of transdisciplinary research, scientists collaborate with NGOs and local initiatives or on urban-development issues. In the context of real-world laboratories, researchers even try to help shape urban development (Section 10.2).

2.5.2 Structures of urban governance

In different constellations, the above-mentioned actor groups are involved in organizing the affairs of a city (Section 2.4.1). From a global point of view there are big differences in the tasks the various actors perform and how they fulfil them. Despite all the differences, certain task areas can be identified for which most local governments are responsible (UCLG, 2013). Either they

are directly involved in implementation or they commission other actors. These areas include the provision of urban services such as drinking water supplies, sewage disposal, local public transport, waste disposal, and the provision, maintenance and lighting of streets and public places. City administrations are usually responsible for dealing with air pollution, environmental and health protection and disaster-control systems on their territory. In addition, their areas of responsibility often also include social tasks such as education and child care, cultural facilities (museums, libraries, etc.) and tourism. They are responsible *inter alia* for planning, structural development, building standards and the maintenance of public buildings (UCLG, 2013). In addition, there are challenges of the 21st century – such as climate-change mitigation and adaptation, guaranteeing citizen participation in planning processes, and accommodating and caring for refugees – which are often dealt with (*de facto*) at the local level.

2.5.2.1

Interaction between state and private governance

There have been major changes in urban governance worldwide over the last few decades. The dominance of neoliberal ideas and discourses and the idea of the 'lean' state have also been reflected at the local level (Harvey, 1989; Jessop 1997; Brenner and Theodore, 2002; Swyngedouw et al., 2002). In many countries, municipal institutions have withdrawn partially or completely from some areas of basic public service provision and handed responsibility over to private businesses. In the course of the liberalization of public services, many cities began privatizing utility services in the fields of energy, water, healthcare and mobility, forming public-private partnerships with private companies, or transferring the tasks to private companies. These changes did not pass off without problems. Counter-movements can be observed in many places, especially since the beginning of the global financial and economic crisis in 2007. The change of direction towards participatory governance instruments, such as participatory budgets or citizen advisory councils (*consejos*) in Latin America, can be seen in connection with the rejection of neoliberal ideas and developments (Geddes, 2014).

The many different governance structures differ on the one hand in the modes of regulation, and on the other with regard to the type of actors implementing them, as different typologies show. One example is the typology of urban governance modes that Bulkeley and Kern (2006) developed for their analysis of local efforts at climate-change mitigation. They differentiate between 'governing through authority' – hierarchical forms of urban governance such as regulations, land-

use plans, etc. – ‘governing through provision’ and ‘governing through enabling’. In the case of governing through provision, they describe the steering effect that can be achieved by the provision of public infrastructure and services. A good public transport network and a limited number of parking spaces in inner cities, for example, help reduce the volume of motorized individual traffic in a city (Section 4.2.2). Governing through enabling describes financial or communicative measures aimed at enabling people to act in a certain manner. This includes support and loan programmes to make it possible for people, e.g., to implement the energy-related rehabilitation of a building, or information and education campaigns to inform people about problems and possible solutions and thus trigger stimuli for change.

The literature on global governance distinguishes between hierarchical, network-like and market-shaped forms of governing which can also be found at the municipal level (Pattberg and Stripple, 2008). There, a further distinction is made between governance structures according who regulates, supports and enforces them. This source of ‘authority’ (Pattberg and Stripple, 2008) lies either with state or with non-state actors. The different approaches can be summarized in a typology of urban governance (Figure 2.5-1). The assignment of individual examples differs from region to region. In some cities, for example, social housing is provided directly via urban or other state housing societies. In others, this is achieved through the interaction of state and private actors, e.g. by awarding subsidized state loans to build private apartments under a rent-control scheme. In many cities where neither municipal or state authorities provide social housing, affordable housing is offered by cooperatives or other civil-society institutions.

2.5.2.2 Informal governance

When analysing urban governance, a conceptual distinction can be made between informal and formal processes and structures – although in reality the two are often closely linked and the transitions are fluid. Formal processes are legally enshrined structures and procedures (e.g. legislative procedures or administrative processes). Informal processes, on the other hand, have no (direct) legal basis. The diversity of informal governance is huge: it can include informal agreements between city councillors in connection with a formal decision-making process as well as self-organized structures in informal settlements. Informal processes show large differences when it comes to their degree of institutionalization. In addition to ad hoc agreements, there are processes which, although they have no legal

basis, have a long institutional or cultural tradition.

For some years the scientific debate has gone a long way beyond a binary description – ‘if it’s not legally regulated, it’s informal’. This is shown by a number of different approaches which are re-analysing the topic. For example, a distinction is made between ‘informality from above’ (by the administrations themselves or cooperation between governments, administrations and the private sector), and ‘informality from below’ – which is primarily a self-organization of residents at the neighbourhood and city-district levels (Roy, 2009).

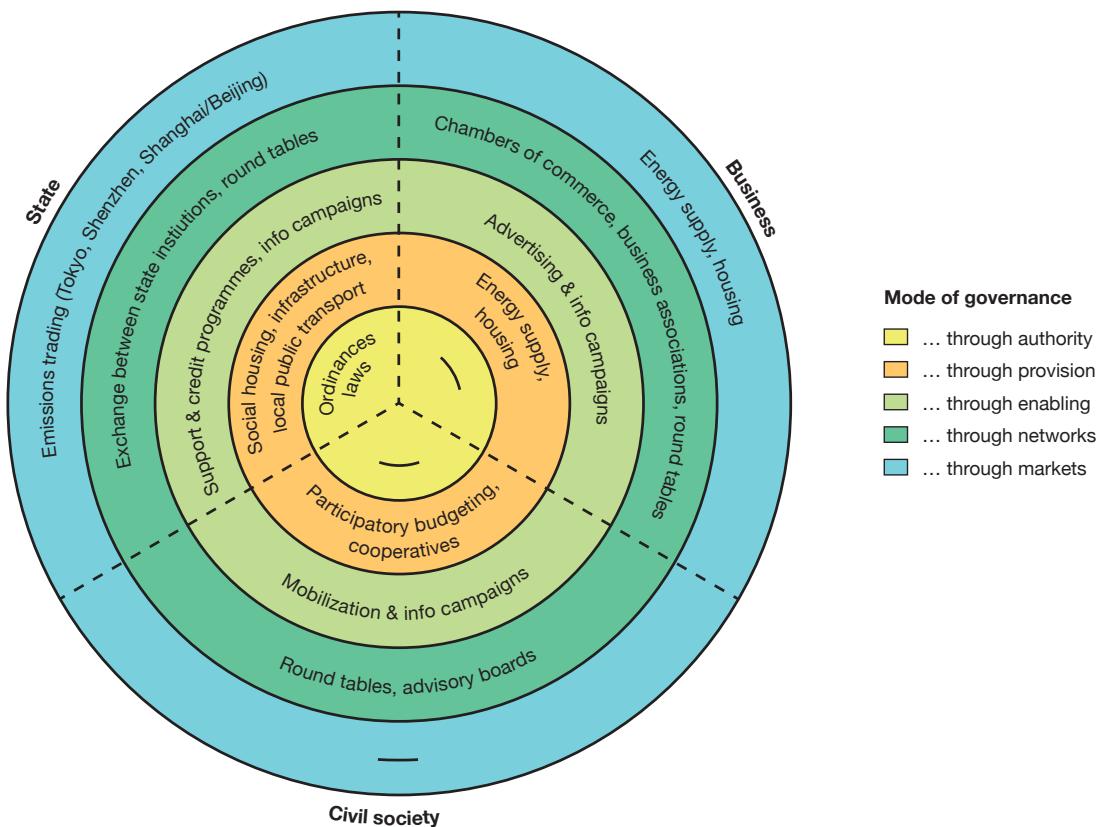
Altrock (2012) offers a further helpful approach by distinguishing between complementary and supplementary informality. *Complementary informal governance* augments formal processes or helps prepare them, e.g. the above-mentioned agreement between city councillors before a resolution is passed. *Supplementary informal governance* develops parallel to the existing formal processes – usually because the needs of affected actors are not adequately met by formal structures. Examples of supplementary informal governance processes include self-organized initiatives in informal settlements, e.g. a neighbourhood-based organization of the drinking water supply. These develop parallel to existing urban administrative structures, when responsible actors do not take action or are not in a position to meet needs because there is not enough capacity, a shortage of finance, a lack of interest or no legal basis (Kreibich, 2000).

In the context of urbanization in China there are forms of *tolerated informality* (which replace lacking municipal services but are not legal) and *experimental informality* (i.e. informality that finds other solutions; its usefulness and desirability are initially monitored by the administration; Schoon and Altrock, 2014). Although the distinction between different types of informal governance can be depicted well in theory, empirical research reveals numerous mixed forms that cannot be clearly assigned to one or the other.

2.5.3 Cities as part of a multi-level system

2.5.3.1 Powers and responsibilities

How local governments are able to tackle the tasks for which they are responsible (Section 2.5.2), and how much freedom they have to implement new policies, depends greatly on the national framework conditions and the governance system. For example, the relationship between the city and higher levels of government, and the distribution of power within the local govern-

**Figure 2.5-1**

Different forms of urban governance. Urban governance exists in many different forms that can be categorized according to two aspects: (1) Who is trying to govern? Are they state, business or civil-society actors? Multiple groups of actors can be involved. (2) What mode of governance is being used by the actors? Is it hierarchical or a form of network-like control? What things are made available or which actors empowered? The examples mentioned above can also be assigned to different categories depending on the context. In the case of business actors, examples such as energy utilities or housing corporations can be assigned to the categories provision and markets at the same time.

Source: WBGU

ment, determine the framework for urban action and in particular the possibilities of local legislation (Rodríguez and Shoked, 2014: 168).

First and foremost, cities and municipalities are integrated into the governmental and administrative structures of their nation state – although there are considerable variations in the structure of this relationship, i.e. in particular in the city's degree of independence in terms of decision-making powers and finance. The national and (in federalist systems) state constitutions, simple laws or, in some cases, even ordinances allow and regulate the existence and development processes of cities (Shah, 2006a: 1). Different models can be identified as far as the integration of cities in the state structure is concerned (Hesse and Sharpe, 1991; Page and Goldsmith, 1987). According to Hesse and Sharpe (1991), for example, the Scandinavian countries, Austria, Switzerland, the Netherlands and Germany guarantee the existence of the municipal level in their con-

stitutions. Furthermore, this level is relatively independent with regard to its finances and responsibilities (North Middle European Group; Hesse and Sharpe, 1991: 607; Kuhlmann, 2006). By contrast, the role of the municipal level in the British system is more that of a local administration than of a local government, i.e. the municipal level has little political influence at the national level. Similar models exist in Ireland, Canada, Australia, the USA and New Zealand (Anglo Group; Hesse and Sharpe, 1991: 607; Kuhlmann, 2006). Recent research speaks of a continuum of structures in the relationship between nation states and the local level (Rodríguez and Shoked, 2014: 143). Six types of governance relations can be identified along this continuum; at one end is a weak empowerment of the local level, at the other the strongest form of empowerment in the form of autonomy in relation to the nation state (Table 2.5-2).

If, as in the overwhelming majority of cases, the

Table 2.5-2

Continuum of the distribution of powers between the nation state and the local level.

Source: WBGU, based on Rodriguez and Shoked, 2014

Model	'Creature' of the state	Strictly limited powers and state control	Pre-determined list of powers	Authority to decide on 'local' or 'urban' concerns	Comprehensive powers, unless something is explicitly excluded	Autonomy
Characteristics	No empowering of the local level through transfer of powers; complete management by the state	No recognition by federal law, transfer of certain powers, monitoring of transgression of competence (ultra-vires control), no competence competence (Dillon's rule)	Power to legislate exists only if expressly transferred previously	Power to legislate in the field of local and urban affairs, as long as this does not contravene federal law or the constitution (Home Rule)	Power to legislate always exists, unless an area is explicitly (legally) excluded; restricted by the local level's severe financial dependence	Extensive powers and regular participation in national legislation
Example	Mexico City (Mexico)	Montreal (Quebec, Canada)	Paris (France)	New York (USA)	London (England, since the Localism Act 2011)	Buenos Aires (Argentina)

nation state determines the existence and powers of the municipalities, it also determines relations between cities and other cities in a relationship of equality: nation states can allow cooperation between their cities, create incentives for it or even enforce it (Rodriguez and Shoked, 2014: 160). Moreover, the nation state also determines the role of regional, inter-city bodies by creating or allowing them (Rodriguez and Shoked, 2014: 161). Another variant is to transfer certain tasks to another institution, which then, for example, guarantees the water supply or transport for a certain regional area – independently of, or in cooperation with, the municipal administration (Rodriguez and Shoked, 2014: 161).

Further levels can exist below the city level. In metropolitan regions, various different structures have been established to meet the demands made by governing large conurbations (Box 2.5-1). Under the label micro-localism, Rodriguez and Shoked describe structures at the borough or city-district level, with which local policies and decisions can be influenced (Rodriguez and Shoked, 2014: 161). In cities such as Paris and Buenos Aires, certain powers are formally enshrined at the district or neighbourhood level; in other constellations these levels only have advisory or administrative functions (Rodriguez and Shoked, 2014: 162ff.). In other cases, neighbourhoods have been given the right to appeal in court against locally relevant decisions made by the local government (Rodriguez and Shoked, 2014: 164).

2.5.3.2 Challenges

Although, historically, the first cities existed long before nation states as we now know them, in most cases cities today derive their powers from a nation state. In some constellations, the national constitutions secure the existence of the municipal level and guarantee its rights above and beyond this, e.g. the right to municipal self-government, as stated in Article 28(2) of the German federal constitution (Basic Law) or the European Charter of Local Self-Government (European Charter of Local Self-Government, 1985; Lazar and Leuprecht, 2007: 7). The fact that there is a need for this law makes it clear that the cities and municipalities are, on the one hand, to be understood as a part of the state structure with a claim to sovereignty, but, on the other hand, can find themselves in defensive situations vis-à-vis other state levels, in which a right to municipal self-government is necessary to safeguard their own powers. For example, alongside the level of the nation state, other levels have a direct or indirect influence on the municipal level, particularly via legislation: e.g. the international level via international agreements, the European level via EU legislation, possibly a state level via federal legislation in federal systems, and perhaps regions via their regional legislation (Section 5.4). Here it becomes clear that cities are part of a complex multi-level system. In case of doubt, all these regulations culminate at the local level, which must then provide and coordinate personnel and financial capacity to perform the (new) statutory tasks.

There are various attempts at justifying this decen-

Box 2.5-1**Governance in metropolitan regions**

Different governance structures have formed in metropolitan regions and major agglomerations. Some urban regions try to do justice to the need to administer both the city districts and the entire metropolis by using two-tier government structures. Others have a one-tier model, which can be either fragmented or consolidated (Slack and Côte, 2014:8ff.). In the first case, a metropolitan region consists of many independent municipalities, but no higher central authority. This is the case in many Swiss and US cities, for example. Los Angeles, a city with nearly 13 million inhabitants, consists of more than 200 municipalities and five counties (Slack and Côte, 2014:11). The municipalities have to coordinate their efforts to achieve joint developments for the entire metropolitan region, and this involves great challenges. Moreover, diverging levels of tax revenue also means greater inequality between the individual municipalities in a metropolis (Slack and Côte, 2014:10f.).

Cities with a “one-tier consolidated government” (Slack

and Côte, 2014:11; e.g. New York City or Toronto) benefit from economies of scale. Larger tax revenues and the possibility of distributing these funds mean that there is also less inequality between different city districts and the local communities. The simple structure makes the system easier for the public to understand. In large cities, however, there is a danger that citizens find it difficult to access their parliamentary representatives or other decision-makers. Furthermore, in cities with a one-tier consolidated government, it is also important that the city and the surrounding communities cooperate well. If the economic region is larger than the administrative area, the city administration must come to an agreement with communities in the environs and has a lot of coordination work to do (Slack and Côte, 2014:11f.).

Two-tiered structures, as in the case of Tokyo, represent a compromise inasmuch as they can do justice to interests affecting both local communities and the entire metropolitan region. Points that are raised against this model include inefficiency and higher costs as a result of the duplication of structures on the two levels. It is also more difficult for citizens to understand who is the right person to contact for which topic (Slack and Côte, 2014:12ff.; Hohn, 2000).

tralized performance of tasks by the municipal level; most of them focus on the fact that the municipal level is close to the citizens and thus can best understand and represent their interests (Shah, 2006a:3f.; Frug, 2014b:4). The subsidiarity principle reflects these considerations by only passing responsibility for tasks on to the next higher level if that level is better suited for the corresponding tasks (Shah, 2006a:4).

Certain challenges – such as a lack of decision-making powers and finances – can be generalized for the local level (Lazar and Leuprecht, 2007:1). In a similar way to the concrete structure of relations between a nation state and its municipal level, however, the challenges and problems of the municipal level vary worldwide. In industrialized countries, the challenge is to adjust the cities' financial resources to their powers and tasks. A certain degree of autonomy should also be created for the cities; i.e. they must have the option to exercise certain sovereign rights, such as sovereignty over finances and personnel. Even considering the above-mentioned differences between the North Middle European Group and the Anglo Group (Section 2.5.3.1) alone, it becomes clear that the challenges can also vary considerably in industrialized countries.

In developing countries and emerging economies, municipalities have responsibility for fewer tasks on average. Often it is only the provision of basic services such as the water supply or waste disposal. Education and healthcare services are not always included. Furthermore, they are also subject to intensive supervision in a subordination relationship with higher levels. Their autonomy in the fields of tax revenue and expenditure

is more restricted than in industrialized countries. This is in sharp contrast to the transfer of responsibilities to the local level (Shah, 2006b:41). To an even greater degree than in the industrialized countries, the municipalities in developing countries and emerging economies face the challenge of becoming accountable to their citizens via elections or forms of participation (Shah, 2006b; Haque, 1997). Many developing countries and emerging economies still face the challenge, on the one hand, of overcoming the effects of colonization and, on the other, of integrating traditional structures, such as clan structures, into other organizational structures (Balderheim and Wollmann, 2006:116f.).

2.5.4**Municipal financing**

Municipalities are financed both from local sources, such as taxes and charges, and from external sources, such as national transfer payments and access to capital markets. In addition, cities frequently conclude contracts with private-sector actors to enable them to carry out public functions and to mobilize additional capital for urban development.

The scope of municipal financial autonomy, the level of national transfer payments and any access conditions for municipalities to the capital markets are determined by a country's national framework conditions; they vary considerably (Section 2.5.3). The main determinants of the scope of the municipal budget – apart from the structure of the transfer systems and a city's

ability to raise its own resources – are national revenue from taxes, the exploitation of natural resources and international public cooperation (Box 2.5-2). The importance of the various sources of finance for the budgets of individual cities therefore varies greatly throughout the world.

In the majority of cases, the scale of the tasks involved and the associated local expenditure far exceeds the revenues that cities can generate on the basis of the financial autonomy granted to them (Boadway and Shah, 2007). Transfer payments from national governments to cities are therefore widespread worldwide. Especially in cities in the developing countries and emerging economies, transfer payments constitute the main source of revenue (Martinez Vazquez, 2015; UN-Habitat, 2015f). On the one hand, the level of transfer payments depends on the scale of municipal expenditure requirements; on the other, the payments are made in pursuit of national goals such as creating regionally homogeneous living conditions, equity and equal opportunities, incentives for an efficient local financial administration, and the provision of public services (Boadway and Shah, 2007).

Internal sources of finance, such as municipal taxes or charges, account for a high proportion of the municipal budget primarily in cities in industrialized countries and in countries with highly decentralized administrative structures. Revenue at the municipal level, calculated as a percentage of total state revenues or of a country's total economic output, therefore also reflects the importance of the municipal level as an actor in the multi-level system. Local tax revenue makes up 2.3% of GDP in developing countries and emerging economies, for example, and 6.4% in the industrialized countries (UN-Habitat, 2015f.). The lower value for developing countries can be explained on the one hand by the fact that the municipalities there have fewer financial instruments at their disposal, and, on the other, by the fact that their effective use depends on efficient administrative structures and a functioning local government leadership, which often do not exist in developing countries (Allain Dupré, 2011; Milio, 2007). Similarly, the level of municipal expenditure and its allocation give an impression of the scope of municipal autonomy. A distinction must be made here, however, between municipalities that can decide independently on the use of resources and those that only execute a nationally fixed allocation.

Only few cities are able or allowed to use national or international financial markets to raise loans or capital to finance municipal tasks or to canvass for infrastructure investment. At present, about 4% of the 500 largest cities have internationally recognized credit ratings; another 20% have domestic ratings (Hogg, 2013).

2.5.4.1

Internal financing instruments

There is a broad set of local financing instruments worldwide that can be used in various combinations and intensities by cities and municipalities. Taxes in particular make up a large proportion of the income of cities and municipalities. Data on revenues and expenditures at the sub-national level are available for industrialized countries; however, the data situation in emerging economies and developing countries is limited. In OECD countries, for example, the share of the local budget that comes from taxes varies between 31.4% (Luxembourg) and 72.9% (Iceland). In developing countries and emerging economies such as Uganda, Kenya or South Africa, the share is 4.9%, 21.4% and 19.7% respectively (UN-Habitat, 2009a). Municipalities in many developing countries have the right to levy their own taxes too, but the revenue potential of the already low tax base is rarely fully exhausted (World Bank, 2015a).

Among all local taxes property taxes are the most widespread. They offer the advantage of generating a stable revenue base without being in direct competition with national taxation. The revenue potential is high, especially in prosperous cities, since both improvements in the local economic situation and population growth are reflected in higher land and real-estate prices. Building on the property tax, there is the option of levying 'betterment fees', so that property owners participate in financing infrastructure projects that lead to a higher value of their property. This instrument is already in use in many countries. Since the current market value of the land and its buildings before and after a development measure must be determined as accurately as possible, the implementation of this financial instrument requires administrative skills that many cities do not have.

In principle, it makes sense to let the local level participate in local economic development by collecting a share of taxation or having its own tax powers. Cities and municipalities in several OECD countries can collect income taxes. For example, income tax makes up 86.6% of total local tax revenue in Finland, and 91.1% in Denmark (UN-Habitat, 2009a). Elsewhere, local authorities receive a percentage of national tax revenues. Local corporate taxes, such as trade tax in Germany and local taxes on goods and services, are further effective taxes at the municipal level. In addition to their function as a local financing instrument, these taxes also offer a possibility to influence corporate location decisions and thus local investment activity. However, they can also lead to undercutting competition to attract external investment. In such cases, local tax autonomy has negative financial consequences for the public sector.

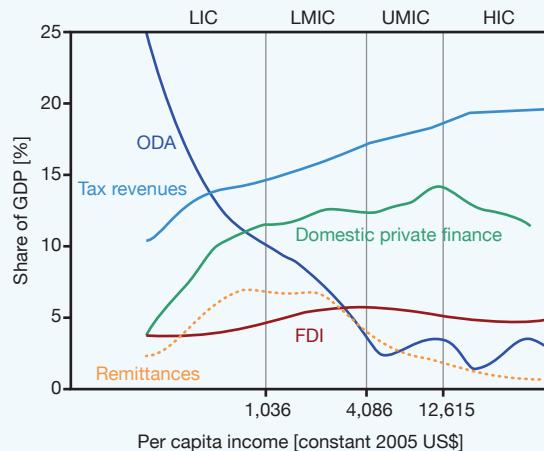
Box 2.5-2**National and international sources of funding**

For the most part, states are financed from national public revenue such as taxes or income from the extraction of natural resources, and international public revenues, which include official development assistance (ODA). In addition, national and international private financial flows have an impact on a country's financial capacity; these need to be specifically mobilized, unlike public funds, which are directly available to the governments to meet policy objectives.

Figure 2.5-2 shows the relevance of various financial flows, measured in terms of their respective share of GDP, for countries with different income levels (ERD, 2015). Tax revenue is the main source of income for most countries. As a rule, the higher a country's per-capita income, the higher the level of tax revenue as a percentage of GDP. This percentage is approx. 10% in low-income countries (LICs), 15% in middle-income countries (LMICs) and 20% in high-income countries (HICs). The absolute per-capita tax revenues of the wealthy and poorer countries differ enormously. For example, the annual per-capita income tax revenue in the Netherlands in 2013 was €8,021; in Ethiopia it amounted to only 250 Birr, the equivalent of approx. €10 (IMF, 2014).

The relative importance of domestic private financing increases with higher per-capita income. In emerging economies and developing countries, too, private companies, institutions and households have substantial financial assets – savings that can be transformed into loans or investments through the banking system, or made accessible by households purchasing bonds issued by private companies or cities. With a share of 11–14% of GDP, private domestic financing is the second most important source of finance in countries with a middle or high per-capita income. In very-low-income countries the figure amounts to 5%.

The importance of remittances from migrants has increased steadily in recent years in many countries. Their share of GDP is around 7% in low- to middle-income countries. For those countries, therefore, remittances from migrants are more important, in terms of scale, than foreign direct investment, which makes up 4% of GDP in low-income countries and 6% in emerging economies.

**Figure 2.5-2**

Relevance of international and national financial flows for countries with different income levels, measured in terms of their share of the GDP. LICs: low-income countries; LMICs: lower middle-income countries; UMICs: upper middle-income countries; HICs: high-income countries; FDI: foreign direct investment.

Source: ERD, 2015

In countries with very low incomes, ODA remains of great importance and represents the main source of funding. For emerging economies, however, it is of secondary importance. International financial flows are also channelled to the respective countries via bilateral funding mechanisms and international donor initiatives. Since the late 1990s, loans and grants between states have been growing in importance within the framework of international climate finance. Climate finance is increasingly being extended by multilateral funds, which are available in particular to developing countries for climate projects. Examples include the Special Climate Change Fund, the Least Developed Countries Fund, the Adaptation Fund, the Emerging and Sustainable Cities Multi-Donor Trust Fund of the Inter-American Development Bank, the Clean Technology Fund, and the Green Climate Fund.

Apart from taxation, cities receive internal income from contributions, charges and fines, which can make up a significant share of a municipality's total budget. Contributions and charges can be levied on the entire spectrum of municipal services, e.g. for water supplies, sewage and waste disposal, for urban public transport, kindergartens, museums, parks, sports facilities, as well as administrative services such as the registration of business start-ups, driving licences and ownership rights to land. However, many municipalities face the challenge that certain public services cannot or are not intended to cover their costs. The reason is often that not all users of a service can be called upon to pay. In other cases, socio-political considerations also play a role.

2.5.4.2**External financing instruments****Transfer payments**

The design of transfer payments is closely linked with fiscal decentralization within a country. Transfer payments are used on the one hand to close municipal financial gaps, which occur when the range of municipal tasks is broader than the degree of financing autonomy granted to the cities. On the other hand, in the multi-level system, transfer payments often include a balancing element by means of which poorer municipalities with a lower revenue base receive higher per-capita payments. The aim here is to strike a balance between economic efficiency and social justice (Boadway and

Shah, 2007). Whereas transfer payments to municipalities and cities aim to offset regional differences in living conditions, municipal tax powers aim to improve the efficiency of taxation and administration; they also prevent a potential development towards a subsidy mentality and free-rider effects. These considerations are assessed differently in different countries, so that the decentralization of fiscal powers and the distribution keys of transfer payments are designed very differently worldwide. The national government can also use transfer payments to influence local politics, for example by linking transfer payments to specific conditions that the municipalities must meet.

Financial markets

Some cities have access to national or international financial markets. Debt financing via banks or the capital market is common practice in industrialized countries. Fixed-rate bonds on the capital market are organized by banks or investment banks and are only worthwhile above a minimum amount of approx. US\$100 million. They are therefore only suitable as a financing instrument for larger municipalities. In the USA, for example, there are tax-free, municipal bonds subsidized by the national government, which offer investors special incentives for urban investment. Cities in emerging economies like Brazil and India also have access to the capital markets. Cities in Sub-Saharan Africa, by contrast, are hardly present on the capital markets (Sturgis, 2015). In many emerging economies and developing countries there is no legal basis for access to the capital markets or to bank loans. In addition, there is a dearth of functional local financial markets and local financial-management capacities. Furthermore, there is the risk of over-indebtedness, since access to the financial markets is often used not for investment but to finance current expenditure. For this reason, the risk-return profile of cities is often not very attractive and the confidence of investors is low (Meyer, 2016).

Public-private partnerships

In recent decades, public-private partnerships (PPPs) have gained in importance, particularly for infrastructure financing. PPPs are a form of medium- to long-term division of labour between the public sector and private actors. In the case of PPPs, public tasks – such as the provision of infrastructure or public services – are taken on by companies which bear part of the project risk and responsibility for management. The distribution of risks and areas of responsibilities is defined by contract; the private companies are granted the right to earn a performance-linked return on investment (IBRD et al., 2014).

Experience with PPPs varies considerably. On the

one hand, PPPs offer financially weak local authorities an opportunity to invest and initiate projects without having to raise large sums themselves. In addition to this, PPPs direct capital into economically feasible projects, and management experience – which may be lacking – can be acquired. On the other hand, many local public services cannot be profitable if the charges for their use are also to be affordable for poorer population groups. As a result, PPPs have in many cases led to higher prices for consumers in the past. There are also many examples of PPPs in which the public sector bore the losses, while, in the event of success, the profits went to the private sector (IBRD et al., 2014). It is therefore of key importance that public actors have sufficient expertise to design contracts in a way that anticipates long-term implications and protects the public interest by ensuring a fair sharing of risks (Instrate and Puente, 2012).

2.5.5

Good urban governance

After the overview of the multifaceted and complex governance structures, the discussion now turns to what good governance in cities looks like. Parallel to the debates on good governance at the national and international levels, there has also been a long discussion on good governance at the municipal level (UN-Habitat, 2002; van den Dool et al., 2015). The criteria applied to good urban governance – or the principles that are developed for the purpose – vary with the authors or institutions that define it. They can be divided into three groups: input criteria such as representation and participation, output criteria such as effectiveness and efficiency, and systemic criteria such as consensus orientation and the separation of powers (Hendriks, 2013).

Within the framework of its campaign on good urban governance (1999–2007), UN-Habitat defines eight principles that represent good governance in cities: (1) sustainability, (2) subsidiarity, (3) equity, (4) efficiency, (5) transparency, (6) accountability, (7) civic engagement and citizenship, (8) security (UN-Habitat, 2002: 2002: 19, 2003: 182f., 2009b: 74ff.).

The UNDP's Urban Governance Initiative (TUGI; term 1998–2004) added the following criteria: rule of law, responsiveness, consensus orientation, and effectiveness and efficiency (UNDP TUGI, 2003: 160). In addition to the criteria already mentioned, the Council of Europe also mentions ethical conduct, competence and capacity, innovation and openness to change, sound financial management, cultural diversity and social cohesion (Council of Europe, 2014a). When academics and practitioners are not defining good urban govern-

ance in general, but discussing it in the context of certain policy fields, e.g. the mitigation of climate change (Section 2.6.1.1; Corfee-Morlot et al., 2009), the focus sometimes moves to other aspects; additional principles are defined and/or others omitted.

The following spotlights more intensively the state of research on the aspects of transparency, responsibility, accountability and participation. All aspects are closely interlinked and in some cases mutually determine each other: accountability vis-à-vis the population creates transparency; participation instruments increase the responsibility and accountability of decision-makers but are dependent on a minimum level of transparency. A functioning public sphere is an important foundation for transparency, responsibility and participation (Box 2.5-3).

Accountability can be distinguished on the basis of various criteria. On the one hand, there is legally required accountability, which can be directed towards a higher authority at the state or federal level, or towards the population. On the other hand, there are forms of accountability that are not (solely) based on legal obligations but are demanded by civil society (Sud and Yilmaz, 2013:121). In the past, the focus in urban governance was primarily on legally required accountability, according to which officials and institutions report to higher-level institutions or have their actions approved beforehand. Furthermore, they must make certain information accessible to the public to create transparency. In both cases, it is important how official business is conducted, public money is spent, or municipal companies are managed. In recent years, practitioners and academics have concerned themselves more with the role of civil society, which demands accountability and creates an awareness of responsibility through civil-society attention and the involvement of NGOs, CBOs and citizens in the form of queries, petitions or campaigns. Civil society's option to initiate citizens' initiatives and referenda (Table 2.5-3) also offers this double function (Sud and Yilmaz, 2013:126). Moreover, both forms of accountability help fight and prevent widespread corruption. Corruption is a major obstacle to sustainable urban development, especially at the local level (see Sections 4.3.3.1, 7.3.5.3, 8.2.3.3).

Not only in the last few years has participation become a central concept in the discussion on urban development, urban management and urban governance. In general terms, the concept describes the inclusion of people in the conduct of common affairs, e.g. participation in political decision-making processes (Schubert and Klein, 2011). In the urban environment, participation can be defined in the broadest sense as 'getting involved' in urban development (Selle, 2013:60). Since 'participation' describes a wide range

of instruments and processes (Table 2.5-3; UN-Habitat, 2009b), it is often unclear what exactly is meant when different actors speak of participation (Cornwall, 2008).

One of the best known models for understanding participation structures (Selle, 2013:69) is Arnstein's ladder of participation (Arnstein, 1969:217). It distinguishes eight levels of participation, summarizing them under the headings non-participation, tokenism and citizen power (Figure 2.5-3).

Cornwall (2008), in turn, building on White (1996), distinguishes four different forms of participation: nominal, instrumental, representative and transformative. She considers in particular the interests that state, economic and civil-society actors have in providing and taking part in these forms of participation.

Since the concept of participation is used for such different aspects as the provision of information, participatory budgets (Box 2.5-4) and binding referenda, there is considerable vagueness in the way in which it is used. Herrle et al. (2015b:201) therefore use the term collaboration to highlight those forms of participation in which civil-society actors set the agenda and priorities, and interact as equals with municipal decision-makers and companies. To make this possible, it is often necessary to sufficiently empower the civil-society actors and to create the structural prerequisites and degrees of freedom for participation (Horelli, 2002). The methods used in the course of a participatory or collaborative process should therefore be adapted to the target groups (e.g. age, level of education, previous knowledge, time availability; Nanz and Fritzsche, 2012; Energy Trans, 2014:7). In addition, psychological participation research shows that human needs for autonomy and self-realization play an important role in many cultures in order to maintain the motivation needed to participate (Mathies and Blöbaum, 2008). Collaboration and local identity can influence each other positively: the more people feel connected with their environment, the more likely they are to participate in processes that affect their habitat (Lewicka, 2005). At the same time, local identity increases when people have the chance to help shape their environment (Pol et al., 2002; Section 2.4.1.2).

Examples of collaborative solution approaches can be found in the provision of housing, a field where civil-society organizations have legitimacy and resources to offer (e.g. savings systems and micro-credit groups). Some of these are transnationally organized, as in the case of Shack/Slum Dwellers International (Herrle et al., 2015b; Sections 6.2.2, 8.3). However, non-collaborative participation instruments should not be ignored or dismissed as inadequate. This is because, on the one hand, strong participatory instruments, such as com-

Box 2.5-3**Democratic public sphere in the urban space**

The public sphere is formed in locations with open and low-threshold access where people can gather, exchange opinions, make judgements and, where appropriate, also make decisions. The public sphere can be defined as a process, as publicity, or as the public (Hölscher, 1979, own translation). The 'public' aspects, therefore, include the democratic information, communication and decision-making process, transparency in facts and decisions, and the people, who participate not only passively. A normative model of the public sphere postulates three essential requirements (Ritzi, 2015:179ff.): equality (of access, visibility and influence),

thematic openness (diversity of objects, diversity of interpretation patterns) and discursivity (the will to find a political decision, recognition of contingency, representation of conflicts, argumentative exchange; Ritzi, 2015:222ff.).

At the beginning of the 20th century, scientists who are regarded as the classic founders of spatial sociology, e.g. Simmel and Park, pointed out the importance of urban space for society (Park, 1915; Simmel, 1903, 1908). The city, as a public sphere, serves to enable exchange, conflict and the coordination of individuals, groups and movements in a way that functions much better than in non-urban areas. Closely related to this are places where democratic public opinion can form, because not every urban space is simultaneously a place, i.e. a space that has become effective.

munity action planning or referenda, cannot be used for all topics or at all levels. Direct democracy elements are easier to apply at the neighbourhood level than at the metropolitan level (UN-Habitat, 2009b:108). On the other hand, fundamental change processes can also be set in motion by 'weaker' instruments such as the provision of information (Cornwall, 2008:274).

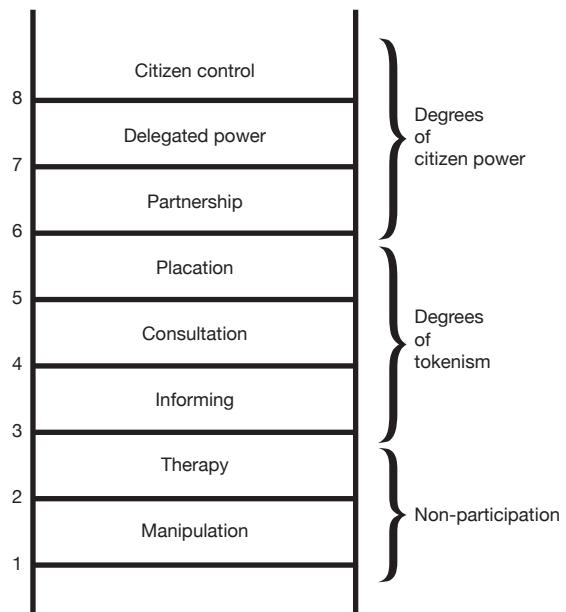
the reverse direction, cities can influence the decisions of higher levels, as far as the (legal) framework conditions allow it. Some cities have a large de facto influence solely on the basis of their economic power (Sassen, 2002). The influence exerted by cities on other, higher levels of the governance system can be described as 'vertical urban governance'. The vertical dimension of urban governance has hardly been investigated or systematized up to now.

2.5.6**Global urban governance**

In addition to their central role as local governance actors, cities and local governments are becoming increasingly important as transnational actors in global governance. They are gaining more and more capacity to influence international policy and are making use of these possibilities (Acuto, 2013b). The WBGU summarizes these activities under the term 'global urban governance'. It is defined as the actions of state and non-state actors with the aim of shaping national and global governance processes and structures for and by a city. Alongside central multilateral institutions and negotiating structures, which can be identified with a view to the topics of urbanization and urban development (e.g. UN-Habitat: Box 2.5-5), global urban governance can be divided into a vertical (Section 2.5.6.1) and a horizontal dimension (Section 2.5.6.2): the integration of cities in the hierarchical multi-level system and cross-border city alliances.

2.5.6.1**Vertical urban governance**

Cities are part of a multi-level governance system. International, supranational (e.g. EU), national requirements and decisions, as well as requirements of states or regions, impact all the way down to the urban level and affect the political and legal actions of cities. In

**Figure 2.5-3**

Arnstein's ladder of participation. One of the best-known models for understanding participation structures.
Source: Arnstein, 1969

Box 2.5-4**Participatory budgeting**

Participatory budgeting was developed as a participatory instrument of governance in Brazil in the late 1980s (Section 5.8) and has been applied in many cities over the past 15 years. In 2013, participatory budgeting was practised in between 1,269 and 2,778 cities worldwide, depending on how the term is defined (Sintomer et al., 2013:11). Participatory budgeting systems vary in structure and character, in some cases markedly. As a rule, the term is used when a city's residents have an influence over part of the municipal budget on a regular basis. The share of the budget that is entrusted to citizens can vary, depending on the city, from under 1% to 100%, the latter being the exception found e.g. in Campinas and Novo Mundo in Brazil (Cabannes, 2004:30). There are also differences in the way in which the citizens participate. In some models, citizens make their contributions via open plenary meetings, often on specific topics; in others, delegates are elected to a budget committee. In the plenary meetings and committees, potential projects are developed, discussed and prioritized, and the budget is drafted accord-

ingly. Depending on the city and institutional structure, either their decisions are binding or they are submitted to the city council or mayor for approval or as a recommendation for implementation.

Many positive effects are attributed to participatory budgeting. For example, strong participatory budgeting systems reinforce democratic structures and processes through their participatory element and improve mutual understanding between the population and decision-makers or the city administration (Cabannes, 2004:39). The resulting transparency has positive effects in the fight against corruption and clientelism. Wherever enhanced public interest generates transparency, the accountability of politicians and decision-makers increases, and corruption and nepotism is made more difficult (Sintomer et al., 2013:39). However, no studies have yet been published that document this effect systematically. In places where participatory budgeting pursues the goal of social renewal and social justice, it contributes to overcoming inequality and makes the participating citizens more aware of the problems and needs that exist in other city quarters (Sintomer et al., 2013:39); however, this effect has also not been systematically evaluated to date.

2.5.6.2**Horizontal urban governance**

A novel phenomenon in relation to cities are cross-border alliances. Climate change in particular has brought several city alliances onto the scene, including C40, the EU's Covenant of Mayors, the Climate Alliance of European Cities, or ICLEI – Local Governments for Sustainability (Box 2.5-6; Corfee-Morlot et al., 2009). These cross-border city alliances are characterized by the fact that the urban partners cooperate with each other on the same level (horizontal cooperation).

Since the 1990s, there has been an increasingly intense and differentiated debate on the loss of importance of national policies, and the simultaneous increase in importance of supranational and subnational, urban and regional actors (Amen et al., 2011; Acuto, 2013a, b; in relation to climate change: Monaghan et al., 2013; UN-Habitat, 2011a; C40 and Arup, 2011). The fact that cities are increasingly gaining in importance as actors here is attributed inter alia to the rising urban population figures and the ever more important role of cities in the global economic context and in the development of cultural, social and political innovations.

Cities enter into partnerships with each other and take part in city networks. City networks offer an important forum for exchanging experience and knowledge. Cities experiment with various technical and regulatory measures to meet such challenges as climate change (Bulkeley and Castán Broto, 2012; Bulkeley et al., 2014). City networks are important in this context, because they make mutual learning possible and offer a chance to exchange notes on innovations, policies and

good practices (Lee, 2011; Liefferink et al., 2013). The potential to build up connections on a personal level is also referred to as 'soft diplomacy' at the local level (Vallier, 2014). An important and driving role here is attributed in particular to mayors (Barber, 2013).

Mayors – according to Barber's hypothesis (2013) – are having an impact on global governance. For instance, they are active (1) by 'regime building', e.g. with the establishment of the World Mayors Council on Climate Change; (2) by the 'hybridization of governance', e.g. with a view to city networks, which are also incorporating companies, public-private partnerships and transnational NGO initiatives more and more frequently and intensively; (3) by 'diplomatic entrepreneurship', e.g. in the context of C40; (4) by 'normative mediation', e.g. with the European Charter of Local Self-Government; and (5) by influencing local, national and global policy measures, directly impacting on the lives of the city residents (Acuto, 2013a).

In the climate field, cities network (among other things) to address climate-change-induced risks and damage quickly and effectively (Barber, 2013; Lee, 2011). Voluntary participation in global climate networks is thus an expression of the (often politically and economically motivated) need or willingness of cities to jointly become creatively active in the field of climate-change mitigation.

Legal implications of transnational urban activities

The 'foreign policy' activities of cities through transnational city networks described above have legal implications at both the national and the international levels

Table 2.5-3

Selection of widespread participation instruments.

Source: WBGU

		Type
Information event, information campaigns	The inhabitants of a city or a city district are provided with information on certain decisions made by the mayor and the city council or on (construction) projects.	Information provision, transparency
Citizen survey	Structured in a similar way to a referendum, albeit without any binding effect on the mayor or city council.	Consultation
Citizen report cards	Instrument for collecting feedback on the quality of public services. Residents evaluate the services in a similar way to a school report (Sud and Yilmaz, 2013:127).	Consultation
Participatory urban appraisal	Set of instruments (surveys, interviews, focus groups, etc.) for conducting a participatory appraisal in a municipality. The aim is to determine the residents' needs and priorities and incorporate the results into the planning process (World Bank, 1996:191 f.; UN-Habitat, 2009b:101).	Consultation
Community action planning	Builds on the participatory urban appraisal but tries to develop specific solution approaches with the population.	(Co-)decision-making
Participatory budgeting	Opportunity for residents to co-design part of the municipal budget via consultation and decision-making processes (Box 2.5-4).	(Co-)decision-making
Citizens' report/planning cell	A group of about 25 non-expert citizens selected by a random process are released from work for several days to develop solution proposals for a planning problem (Reinert, 1998; Dienel et al., 2014; Nanz and Fritzsche, 2012).	(Co-)decision-making
Referendum	Vote on a proposal which, if adopted, is usually binding on mayors and city councils. A quorum usually applies, i.e. a minimum number of residents must vote in order for the referendum to be valid. There are models in which citizens can also vote a mayor out of office through a referendum (Sud and Yilmaz, 2013:126).	Decision-making

(Aust, 2013, 2015a, b). There are also cases where cities refer to international treaties as a justification for their actions, or where international law impacts on cities. In Germany, for example, several cities, invoking international labour-law standards of the International Labour Organization (ILO), no longer allowed tombstones to be used in their cemeteries if children had been involved in the production process (Kaltenborn and Reit, 2012; Aust, 2015a). Furthermore, international trade agreements have effects on trade by cities, for example in that they can further tighten up national regulatory requirements beyond what is required by national rules on local trade (Frug and Barron, 2006:38). These developments challenge both national legal systems and the international legal system.

The example of cross-border cooperation by cities can reveal implications for national legal systems. In the meantime, legal scholars are studying the question of how to assess 'foreign-policy' actions by cities in the national, constitutional context (Aust, 2015b:267). Cities and the respective city networks (Box 2.5-6) are active in the field of international politics and, in the case of cities and municipalities, do so partially

"in their capacity as part of the public authority of a state" (German quote translated from Aust, 2013:678). In Germany, for example, Article 32 of the Basic Law does not cover actions of cities involving relations with foreign states as part of "foreign authority" (German quote translated from Aust, 2015a:220). Another point of contention is whether Article 28(2), sentence 1 of the Basic Law, which deals with the right to municipal self-government, can be interpreted to mean that actions by cities on the international stage are legitimate. This could be justified with a broad interpretation of Article 28(2), sentence 1 of the Basic Law that takes into account "the increasing differentiation of the actors acting at the international level" (German quote translated from Aust, 2014: Rn. 5). In the case of the above-mentioned adaptation of cemetery by-laws to ILO standards, it has been argued that such by-laws are just outside the range of local self-government, because municipalities have "no general political mandate" (German quote translated from Misera and Kessler, 2009:53). The prevailing opinion, however, is that an issue can be simultaneously of international and local interest (Bavarian Constitutional Court, decision dated

Box 2.5-5**The Habitat conferences and UN-Habitat**

The names Habitat I and II refer to the UN Conferences on Human Settlements that were held from 31 May to 11 June 1976 in Vancouver, Canada, and from 3 to 14 June 1996 in Istanbul, Turkey. The twenty-year cycle has been retained, and Habitat III will be held from 17 to 20 October 2016 in Quito, Ecuador, in accordance with Resolution 66/207 of the UN General Assembly. The conferences in Vancouver and Istanbul closed with declarations – in 1976 with the Vancouver Declaration, and in 1996 with the Istanbul Declaration and an additional Habitat Agenda, in which various principles on settlements and urban development were agreed, as well as action plans for their implementation. Key elements of the Habitat Agenda include the call for the provision of "Adequate shelter for all" and "Sustainable human settlements development in an urbanizing world" (UN, 1996). The declarations were noted by the UN General Assembly, but have not attained any further international legal status.

Like other UN negotiations, the Habitat conferences are intergovernmental negotiations in which non-nation-state actors such as cities or NGOs are only granted an observer role. In order to integrate the cities better, the decision was taken to relax the UN's standard rules for negotiations at international conferences for the first time for the 1996 negotiations in Istanbul, and allow cities and civil-society actors

better access to the negotiations (Citiscope, 2015).

UN-Habitat is the United Nations Human Settlements Programme (Section 8.4.3). It developed from the United Nations Commission on Human Settlements founded in 1977 – as a result of Habitat I – and the United Nations Centre for Human Settlements. After Habitat II in 1996 and the Millennium Development Goals of 2000, these two organizations were reformed, merged and upgraded to a UN programme in 2002 by Resolution A/56/206 of the UN General Assembly. The budget of the programme, which is based in Nairobi, Kenya, amounted to US\$186.3 million in 2012 (the most recent available figure). US\$10.7 million of this came from the UN as core funding. A further US\$175.6 million is made up of voluntary contributions made by member states, nearly 94% of which was earmarked (UN-Habitat, 2013e:45). In addition to thematic policy work, e.g. the creation of reports on challenges of urbanization or solution approaches in urban development, technical cooperation, at 69%, constitutes the biggest part of the UN-Habitat budget. Originally founded to cover the subject of human settlements, UN-Habitat today focuses in particular on sustainable urban development in its policy work. It is the only UN institution that deals with this issue. Since its realignment in 2011, UN-Habitat has seven thematic focus areas: Urban Legislation, Land and Governance; Urban Planning and Design; Urban Economy; Urban Basic Services; Housing and Slum Upgrading; Risk Reduction and Rehabilitation; and Research and Capacity Development (UN-Habitat, 2013d).

07.10.2011, Vf. 32-IV-10; Federal Administrative Court (BVerwG), decision dated 16.10.2013, 8 CN 1.12; Aust, 2015a; Kaltenborn and Reit, 2012). Nevertheless, the Federal Administrative Court rescinded the cemetery by-laws in its 2013 judgement because they were not defined clearly enough and did not provide sufficient legal basis for an encroachment on the freedom of occupation pursuant to Article 12(1) of the Basic Law (BVerwG, decision dated 16.10.2013, 8 CN 1.12, Rn. 28). To sum up, it can be said that many issues relating to the 'foreign-policy' activities of cities are still unclear in terms of the internal relationship with the nation state and that more intensive (scientific) debate is necessary (Box 10.1-10).

Not only are cities not legal entities under international law (Aust, 2015b:274), but the (internal) relationship between cities and the nation state is traditionally outside the influence of international law (Frug and Barron, 2006:2). Even so, building on approaches of political science, there is a discussion on what position the system of international law should adopt on the actions of cities on the international stage (Aust, 2015b analysed by Acuto, 2013b; Barber, 2013; Bouteilier, 2013; Curtis, 2014). The issue here, in particular, is whether cities or city alliances should or should not be recognized as legal entities under international law, or whether, for example, an entirely new legal form of

'transnational public law' ought to be created (Aust, 2013:675). Although there are arguments in favour of recognizing cities as legal entities under international law – there are more people living in some megacities than in many countries – delimitation problems would emerge, *inter alia* in relation to the nation states of which the overwhelming majority of cities are part (Section 2.5.3). Nevertheless, the need for a scientific and practical examination of the 'foreign-policy' actions of cities remains. Perhaps they do not need to become legal entities under international law, but require on the one hand national constitutional security in relation to their rights and obligations in the context of their 'foreign-policy' activities, and on the other hand international consideration through some form of recognition of their activities: "The more 'accepted' international actors such as states and international organizations refer to cities as relevant actors, the more their status will become enshrined in international law" (Aust, 2015b:274; Section 8.4).

Box 2.5-6**Examples of important city networks**

There are numerous transnational city networks, some of which have a general remit, while others work on individual aspects such as climate-change mitigation. The largest and most important networks include:

- *United Cities and Local Government (UCLG)* is a global network of cities, local governments and community organizations. It was formed in 2004 after the merger of the International Union of Local Authorities (IULA), the United Towns Organisations (UTO), and the Metropolis network. Its membership includes 175 national urban and regional associations as well as more than 1,000 cities that are direct members. The UCLG claims to represent the local governments of more than half of the world's population. UCLG works on a wide variety of topics and deals with such diverse aspects as decentralization, gender equality and local economic development (UCLG, 2015:26ff.).
- *ICLEI – Local Governments for Sustainability* was founded in 1990 as the International Council for Local Environmental Initiatives. It is an NGO that works internationally with more than 1,000 cities and communities on local sustainability policy. Among other things, it aims to make cities more sustainable, climate-friendly, resource-efficient and biodiverse by supporting local measures (ICLEI, 2014).

Since 1995, ICLEI has also served as coordinator of the Local Governments and Municipal Authorities observer group of the UNFCCC.

- *C40* was set up in 2005 as a worldwide network of currently 83 large cities that have agreed to reduce greenhouse-gas emissions. C40 was initially an alliance of mega-cities. In the meantime, it also includes smaller cities, such as Heidelberg and Basel, that are taking on a pioneering role in climate change (Aust, 2013:687f.). C40's structure and procedures are similar to those of an international organization. C40 claims that its members had already taken over 10,000 climate-change-mitigation measures by 2015 (C40, 2014), and thus will have saved 3 Gt of CO₂eq by 2020. With such activities, C40 positions cities as a driving force in global climate-change mitigation.
- The *Compact of Mayors* is a mitigation initiative founded in September 2014 by the three leading networks C40, ICLEI and UCLG. It aims to reduce the greenhouse-gas emissions of the participating cities and to document the reductions with the help of the carbonn Climate Registry (cCR). The latter is the most important platform for measuring and monitoring local and subnational climate commitments and activities. cCR is also a good example of cross-network activities, since, in addition to numerous other actors, both ICLEI and UCLG were involved in the development of the platform (ICLEI, 2014; cCR, 2014).

2.6**Global urbanization reports: problem descriptions, solution approaches and actors**

Over the past four decades, sustainable urbanization has become established internationally as a field of action for politics; accordingly, the number of global – in some cases regular – reports on this topic has steadily grown (Box 2.6-1). Having reviewed recent global reports by the United Nations (UN-Habitat, UNEP), the World Bank, the OECD, the IPCC, international commissions, and institutions of development cooperation, in this section the WBGU summarizes the problem analyses, thematic priorities and solution approaches enshrined in them. A pertinent quote has also been selected from each report to illustrate the respective author's line of thought. At the end of this section, a synopsis relating to the transformation towards the sustainable city sets forth which new perspectives the WBGU believes deserve more attention in the international debate. The global reports are grouped and analysed according to the three following, closely interrelated groups of topics (1) climate–energy–resource efficiency (Table 2.6-1), (2) basic services–inclusion–socio-economic disparities (Table 2.6-2), and (3) planning–finance (Table 2.6-3).

2.6.1**Priorities of selected global urbanization reports****2.6.1.1****Climate–energy–resource efficiency****UNEP (2015): District Energy in Cities**

The UNEP study 'District Energy in Cities, Unlocking the Potential of Energy Efficiency and Renewable Energy', published in 2015, is one of the first studies worldwide to deal conceptually with the possibilities of promoting efficient heating and cooling systems and integrating renewable energies in cities on the basis of best-practice examples (UNEP, 2015; Table 2.6-1). It provides an overview of advances in the development of efficient heating and cooling systems at the city-district level and aims to put this aspect, which has been neglected up to now in the climate and energy debate, onto the political agenda. The aim is to identify the key factors for a successful scaling-up of energy efficiency and renewable energies and for the successful introduction of low-carbon technologies.

Modern district energy systems in cities use technologies such as combined heat and power (CHP), thermal storage and a decentralized energy supply. These systems can create synergies with the municipal electricity supply, sanitation system, and waste and sewage

treatment. The study aims to help local decision-makers to identify the most suitable and cost-efficient technologies for their city district, and highlights the need for a dialogue between national governments and local authorities to develop coherent policies. Building on the examples of best practices investigated, a ten-step policy and investment timetable is drawn up to accelerate the development, modernization and upscaling of district energy systems. A decision tree published on the web aims to give municipalities orientation in their role as planners, legislators and supporters. The aim of UNEP's new District Energy Initiative is to forge contacts between pioneer cities and those who seek to improve energy systems. As regards relevant actors, the study mentions primarily local governments as planners and legislators, and multi-stakeholder partnerships.

IPCC (2014): Fifth Assessment Report

As a result of the global urbanization dynamic, urbanization is comprehensively taken into account for the first time in the 5th Assessment Report of the IPCC. The focus is on the contribution made by cities to the stabilization of atmospheric concentrations of greenhouse gases and on how they are adapting to the effects of climate change.

A contribution of Working Group III of the IPCC (Seto et al., 2014) deals with urban form, urban infrastructure provision and urban land use (a separate contribution is devoted to the topic of transport). Building on this, the report shows ways to reduce emissions by pursuing an appropriate form of spatial planning: "Spatial plans might be defined less in terms of a specific urban-form vision and more with regard to core development principles" (Seto et al., 2014:958). It also lists key factors for successful urban climate governance, including the cross-sector integration of climate-policy goals, transformation-promoting governance structures and planning capacity, the integration of land use and transport, and adequate financing opportunities. Emphasis is placed on preventing path dependencies and taking into account the co-benefits, urgency and scale of the need for a change of direction to prevent dangerous climate change.

Contributions of Working Group III (Mitigation of Climate Change) analyse in detail the potential of different instruments and urban-development policies for climate-change mitigation and show that many cities have already developed climate action plans (Lucon et al., 2014; Seto et al., 2014). One contribution on buildings and the expected global growth of buildings and city districts illustrates the need for energy-efficient design in buildings (Lucon et al., 2014). With respect to regional differences, the report notes that basic energy services are often not available in buildings in developing

countries, while, in industrialized countries, energy use in buildings is comprehensive but often inefficient. If no further measures are taken, the report says, global energy demand from buildings can be expected to double or even treble by the middle of the century; however, it could be stabilized or lowered by taking appropriate measures (e.g. technical improvements, or taxes on buildings according to energy consumption). Consumer behaviour and life style also play a role (Lucon et al., 2014:719). Further key action fields mentioned are the building materials needed worldwide for the anticipated growth in city districts and their climate compatibility, access to modern energy services, and low-carbon and compact urban planning. The relevant stakeholders mentioned are municipal administrations, interest groups, community groups, academia and the private sector.

One contribution of the IPCC's Working Group II deals with 'Impacts, Adaptation, and Vulnerability' of cities to the risks of climate change (Revi et al., 2014). A key role is played in this context by disaster prevention, reducing exposure to climate risks, and strengthening the adaptive capacity of vulnerable groups. Essential prerequisites include an improved supply for the population of basic services, and resilient infrastructures for water supplies and sanitation systems, waste disposal, access to electricity and telecommunications, as well as health and emergency services. In addition to a resilient infrastructure, the importance of good-quality, affordable and well-located housing options is also considered essential in order to minimize exposure to the impact of climate change and the damage caused by it. The report identifies necessary governance-related measures (Table 2.6-1), points to the limited support provided by international financial institutions, and draws attention to the importance of local scientific capacity for the adaptation to climate change. According to the report, if urban adaptation policy is to be successful, municipalities must ultimately be at the centre of it, because effective adaptation by cities depends largely on its integration into local investments, policies and the legislative framework.

GCEC (2014): Better Growth, Better Climate

The study by the Global Commission on the Economy and Climate (GCEC, 2014) focuses on how to achieve low-carbon growth without conflicts of objectives between growth and climate-change mitigation. The GCEC is a transdisciplinary advisory initiative that was formed in 2013 by Colombia, Ethiopia, Indonesia, Norway, South Korea, Sweden and the UK. The message of the study is that there is currently an opportunity in all countries, regardless of income levels, to simultaneously ensure sustainable economic growth and stem the risks

of climate change. In this context, the next 15 years will be vital years of investment in order to realize the economic structural transformation towards the decarbonization of the economy. The authors stress that the development of the largest and fastest-growing agglomerations will have a formative influence on the future of the global economy and the development of the climate. In particular, compact cities with a well-integrated local public transport system are identified as being key to economically dynamic and healthier cities with lower emissions. The recommendations are presented as a 10-point action plan, three of which relate to the urbanization transformation field: (1) make connected and compact cities the preferred form of urban development and prioritize investments in local public transport; (2) phase out subsidies for fossil fuels and incentives for urban sprawl; (3) greatly reduce the capital costs of investment in a low-carbon infrastructure by providing better access to institutional capital. The report identifies economic-policy decision-makers in the public and private sector as decisive actors.

UNEP (2012a): Sustainable, resource efficient cities – Making it happen!

The report 'Sustainable, resource efficient cities – Making it happen!' focuses on the construction and conversion of urban infrastructure (energy, waste, water, etc.), but simultaneously points out that the task involves more than a technical retrofit; in many situations, socio-cultural identity, inclusion, the consideration of informality, and 'local voice and agency' are vital additional prerequisites for the success of the transition to urban sustainability (UNEP, 2012a). The development pathways are described as 'transitions to sustainability'. One of the core statements is that the transition towards sustainability can be furthered primarily by iconic projects (e.g. fundamental modernization of local public transport systems). Attention is also drawn to the role of strategic intermediaries who can promote participatory governance and support cross-sectoral and inter-institutional coordination in the implementation of urban sustainability agendas. Such intermediaries can be educational, research and advisory bodies, NGOs or local civil-society initiatives, who e.g. run pilot projects in urban laboratories. In addition, the special importance of creating monitoring and evaluation systems that cover the multi-dimensionality of sustainability is also stressed. Finally, the report recommends that cities establish infrastructures that enable them to respond flexibly to existing, emerging and future challenges.

UN-Habitat (2011a): Cities and Climate Change: Global Report on Human Settlements 2011

Mitigation of and adaptation to climate change were the main focus of UN-Habitat's (2011a) annual report for the first time in 2011. The starting points are, on the one hand, the contribution of urban areas to climate change, the potential and urgency of urban climate-change mitigation, and the lack of reporting and monitoring of urban greenhouse-gas emissions. On the other hand, the report centres on the vulnerability of cities to climate change and their adaptation potential and strategies, including existing obstacles. It is noted that not enough cities have developed coherent adaptation strategies up to now (UN-Habitat, 2011a: 175). With reference to governance deficits in urban climate-change mitigation, the report adds: "Despite the array of mitigation responses by urban centres to date, a piecemeal rather than a strategic approach is very common" (UN-Habitat, 2011a: 171). In addition to general principles for policy-making (UN-Habitat, 2011a: 182), policy recommendations are made for the international, national and urban levels. Partnerships between public, private and civil-society actors, for example, are regarded as decisive for dealing with the challenges of climate change.

OECD (2010): Cities and Climate Change

In this three-part report (trends, competitiveness, governance) targeting OECD countries, the focus is on the key role of cities for global climate-change mitigation and how they are affected by climate change (OECD, 2010). In this context, urban form, life styles and energy use are listed as decisive action fields. Cities can be laboratories for innovative mitigation measures. The prerequisite for the use of synergies is a cross-sector urban climate-change-mitigation policy, which cannot be seen in isolation from the role of the national government. Rather, the latter can play a key role in the emergence and elimination of barriers and create crucial overall conditions for urban climate-change mitigation. Finally, the report emphasizes that there are no universally applicable solutions for creating an optimal relationship between national governments and cities; bottom-up approaches (e.g. new urban climate-change-mitigation models) or top-down approaches (e.g. national climate policy as a compulsory framework) or a combination of the two can be the best choice depending on the circumstances. The local or national governments, the private sector, trade unions and experts are identified as key actors.

Box 2.6-1**Reviewed Global Reports on Urbanization**

- Corfee-Morlot et al. (2009): Cities, Climate Change and Multilevel Governance. Paris: OECD.
- GCEC – Global Commission on the Economy and Climate (2014): Better Growth, Better Climate. The New Climate Economy Report. The Global Report. Washington, DC: New Climate Economy.
- LSE Cities, ICLEI – International Council for Local Environmental Initiatives und GGGI – Global Green Growth Institute (2013): Going Green. How cities are leading the next economy. Final Report. London: LSE Cities.
- Lucon, O., Ürge-Vorsatz, D., Zain Ahmed, A., Akbari, H., Bertoldi, P., Cabeza, L. F., Eyre, N., Gadgil, A., Harvey, L. D. D., Jiang, Y., Liphoto, E., Mirasgedis, S., Murakami, S., Parikh, J., Pyke, C. und Vilariño, M. V. (2014): Buildings. In: IPCC – Intergovernmental Panel on Climate Change (Hrsg.): Climate Change 2014: Mitigation of Climate Change. Contribution of Working Group III to the Fifth Assessment Report of the IPCC. Cambridge, New York: Cambridge University Press, 671–738.
- OECD – Organisation for Economic Co-operation and Development (2010): Cities and Climate Change. Paris: OECD.
- OECD – Organisation for Economic Co-operation and Development (2015a): The Metropolitan Century. Understanding Urbanisation and its Consequences. Paris: OECD.
- Revi, A. und Rosenzweig, C. (2013): The Urban Opportunity: Enabling Transformative and Sustainable Development. Background Research Paper for the High-Level Panel of Eminent Persons on the Post-2015 Development Agenda. New York: Sustainable Development Solutions Network Thematic Group on Sustainable Cities.
- Revi, A., Satterthwaite, D., Aragón-Durand, F., Corfee-Morlot, J., Kiunsi, R., Pelling, M. und Solecki, W. (2014a): Urban areas. In: IPCC – Intergovernmental Panel on Climate Change (Hrsg.): Climate Change 2014: Impacts, Adaptation, and Vulnerability. Part A: Global and Sectoral Aspects. Contribution of Working Group II to the Fifth Assessment Report of the IPCC. Cambridge, New York: Cambridge University Press, 535–612.
- Seto, K. C., Dhakai, S., Bigio, A., Delgado Arias, S., Dewar, D., Huang, L., Inaba, A., Kansai, A., Lwasa, S., McMahon, J. A., Müller, D. B., Murakami, J., Nagendra, H. und Ramaswami, A. (2014): Human settlements, infrastructure and spatial planning. In: IPCC – Intergovernmental Panel on Climate Change (Hrsg.): Climate Change 2014: Mitigation of Climate Change. Contribution of Working Group III to the Fifth Assessment Report of the IPCC. Cambridge, New York: Cambridge University Press, 923–1000.
- UCLG – United Cities and Local Governments (2013): Basic Services for All in an Urbanizing World. Executive Summary. Third Global Report of United Cities and Local Governments on Local Democracy and Decentralization – GOLD III. Barcelona: UCLG.
- UKAID – Department for International Development und DFID – Department for International Development (2012): Future proofing cities. Risks and opportunities for inclusive urban growth in developing countries. London: UKAID.
- UN-Habitat – United Nations Human Settlements Programme (2009b): Planning Sustainable Cities: Global Report on Human Settlements 2009. London: Earthscan.
- UN-Habitat – United Nations Human Settlements Programme (2011a): Cities and Climate Change: Global Report on Human Settlements 2011. Nairobi: UN-Habitat.
- UN-Habitat – United Nations Human Settlements Programme (2013a): State of the World's Cities 2012/2013. Prosperity of Cities. Nairobi: UN-Habitat.
- UNEP – United Nations Environment Programme (2011b): Towards a Green Economy. Pathways to Sustainable Development and Poverty Eradication. Arendal: UNEP GRID.
- UNEP – United Nations Environment Programme (2012a): Sustainable, resource efficient cities – Making it happen! Nairobi: UNEP.
- UNEP – United Nations Environment Programme (2015): District Energy in Cities. Unlocking the Potential of Energy Efficiency and Renewable Energy. Nairobi: UNEP.
- WHO – World Health Organization und UN-Habitat – United Nations Human Settlements Programme (2010): Hidden cities – Unmasking and overcoming health inequities in urban settings. Genf: WHO.
- World Bank (2010a): Cities and Climate Change: An Urgent Agenda. Washington, DC: World Bank.
- World Bank (2013): Planning, Connecting & Financing Cities – Now: Priorities for City Leaders. Washington, DC: World Bank.

World Bank (2010a): Cities and Climate Change – An Urgent Agenda

The World Bank already examined the topic of 'Cities and Climate Change' in a comprehensive study in 2010. The key role of the cities for global climate-change mitigation and the challenges involved in the adaptation of cities to climate change are at the centre of attention. The report also believes that cities themselves will take on a more substantial creative role in global climate-change mitigation in the future. In order to comply with the 2°C guard rail – the report continues – an 'energy revolution' is needed; its implementation requires intensive cooperation between inter-

national donors and the UN, city networks, the OECD, the private sector, pioneer cities and academia. Reducing greenhouse-gas emissions, making buildings energy-efficient, and reducing the vulnerability of the urban population to natural disasters are named as priority action fields in cities. Targets for implementation are specified for these three fields, as are suitable instruments (World Bank, 2010a:41). Examples are given of ways to reduce greenhouse-gas emissions; these include the densification of cities, the promotion of local public transport, negative incentives for the ownership of private cars and for vehicle use, support for non-motorized movement, and efficient vehi-

cle engines. Key actors mentioned in the report are alliances of international donors, lending institutions, UN organizations and city networks. In addition, partnerships with the private sector, the OECD, municipal organizations, pioneer cities and academia are mentioned.

[OECD \(2009\): Cities, Climate Change and Multilevel Governance](#)

Beginning with the statement that "climate policy at city-scale remains fragmented and the basic tools to facilitate good decision making are still lacking" (Corfee-Morlot et al., 2009:87), the OECD report 'Cities, Climate Change and Multilevel Governance', published in 2009, focuses on improving the integration of different levels of governance. National policy is seen as a decisive precursor for municipal climate-change-mitigation policy, although many cities have set their own targets for mitigation and adaptation. The study focuses on the interaction between local and regional, and between local and national governance, and then makes recommendations on how institutions can be strengthened. Eight principles for good urban governance are formulated, differentiated according to the relative strengths of national and local policy-making. Local authorities, urban stakeholders and national governments are mentioned as the key actors.

2.6.1.2 Basic services–inclusion–socio-economic disparities

[Revi and Rosenzweig \(2013\): The Urban Opportunity – Enabling Transformative and Sustainable Development](#)

This study by the Sustainable Development Solutions Network (SDSN) for UN Secretary General Ban Ki-moon's High-level Panel of Eminent Persons on the Post-2015 Development Agenda, focuses on improving the living conditions of slum dwellers (Revi and Rosenzweig, 2013; Table 2.6-2). It is made clear that global climate-change mitigation and improving local living conditions are closely related. The report demands that urban poverty groups be given a voice and be actively included in the shaping of their urban environment: "Over the last few decades, many communities have been unwilling to passively accept the planning decisions of politicians and technocrats that impact on their day-to-day environments" (Revi and Rosenzweig, 2013:37). Taking cultural identity, diversity and informality into account in urban governance is seen as an important prerequisite for the success of sustainable urban development.

It is argued as a general principle that cities have

special potential for transformative change, that they are places where social change and inclusion can succeed and where the change of direction towards sustainability must take place. The report refers to the global objective of a complete withdrawal from the fossil energy system by 2050 and makes it clear that urbanization must not breach ecological guard rails: "Sustainability requires that urbanization occur within regional and planetary limits of ecological and other life-support systems" (Revi and Rosenzweig, 2013:11). The report stresses the need for a joint effort by governments, private companies, civil society and local urban communities.

[UN-Habitat \(2013a\): The State of the World's Cities 2012/2013 – Prosperity of Cities](#)

The starting point of the 'Prosperity of Cities' report is the statement that cities have too often become places of social discrimination, inequality and exclusion, and that many people have to live in slums, especially in developing countries and emerging economies: "Highly unequal cities are a ticking time bomb waiting to explode" (UN-Habitat, 2013a: 114). UN-Habitat sees the foundations of this negative development inter alia in the globally widespread standard urbanization model: "This is the pattern which UN-Habitat refers to as the 'Global Standard Urbanization Model of the 20th Century', which privileges individualism, consumerism, new (artificial) values and lifestyles, excessive mobility and privatization of the public space" (UN-Habitat, 2013a: 130).

Proceeding from this point, UN-Habitat presents its newly developed concept of an extended urban welfare model that explicitly goes beyond the narrower target of economic growth and is comprehensive in nature: "prosperity for all has been compromised by the narrow focus on economic growth" (UN-Habitat, 2013a: 185). The six elements of welfare, described as the 'spokes' of a wheel, are ecological sustainability, productivity, infrastructure, quality of life, equity and social inclusion. These spokes mutually influence each other: for example, adequate infrastructures promote not only productivity, but also quality of life and inclusion in equal measure. The 'urban power functions' are centred in the axle of the wheel (e.g. the local government, laws and regulations, urban institutions, urban planning and civil society; UN-Habitat, 2013a: xiii). The need to change is described as transformation; three target dimensions are named and central action fields for reaching these targets described. The identified key actors are primarily the public sector, especially urban planners, city administrations, civil society and local politicians.

[UCLG \(2013\): Basic Services for All in an Urbanizing World](#)

This report from the city network United Cities and Local Governments concentrates on the role of (local) governance in improving the living conditions of urban poverty groups in developing countries and emerging economies (UCLG, 2013). The focus is above all on the infrastructures for securing access to sufficient and safe drinking water, sanitation and sewage disposal, waste management, energy supply, a good public transport infrastructure and its funding. A central recommendation of the report is that national and international institutions should give priority to investment in basic services (water supply and sanitation, waste management, prosperity and quality of life, mobility and transport, communications, energy, health, education, public security and maintenance of public urban spaces; UCLG, 2013:13). In order to make such long-term investment possible, loans must be made available under the kind of preferential conditions that can only be granted by national governments or multilateral organizations. Another key recommendation is that international organizations should enable municipalities to access global financing mechanisms directly. The detailed recommendations on governance are structured according to the respective actors' tasks (e.g. local and national governments or institutions, the private sector, civil society, trade unions).

[UKAID and DFID \(2012\): Future proofing cities](#)

The report 'Future proofing cities – risks and opportunities for inclusive urban growth in developing countries' stresses that cities in developing countries and emerging economies must take urgent measures to ensure that their long-term economic development is not jeopardized by environmental risks (UKAID and DFID, 2012). It is argued that the traditional way of looking at urban poverty in isolation is no longer sufficient, and that environmental risks must also be addressed. The report describes the considerable data and knowledge gaps, identifies where research is needed on the governance of urban environmental risks, and highlights the need to involve all relevant actors in decision-making and planning processes. Seven key messages and seven core recommendations are given. The general recommendations are subdivided according to those that are 'relatively easy to implement', 'challenging to implement', and those where 'trade-offs between affordability, governance and planning requirements and deliverability' can impede implementation. The key actors addressed are international development agencies together with political decision-makers, academia, citizens and practitioners.

[WHO and UN-Habitat \(2010\): Hidden cities – Unmasking and overcoming health inequities in urban settings](#)

In this report in the form of a global overview study, the WHO and UN-Habitat jointly apply themselves to the subject of health in cities for the first time. The report's main concern is to make it clear that, contrary to a widely held assumption, the health status of urban populations is not automatically better than that of rural populations, and that it can sometimes even be worse (WHO and UN-Habitat, 2010:35). Despite a relatively good urban health infrastructure, differences in access and risk exposure can cause major health disparities within urban societies. One key reason why urban health inequities among individual urban population groups are not recognized is the fact that urban health data are aggregated to too high a level (WHO and UN-Habitat, 2010:38). Averaged-out figures hide the sometimes extreme socio-spatial disparities in health status and access to healthcare services within a city. In some cases, this problem has been recognized, and data records later disaggregated.

The report looks at options for improving the precarious health conditions of individual social groups and initially recommends the creation of a sufficiently disaggregated data basis. Building on this, three approaches for reducing disparities in healthcare are recommended (WHO and UN-Habitat, 2010:90): target-group-oriented measures to improve the situation of the poorest; narrowing the health gap between the best and the worst cared-for groups of a city's population; and the reduction of urban socio-economic disparities in general. The report concludes with actor-oriented recommendations for health ministries, local authorities, civil society, academia, urban planners and international institutions.

2.6.1.3 Planning-finance

[OECD \(2015a\): The Metropolitan Century – Understanding Urbanization and its Consequences](#)

The OECD report begins by putting the current urbanization dynamic into its historical context, and goes on to identify overall, general challenges and opportunities in the 'century of urbanization', naming the main factors for 'successful cities' (Table 2.6-3). The growing expectations of the globally emerging middle classes, who are seeking qualified employment and good, healthy living conditions in cities, are named as the key drivers of the new urbanization dynamic. Especially in developing countries and emerging economies, large-scale new urban infrastructures will be built in the future: "While in large parts of Europe and Northern America the bulk

2 Urbanization in a global context

Table 2.6-1

Global urbanization reports: field of climate–energy–resource efficiency.

Source: WBGU

Problem description	Focus, dominant perspective	Aims, recommendations	Selected quote
UNEP (2015): District Energy in Cities			
Supply of sustainable energy services	Technical/infrastructural <ul style="list-style-type: none"> ➢ Best-practice approach: empirical study of pioneering cities with district energy ➢ District energy systems, combined with efficiency measures, can contribute a significant proportion of the emission cuts needed to limit the global rise in temperature to 2–3°C 	<ul style="list-style-type: none"> ➢ Local, affordable, low-carbon energy supply ➢ Key factors for scaling-up energy efficiency and renewable energies Urban energy system <ul style="list-style-type: none"> ➢ Ten-step policy and investment timetable to accelerate the development, modernization and upscaling of district energy systems. ➢ Online decision tree as an aid for municipalities ➢ UNEP's District Energy Initiative: set up contacts between pioneering cities and interested cities ➢ Best-practice support schemes for consolidation cities, refurbishment cities, expansion cities, new cities 	„Continued communication and dialogue with a wide range of stakeholders – including customers; the wider public; national, regional and local policy-makers; investors; universities; architects and builders; and others – is a vital element for the successful expansion and implementation of district energy strategies.“ (UNEP, 2015:80)
IPCC's Fifth Assessment Report: Revi et al. (2014a): Urban Areas			
Adaptation to climate change	Governance- and actor-centred Window of opportunity <ul style="list-style-type: none"> ➢ The next 15 years will be vital years of investment ➢ Distinction between incremental and transformative adaptation 	<ul style="list-style-type: none"> ➢ Disaster preparedness ➢ Reduce exposure to climate risks ➢ Strengthen the adaptive capacity of vulnerable groups Governance <ul style="list-style-type: none"> ➢ Effective multi-level urban risk governance ➢ Integration of policies, incentives and measures to strengthen adaptive capacity ➢ Synergies with the private sector ➢ Adequate financing and institution development 	„Urban climate change risks, vulnerabilities, and impacts are increasing across the world in urban centers of all sizes, economic conditions, and site characteristics.“ (Revi et al., 2014a:538)
IPCC's Fifth Assessment Report: Lucon et al. (2014): Buildings, and Seto et al. (2014): Human Settlements			
Cities' contribution to climate change	Technical/infrastructural <p>Distinction between incremental and transformative development pathways</p> <p>Attention should be paid to:</p> <ul style="list-style-type: none"> ➢ Path dependencies ➢ Co-benefits ➢ Urgency ➢ Scale 	Low-carbon urban and spatial planning Energy-efficient buildings <p>In a 'business as usual' scenario, energy demand from buildings will double or treble by the middle of the century</p> Building materials <p>Need for low-carbon solutions because of growth in buildings and city districts and high demand for construction materials</p> Energy services <p>Improve access to modern energy services</p>	„Successful implementation of mitigation strategies at local scales requires that there be in place the institutional capacity and political will to align the right policy instruments to specific spatial planning strategies.“ (Seto et al., 2014:928)
GCEC (2014): The New Climate Economy Report. Better Growth, Better Climate			
<ul style="list-style-type: none"> ➢ Fast-growing cities are both an opportunity and a risk for climate-change mitigation ➢ Climate-resilient growth without conflicts between the objectives of growth and climate protection 	Technical/infrastructural approach <ul style="list-style-type: none"> ➢ Urbanization as a key transformation field alongside land use and energy ➢ 2°C guard rail as an orientation 	10-point action plan <p>of which the following are relevant for urbanization: (1) build connected and compact cities, (2) phase out incentives for urban sprawl, (3) reduce the capital costs of investment in a low-carbon infrastructure</p>	„Strong political leadership and the active participation of civil society will be needed, along with far-sighted, enlightened business decisions.“ (GCEC, 2014:10)
UNEP (2012a): Sustainable, Resource Efficient Cities – Making it Happen!			
<ul style="list-style-type: none"> ➢ Urban sustainability jeopardized by economic globalization, resource scarcity, rapid technological and social change, environmental and climate change ➢ Impact on food, water, energy, transport and waste 	Socially embedded infrastructures <p>Regional focus: cities in developing countries and emerging economies</p>	<p>Resource efficiency with focus on infrastructure: energy, waste, water, etc.</p> <p>Action fields</p> <ul style="list-style-type: none"> ➢ Participatory governance ➢ Cross-sector, inter-institutional coordination ➢ Monitoring and evaluation systems ➢ Flexible infrastructures <p>Iconic projects</p>	„Mitigating against climate change, and adapting to the effects of climate change will require more than mere retrofitting of existing infrastructures.“ (UNEP, 2012a:48)

Problem description	Focus, dominant perspective	Aims, recommendations	Selected quote
UN-Habitat (2011a): Global Report on Human Settlements: Cities and Climate Change			
Urgently needed: <ul style="list-style-type: none"> ➢ Urban climate-change mitigation and adaptation ➢ Climate change further aggravates the already existing urbanization problems ➢ Not enough cities have developed coherent adaptation strategies 	Governance, climate Time frame: global greenhouse-gas emissions should have peaked in 2015	Recommendations for the international, national and urban levels Principles <ul style="list-style-type: none"> ➢ No blueprint for solutions ➢ Synergies and co-benefits taken into consideration ➢ Compatibility of short-term and long-term objectives Recommendations <ul style="list-style-type: none"> ➢ Develop a vision of the future ➢ Citizen participation ➢ Risk analysis ➢ Action plans 	„The crux of the challenge is that actors at all levels need to move within short time frames to guarantee long-term and wide-ranging global interests, which can seem remote and unpredictable at best.“ (UN-Habitat, 2011:VI, introduction by Joan Clos)
OECD (2010): Cities and Climate Change			
Contribution of cities to climate change; how they are affected by climate change	Urbanization trends, competitiveness, governance	Climate-change-mitigation and adaptation strategies	„Some urban climate policies may be no-regret policies as they can provide co-benefits that offset their cost.“ (OECD, 2010:20)
World Bank (2010a): Cities and Climate Change. An Urgent Agenda			
Contribution of cities to climate change; how they are affected by climate change	Infrastructure and governance, climate <ul style="list-style-type: none"> ➢ Cities have a key role to play in climate-change mitigation ➢ Energy revolution to comply with the 2°C guard rail 	<ul style="list-style-type: none"> ➢ Reduce greenhouse-gas emissions ➢ Build more energy-efficient buildings ➢ Reduce vulnerability to natural disasters 	„Decisions taken today lock in the futures of many cities. The infrastructure of 2050 is being built today, yet the world of 2050 will be very different from today.“ (World Bank, 2010a:v; Inger Andersen, Vice President World Bank)
OECD (2009): Cities, Climate Change and Multilevel Governance			
Fragmented urban climate policy (mitigation and adaptation) and basic lack of instruments to facilitate decision-making processes	Governance, climate <ul style="list-style-type: none"> ➢ Condition for success: integration of different levels of governance ➢ But national policy is seen as the key trailblazer for local measures on climate-change mitigation and adaptation 	Good urban governance <ul style="list-style-type: none"> ➢ Ensure participatory governance and strategic planning ➢ Create analytical capability for short- and long-term planning ➢ Ensure cost efficiency ➢ Promote experiments and innovations ➢ Take distribution issues and equity into account ➢ Establish long-term planning horizon ➢ Encourage coherent policy-making ➢ Build up monitoring and evaluation systems 	„City authorities are in a unique position to engage local stakeholders and design locally tailored responses to climate change.“ (Corfee-Morlot et al., 2009:12)

of urbanisation has already taken place and is embodied in city forms and existing infrastructures, developing and emerging countries currently have an unprecedented opportunity to shape their urban futures“ (OECD, 2015a: 121).

It is noted that a shift of power is currently taking place in many countries in favour of large agglomerations; in this context it is expected that competition between countries will increasingly shift in favour of competition between urban agglomerations in the coming decades (OECD, 2015a: 122). Accordingly, says the OECD report, countries do well to equip their large urban conurbations, which are increasingly becoming economic engines of national development, with appropriate governance skills, i.e. with more political-administrative autonomy and greater financial self-determination: ‘All this does not mean the end of the nation state in its current form – or unions of nation states – as the dominant ways of political organisation, but it certainly implies a shift in power. It would seem in the best interest of central governments to accompany these shifts by modernising and adapting admin-

istrative structures to better reflect the needs of metropolitan areas [...]’ (OECD, 2015a: 122). This emerging power shift will also change international cooperation in the long term, although there is a wide range of possible developments: ‘At one extreme of the spectrum, large metropolitan areas could take on a key role in international co-operation. [...] At the other end of the spectrum, nation states (or associations of them) may maintain their dominance in international and diplomatic affairs, while further integrating and representing the interests of their large metropolitan areas at this level’ (OECD, 2015a: 122).

LSE Cities et al. (2013): Going Green – How cities are leading the next economy

The ‘Going Green’ report contains the results of a survey of 90 urban administrations worldwide and eight case studies on ‘green growth’ (LSE Cities et al., 2013). Conclusions are drawn from the analysis on leadership, financing, regulation/planning and partnerships. Land use, transport, buildings, energy, waste and water are treated as relevant sectors of green growth. One of the

2 Urbanization in a global context

Table 2.6-2

Global urbanization reports: field of basic services–inclusion–socio-economic disparities.

Source: WBGU

Problem description	Focus, dominant perspective	Aims, recommendations	Selected quote
Revi and Rosenzweig (2013): The Urban Opportunity – Enabling Transformative and Sustainable Development			
Poor living conditions in slums, climate-change mitigation and adaptation	Actor-centred <ul style="list-style-type: none"> ➢ Emphasis on the transformative potential of cities ➢ Consideration of guard rails, including climate-change mitigation: complete withdrawal from fossil energy system by 2050 	Goals <ul style="list-style-type: none"> ➢ End extreme urban poverty and improve living standards ➢ Universal access to basic services and housing ➢ Affordable housing for all ➢ Resilience and ecological sustainability ➢ Mechanisms to promote sustainable urbanization 	„Culture provides identity, agency, and tools for communities to fight poverty. Integrating diversity of culture into governance, based on the needs and expectations of citizens, facilitates participation, intercultural dialogue, and the practice of equality of rights.“ (Revi and Rosenzweig, 2013:36)
UN-Habitat (2013a): The State of the World's Cities 2012/2013 – Prosperity of Cities			
<ul style="list-style-type: none"> ➢ Many cities are places of social discrimination, inequality and exclusion ➢ Causes: standard urbanization model of the 20th century, which is largely based on land speculation, the privatization of public urban spaces, and the interests of the real-estate industry; it is often in conflict with the objective of urban prosperity for all 	Dimensions of urban prosperity <ul style="list-style-type: none"> ➢ Productivity ➢ Infrastructure ➢ Quality of life ➢ Social justice and inclusion ➢ Ecological sustainability 	Goals <ul style="list-style-type: none"> The city of the 21st century is one that ➢ reduces disaster risks, ➢ creates jobs, promotes social diversity, protects the natural environment, strengthens public spaces, ➢ creates conditions for prosperity Recommendations <ul style="list-style-type: none"> ➢ Promote innovations ➢ New urban planning must be in the public interest ➢ Strengthen legislation and regulations that promote the common good 	„As a decision-making tool, urban planning must better defend the 'public' against the menace of ever-expanding 'private' interests and its consequences: shrinking public spaces and reduced provision of public goods, which in turn affect more collective, intangible dimensions like quality of life, social interaction, cultural identity and social values.“ (UN-Habitat, 2013a:13)
UCLG (2013): Basic Services for All in an Urbanizing World			
Socio-economic disparities and insufficient supply of basic services for large sections of the urban population, especially in developing countries and emerging economies	Actors and urban governance Regional chapters (Africa, Asia-Pacific, Eurasia, Europe, Latin America, Middle East and West Asia, North America, metropolitan regions)	Prioritize investment in basic services/infrastructures, develop financing strategies <ul style="list-style-type: none"> ➢ Disaster-resilient infrastructures for drinking water, sanitation and sewage disposal, waste management, energy supply and local public transport ➢ Governance recommendations for local, regional and national levels 	„'Putting people first' means putting basic local services first.“ (UCLG, 2013:113)
UKAID und DFID (2012): Future Proofing Cities			
<ul style="list-style-type: none"> ➢ Cities as both polluters and victims of environmental risks: no development without environmental protection ➢ Cities in developing countries and emerging economies must take urgent action to ensure that their long-term economic development is not jeopardized by environmental risks 	Actor-centred Integrated strategies to make cities future-proof	Recommendations <ol style="list-style-type: none"> 1. Develop future-proof urban strategies 2. Mobilize funding 3. Compile urban risk diagnose 4. Strengthen powers for urban governance, planning and service system 5. Improve the data situation as a basis for decision-making 6. Conduct research to build a better basis for planning 7. Identify risks to existing and planned investment portfolios Recommendations for five types of cities <ol style="list-style-type: none"> 1. Energy- and carbon-intensive cities 2. Cities with major climate change hazards 3. Cities with regional support systems at risk (food, water, natural habitat) 4. Cities with multiple risks 5. Cities with a low risk profile 	„The central message of this report is that the earlier cities in developing countries take steps to future proof their urban development, the better. There is an important – but closing – window of opportunity for many cities to act now before they are locked into unsustainable and unsuitable development pathways.“ UKAID and DFID, 2012:ix)
WHO and UN-Habitat (2010): Hidden Cities – Unmasking and Overcoming Health Inequities in Urban Settings			
Extremely unequal distribution of health risks and their scale within cities	Solutions often lie beyond the health sector and require the involvement of many actors	General <ul style="list-style-type: none"> ➢ Disaggregated data basis is crucial for recognizing problems ➢ Solutions often lie outside the health sector Three strategic starting points <ol style="list-style-type: none"> 1. Target-group-oriented measures to improve the situation of the poorest 2. Narrow the 'health gap' between the best and the worst cared-for groups 3. Reduce urban socio-economic disparities in general Recommendations for individual actors (WHO and UN-Habitat, 2010:100f.)	„Cities offer both the best and the worst environments for health and well-being.“ (WHO and UN-Habitat, 2010:12)

main deficiencies identified in this study is the fact that the positive effects of 'green policy' on the economic development of a city are usually not mentioned. The report also shows that many cities are open minded on the use of hardly proven or unproven innovations, since they hope for potential benefits from playing a pioneering role. London and Berlin are highlighted as examples for testing electromobility, Portland and Stockholm for innovative eco-districts. In these cases, decisive pioneering advantages have already emerged. However, the power to plan and shape does not always lie entirely with the municipalities, since, for example, urban climate-change mitigation is essentially predetermined by national energy policy. As a rule, urban administrations are responsible for land-use policy, the development of transport and for waste management. The great importance of an encouraging national framework is illustrated by the example of electromobility in Berlin and of Copenhagen's land-use policy. In some cases, such as Durban's waste-to-energy project, the introduction of new technologies has been significantly driven by international actors. Nevertheless, the report, which regards the municipalities as key actors, surprises readers with the finding that, according to the experience of the cities, the strongest stimuli for an environmentally compatible and low-carbon development pathway ultimately come about as a result of public pressure from committed citizens.

[World Bank \(2013\): Planning, connecting & financing cities – now: priorities for city leaders](#)

The World Bank's report, which targets cities in developing countries and emerging economies, identifies three key action fields for sustainable urban development: planning, connecting and financing cities (World Bank, 2013). On the topic of 'planning cities', the focus is on improving living conditions in slums and on covering basic needs. Regarding living conditions in slums, rules are discussed for a flexible use of land, taking into account infrastructure development, the use of resources and disaster risks. In relation to basic services, the report emphasizes that the primary issue is not always finance, but the structure of markets and identifying suitable rules for competition-oriented pricing and cost recovery and, where appropriate, the granting of subsidies. According to the report, cities are economically better positioned if they are planned in the vicinity of existing metropolitan regions. On the subject of 'financing cities', the upfront investment that is deemed necessary is described as the biggest challenge for urban development. Against this background, there is a discussion of innovative financing mechanisms for urban development in Colombia and the Indian state of Tamil Nadu. Improving creditworthiness, transpar-

ency, rules on public-private financing models, and leveraging investment by using a city's assets (e.g. by selling land) are regarded as necessary prerequisites. The addressees of the report are city leaders.

[UN-Habitat \(2009b\): Planning Sustainable Cities – Global Report on Human Settlements](#)

With the publication of this relatively comprehensive overview study, the debate on the reform of urban planning systems has reached the level of global reports (UN-Habitat, 2009b). Four guiding principles for a new urban planning policy are named. The report deals extensively with inclusion in the context of planning processes and related power issues, and describes the spectrum from nominal, consultative, instrumental, representative to transformative participation. In the case of the latter type, inclusion is regulated in a contract between the municipality and the urban population, plans are developed jointly, and power, access to resources and responsibility are shared or assigned (UN-Habitat, 2009b:94). Above all in the context of developing countries and emerging economies, reference is made to the commonly existing gap between participation rhetoric and the right to genuine participation in planning processes; a number of recent participation approaches are presented, e.g. participatory urban appraisal, community action planning, women's safety audit, participatory budgeting and city development strategies. Moreover, the report points out that in many cities with a weak or fragile administration, private investors determine the development of the city. On the other hand, it can also happen that city dwellers themselves take over the task of supplying and developing their districts if there is no urban administration. The recommendations are structured according to developing countries, emerging economies and industrialized countries, since the urban planning challenges vary greatly.

The report points out that actors of urban development often operate outside of municipal activities and that the expectation of inclusive planning requires their active involvement all the more. It goes on to say that inclusion is largely determined by power relations, cultural norms (e.g. traditional hierarchies) or formal rules of integration. As important actors the report names households, business people, neighbourhood groups, landowners, politicians, planners, investors, numerous governmental, non-governmental and private-sector institutions, NGOs, business associations and scientists.

2.6.2

Conclusions

The following synopsis compares and assesses the global urbanization reports that were discussed individually above according to the nature of the problem description, the different solution approaches, the actors mentioned, and the blockades identified. The section concludes with a discussion of the extent to which aspects of transformative change towards sustainability are already rooted in these reports.

Convergence between the problem descriptions

Despite variations of emphasis, weighting and combination of topics (Tables 2.6-1, 2.6-2, 2.6-3), the problem descriptions in the 19 global urbanization reports examined here (Box 2.6-1) are largely similar and, in different ways, usually pursue a more or less integrated approach based on the sectors selected in each case. For example, the report compiled by Revi and Rosenzweig (2013) for the High Level Panel of Eminent Persons on the Post-2015 Development Agenda of the United Nations takes up the topic of climate-change mitigation in addition to the fight against poverty, and examines the links between the two issues.

The global urbanization reports deal with the following pivotal problem fields (to which many additional subtopics could also be assigned): urban development, improving the living conditions of urban poverty groups (OECD, 2015a; Revi and Rosenzweig, 2013; World Bank, 2013; LSE Cities et al., 2013; UCLG, 2013; UN-Habitat, 2009b), infrastructure development and improving energy services (UNEP, 2012a, 2015; LSE Cities et al., 2013; World Bank, 2010c), and environmental protection and climate-change mitigation, including adaptation to the effects of climate change and disaster preparedness (LSE Cities et al., 2013; OECD, 2015a; GCEC, 2014; Revi and Rosenzweig, 2013; UN-Habitat, 2013a; UKAID and DFID, 2012; World Bank, 2010a). Parallel to these problem areas, almost all the reports deal with the related issues of good urban governance including inclusion, finance and planning (UN-Habitat, 2009b).

Differences in the perspective on problem solving

Marked differences become apparent in the global urbanization reports when it comes to their perspectives on solving problems. A number of reports mainly follow a technical infrastructural approach, in which problem solutions are reached mainly by providing a specific infrastructure portfolio, in some cases combined with certain governance requirements (UNEP, 2015; LSE Cities et al., 2013). A further type of technical report, also oriented towards the development of infrastruc-

tures, has a primarily economic perspective in which investment requirements and economic-policy issues are at the centre of attention (GCEC, 2014). Although the UNEP report (2012a) also focuses on infrastructure development, it simultaneously criticizes ‘purely technical fixes’ and points to the need for the social embedding of infrastructure measures.

A different approach is taken by reports that concentrate mainly on governance issues, or on an integrated combination with a sectoral topic such as infrastructures or climate (UCLG, 2013; UN-Habitat 2011a; OECD, 2010).

By contrast, the problem-solving approaches in other reports pursue primarily an actor-oriented method in addition to their focus on certain priority topics (e.g. citizen or stakeholder participation; Revi and Rosenzweig, 2013; UN-Habitat, 2009b; UKAID and DFID, 2012). This orientation towards actor empowerment is frequently found in reports on disaster preparedness and vulnerability. The UKAID and DFID report (2012) is additionally characterized by an unusual feature in that it looks at ways to strengthen the cities’ own strategic abilities to solve problems (future-proof urban strategies).

Two rather more cross-sector-oriented works, each with a systemic approach, stand out from these mainly sectoral or multi-sectoral reports. One of these is the OECD report ‘The Metropolitan Century’ (OECD, 2015a), which classifies the challenges in a historical context. It describes the current urbanization process as the ‘second great wave’ after the phase of industrialization and highlights the scale of the challenge. The second primarily cross-sector, highly integrating report was drawn up by UN-Habitat in 2013 under the title ‘Prosperity of Cities’; it is a paradigmatic contribution on the issue of what constitutes a good quality of life in the city (UN-Habitat, 2013a). It presents five dimensions of welfare oriented towards the re-appropriation of public interests in the urban area and to overcoming socio-economic disparities.

Involvement of local actors and quality of life in the city

Most of the reports studied give only marginal consideration to issues such as quality of life in the city, inclusion and equity, appropriation of public spaces, socio-cultural identity and agency. As a rule, the reports directly address local and national governments and planning systems, and in some cases the private sector. The inclusion of affected population groups and civil-society initiatives is usually described as an additional option, which creates the impression of a rhetorical extra (“‘putting people first’ means putting basic local services first”, UCLG, 2013:113) rather

Table 2.6-3

Global urbanization reports: field of planning-finance.

Source: WBGU

Problem description	Focus, dominant perspective	Aims, recommendations	Selected quote
OECD (2015a): The Metropolitan Century. Understanding Urbanization and its Consequences			
Challenges of the 21st century <ul style="list-style-type: none"> ➢ Lack of basic infrastructures in developing countries ➢ Water and air pollution, including health risks in emerging economies and developing countries ➢ Carbon footprint of large agglomerations, especially in the USA ➢ Ageing urban populations, e.g. Japan and Europe ➢ Relatively small city sizes make networking important in Europe in order to secure agglomeration advantages ('borrowed' agglomeration) ➢ Growing expectations of the worldwide emerging middle classes 	Cross-sector, historical perspective <ul style="list-style-type: none"> ➢ Cities as engines of growth ➢ Great potential for green growth Accompany and shape urbanization <ul style="list-style-type: none"> ➢ Instead of preventing or confining urbanization, governments should accompany and shape the urbanization process ➢ Newly emerging cities/city districts are windows of opportunity Cities as new international actors	'Secrets of successful cities' <ul style="list-style-type: none"> ➢ good-governance structures, ➢ regulatory systems for land use, ➢ high degree of economic activities, ➢ not-too-fragmented administration, ➢ integrated sectoral policies, ➢ climate of confidence and transparency, ➢ resilience in dealing with natural disasters 	„While in most of Europe and Northern America the largest part of urbanisation has already taken place and is embodied in city forms and existing infrastructures, developing and emerging countries currently have an unprecedented opportunity to shape their urban futures.“ (OECD, 2015a:13)
LSE Cities et al. (2013): Going Green – How Cities are Leading the Next Economy			
General problems <ul style="list-style-type: none"> ➢ Traffic congestion ➢ Lack of affordable housing ➢ Urban sprawl ➢ Air pollution ➢ Storm and flooding risks ➢ Waste management Additional problems in low- and middle-income countries <ul style="list-style-type: none"> ➢ Water scarcity ➢ Untreated sewage ➢ Excessive density ➢ Informal land use ➢ Infrastructure deficiencies ➢ Inadequate public services 	<ul style="list-style-type: none"> ➢ Governance and infrastructure development ➢ Best-practice approach: analysis of pioneering cities ➢ Goal: improved understanding of urban green growth ➢ There has been progress, especially in recycling, green areas and water treatment; resource efficiency and energy security are the main challenges 	<p>Lessons learned in the fields of (1) leadership, (2) finance, (3) regulation/planning and (4) partnerships</p> <p>Key sectors</p> <ul style="list-style-type: none"> ➢ Transport ➢ Buildings ➢ Energy 	„Public opinion, a change in local political leadership and pressure from stakeholders have been the most important triggers for going green.“ (LSE Cities et al., 2013:5)
World Bank (2013): Planning, Connecting & Financing Cities – Now. Priorities for City Leaders			
<ul style="list-style-type: none"> ➢ Improve living conditions in slums ➢ Ensure basic services in cities 	Primarily economic perspective <ul style="list-style-type: none"> ➢ Problem solution through planning, financing, market design and investment ➢ Country examples from Brazil, China, India, Indonesia, Colombia, Korea, Vietnam ➢ Pressure to act, especially in emerging economies 	<p>Plan cities</p> <ul style="list-style-type: none"> ➢ Improve living conditions in slums <p>Connect cities</p> <ul style="list-style-type: none"> ➢ Newly emerging cities should be well located, flexibly regulated and well connected with the infrastructure <p>Finance cities</p> <ul style="list-style-type: none"> ➢ Improve creditworthiness, transparency and rules for public-private financing models (PPPs); leverage investment by using a city's assets (e.g. by selling land) 	„Having identified priorities for investments, city leaders confront the problem of financing those investments. The main difficulty is the need for money up front.“ (World Bank, 2013:67)
UN-Habitat (2009b): Planning Sustainable Cities – Global Report on Human Settlements			
Need for reform of urban planning due to altered challenges <ul style="list-style-type: none"> ➢ Demographic: rapid growth ➢ Economic: effects of globalization and structural change, including disparities ➢ Socio-spatial fragmentation and disparities on the increase ➢ Institutional: change from government to governance (adjustment of urban planning) 	Urban planning in the context of new challenges <p>Planning systems are intended to help solve conflicts over land use and steer urban development in a direction that promotes quality of life/prosperity, ecological sustainability and intra- and inter-generational equity</p> <p>'Cities without slums' is one of the main objectives of urban planning in developing countries</p>	Guiding concepts for new urban planning policy <ol style="list-style-type: none"> 1. Governments should concentrate more on their formative role (especially in basic services) 2. Take new urban challenges such as climate change and poverty into account 3. Develop a national perspective on the role of cities 4. Create powers to enforce planning requirements 	„Urban planning will need to seek the right balance between cultural groups seeking to preserve their identity in cities and the need to avoid extreme forms of segregation and urban fragmentation.“ (UN-Habitat, 2009b:27)

than the powerful and effective inclusion of people as equals in planning and implementation processes. This aspect is emphasized more strongly in the report to the UN Secretary General (Revi and Rosenzweig, 2013), which refers to the importance of cultural identity and agency for powerful inclusion, and in the UNEP report (2012a) on sustainable and resource-efficient cities, which criticizes the policy of adhering to purely economic or purely technical solutions, without incorporating socio-cultural embedding or questions of a social transformation and 'local voice and agency'.

Implementation deficits and blockades

Although the main action fields for sustainable urbanization and the possible solutions are known, implementation is often not successful enough as a result of institutional, political and market barriers (OECD, 2010; UKAID and DFID, 2012; UN-Habitat, 2013a). In a global survey of local experts on the main obstacles to economic productivity in cities, UN-Habitat (2013a) showed that although physical factors such as infrastructures are doubtless important, 'soft' factors are also classified as highly significant. Corruption and poor governance were identified by a quarter of the respondents as two of the most important barriers (UN-Habitat, 2013a:50). Further obstacles mentioned included the high costs or difficulties in the implementation of private-sector activities, weak institutions, and a lack of access to information.

These problems can be illustrated with an example from the field of urban climate-change mitigation: an increasing number of cities are committed to climate-change mitigation and adaptation measures, but successful implementation is often held back by blockades (OECD, 2010). During the phase of *agenda setting and strategic planning*, the barriers include overlapping mandates, lack of decision-making powers in key policy areas, and low prioritization and motivation for climate policy. During the *formulation of policy*, one of the main obstacles is the tendency to favour short-term measures, regardless of whether they fit in with integrated urban planning and long-term mitigation objectives: "Yet in many cities there is a lack of integration of climate policy into urban planning" (OECD, 2010:36). The *implementation of climate policy in cities*, furthermore, can be impeded by institutional blockades within the urban administration, inadequate capacities and expertise, financing deficits, a lack of decentralization and insufficient support by national governments, too little coordination of policies, by path dependencies and lock-in effects (OECD, 2010:676): "When it comes to climate and energy, the policy landscape is full of sub-national governments unable to tie quantifiable mitigation targets with large-scale applications of

energy efficient buildings, building retrofits, renewable energies, and transit-oriented development" (OECD, 2010:87). Finally, the *lack of reviews and evaluations* of urban climate policies is another obstacle that is often cited.

Weak or non-existent embedding into a transformation concept is a major deficit

Although it is made clear in most of the urbanization reports that very many global problems must and can be resolved primarily at the city level, few reports explicitly structure their recommendations as part of a well-formulated global, long-term strategy from which key action fields might be derived for a future-oriented urban-development policy.

Hardly any of the reviewed global reports on urbanization are embedded in a coherent, higher-level transformation concept in which the required orders of magnitude, long- and short-term time frames, acceleration requirements and consequences for urban governance are explained clearly enough and translated into action needs. An exception to this rule are the reports on climate change and energy in cities that are already beginning to place their comments on sustainable urbanization into the context of the transformation towards sustainability (transformative pathways; Lucon et al., 2014; Revi et al., 2014; Seto et al., 2014; GCEC, 2014). UNEP classifies the urban transformation as a transition to a new industrial age: "The next 'industrial transition' – as it is termed – will increasingly be characterised by resource constraints (especially in terms of materials, energy and ecosystem services) instead of resource abundance posing multiple challenges for growth and development in cities, where production activities are often concentrated." However, it does not explain which transformative measures are needed to achieve this (UNEP, 2012a:11). UKAID argues in a similar way, describing the necessary change in cities as a transformation towards an alternative development pathway (UKAID and DFID, 2012:107). Revi and Rosenzweig (2014) also develop a broad understanding of transformation in their report to the UN and emphasize, like UN-Habitat (UN-Habitat, 2013), the extraordinary potential of cities for the transformation towards sustainability with reference to planetary guard rails: "Sustainability requires that urbanization occur within regional and planetary limits of ecological and other life-support systems" (Revi and Rosenzweig, 2014:32). Hardly any of the reviewed global urbanization reports have a list of systematically derived central transformation fields. One example, albeit only in relation to low-carbon urbanization, is the New Climate Economy Report (GCEC, 2014:7), which proposes the implementation of a comprehensive ten-point global action plan.

Only a few of the global reports studied here discuss

to what extent the necessary global effect or dimensions (e.g. the zero target for greenhouse-gas emissions by 2070; an almost complete urban circular economy; access to basic services for all) can be achieved with the (infrastructure) measures described. UNEP states that new technical solutions or new infrastructures alone cannot deliver the comprehensive and far-reaching changes that are needed and refers to the key importance of human behaviour: "New infrastructures alone do not bring greater efficiency and sustainability. Rather, how human behaviours orient around these new infrastructures and technologies plays a critical role" (UNEP, 2012a:50). One complicating phenomenon mentioned is the 'rebound effect', as a result of which the full potential of efficiency gains for savings is only partly realized. Moreover, reference is made to the need for possible solutions that can be successfully implemented in a local context: "This is especially true in developing world contexts where slums and informality constitute significant proportions of the city, and poverty and inequality exacerbate the urban divide" (UNEP, 2012a:8).

In the WBGU's opinion, what is often lacking is a coherent embedding of the subject into an urban transformation concept that emphasizes the scale and urgency of the necessary changes, and a systematic derivation of action fields with a transformative goal and leverage effect.

2.7

Challenges and needs for action

Challenges and needs for action from the WBGU's point of view

The year 2007 represents an important turning point in the history of human settlement. Since then more people have been living in cities than in rural areas worldwide, and the trend is rising. The growth of cities is mainly concentrated in Asia and Africa, where almost three quarters of the global urban population are expected to be living by 2050 (Section 2.1). This regional concentration of urbanization is accompanied by a strong growth dynamic in medium-sized cities. A population increase of 128 million to 1.13 billion people is expected from 1950 to 2030 in the category of cities with 1–5 million inhabitants (medium-sized cities). This will involve immense challenges for providing adequate housing and living conditions in both existing and newly emerging cities. Today, more than 60% of the urban population in Sub-Saharan Africa already live in slums; in Asia the figure is approx. 30%: about 284 million people in China (180 million) and

India (104 million) alone (UN-Habitat, 2013a).

A growing concentration of incomes and assets can be observed in many countries worldwide. Particularly in the major cities, income disparities – both between social groups and between individual urban neighbourhoods – are much higher than the respective national average. Since assets are mainly tied up in real estate today, cities are also of key importance in the development of wealth inequalities. The current urbanization dynamic can be expected to further exacerbate income and wealth inequalities within countries.

Cities and urban societies are key drivers of environmental change, while at the same time being most affected by it. The contribution of cities to climate change is particularly high: approx. 70% of the energy-related global CO₂ emissions are generated in cities (Section 2.3.3.1). Cities also harm the local environment, most seriously by air and water pollution and waste generation (Section 2.3.4).

Conversely, cities are exposed to the effects of climate change. Large cities in low-lying coastal areas and river plains, many of which are located in Asia, are seen as being particularly at risk over the next few decades. In addition, increasing water shortages are to be expected in arid regions as a result of climate change: about half of all cities with more than 100,000 inhabitants worldwide are located in areas affected by hydrological water scarcity.

A profound understanding of urban governance structures plays a crucial role in dealing with city-related challenges, because urban-development policy must steer, or take sufficient account of, the various needs and decision-making rights of different population groups as well as the action options of the stakeholders (Section 2.5). The strategies should take into consideration the respective constellations of decision-makers and the decision-making framework, as well as the place identity and diversity of the population – aspects that are of importance for cohesion and individual solutions. In view of the complexity and diversity of cities and urban societies, there are no transferable blueprints for urban planning and management. An approach that takes this into account makes people aware of individual solutions and courses of action. These form the basis for exchanging and learning from each other. Moreover, cities should be empowered to act, especially where their possibilities are hindered by a lack of financial resources and poor monitoring capacity. Only in this way will it be possible to activate the transformative power of urban societies (Figure 2.7-1).

Problem views and needs for action in international discourse

Over the last four decades, sustainable urbanization has become internationally established as a field of action for politics. Accordingly, the number of global – and in some cases regular – reports on this topic by the United Nations, the World Bank, the OECD, the IPCC, international commissions, and institutions for development cooperation has steadily grown (Section 2.6).

A high level of convergence in the problem descriptions can be observed. Despite variations of emphasis, weighting and topic combinations, the problem descriptions in international reports are, to a large extent, very similar (Section 2.6.2). Frequent combinations of topics include, for example, climate–energy–resource efficiency, basic services–inclusion–socio-economic disparities, and planning–finance, with specific governance issues being discussed in each case (Section 2.6.1). Many reports note shortcomings in the public sector's ability to shape developments. Because an efficient and assertive public administration is lacking in many developing countries and emerging economies, many areas of urban development are left to the private sector or to the urban population's self-help capabilities and creativity (Section 2.6.2). Institutional and political blockades obstructing solutions to problems are often mentioned. Corruption and poor governance are regarded as the two most important barriers – after weak institutions, an uncertain investment climate and lack of information.

When it comes to perspectives on solving problems, however, there are some considerable differences between the global urbanization reports. While some primarily look at the problems from a technical and infrastructure-focused point of view and see problem solutions mainly in the provision of certain infrastructure portfolios, other reports concentrate on investment requirements and economic-policy issues. By contrast, further reports concentrate on urban governance, or an integrated combination with a sectoral issue, e.g. 'infrastructure development and governance' or 'urban climate-change mitigation and governance'. Finally, yet another approach is favoured in those reports that, in addition to their orientation towards certain priority issues, primarily follow an actor-oriented focus.

Many global urbanization reports discuss a growth in the importance of cities as national and international actors. Especially in developing countries and emerging economies, a power shift in favour of large agglomerations can be observed, so that competition between countries is also developing into competition between urban agglomerations. Accordingly, these reports consider it important to equip and strengthen large urban agglomerations in particular with appropriate gover-



Figure 2.7-1

Street art in Tehran, Iran.

Source: © Johanna Rapp and Homa Maddah

nance skills, since, according to this view, such cities are increasingly becoming economic engines of national and international development.

In the WBGU's opinion, one striking feature of many global urbanization reports is that they are only weakly embedded in a comprehensive long-term transformation concept – if at all. Although it becomes clear from most of the urbanization reports that many global problems must and can be resolved primarily at the city level, few reports explicitly structure their recommendations in a well-formulated global, long-term vision from which key action fields can be derived for a future-oriented urban-development policy.

The Normative Compass

3.1

The Great Transformation and cities

Starting point: the WBGU's understanding of the Great Transformation

Hitherto, leaps of human civilization (e.g. the Neolithic or the Industrial Revolution) have not been controlled processes, but the result of evolutionary change (WBGU, 2011:27). A key and historically new challenge in the transition to a sustainable society in which planetary guard rails are complied with lies in shaping this complex process to avoid what has historically been the ‘normal case’ – namely a change in direction as a result of crises, shocks or evolutionary processes of innovation and change, which have tended to be comparatively slow.

The following characteristics can be identified in major transformation processes (these are essentially quoted from WBGU, 2011:83; based on Grin et al., 2010):

1. Major change processes occur in a co-evolutionary manner, rely on a great number of changes in different socio-technical and socio-cultural (sub)systems, and take place at local, national and global action levels.
 2. They include both the development of (niche) innovations and their takeover and societal embedding via markets, regulations, infrastructures and new societal guiding concepts.
 3. They are influenced by a large number of political, scientific, economic and civil-society actors and by consumers. Great transformations have no clear centre from which they emanate; they are therefore difficult to control.
 4. Ultimately, they are radical processes in terms of their impact and range; they may, however, sometimes take place very slowly over several decades.
- In its report ‘A Social Contract for Sustainability’ (2011), the WBGU stated that the Great Transformation towards sustainability is difficult to control, but

it can be shaped. Starting from a new social contract, i.e. a societal agreement on the goal of the transformation towards a sustainable society, this shaping process should take place in a knowledge-based societal searching and learning process – under a normative reorientation that has already taken hold to varying degrees in all societies in the form of a change of values. Although the WBGU examined the transformation towards sustainability in the above-mentioned report, the analyses focused mainly on the mitigation of climate change as a *conditio sine qua non* for sustainable development: “Although climate protection alone cannot guarantee the conservation of the natural life-support systems on which humanity depends, it is nevertheless foreseeable that without effective climate protection, mankind will soon have to do without some essential development opportunities” (WBGU, 2011:2).

Three main pillars of today’s global society were identified as key transformation fields that should be the starting point for any political agenda working towards transformation: *first* the energy systems, including the transport sector; *second* the urban areas; and *third* the land-use systems. The WBGU believes a key role in the transformation could be played by a proactive state offering extended participation possibilities, acting at the national and global levels, and accountable to its citizens, who would also drive the transformation forward. A ‘global social contract’ – not so much on paper, but rather in people’s consciousness – with which society and its actors assume “joint responsibility for the avoidance of dangerous climate change, and the aversion of other threats to humankind” (WBGU, 2011:2), thus lays down the framework and sets the direction of the transformation, whose detailed designing process develops in a search and learning process involving the whole of society.

The Great Transformation cannot be achieved by means of incremental change; rather, it has the character of an upheaval. The manifestation of this dynamic is accompanied by observable, major changes within a short period of time (Figure 3.1-1): (1) the number and relevance of change agents increases; (2) busi-

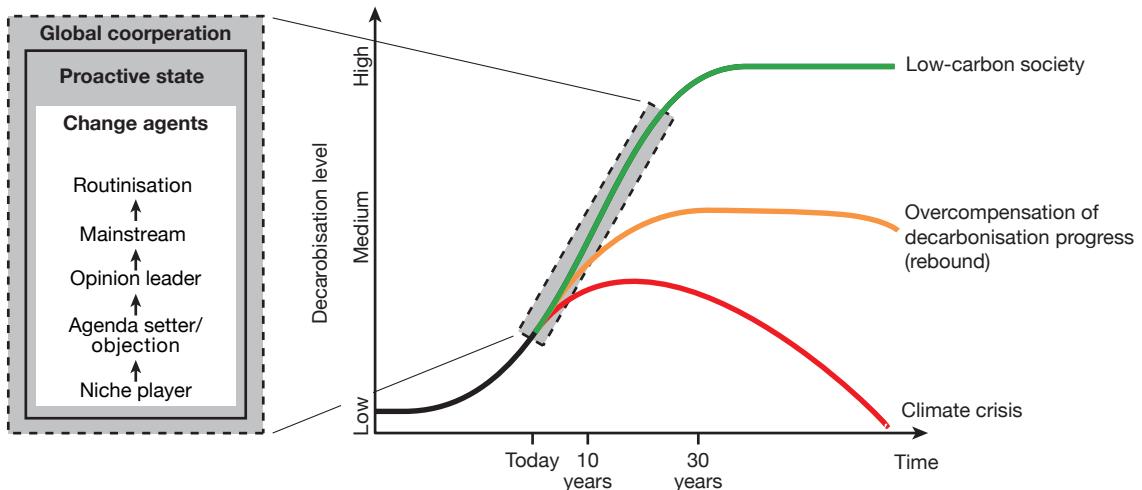


Figure 3.1-1

The transformation's temporal dynamics and action levels. The goal of the transformation is a low-carbon society. Central to the transformation is the decarbonisation of energy systems. Left: The proactive state and the change agents are the key players. As far as the change agents are concerned, they must move away from a marginalised existence and increase their impact through widespread inclusion in social routines. Right: Decisive action for a change of course towards transformation must be taken within the next decade if the conversion is to succeed within the next 30 years. The sustainable path (green) manages the transition from high-carbon to low-carbon society in time. Overcompensation for decarbonisation advances (for example through rebound effects) could lead to rendering climate protection measures ineffective, so that the transformation fails (yellow). Moderate endeavours only carry the risk of path dependencies that will lead to a global climate crisis (red).

Source: WBGU, modified acc. to Grin et al., 2010

ness models adapt to the change (e.g. utilities withdraw from coal and launch renewable energies; Figure 3.1-2); (3) the institutional conditions alter, promoting the change; (4) technological development makes it easier to implement the transformation. The general impact and the level of acceptance in the population increases in the course of this process.

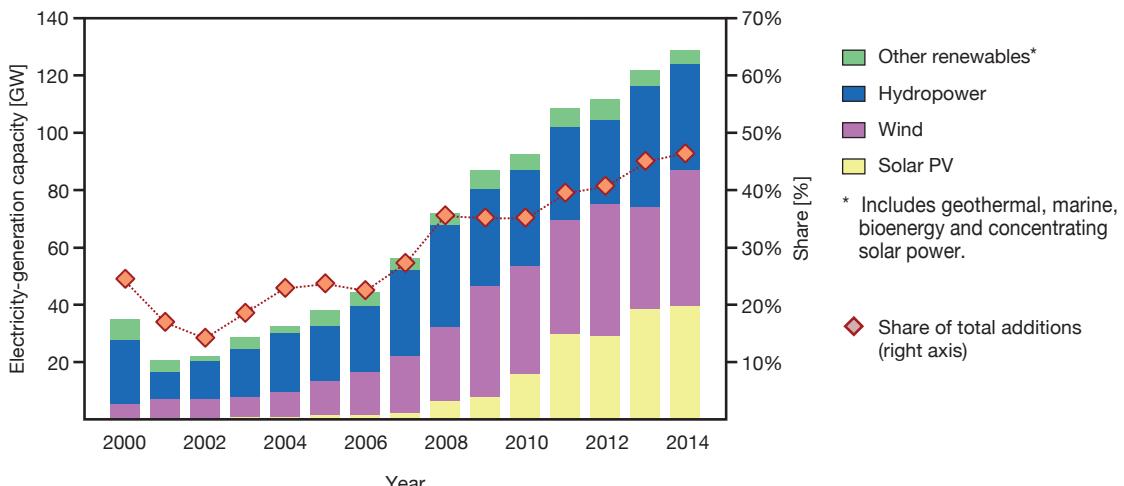
Where does the Great Transformation stand today?
When the WBGU report was published in 2011, the insight that decarbonization – i.e. a profound restructuring particularly of the energy systems – was necessary was only widespread among niche actors. In the meantime, the discourse has reached the agendas of the economic and political elites. It is being noticed worldwide and is broadly established in international diplomacy and public opinion. With regard to the pattern shown on the left of Figure 3.1-1, which describes the expansion of the actors involved in the transformation, the WBGU believes the development has come a long way; the topic has reached the ‘opinion leaders’ and is in the process of being recognized in the ‘mainstream’.

The following examples are representative of this development:

1. *Political actors:* In June 2015, the G7 heads of state and government committed themselves to the decarbonization of the world economy in the course of the 21st century (G7, 2015). Other important countries, e.g. Brazil, also support this objec-

tive (Zeit Online, 2015). The fight against climate change has been laid down as a sustainable development goal in its own right (SDG no. 13: “Take urgent action to combat climate change and its impacts”; UNGA, 2015a). Finally, the Paris Agreement of December 2015 contains the international community’s target of reducing net greenhouse-gas emissions to zero in the second half of the century. Furthermore, one of the three main objectives laid down in the agreement is to make finance flows consistent with a pathway towards low greenhouse-gas emissions and climate-resilient development (UNFCCC, 2015a).

2. *Societal actors:* The encyclical *Laudato Si'* presented by Pope Francis in June 2015 calls upon world society to effect a transformation from energy systems based on fossil fuels to renewable energy systems (Pope Francis, 2015). A declaration by major Islamic dignitaries points in the same direction (International Islamic Climate Change Symposium, 2015). Representatives of other world religions have also issued statements on this subject (UNFCCC, 2015c; GBCCC, 2015; Oxford Centre for Hindu Studies et al., 2015; Rabbi Arthur Waskow, 2015).
3. *Economic actors:* A change in investment behaviour in the energy sector can be observed worldwide. The business models are changing; the costs of fossil and renewable energy are moving closer together. In 2014, renewable energies already accounted for

**Figure 3.1-2**

Newly installed electricity-generation capacity based on renewable energies by energy source; their share of total newly installed electricity-generating capacity.

Source: OECD and IEA, 2015a

more than 45% of the newly installed global electricity-generating capacity (Figure 3.1-2; OECD and IEA, 2015a).

4. *International institutions:* A study published by the International Monetary Fund (Cody et al., 2015) makes it clear that current investments in fossil energy generation are not efficient. The authors expect global energy subsidies to rise to US\$ 5,300 billion in 2015 (the equivalent of 6.5% of global GDP), including the potential value-added taxes that are not stated in the energy price, and the environmental costs – that are not covered – which are essentially caused by the use of fossil fuels. The study comes to the conclusion that a reform of these subsidies could cut the annual number of deaths from air pollution by half and increase global economic welfare by US\$ 1,800 billion. By comparison, average annual investment in the global energy system totals US\$ 1,400 billion (GEA, 2012).

5. *Financial actors:* The divestment movement is gaining momentum and major players are joining it in the meantime (WBGU, 2014a). The website gofossil-free.org, for example, names more than 500 institutions (including foundations, religious groups, government organizations and universities) that have committed themselves to withdrawing their investments from companies operating in the fossil-fuel industry (Gofossilfree.org, 2016). Prominent examples include the Norwegian State Fund, the World Council of Churches, the University of Glasgow, the Rockefeller Brothers Fund and the British Medical Association.

In addition, on the UNFCCC's NAZCA website more

than 10,000 non-state actors – cities, regions, companies, investors and civil-society organizations – have published their action commitments to address climate change (UNFCCC, 2016). So there are many indications that, in the last few years, public opinion on the climate problem has already shifted clearly in the direction of decarbonization. Interpretations and narratives on the subject of a sustainable future have arrived in the mainstream of society (Figure 3.1-1) and in the general population. A new fundamental understanding is becoming established in public discourse on which technologies and lifestyles are regarded as having a promising future. These are important signs indicating the gradual establishment of the new social contract.

Whether the guiding concept of decarbonization, which has been formulated on many levels for the future development of the energy systems, has already triggered a global dynamic in the direction of a physical transformation, cannot be unequivocally decided on the basis of the current data. On the one hand, recent developments suggest that a decoupling of energy use from emissions might be possible: in 2014 the global economy grew by 3% without any increase being recorded in energy-related CO₂ emissions (OECD and IEA, 2015a). A study by the Global Coal Plant Tracker comes to the conclusion that the extremely dynamic worldwide expansion of coal-fired power plants has weakened considerably since 2010, and that currently only one third of the planned projects are being realized (Shearer et al., 2015). Coal production by the world's biggest producer, China, as well as production worldwide, was lower in 2014 than in 2013 (IEA, 2015).

On the other hand, there are people who regard

global decarbonization as unlikely. For example, Steckel et al. (2015) argue that we are currently experiencing a renaissance of coal stimulated by poor countries with strong economic growth, and that this is leading to new path dependencies. In the western industrialized countries, most of which have harmonized their electricity markets, the market will largely determine the use of coal. The use of the various technologies usually follows the sequence of short-term marginal costs. A varied picture has recently been emerging here, distributed across geographic regions. In the USA, natural gas was often cheaper to use as a result of the shale gas boom, so that there was a decrease in the use of coal (IEA, 2013). In other parts of the world, the price of natural gas is two to three times higher than in the USA as a result of transport restrictions; in addition, the collapse of the demand for coal in the USA led to further falls in world market prices. These factors and low CO₂ prices in emissions trading led to an increase in the use of coal in the EU's electricity markets, while natural gas was often squeezed out of the market due to the increasing input of renewable energies (Delarue et al., 2008). Following three decades of continuous decarbonization of the energy systems, the emission intensity of global energy generation rebounded in the decade from 2001 to 2010 (IPCC, 2014c). Developments will therefore depend on whether this trend towards the 'recarbonization' of the energy systems is sustainably reversed.

A look at the UN negotiations is encouraging. An initial analysis of the national climate actions (Intended Nationally Determined Contributions – INDCs) submitted by the states to the UNFCCC up to mid-October 2015 already showed that about half of the states are explicitly planning measures to mitigate climate change in the energy sector. An implementation of these targets by 2030 would lead to a significant decoupling of economic activity from greenhouse-gas emissions: the projected energy-related emissions per unit of economic performance would fall by 40% compared to today's figures (OECD and IEA, 2015b). However, further-reaching measures will be needed to move towards a development pathway that allows anthropogenic global warming to be limited to well below 2 °C or to as low a figure as 1.5 °C.

The WBGU believes that overall many factors indicate that global development trends are approaching a tipping point for the Great Transformation. The Paris Agreement set an appropriate benchmark for the transformation towards climate compatibility; now it is time for its implementation.

The transformation towards a sustainable urban society

With this report, the WBGU aims to examine urbanization from the perspective of the Great Transformation towards sustainability and reveal the areas in which fundamental changes are required for the urban transformation towards sustainability. At the same time the WBGU is broadening the perspective: the focus is not only on the transformation towards climate compatibility, but also on the comprehensive transformation towards a sustainable society (Section 3.2). Furthermore, not only the proactive state is at the centre of interest in this report; above all the cities and their inhabitants are included in the analysis as co-designers of urban transformation.

This report focuses *first* on the cities as both drivers and victims of global change. The Great Transformation towards sustainability is bound to fail without a substantial contribution from cities: it requires fundamental changes to urban land-use, energy and transport systems, and to the management of materials and material flows, as well as fundamental changes in urban governance (Chapter 4).

Second, the people who live in the city, their quality of life, their ability to act and their long-term future prospects are at the centre of the report. Many cities will undergo a profound change in this century simply as a result of the rapid growth in their populations. The increasing inequality of living conditions and development opportunities in cities is an example of further challenges that make a fundamental change here unavoidable.

Third, when considering the role of cities in the transformation process, the plurality of transformation pathways gains particular importance. In the OECD, the living conditions in many cities have converged in terms of the dimension of inclusion (Section 3.4). Nevertheless, there is very considerable diversity between the cities, e.g. in the urban form, the local governance and the design of the transformation pathways. The demands made on the cities by the transformation, as drafted from the normative viewpoint in numerous manifestos and resolutions, tend to be universal in character, yet the prerequisites and strategies for a successful implementation in the cities vary considerably.

The Great Transformation towards sustainability will involve fundamental changes and take many decades. The above-mentioned characteristics of major change processes also apply in the cities. Such a targeted and knowledge-based urban transformation over a period of several decades first requires a change of perspective. Looking from today's viewpoint into the future is not decisive here because this angle tends to be ori-

ented mainly towards the needs and constraints of the present, and usually makes well-trodden paths appear inevitable. Looking back to today from a concrete, though imaginary, desirable future has a different dimension: How can ways be found to make this future possible? This change of perspective by switching to the future perfect tense – “What will we have had to have done” – makes it easier to see the need for radical change in the cities. Incremental improvements to well-trodden paths will not be enough; rather, fundamental upheavals in the systems will be required in some areas of policy (Chapter 4).

Not only the concept of the transformation can be transferred to the city, but also the idea of a new social contract. The virtual social contract for the Great Transformation outlined by the WBGU in 2011 can be fleshed out for cities. Such a ‘social contract for the urban transformation towards sustainability’ should be reflected worldwide and at different levels of governance in the form of written charters (Section 9.2). Accordingly, urban societies should agree in a participatory way on the objectives of the transformation process and thus on their long-term future, and formulate them each in their own city charter for urban transformation. They should simultaneously pursue both their local concerns and universal global objectives – to which all people and cities must contribute – and resolve the conflicts of objectives that crop up. The issue here is to sustain the natural life-support systems, but also to enable the people to live a good life and to empower them to help shape their city; both must take into account the great diversity of the cities, the wealth of their cultural traditions and the variety of their development pathways (Section 3.2). The implementation of the charters will have the character of a search and learning process and cannot be derived from universal master plans. It is therefore a common task for all actors. Similar charters can also be useful at the regional, national and international level in order to place the relationship between the cities and the nation states on a new footing (Section 9.2).

Cities are both places of continuous negotiation processes and centres of innovation and change. This is where niche innovations evolve that nourish and promote transformation processes ‘from below’ and have to be brought into line with planning processes ‘from above’. An urban society therefore requires space for diversity and creative autonomy in order to generate the necessary freedom for innovation (Section 3.5.3.3).

Like the transformation fields in the area of climate-change mitigation, which the WBGU described in its 2011 report, transformative action fields can be identified for the transformation towards sustainability in cities (Chapter 4). These are key levers for shap-

ing the Great Transformation towards sustainability in the cities which, due to their urgency, their scale, their potential for preventing path dependencies and their substantial co-benefits, are particularly suitable for triggering system turnarounds towards sustainability (Sections 4.1, 9.3). In this context, the WBGU asks about the concrete options as regards the design of the transformation, about blockades and path dependencies that can stand in the way of the transformation, about ways of overcoming them and how best to accelerate and massively upscale measures to achieve these goals. The roles of different actors and pioneers are also examined (Chapters 5, 6). Since this is a societal search and learning process, research has an important role to play (Chapter 10).

The universal challenges of the transformation tend to be similar for many cities, but local circumstances and problem constellations differ considerably. Ultimately, therefore, every city must develop its own transformation pathway; there cannot be a universal answer. However, urban actors can learn from each other. The great diversity between the cities is also an opportunity to see how different solution approaches are developed and tried out, so that a global learning process is stimulated in this way.

One problem, however, is the question of speed. Due to the strength of urbanization dynamics, in many cities the development of infrastructure and urban services is considerably lagging behind the increase in population. There is a lot of pressure to create appropriate structures quickly and on a large scale. For decision-makers this can lead to conflicts with long-term sustainability requirements. Therefore, there is a risk of imprudent infrastructure expansion, creating path dependencies that run counter to the desired transformation direction. There is thus not much time for trying out solutions and innovations if the transformation is also to succeed in fast-growing cities. In addition, this time pressure makes it difficult to handle the existing conflicts of objectives.

This clearly reveals the huge dilemma of the current rapid urban development. As a societal search and learning process, the transformation requires an adaptable development that can react to new knowledge, while the high input of resources in the case of profound changes in land use and in the construction of buildings and infrastructures, as well as their longevity, can lead to path dependencies, the consequences of which are difficult to predict. It is therefore essential that urban development has a transitory element: adaptability should be incorporated as a principle of urban development (Section 9.2.4.2). It remains to be seen to what extent this dilemma can be resolved.

3.2

An extended normative concept for the transformation towards sustainability

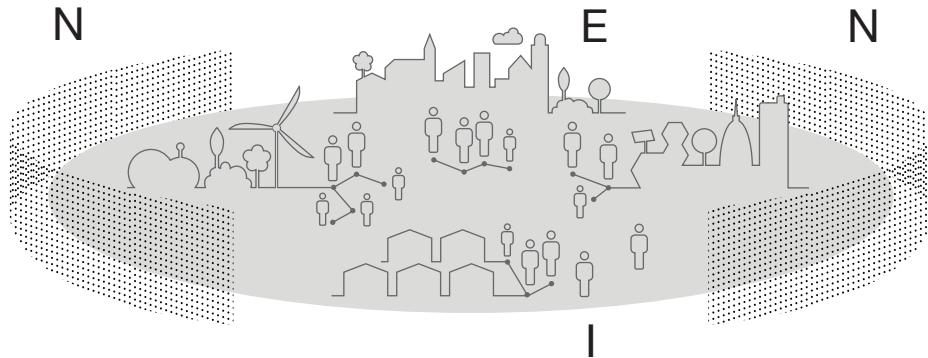
Against the background of the Great Transformation towards sustainability and the outlined transformation concept (Section 3.1), the WBGU uses the theme of the city and urban areas in this report as an opportunity to examine the normative basis of the transformation and to define it in greater detail. The following section outlines a 'normative compass' which is intended to serve as an orientation framework for the Great Transformation in general and the transformation in the city in particular. On the one hand, this compass is based on an understanding of prosperity that goes beyond material/economic factors; the WBGU already laid this down in its report 'A Social Contract for Sustainability' (WBGU, 2011:74 ff.). On the other hand, the concept is founded on an understanding of societal and urban development that places the needs, the quality of life and the actions of people at the centre of all considerations, beyond sectoral and purely functional planning and management approaches. This requires the participation of all actors in the urban society. Unlike many planning and management approaches, the WBGU does not regard this participatory and transdisciplinary extension as a delay, but places its trust in efficiency and time gains, when such processes are well organized and coordinated, and are transferred to the level of governance with a high degree of commitment (Section 8.3.1.1).

The key message of the present report is that the transformation can be achieved by a combination and balance of three dimensions (Figure 3.2-1):

- *Sustaining the natural life-support systems:* All cities should pursue development pathways that take account of the planetary guard rails on global environmental change and solve local environmental problems – to ensure sustainable urban development and the protection of the natural life-support systems. This involves, for example, meeting the 2 °C climate-protection guard rail and combating health-damaging air pollution, ending human-induced land and soil degradation, and stopping the loss of phosphorus, an essential resource for agriculture. This dimension links up to statements made in many previous WBGU reports (e.g. WBGU, 1995, 2005, 2011, 2014b).
- *Inclusion:* universal minimum standards for social, political and economic inclusion should be met in all cities and by all cities. The WBGU extends this dimension beyond the objectives of providing public services (substantive inclusion) by adding economic

and political inclusion (Section 3.4; WBGU, 2005). The aim here is to open up access to the foundations of human security and development for all people, enabling them to unfold and implement their individual and joint life concepts.

- *Eigenart:* with the dimension of *Eigenart* (a German word meaning 'character'), the WBGU is introducing a new category into the sustainability discussion. According to the WBGU's normative understanding, the first two dimensions – sustaining the natural life-support systems and inclusion – open up a framework within which a wide variety of transformation pathways can develop. The dimension of *Eigenart* emphasizes that, within this framework, every city can and must look for its 'own way' (in German '*eigene Art*') towards a sustainable future (Section 3.5). On the one hand, *Eigenart* comprises all that is typical of each particular city. This can be described on the basis of its socio-spatial and constructed environment, its socio-cultural characteristics and local urban practices (descriptive *Eigenart*). On the other hand, *Eigenart* is a target or orientation dimension of urban transformations: it emphasizes that socio-cultural diversity in and of cities, their urban form, and the autonomy of city residents are key components of people-oriented urban transformation in the creation of urban quality of life and identity (normative *Eigenart*). In this normative connotation of *Eigenart*, people are seen as actors who use their inclusion rights and thus design their cities in different and specific ways in order to achieve quality of life. *Eigenart* thus enables and equips people to develop self-efficacy and to shape urban societies and urban spaces, in order to develop quality of life, trust, identity and a sense of belonging – and to design cities, infrastructures and spaces in a way that supports this. In the WBGU's view, two essential principles must be guaranteed to enable people and urban societies to develop *Eigenart*, and thus quality of life and sustainability: (1) the recognition of creative autonomy, i.e. that the residents themselves should shape and appropriate urban spaces, and (2) the recognition of difference, i.e. of the Diversity of Cultural Expressions (UNESCO, 1997) and the individual opportunity to appropriate cultural identities. The introduction of the concept of *Eigenart* draws attention to the spatial-social prerequisites for the appropriation of space, and thus for the creation of urban quality of life, social cohesion and local identity. It also allows the diversity of cities and their transformation pathways to be taken account. The spotlight is thus directed at the many and varied forms, designs and cultural manifestations of urban areas. The focus is also on the specific

**Figure 3.2-1**

Normative compass for the transformation towards sustainability. The transformation of the cities towards sustainability can be achieved by an interaction and balance between the following three dimensions:

- 'Sustaining of the natural life-support systems' (N): All cities and urban societies should pursue development pathways that take the planetary guard rails into account and solve local environmental problems.
- 'Inclusion' (I): Universal minimum standards for substantive, political and economic inclusion should be met in all urban societies.
- 'Eigenart' (E): With the dimension of *Eigenart* (a German word meaning 'character'), the WBGU on the one hand recognizes the socio-cultural and spatial diversity of cities and urban societies (descriptive *Eigenart*). On the other hand, *Eigenart* is a target or orientation dimension of urban transformations (normative *Eigenart*); it emphasizes that conditions should be created in urban living environments which ensure (a) that people can develop self-efficacy in the spatial structures and can feel and create urban quality of life for themselves; (b) that local identity and social cohesion can develop; and (c) that there is a strengthening of the potential for social and economic creativity and innovation that is generated via local interactions (connectivity) between actors from different spheres of society.

Source: WBGU; diagram: Wernerwerke, Berlin

potential for creativity and innovation which develops as a result of local interactions (connectivity: Section 3.5.3.3) between actors from different spheres of society. Furthermore, the WBGU regards diversity in and between cities as an important resource for the urban transformation towards sustainability.

Solidarity-based quality of life: a compass for transformations at the micro level

With its normative compass made up of sustaining the natural life-support systems, inclusion and *Eigenart*, the WBGU is basing its thinking on an extended understanding of quality of life and prosperity (Section 2.4). As a rule, a classic understanding is based on the material/economic prosperity that can be attained in the short term; it is described by such factors as growth, employment and infrastructure development. The decoupling of these factors from their environmental consumption and their environmental degradation by means of new technological developments and more efficient use practices can be called 'decoupling of the first order' (Schneidewind, 2015). This form of decoupling corresponds to a rather narrow understanding of prosperity.

Discussions on an extended understanding of prosperity have gained in importance worldwide over the last few years (Jackson, 2009; Skidelsky and Skidelsky, 2012; Ura et al., 2012; OECD, 2011a, 2013a, 2015d; Enquête-Kommission, 2013). This discussion centres on the question of how prosperity and quality of life can be decoupled not only from environmentally harmful production methods, but also (at least partially) from economic growth and monetary prosperity ('decoupling of the second order'; Schneidewind and Zahrnt, 2013). The starting point is an extended definition of quality of life and prosperity that goes beyond materially/economically 'objective' factors and also includes 'subjective' factors such as self-efficacy, identity, solidarity, a sense of belonging, trust and social networks; these simultaneously comprise the social capital of a society: the glue that holds societies together. One example of this is the *buen vivir* movement in Latin America, which attempts to find an alternative definition of 'good life' oriented, *inter alia*, towards indigenous knowledge of how to live together sustainably in a community and in harmony with nature (Acosta, 2009).

Research on quality of life can back this up with empirical data. For example, the correlations found between material/economic, 'objective' factors and

people's 'subjective' assessment of well-being or quality of life are frequently only weak (Veenhoven, 1991; Diener and Diener, 1996; Herschbach, 2002). On the other hand, research shows that social networks, trust, social capital, education and future prospects are of greater importance for subjectively felt quality of life than material prerequisites (Kahneman et al., 1999; Siegrist, 2005; Section 2.4.1)

Such an extended understanding of prosperity and quality of life should – in a similar way to the understanding of sustainability – be oriented towards the principles of intra- and intergenerational justice. An understanding of quality of life that is oriented towards the normative compass would, according to this definition, not only be geared towards one's own needs and those of one's immediate environment (e.g. family), but also towards 'solidarity' in a broader sense, i.e. taking into account the needs of currently living and future generations to the greatest extent possible. This also has an impact on definitions of quality of life, which would thus have to be geared towards the principle of sustainability; above all, highly consumption-oriented and resource-wasting life-styles that are harmful to the natural life-support systems would have to be changed, as would life-styles that restrict the inclusion of other people, communities and societies in the present and in the future.

Two types of prerequisites for the creation of (urban) quality of life can be distinguished here: a non-negotiable 'core' of prerequisites, which include inclusion opportunities and healthy environments (Sections 3.3, 3.4), and a variable scope of possibilities that can be designed in the sense of *Eigenart* (Section 3.5). New definitions of quality of life are necessary to keep this designable and negotiated scope of possibilities within planetary guard rails and maintain the fundamental inclusion rights for all people.

For this, the WBGU has developed the concept of 'solidarity-based quality of life', which means two things: a definition of quality of life that is oriented towards the principle of solidarity, and a quality of life that is made possible by solidarity and supportive communities. The WBGU refers here to the concept of the 'we-identity', which emphasizes those characteristics and practices that connect a person with other people. The we-identity ensures that people see their own actions in relation to other people (Elias, 1987). The term 'solidarity-based quality of life' focuses on the individual definitions of quality of life. It is assumed here that the creation of cities that are liveable for everyone presupposes that an individual person's urban quality of life is created in cities within a scope of possibilities that does not curtail the prerequisites – especially the core of prerequisites – for the

production of quality of life for other people (local and global, intra- and inter-generational). In view of global disparities, which have developed particularly strongly in many urban areas, the core and scope of possibilities of urban quality of life can be restricted in many cities. At the same time, research shows that the more pronounced the social capital and social cohesion are in a country (or in a city) and the smaller the social inequalities, the higher is people's average satisfaction with life and the less crime and violence, disease, anxiety and social mistrust – and hence risks to societal stability – are found (Section 2.4).

The WBGU concludes from this that solidarity-oriented quality of life is not only beneficial for a fairer distribution of opportunities to produce quality of life for all; but also that it can offer new qualities (a stronger sense of community, less fear of poverty) to those who may have been restricted hitherto by solidarity-oriented action within their scopes of possibilities. Since solidarity-based quality of life is defined individually and has to be negotiated in society, the WBGU believes it is not useful to develop a concrete definition of the term. Rather, it is a matter of formulating the offer of a discourse: i.e. in the context of a Great Transformation and the conclusion of a social contract, reflective and negotiation processes should take place in which visions and pathways are developed on how quality of life can be achieved for all people (Chapter 8). The Kantian principle of the categorical imperative thus becomes the basis of the WBGU's understanding of prosperity and quality of life, taking on board global and intergenerational principles of fairness.

3.3

Sustaining the natural life-support systems

Sustaining the natural life-support systems is one of three dimensions of the urban transformation towards sustainability. In this context, the WBGU focuses *first* on the planetary guard rails (Section 3.3.1). These describe maximum levels of damage: exceeding them would have intolerable consequences today or in the future (WBGU, 2014b). Planetary guard rails are a core concept of the WBGU for dealing with global environmental changes which are not only caused to a considerable extent by cities, but whose effects are also strongly felt by them. *Second*, local environmental problems occur in cities (e.g. air pollution or unregulated waste disposal) which in some cases considerably worsen the living conditions of the urban population (Section 3.3.2). These local environmental problems are not independent of global environmental changes, but are frequently reinforced by them and can themselves

reinforce them in turn.

Sustaining the natural life-support systems has already been codified in the principles and rights laid down in international environmental law, or else is under discussion. There are also references to operationalization in European and national legislations. Although the WBGU keeps all aspects of the natural life-support systems in mind when considering the theme of urbanization, when selecting its main topics it focuses in particular on the mitigation of climate change, the handling of materials and resources, and aspects of urban environmental protection (water and sanitation, waste, air pollution and local climate risks).

3.3.1

Planetary guard rails for global environmental change

The WBGU refers to six planetary guard rails which it recommended in a policy paper published as a contribution for the SDGs (WBGU, 2014b). The ‘neutrality concept for safeguarding Earth system services’, formulated in this policy paper, requires a redirection of development paths to avoid breaching the planetary guard rails. Compliance with the guard rails for such environmental change, in which the effects of the drivers add up over time, is only possible if the anthropogenic drivers of the respective environmental change are halted (neutrality towards the guard rail). The target to be pursued should therefore be to reduce the corresponding drivers to zero (zero targets). By setting such zero targets, the guard rails can also be operationalized for the cities, because the zero targets are global in nature and apply everywhere and across the board. The zero targets for the planetary guard rails are as follows:

- The WBGU recommends ceasing global CO₂ emissions from fossil sources completely by 2070 at the latest in order to have a realistic chance of reaching the target agreed at the UNFCCC of limiting global mean surface temperature rises to well below 2°C compared to pre-industrial levels (*climate-change* guard rail) as well as complying with the *ocean-acidification* guard rail proposed by the WBGU (Section 2.3.3.1, Box 2.3-1; WBGU, 2014b; UNFCCC, 2011). With a view to limiting temperature rises to 1.5°C, CO₂ emissions should already be reduced to zero by 2050, at least in the electricity sector. The challenge from this target for sustainable urban development is the need to plan urban strategies that enable cities to develop a CO₂-emissions-free economy and mode of operation. In addition to the transformation of the energy systems, a key challenge lies in the develop-

ment of CO₂-emissions-free urban mobility systems. The goal of zero emissions is not identical to that of ‘climate neutrality’, because the latter often describes a condition in which, for example, a city’s transport system still generates emissions, but these are ‘compensated’ by reductions in emissions outside the city limits. This is possible for a transitional period on the way to global zero emissions, but it is not a sustainable solution for the zero target. If global net zero emissions are to be achieved, CO₂ emissions could only continue in sub-systems if they are offset by real ‘negative emissions’, i.e. the capture and storage of CO₂ from the atmosphere, a process that has not yet been commercially tested (WBGU, 2014b). It is also limited in terms of potential and involves risks for land use (WBGU, 2009a); it should not, therefore, be included in planning as a method for the large-scale compensation of fossil CO₂ emissions.

- The human-induced direct drivers of the *loss of biodiversity and ecosystem services* should be halted by no later than 2050 (Box 2.3-3; WBGU, 2014b). This target is in line with the strategic plan of the Convention on Biological Diversity (CBD, 2010). This involves a two-fold challenge for sustainable urban development. First, the protection of biodiversity and ecosystem services within the city limits must be improved (Box 2.3-2). Second, cities have significant, global, long-distance effects on biodiversity and ecosystem services, for example through their resource and energy flows. They therefore have a responsibility to also look at these indirect effects and make use of their possibilities to minimize the negative effects (Section 2.3.3.2).
- *Net land degradation* should be halted worldwide and in all countries by 2030 (Box 2.3-3; WBGU, 2014b). This target is compatible both with the concept of a ‘world without land degradation’ agreed at the Rio+20 Conference (UNCSD, 2012), and with the current debate in the UNCCD (Secretariat of the UNCCD, 2012). The challenge for sustainable urban development here stems mainly from the remote effects for which the cities should take responsibility (as in the case of the impacts on biodiversity and ecosystem services; Section 2.3.3.2).
- In order to stem the risks posed by *long-lived and harmful anthropogenic substances*, the substitutable use of mercury and anthropogenic mercury emissions should be stopped by 2050 (Box 2.3-4; WBGU, 2014b). The relevant UN environmental convention on mercury (Minamata Convention) has not yet come into force. The release of plastic waste into the environment should be stopped worldwide by 2050. Microplastics in the oceans are suspected of accu-

mulating in the food chain and transporting pollutants (WBGU, 2014b). The dangers of plastic waste were pointed out at the Rio+20 Conference (UNCSD, 2012); however, there is as yet no specific and comprehensive international instrument on the issue (WBGU, 2014b). The WBGU recommends halting the production of nuclear fuels for use in nuclear weapons and nuclear reactors by 2070 (WBGU, 2014b). No corresponding international target has been agreed to date. Through their energy systems and resource flows, cities have a significant influence on the global risk from long-lived anthropogenic substances, which should therefore be taken into account within the framework of sustainable urban development (Section 2.3.3.3).

- The release of non-recoverable *phosphorus* into the environment should be stopped worldwide by 2050, so that its global recycling can be achieved (Section 2.3.3.4; Box 2.3-5). “Up to now there have been no international governance structures that are explicitly responsible for the long-term availability of phosphate and equitable access to it” (WBGU, 2014b). This guard rail involves challenges for sustainable urban development relating to the treatment of sewage and waste (Section 4.4.2).

3.3.2 Local, urban environmental problems

At the local, urban level, too, situations can be defined for various environmental and resource dimensions that lie beyond what is tolerable and must be taken into account in the urban transformation. These include primarily the following dimensions of urban environmental protection:

1. *Avoid risks to (urban) water resources*: Urban water resources can be put at risk directly (through overuse or pollution; Section 2.3.4.2) or indirectly (via the effects of climate change or modified discharge regimes; Section 2.3.4.4). Sustainable urban development must therefore include the sustainable management of water resources. This must (1) avoid overuse, (2) avoid pollution caused by chemical substances or microorganisms, and (3) react to changes in water availability, e.g. in the course of climate change. This environmental dimension is closely connected with substantive inclusion: safe access to sufficient, high-quality drinking water should be guaranteed for all people (Section 3.4.1).
2. *Avoid environmental risks posed by sewage*: Sewage can endanger people and cause damage to natural ecosystems and their services (aquatic and marine ecosystems, groundwater; Section 2.3.4.2).

However, it also offers opportunities, such as the recovery of energy, organic substances and phosphorus. Sustainable urban development should aim to build a sewage-treatment infrastructure that is capable of protecting the population, resources and aquatic ecosystems (rivers, lakes, coastal waters) from harmful effects (e.g. risks from pathogens, excessive nutrients). This environmental dimension is closely connected with substantive inclusion: all people should have access to sanitation facilities (Section 3.4.1).

3. *Avoid environmental problems caused by waste*: In future, cities must not simply landfill, incinerate or export waste, but must be put in a position to use waste as a source of resources. Currently, 70% of urban waste is simply dumped (Section 2.3.4.3). It should be the aim of sustainable urban development to minimize the consumption of resources, close material cycles, avoid damage to the environment caused by waste (Section 4.4), and protect the ecosystem services (e.g. from discharges of toxic substances or CH₄ emissions from landfill sites).
4. *Avoid urban air pollution*: Air pollution inside and outside buildings is the local environmental problem that causes the most health problems (Sections 2.3.4.1 and 4.5.4.3; Box 4.5.-1). The World Health Organization has developed thresholds for various aspects of urban air pollution (WHO, 2006b). The aim of sustainable urban development should be to comply with internationally recognized thresholds for air pollution. In its report ‘Fighting Poverty through Environmental Policy’, the WBGU recommended reducing regional ‘disability-adjusted life years’ (DALYs) caused by air pollution to below 0.5% (WBGU, 2005).
5. *Strategically plan and set up urban green spaces*: The many different positive, direct and indirect effects of ‘green urban infrastructure’ have been known for a long time (Section 2.4). Every city dweller should therefore have access to green spaces and public squares (Section 3.4.1). Green areas improve not only city residents’ quality of life, but also the biological diversity of specially adapted urban ecosystems. It should therefore be part of sustainable urban development to maintain and increase urban biodiversity through appropriate and sufficiently large urban green areas (Box 2.3-2); wherever possible, the green areas should be linked together to form bio-corridors.
6. *Reduce climate risks in cities* (e.g. urban warming and extreme heat waves, droughts and extreme precipitation events, glacial melting, rising sea levels; Section 2.3.4.4): Cities should be prepared for the possible impacts of climate change and develop

comprehensive adaptation strategies which also include handling uncertainty and risks (Section 4.2.4).

These points can be operationalized by the thresholds for harmful substances and similar targets that have already been codified in many cities and countries, in some cases under international environmental law.

3.4 Inclusion

In addition to local environmental protection and sustainable global development within the secure corridor of the planetary guard rails, the goals of the Great Transformation also include the realization of societal inclusion for all people. Without inclusion, neither a good life nor sustainable development is possible. A key aspect of societal inclusion is the creation of suitable prerequisites for the entire population of a city to participate in its shaping and management. This requires ‘inclusive cities’ that open up corresponding capabilities for all its inhabitants (Sen, 1999, 2002, 2012; Boxes 3.4-1, 3.4-2). City residents need not only the right to get involved, but also the means and abilities to do so. The WBGU, therefore, divides inclusion into substantive, economic and political inclusion. The WBGU understands *substantive inclusion* as the city’s entire population being able to satisfy their fundamental human needs. This includes access to drinking water, food and housing, as well as to other basic services (e.g. energy, mobility, education; Section 3.4.1). *Economic inclusion* is the integration of the city’s population into economic processes, along with the possibility of influencing these processes (Section 3.4.2). *Political inclusion* within the context of this report is defined as the right of the city’s population to determine the local government and to participate in local decision-making processes (Section 3.4.3). The WBGU thus takes up numerous aspects that are also being discussed at the international level under the heading of ‘right to the city’ (Box 3.5-1).

Inclusion, as described by the WBGU, reflects a large number of already codified and, therefore, binding human rights (Box 3.4-1). Although cities are not subjects of international law, they must (indirectly) fulfil commitments that their respective nation states have made. Numerous cities and city networks have additionally explicitly acknowledged their commitment to human rights in charters, and made their protection the foundation of their activities (Box 3.5.1).

The growth in socio-economic inequality, which can be observed all over the world (Box 2.1-6; Section 2.4.2.1), is a challenge for the realization of inclusion and the creation of inclusive cities. Such disparities

have increased in many countries over the past 25 years (OECD, 2012b; UNDP, 2013) and in many cities they are even stronger than the respective national average (Rode et al., 2009:3ff.; UN-Habitat, 2008:62ff.). To ensure inclusion for everyone and improve the Great Transformation’s chances of success, it will be necessary to make the battle against severe inequality a key component of sustainable urban-development policy, for example by promoting inclusive growth (Section 3.4.2) and reinforcing and improving the integration of marginalized population groups (Section 3.4.3). In the WBGU’s opinion, the goal must be to markedly reduce socio-economic disparities and, by making the appropriate participative and other governance instruments available, to create the conditions required to give all people equal opportunities to embrace ownership of their city and shape its development (Section 4.2.5).

3.4.1 Substantive inclusion

Substantive inclusion opens up fundamental capabilities (Box 3.4-1) and encompasses the minimum requirements for a dignified life and participation in societal development. Substantive inclusion is closely intertwined with the other two dimensions of inclusion. It forms the foundation for participation in the political and economic system. People who have to go to great lengths to provide themselves and their families with enough food or clean drinking water have little time and scant capacity to participate in shaping their urban environment. People who have no access to education, or inadequate access to the municipal transport system, are seriously disadvantaged on the labour market and have only limited chances of becoming integrated in the city’s economy. A high degree of political inclusion, by way of contrast, enables people to use the political system to apply pressure on the decision-makers and ensure that their basic needs, i.e. their substantive inclusion, are secured. Amartya Sen describes this interaction in ‘Development as Freedom’, in which he emphasizes that famines have never been experienced in a multi-party democracy (Sen, 1999, 2002:217ff.). If people have an adequate income thanks to a high degree of economic inclusion, they are able to satisfy many of their basic needs themselves.

In the WBGU’s opinion, substantive inclusion involves access to:

- Food in a form that allows a quantitatively and qualitatively adequate and balanced diet, so that no one is forced to suffer from hunger or impaired health due to malnutrition;

Box 3.4-1

Principles of the dimension of inclusion: human rights and capabilities

Substantive, economic and political inclusion are closely related to human rights. Initially, international human rights treaties directly bind nation states and not cities. In Articles 55 and 56, the Charter of the United Nations commits all 195 member states to human rights in a general way. If a UN member state becomes guilty of substantive violations of these rights, it can be called to account on the basis of these provisions alone (Brownlie, 2008: 556). More detailed definitions can be found in subsequently adopted UN resolutions and UN conventions. Based on the Universal Declaration of Human Rights, which was passed as a UN resolution in 1948, the International Covenant on Civil and Political Rights (Civil Pact) and the International Covenant on Economic, Social and Cultural Rights (Social Pact) came into force in 1976 in the form of international treaties. The Civil Pact was signed by 168 states, the Social Pact by 164 states.

Despite repeated discussions on the validity, scope and importance of human rights (Tomuschat, 2014: 47ff., 68ff.), the signatory states have committed themselves to observing civil, political, social, economic and cultural rights on their respective territories. As these human rights, which are enshrined in international law, have been implemented into national law, they also apply at the city level. Cities and municipalities do not have international legal personality and can therefore not accede to the international conventions. A commitment to the rights and principles established under international treaties is also possible for cities *per se*. However, they cannot be directly called to account under international law for violations of such commitments.

In addition to human rights, the WBGU bases its inclusion concept in particular on the Capability approach of Amartya Sen and Martha Nussbaum, with which they have greatly influenced the debate on development and inequality (Sen, 1979, 1999, 2002, 2012; Nussbaum, 2000, 2006). In Sen's view, development goes hand in hand with the simultaneous and successful realization of economic, social and political freedoms. Furthermore, from his point of view it is not income differences (output side) that are of central importance for the consideration of inequality, but different capabilities (input side).

From the point of view of the Capability approach, well-being consists in a person's opportunities to have the freedom to be able to do or be something. What we do and what we are is

summarized under Sen's heading of 'functionings'. Examples of activities (doings) include being able to travel, consume energy, help someone, or injure someone. Examples of states (beings) include being well-fed or undernourished, educated or illiterate. The opportunities to realize certain functions are a person's capabilities. Different actors and actor groups require different resources to realize identical functions (Sen, 2006: 153ff.). For example, people in wheelchairs cannot move around a city to the same extent as those who are not confined to a wheelchair. They are limited in their choice of transport and are constantly being hindered by stairs. Planning and realizing a trip through the city thus requires greater effort.

From the point of view of the Capability approach, a society is fair and just when capability equality has been achieved for all. Critics of the Capability approach say it is not enough to look only at capabilities, i.e. the input side, to combat inequality. Even if equal capabilities were established, societies could still develop in extremely unequal ways as a result of power structures. When developing strategies and instruments for fighting inequality, the critics add, it is therefore necessary to look at both the input side (capabilities) and the output side (income inequality, etc.; UNDP, 2013: 19ff.).

In addition to the aspect of capabilities, Sen also identifies a process aspect in the analysis of political, economic and social freedom. Can a person freely decide whether they realize a capability? It is possible that a person might, for example, have capabilities – e.g. the option of studying at a university – but not be able to decide freely whether and when they intend to take that option: e.g. if they are forced to study. In such a case, the capability aspect of freedom exists, but the process aspect is violated.

If the Capability approach is examined in the context of human rights, it becomes clear that, although these approaches and chains of argumentation are complementary, they are not completely identical (Sen, 2006: 153). The two approaches overlap in particular where the freedoms standardized by human rights guarantee a person's substantive opportunities. In these cases, however, the Capability approach offers a finer analytical set of instruments and emphasizes aspects that would have remained invisible from the perspective of human rights. While the freedom to travel, for example, is enshrined in human rights, the implementation of human rights does not automatically mean that everyone has a chance to travel. This capability requires additional means, e.g. financial resources and language skills. Conversely, the process aspect of freedom can be understood from the point of view of human rights, thus closing a gap in the Capability approach.

- *Clean drinking water* in the home or its immediate vicinity at an affordable price for all income levels;
- *Sanitary facilities* in the home or its immediate vicinity that are connected to a sewage system;
- *Adequate housing*, i.e. also in terms of size and affordability for low-income groups, that does not pose safety or health risks, e.g. due to derelict conditions or pollution;
- *Healthcare* that guarantees not only the treatment of physical and psychological illness, but also preventive treatment (vaccinations etc.);
- *A good and fair education*: this includes early childhood education and a sound primary and secondary education; people of all income groups should also have equal access to tertiary education;
- *Modern energy and telecommunication services*, in other words, connection to a stable supply of electricity, a supply of modern energy for cooking, access to the internet and land-line or mobile telephone networks – all of which should be affordable for all population groups;
- *Mobility* in a form that enables all income groups to

Box 3.4-2**Inclusive growth**

In the last few years, rising inequality in many developing countries, emerging economies and industrialized countries (OECD, 2012b; UNDP, 2013) despite long periods of high economic growth has led to a discussion on how growth can be made inclusive. The debate under the designation 'inclusive growth' has not only been held by scientists, it has also increasingly influenced the actions of development banks such as the World Bank (World Bank, 2015b) and the Asian Development Bank (Klasen, 2010). In the broadest sense, it is about achieving prosperity through growth while establishing justice. To do this, the promotion of growth, the fight against poverty and the reduction of inequality must be integrated, and the structure of growth (i.e. which population group benefits and to what extent) must be changed (UNDP, 2013:23ff.; Klasen, 2010).

There is a lot of overlap between the discussions on inclusive growth and on 'pro-poor growth', which dominated development policy in the first decade of the 21st century. Pro-poor growth is defined as growth that particularly benefits people living below the poverty threshold. Although an understanding of pro-poor growth as relative income growth – i.e. higher income growth among people below the poverty line than average income growth – has increasingly become established (UNDP, 2013:21ff.), some in the discussion on inclusive growth already define absolute income growth among poor people as inclusive growth – even if the middle- or higher-income groups benefit even more from the growth (Klasen, 2010).

Apart from the focus on the income and/or outcome dimension, the discussion also contains approaches that define inclusive growth via the process dimension (Klasen,

2010). From this angle, growth is inclusive if as many people as possible are involved in the growth process and co-generate the growth. From this point of view, the opportunity of contributing to growth and thus participating in it economically (e.g. via access to the labour market) must be equal for all people. However, this does not mean that everyone also automatically benefits from growth to the same degree. A growing number of people are therefore urging the integration of the two perspectives – i.e. the outcome focus and process focus (Klasen, 2010). Although the debate on inclusive growth is intensively concerned with the distribution of income, many of those involved realize that, on both the output and the process side, there are non-monetary aspects such as education or health which are relevant for inclusive growth and which the WBGU summarizes under substantive inclusion (Section 3.4.1; Klasen, 2010).

In 2013, the World Bank laid down its targets for poverty reduction: cutting absolute poverty to below 3% by 2030 and the promotion of inclusive growth (World Bank, 2015b). The World Bank has set itself the goal of promoting 'shared prosperity' – a term for inclusive growth coined by the World Bank – worldwide up to 2030. This goal is not only the result of a desire to reduce inequality for its own sake, it is also based on the insight that it will otherwise be impossible to push extreme poverty below 3% by 2030. Unrealistically high annual economic growth rates would be necessary without shifting the gains of growth in favour of the poorer population groups by 2030 (World Bank, 2015b:7ff.).

As a way of measuring inclusive growth, the World Bank's economists have developed the Shared Prosperity Index, which compares income growth among the lower 40% of the population with average income growth. The higher the indicator's value, the more the lower 40% are closing the income gap, or the more inequality is being reduced. If the figure is negative, income inequality is rising.

move through a city without difficulty and at low cost; this requires a functioning and well-developed public transport system and good pedestrian and cycling infrastructures;

- *Elementary waste disposal* ensuring compliance with fundamental hygienic and environmental standards and the use of recycling potential;
- *A healthy environment* that is free from pollution by health-threatening substances and offers green areas for relaxation and recreational purposes;
- *Security*, in other words being able to use and move within public and private spaces freely and without risk.

Many elements of substantive inclusion are closely linked to the preservation of the natural life-support systems. Violations of planetary guard rails – in particular those pertaining to climate change, biological diversity, land and soil degradation, and phosphorous – would have devastating effects on food security, also in cities. Non-compliance with local environmental guard rails would make it difficult to ensure an adequate supply of water and a healthy environment.

The above-mentioned elements of substantive inclusion are also part of the 2030 Agenda for Sustainable Development and its Sustainable Development Goals (UNGA, 2015b; WBGU, 2014b) adopted in September 2015. Many aspects of substantive inclusion are recognized in the UN covenants on human rights or in resolutions of the UN General Assembly. Although some aspects are disputed in terms of international law – e.g. access to a healthy environment, modern energy and telecommunications services, or mobility – the aspects discussed here constitute the minimum requirements for guaranteeing fundamental capabilities. The WBGU, therefore, considers it expedient and necessary to pursue not only these goals, but also additional goals defined within the framework of the SDGs (Box 8.4-1).

3.4.2**Economic inclusion**

Economic inclusion means being integrated into an economic system and having access to formal and informal

markets, in particular to the labour and real-estate markets. Economic inclusion is closely linked to substantive inclusion. Education and mobility, for example, make integration into the labour market easier. This, in turn, strengthens substantive inclusion, as an earned income allows the use of goods and services produced outside the household or made available by the state, and also for savings to be set aside for emergencies or future investments. Further guarantees for economic inclusion, in addition to elements of substantive inclusion, include political rights, such as the right to work, industrial co-determination and the right to strike. Fundamental labour rights were enshrined by 164 countries in the UN's Social Pact (UN, 1966).

The amount of income determines the standard of living, which can exceed substantive inclusion. As income can be generated from employment, self-employment, assets or transfer payments, distribution aspects of income and assets are also relevant for economic inclusion. If the return on investment is higher than the rate of economic growth, and the savings rate rises with increasing income, the earnings of people who already have assets and of those who only earn a salary or wage continue to drift further and further apart (Piketty, 2014). The real-estate market is of key importance in this development, as the assets of many people are tied up in the form of real-estate ownership (Davies et al., 2011). Changing prices on the real-estate markets consequently have a direct impact on private assets.

Continued divergence between poorer and richer population groups has a negative impact not only on social cohesion, e.g. due to lower participation (Costa and Kahn, 2003; La Ferrara, 2002) and higher crime rates (Kelly, 2000), but also on productivity and economic growth (Stiglitz, 2012). The ongoing debate on the existence on the dynamics of inequality (Piketty, 2014; Bonnet et al., 2014; Rognlie, 2015), therefore, also contains an equity dimension.

Development economists have developed the concept of inclusive growth to counteract the described inequality dynamic. Achieving it is a key element in curbing rising inequality (Box 3.4-2). The goal is to achieve growth that reduces existing inequality and does not exclude any part of society. As a result, poorer population groups should benefit more strongly from growth than the rest of society. However, inclusive growth does not exclusively mean the redistribution of affluence resulting from growth. It should actually primarily increase the integration of poorer population groups into the economy and improve their work productivity relative to the affluent population groups, in order to counteract or reduce growing inequality (World Bank, 2009). These goals are also enshrined in the SDGs of the 2030

Agenda (UNGA, 2015). Two of the 17 SDGs – namely SDG no. 8 'Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all' and SDG no. 10 "Reduce inequality within and among countries" – are related to economic inclusion.

Inequality within the city is reflected above all in the spatial structures, as population groups are concentrated in specific districts according to their socio-demographic characteristics (Section 2.4.2.1). In many cities, this takes the form of informal settlements or slums, where disadvantaged, poorer population groups live, or gated communities, within which mostly the middle and upper classes segregate themselves. Spatial segregation leads to differences in capabilities, for example due to inferior access to the formal labour market, especially for women (UN-Habitat, 2014a), or to health impairments caused by negative environmental influences that further reinforce the inequality that already exists (UN-Habitat, 2015d).

The consolidation of economic inclusion through inclusive growth is a key element in counteracting inequality – particularly income and asset inequality – and in creating similar capabilities for all people. In addition to this, the WBGU believes that strong urban planning and other governance instruments are needed to contain the social and spatial effects of inequality.

3.4.3 Political inclusion

In its report 'World in Transition – A Social Contract for Sustainability' (WBGU, 2011), the WBGU identifies the proactive state as a key actor, which – starting from a democratically developed new social contract – drives and shapes the Great Transformation at the national and international levels. In doing this, the state plays a key role in developing and designing cities by appointing or influencing mayors, councillors and municipal administrators (Section 2.5.1).

Moreover, cities are not only many people's habitat, but also the places where, due to the diversity and creativity of the population, many niche innovations are created that are necessary for driving the Great Transformation forward. For this reason, urban transformation towards sustainability can only succeed if the urban population is brought to the centre of attention and its possibilities of active participation in shaping the city are guaranteed.

The possibility of societal inclusion is the prerequisite for a good life and the success of the Great Transformation. The WBGU, therefore, believes that it is essential to guarantee the rights listed below for

every city resident – despite the great cultural differences, variations in the distribution of power, and different approaches to governance that exist around the world.

In the WBGU's opinion, human rights are the primary starting and connecting point for all aspects of inclusion. The procedural aspects of political inclusion, i.e. information, co-determination and the possibility of taking legal action (legal remedies), are furthermore derived from the 'Convention on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters' (Aarhus Convention) of the United Nations Economic Commission for Europe (UNECE). This internationally binding agreement, which came into force in 2001, has so far been ratified by 47 countries plus the EU. Although the convention is restricted to environmental issues, it is a unique international agreement on public participation, in that it obliges the parties to bindingly grant citizens and associations participation rights in environment-related administration procedures. These participation rights are especially relevant in cities.

Based on these considerations, the WBGU has defined minimum requirements in relation to political and procedural inclusion for city residents. These requirements are described in the following.

Right to vote

The aim of free, secret, general and equal elections is the democratic legitimization of decisions in the urban environment in areas where an individual decision is not practicable. The guarantor should be an official authority (city, country or state).

Right to information

The aim of information rights is to create transparency, and to enable citizens both to collect information (as a basis for making decisions) and to supervise the decision-makers. Residents should therefore be able to inform themselves about the urban subject matter in which they are interested or have an interest. The guarantor should be the 'regulating' body: this can be an official or unofficial authority. Information on the respective subject matter must be made easily accessible for viewing or be available on request in a public place, at an early stage and for an appropriate length of time (adapted to the local framework conditions and the abilities of those affected).

Participation rights

The WBGU sees participation in the urban context as getting involved in urban development in the broadest sense. Building on the latest findings on participation (Section 2.5.5), and in addition to the above-mentioned

right to information, the city population should have the possibility of:

- asserting its interests with the relevant authorities (*hearings*),
- influencing decisions, e.g. by submitting statements or participating in meetings (*co-determination*),
- becoming involved in decision-making processes (*decision-making participation*),
- participating in the implementation of decisions (*co-responsibility*),
- initiating and making their own decisions (*self-organization*).

Wherever feasible and sensible, the urban population should be involved in decisions on all issues and at all municipal levels. The following aspects must be fulfilled for meaningful implementation:

- Participation must not overwhelm the population or lead to apathy or disinterest in participation possibilities.
- Participation structures must be designed to provide all actors from all actor and income groups with the same opportunities to participate and implement their own ideas in urban design and management.
- Participation rights must not place excessive strain on the public administration. Due to scant resources and capacities, it is initially necessary to set priorities: the long-term consequences of a decision and the number of people affected should be the criteria for this.

Collective rights

In addition to freedom of association, further aspects of collective inclusion in the urban sphere should also be guaranteed. On the one hand, the WBGU understands collective inclusion as the freedom to collectively exercise particular individual legal positions, which, for example, can be mandatory in the case of freedom of assembly, or partial in the case of religious freedom. On the other hand, it must also be possible for minorities to cultivate their culture, language, etc., at the urban level and in this way to collectively participate in urban society, while also enjoying the protection of the legal system (on these collective rights: Sanders, 1991).

Access to legal remedies

The substantive, political and economic rights mentioned above must be enforceable vis-à-vis official authorities if they are not to be merely symbolic in nature. To this extent, it must be possible for individuals to assert individual legal positions. The official authority is simultaneously both the guarantor and the party against whom claims are asserted, or the party opposing claims. The types of instruments used to assert rights can vary, depending on the prevailing

framework conditions.

The guarantee of urban political inclusion can only relate to the areas that fall within the scope of responsibilities of the city or the regulating authority within the city. Guaranteeing regional or national inclusion rights lies in the hands of the respective, responsible authorities. If, for example, major infrastructure projects are being planned, but their planning is not the responsibility of a local office, the regional planning office must ensure the participation of those affected.

3.5 **Eigenart**

With the third dimension of its normative compass, '*Eigenart*' (a German word meaning 'character'), the WBGU is drafting a new concept aimed at expanding current discussions both on prosperity and on the global and urban transformation towards sustainability, by adding an essential perspective. On the one hand, *Eigenart* comprises all that is typical of every particular city. This can be described on the basis of its socio-spatial and constructed environment, its socio-cultural characteristics and urban practices (descriptive *Eigenart*). A link can, in part, be made here with the use of the term *Eigenart* in German urban planning and building law, where the focus is either on the historically evolved uniqueness of the built-up environment in the sense of the protection of monuments (section 34 of the German Federal Building Code – BauGB) or on the emotionally and physically experienced singularity of a landscape (Nohl, 1997). In addition to this, the WBGU defines the descriptive *Eigenart* of urban areas as urbanity as a whole, i.e. the 'face' of a city, which has both evolved historically and been created by everyday urban practices.

On the other hand, *Eigenart* is an orientation dimension for urban sustainability transformations. Against the background of the target vision of designing cities as liveable and sustainable living environments for all city residents, *Eigenart* emphasizes the need for socio-cultural diversity in and of cities and the autonomy of city residents in the creation of urban quality of life and cultural identity (normative *Eigenart*).

The dimensions of sustaining the natural life-support systems and inclusion are not enough to describe such a broad concept of prosperity and quality of life. While inclusion emphasizes the right to equality or equal rights (Section 3.4), *Eigenart* underlines diversity and the recognition of difference. This means that *Eigenart* goes beyond the mere facilitation of *inclusion*, and emphasizes the active *participation* of the urban population in urban life and urban development. It

thus concentrates on the people's need for self-efficacy, autonomy and social belonging, which can be realized by each city in its own way, depending on the local geographical, socio-cultural and historical context. These needs have a specific relevance in urban areas, because, on the one hand, people here are intensively confronted with a wide range of stressors, limitations and development challenges; on the other hand, cities offer special individual and collective 'capabilities' (Sen, 1979; Box 3.4-1).

The idea behind the *Eigenart* dimension is therefore to underline the fact that the variety and diversity of urban spaces can create a suitable, fertile medium for a creative and inventive transition to a sustainable world society. In this respect, the WBGU follows the lead given by the UNESCO Convention on the Protection and Promotion of the Diversity of Cultural Expressions (UNESCO, 2005). Static or generalizing development concepts rarely apply to cities due to their different development pathways and their individual technical, political, cultural and economic dynamics. Depending on the initial situation, therefore, a variety of transformation pathways is possible and necessary in order to achieve the objectives of sustainable and participatory urban development – for each city in its 'own way' (in German '*eigene Art*').

3.5.1 **Descriptive and normative Eigenart**

The WBGU's aim in introducing the dimension of *Eigenart* (character) is to stress that urban spaces are not interchangeable containers, and cities do not consist mainly of material 'things' like infrastructures and buildings. Rather, the focus is on how urban life and urbanity evolve through the thinking and actions of the people who live there. Building on concepts of urban sociology and urban geography, e.g. those of Lefèvre (1991), Tuan (1977) and Löw (2008), the concept of *Eigenart* draws attention to how physical-material spaces are filled with life, how they are 'charged' with significance and experience by human activities and become living environments. Following the arguments of Lefèvre, city and urbanity are not described on the basis of the built environment or infrastructures; it is rather a question of how psycho-physical space is filled with life, i.e. how buildings are inhabited and infrastructures used. A city only becomes a city as a result of specific urban practices of living, producing and exchanging. According to Lefèvre, 'spatial practice' is at the centre, i.e. the way space is used in everyday routines. Spatial actions are determined by the material and structural circumstances, their historical roots

Box 3.5-1**Right to the city**

In a discourse that has developed under the designation 'right to the city', different scientific and socio-political actors champion the cause of more equitable cities and better opportunities for inclusion. The origins of the discourse can be found in the works of Henri Lefèvre, especially in his book 'Le droit à la ville', published in 1968 (Lefèvre, 1968), in which he formulated two key rights for a city's population: (1) the right to participation, i.e. the incorporation of the urban population into decisions that have an impact on the urban space; and (2) the right to appropriation, i.e. enabling the urban population to use not only urban spaces, but also the advantages and achievements of the city to an equal degree (Purcell, 2002: 102f.; Holm and Gebhardt, 2011).

The debate initially developed further in Latin America and was taken up again in the late 1990s in western industrialized countries by academics and protest groups. Demands linked by these groups with the right to the city range from the re-appropriation of public space by the urban population (Mitchell, 2003) to universal access to basic urban services (UN-Habitat, 2008) and comprehensive system criticism by the anti-globalization movements (Harvey, 2012). The right to the city does not aim to achieve individually enforceable rights: rather, it is understood as a collective demand, sometimes even as a societal utopia (Brown and Kristiansen, 2009: 37; Holm and Gebhardt, 2011: 97).

In industrialized countries, as well as in developing countries and emerging economies (primarily in Latin America), there are many groupings and associations championing the right to the city. They mostly originated in the protest movements of individual cities, from which local or regional networks formed. In the USA, for example, there is the Right to the City Alliance, which campaigns for democracy, justice and sustainability and sharply criticizes gentrification, poverty

and discrimination in cities. In Germany, the Right to the City Network (Netzwerk Recht auf Stadt), which was founded in Hamburg, has united a large number of local initiatives protesting against large-scale projects and gentrification in the city. At the global level, urban protest movements are primarily initiated and coordinated by the Habitat International Coalition, which was also involved in the World Charter on the Right to the City at the 2001 World Social Forum in Porto Alegre (Brown, 2013).

In addition to social movements that refer to the right to the city, the debate has also been taken up by city administrations and international organizations. Cities like Montreal (2006 Montreal Charter of Rights and Responsibilities) and Mexico City (2010 Mexico City Charter for the Right to the City) have given themselves charters in which they lay down the respective rights and duties of citizens and the city administration, and formulate the city's common principles and values. In 2005, UNESCO and UN-Habitat initiated a public debate on Urban Policies and the Right to the City (Brown and Kristiansen, 2009: 36). The 2010 World Urban Forum in Rio de Janeiro took up the debate under the theme 'Right to the City: Bridging the Urban Divide'. The right to the city will also play a role at Habitat III.

The discourse moved strongly towards institutionalization in Brazil, for example, where, at the end of the military dictatorship, there were efforts to enshrine the right to the city in the constitution. This was achieved in 1988 with two articles: one on urban development policy (Article 182) and one on property based on acquisitive prescription (Article 183). The aim of the constitutional changes is to secure 'the full development of the social function of the city and the welfare of its inhabitants' (quote translated from the German; Mengay and Pricelius, 2011: 248f.; Box 4.3-5).

Many of the elements of the discourse on the right to the city can be found in the normative compass developed by the WBGU, particularly in the dimensions of inclusion (Section 3.4) and *Eigenart* (Section 3.5).

and geographical specifics; at the same time, people can adjust spatial settings to their needs and goals, and thus change them permanently.

The *Eigenart* of a city or urban spaces is understood as something akin to a process which is forever being re-produced by specific uses of space and/or by urban practices. Every city develops its 'own way' ('eigene Art') in this process; the WBGU calls this 'descriptive *Eigenart*'. However, if urban spaces are to be both unique ('eigenartig') and liveable, the question is how much value the city's *Eigenart* has for its population and how involved they are in its creation. In this way, the WBGU links up with the discourse relating to a 'right to the city' ('Le droit à la ville', Lefèvre, 1968; Box 3.5-1). At the centre of this discourse is the use of the city by its inhabitants and the possibilities of the 'collective re-appropriation of the urban space' (Holm and Gebhardt, 2011: 8): 'The right to the city includes the right to centrality, i.e. access to the places of social wealth, urban infrastructure, and knowledge;

and the right to difference, referring to the city as a site of encounters, recognition and respect, and of dispute' (quote translated from the German). Finally, the right of appropriation or taking possession (Purcell, 2002: 102f.) states that the inhabitants of a city have the right to enter, occupy and use the urban space. Furthermore, it includes the population's right to create new urban space according to their needs. While descriptive *Eigenart* defines urbanity as a dynamic process, the normative concept of *Eigenart* outlined here demands the 'right to the city', i.e. inclusion and participation in this process.

3.5.2**Difference and creative autonomy as principles of people-oriented urban development**

Urban spaces can be regarded as protective and simultaneously creative spaces and are locations for the

Table 3.5-1

The normative qualities and the descriptive operationalization of *Eigenart*.

Source: WBGU

	Descriptive	Normative
Individual (<i>Eigenart of people</i>)	Individual development and identity processes (local identity and identification, appropriation of spaces)	Individual freedom to be different, recognition of individual appropriation of space and creation of quality of life
Collective (<i>Eigenart of groups, districts, cities, cultures</i>)	Collective development and identity processes, emergence of diversity, creativity and social innovation	Collective freedom to be different and appropriation of space, recognition of the diversity of societal development drafts

emergence of innovations. The cultural diversity and innovativeness that emerge in urban spaces contribute in turn to their specific descriptive *Eigenart*. How the right to the city is distributed – i.e. whether and how people can appropriate their environment and feel they belong to it – is also a key aspect in designing liveable spaces and urban quality of life (Section 2.4). In the WBGU's view, therefore, two essential principles must be guaranteed in urban development: (1) the 'recognition of creative autonomy', i.e. that the residents themselves should help shape and appropriate urban spaces, and (2) 'the recognition of difference', i.e. the recognition of the 'diversity of cultural expressions' (UNESCO, 1997) and individual opportunities to appropriate cultural identities.

Both principles are understood as normatively desirable states which are not measurable via quantitative indicators, but can be empirically observed. They apply both to individuals and to groups (Table 3.5-1).

The WBGU's two normative principles indicate that cities with the best basis for the targeted societal transformation processes towards sustainability are primarily those where *Eigenart* can develop in a democratic or participatory way, and where there is an atmosphere of tolerance and room for creativity.

In particular, *Eigenart* and inclusion are closely interconnected in practice. In order to enable the appropriation of cities and thus to produce a describable *Eigenart*, the principles of the *Eigenart* must correspond with the existing possibilities of inclusion in each case, e.g. substantive inclusion and access to space (Figure 3.5-1). Without substantive inclusion, people are hardly able to take action, let alone be innovative and creative. Furthermore, major disparities in urban areas frequently hinder an atmosphere of tolerance. Yet inclusion and *Eigenart* can take different forms. For example, a city can offer good opportunities for inclusion (e.g. civil rights, housing, work, education for all) and, at the same time, not much *Eigenart*, i.e. little diversity in ways of living or little public life, and thus allow only limited spontaneous social interactions. When inclusion oppor-

tunities are similar, the observation of *Eigenart* can help better understand and promote the diversity of ways to design urban life and urban development. Taking up Sen's Capabilities approach (1979) (Box 3.4-1), the WBGU's *Eigenart* relates above all to the 'functions', i.e. actively making use ('doings') of capabilities created by inclusion, as well as the subsequent specific characteristics ('beings') of people.

3.5.3 Categories of *Eigenart*

The social practices of the use and appropriation of space are at the centre of *Eigenart* as a descriptive category (Table 3.5-1). Against the background of the

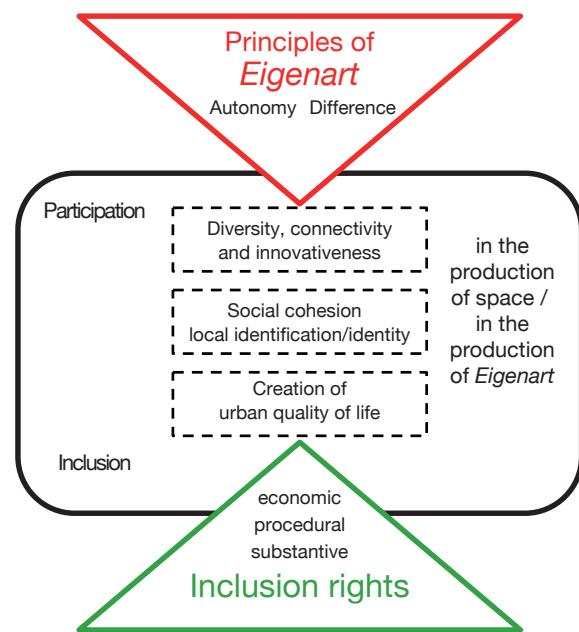


Figure 3.5-1

Inclusion rights and principles of *Eigenart* as prerequisites of urban quality of life, identity and diversity.

Source: WBGU

Box 3.5-2**Indicators of urban quality of life and the connection to the normative dimension Eigenart**

A comparison of different indicator systems for quality of life at the national and specifically urban level – e.g. the OECD's Better Life Index, the Gross National Happiness Index, the City Prosperity Index, or the Sustainable City Index – shows that the dimensions of the natural life-support systems and inclusion are to be found in almost all approaches. Other indicators (can) only correspond or relate implicitly to the dimension of *Eigenart*. In the UN-Habitat's City Prosperity Index (2013c), for example, social capital is measured as a sub-index of quality of life. At the national level, aspects that could measure *Eigenart* play a role primarily in the subjective approach of Gross National Happiness (Ura et al., 2012), where cultural inclusion, cultural etiquette and the sense of

community are documented using subjective assessments. The OECD's Better Life Index (2011a, 2013a, 2015d) looks into the quality of social relations, and the Social Progress Index (Porter and Stern, 2014) examines freedom of assembly and speech, the freedom of religion and life decisions, the equality of minorities, and tolerance towards minorities, which might indicate the realization of the recognition of 'difference'.

One striking aspect in the comparison of national and specifically urban indicators is that subjective well-being, local identification and local identity, social cohesion and the quality of the living environment hardly seem to play any role at all. Similarly, cultural diversity and innovativeness in urban areas are rarely documented. The WBGU therefore proposes several categories for observing *Eigenart* and formulates possible indicators (Section 3.5.4; Table 3.5-2) in order to study the realization of *Eigenart* as a normative dimension.

WBGU's approach of a people-oriented urban transformation towards sustainability, the most interesting aspects are those that can evolve through the active inclusion and participation of people in their city and are seen as important for sustainable development in cities (Figure 3.5-1). Existing indicator systems that come close to such an understanding can be found primarily in research on urban quality of life (Box 3.5-2).

To make it possible to study the realization of *Eigenart* as a normative dimension in a city, the WBGU proposes three observation priorities and formulates possible questions and indicators for leading the research. The first priority comprises the provision of spatial-material prerequisites for urban quality of life and, related to this, the active appropriation of space (Section 3.5.3.1). The second priority focuses on the development and preservation of local identity, local identification and social cohesion, and thus on the individual and collective identity and identification processes in connection with the respective living environments (Section 3.5.3.2). The third priority concentrates on innovativeness, creativity and connectivity and studies the continuous changing and evolution of diversity and novelty in urban areas (Section 3.5.3.3).

3.5.3.1**Provision of spatial-material prerequisites for urban quality of life**

When it comes to the provision of spatial-material prerequisites for urban quality of life, the main question is how urban space can be designed in such a way that people have an opportunity to create and feel quality of life for themselves. As regards the key prerequisites for urban quality of life (Section 2.4.1), it is important to distinguish between universal conditions, i.e. spatial or structural features which are relevant almost every-

where in the world, and culturally and locally specific prerequisites. A universally valid, important prerequisite is that cities must have facilities for recreation, social interaction and social life – for example, urban public space, green areas and parks, semi-public facilities such as churches and mosques (van den Berg et al., 2013; Rogers et al., 2011). These spaces must be accessible and reachable (relevant for inclusion), but also have certain physical characteristics. Protagonists of people-oriented urban planning like Jan Gehl emphasize in this context the spatial enabling of vitality and the 'human scale' as a benchmark for urban design (Gehl, 2010; Box 2.4-3). For example, urban spaces should be an invitation to linger and to interact (e.g. they should not be too big and should offer seating groups); they should also be multi-functional, i.e. in addition to shopping opportunities inner cities should encourage conversations, games or recreation. Buildings should not be so high that users feel out of touch with the city and not part of it; the speed of traffic on the roads should be adapted to that of pedestrians and cyclists.

Research also shows that green spaces have a key role to play as recreation areas (Section 2.4.1.1). It is also important to provide a minimum amount of free space which people can arrange as they wish, as a place to withdraw to, or which they can adapt to their everyday needs (Zurawski, 2014). These aspects are conducive to creative autonomy and thus to self-efficacy in the production of quality of life. The interaction between spatial settings and infrastructures with human action focused on here also reveals interfaces and synergies for sustaining the natural life-support systems. For example, infrastructures for promoting sustainable mobility (public transport, attractive cycle paths and footpaths) can also promote social interac-

tions and lower barriers to participation in mobility. At the interface with the dimension of inclusion, the question also arises as to how the spatial factors of quality of life are distributed and accessible for the different population groups.

3.5.3.2

Social cohesion, local identity and local identification

The quality of life and social cohesion of a (urban) society are closely related. The principles ‘recognition of creative autonomy’ and ‘recognition of difference’ (Section 3.5.2) emphasize the singularity of people and accentuate the quality of the city as an individual development space – a space that offers anonymity and the possibility of submerging in the mass of people. At the same time, however, people need a sense of belonging; their identity only develops through social interactions and relations (Fuhrer, 2008). The individual creation of quality of life succeeds particularly well in a social environment in which social cohesion – i.e. inclusion, a sense of belonging and social trust – are encouraged and there are strong social ties and networks (Section 2.4). Thus social cohesion also promotes social resilience in a society. Social cohesion is often less pronounced in cities (Lev-Wiesel, 2006; Putnam, 2007; Cassiers and Kestelot, 2012). This makes it all the more important to make social cohesion physically and spatially possible, among other things via spaces for social interaction and collective appropriation processes. The large housing estate of Pruitt Igoe in St. Louis, Missouri, was an example of the spatial prevention of social cohesion. Erected in 1954 as a ‘future-oriented project’ of social housing, it had to be demolished just under twenty years later because of high levels of vacancy, vandalism and crime (Bell et al., 1996; Flade, 2015). One of the causes that were discussed was that, as a result of the densely built-up area and the narrow corridors, there had been no space for social contacts or activities between the residents. The residents remained strangers and there was distrust and uncertainty, partly because the corridors and elevators encouraged thefts and assaults rather than positive social interactions. This does not mean that densely built, large housing estates prevent social cohesion as a general rule, but the example does show how well-meaning construction projects can disregard the needs and cultural habits of encounter and social interaction between their target groups, and thus fail to achieve their objectives.

Local identification and local identity emphasize particularly the relationship between people and their spatial environment, and thus the memories, ideas, feelings and sense of responsibility that people con-

nect with their living environments (Section 2.4.1.2). To achieve this, it must be possible for spatial environments to be appropriated; people must be able to realize their spatial identity, for example by being able to move around safely within their environment and spend time in their favourite places. It is also important that people are involved in changes in their living environments, that their needs are taken into account (Fuhrer, 2008), and that they have the resources and freedom to use spaces. The feeling of spatial and social belonging can then also enhance people’s willingness for local involvement. The concept of ‘participatory budgeting’, for example, was developed on the basis of projects in which the residents of neglected districts were given an opportunity to administer and use abandoned buildings in their neighbourhood (Leavitt and Saegert, 1990). As one study shows, the local identity of the people taking part in these projects was an important resource for their willingness to work towards improving the living environment and was simultaneously strengthened by the possibility of self-administration.

Although social processes are key for the development of local identity, one facet of belonging to a place can also be connected with certain outstanding features of the built environment (significant religious locations or landmarks) or the ‘image’ of a city (Flade, 2015).

3.5.3.3

Innovativeness, creativity and connectivity

In the transition to a sustainable urban development, it is important to recognize and change structures and practices that do not meet the requirements of securing the natural life-support systems and inclusion. Creativity and innovativeness, together with openness and the ability to reflect, play an important role for renewable urban societies and create a fertile medium for the transformation.

In the WBGU’s view, the principles of creative autonomy and cultural difference aptly describe the basic essentials needed for an innovative urban society. They cover visible results such as commercially exploitable forms of innovativeness, as well as other forms of urban design ranging from artistic-creative to adaptation- or resilience-oriented that do not primarily target commercial exploitation.

Modern societies are largely dependent on individual creativity and innovations for their economic development (Box 3.5-3). The generation and dissemination of innovations are seen as key growth drivers. Since local interaction facilitates the exchange of ideas (Jaffe et al., 1993), these processes have a spatial dimension in cities. A location’s *Eigenart* can thus offer a competitive advantage, since the local constellation and diversity of knowledge each create a unique starting point.

Box 3.5-3**Understandings of social and technical innovations**

Since the late 1980s, to make a distinction from inventions and innovations of a purely technical nature, innovation research has been using the term 'social innovations', which are needed in particular for a transformation towards a sustainable society (Zapf, 1989; Gillwald, 2000).

In a broad definition of innovation, no distinction is made between technical and social innovations; rather, attention is focused on the social processes as a result of which all innova-

tions are seen as social innovations. In innovation research this means, among other things, that a key role is assigned to the interpretation processes, i.e. to the social recognition of alternatives as novelties (Vordank, 2005:43). What is more important for the study of social change and transformation processes in this context, however, is the focus on the change in social practice, i.e. the altering of established social practices and the emergence of alternative ones in the innovation process. Innovation is thus understood as an 'innovation of social practices' (Schwarz and Howaldt, 2013:56), in which, for example, alternative materialities (such as technologies), social meanings and value orientations, new social settings and new skills change established routines.

Local economic stimuli are further reinforced by externalities and the transfer of ideas and knowledge to uninvolved market participants, so-called knowledge spillovers (Romer, 1986; Lucas, 1988). This applies in particular if the proportion of qualified workers is high.

Richard Florida's (2005) work on the 'creative class' and the relations between 'talent, tolerance and technology' are the epitome of such a directly economically useful understanding of *Eigenart*. With reference to the 'talent' factor, increases in productivity are primarily to be expected in cities that generally succeed in attracting and keeping highly qualified people (Glaeser and Gottlieb, 2006). Several different studies have shown that cities that offer a high quality of life are more successful at competing for highly qualified workers (Glaeser and Gottlieb, 2006; Glaeser et al., 2001; Shapiro, 2006; Partridge, 2010). With reference to 'tolerance', Florida postulates that talented creative professionals such as artists, academics and entrepreneurs prefer cities where there is a high level of acceptance of different values, ways of living and cultural diversity. Cohen-det et al. (2009) and Chantelot et al. (2011) describe the different routes that creative ideas take on their way to commercial exploitation through different layers of an urban society, and the diverse, heterogeneous structures that these require. This is instructive for the WBGU's understanding of the importance of a high level of individual and collective cultural difference.

However, innovativeness can also be understood as a resource in other ways beyond generating economic effects; it can make it possible to handle future changes and risks in a reflective and creative way and create a readiness to accept or participate in transformative processes. Imai (2014) points to the relationships between small-scale social interaction spaces, social entrepreneurship and creativity with effects for an adaptable and resilient urban design. With reference to urban planners, the role of cities as laboratories for future viability was referred to at an early stage (Jacobs, 1961). In addition to urban planners, the momentum of inten-

tional experimentation and creative knowledge production in the modes of co-design and co-production has for some time also been driven forward more strongly by scientific actors, who increase the connectivity and reflectivity of city production in this way. In real-world laboratories (Schneidewind and Scheck, 2013), urban transition labs (Nevens et al., 2013; DRIFT, 2014), living labs (Liedtke et al., 2015; Evans and Karvonen, 2011) or sustainability transition (Luederitz et al., in print), urban design is being geared towards the guiding concept of sustainability and shaped jointly with local actors (Section 10.2.1.2).

3.5.4***Eigenart as an element for city rankings and analyses***

With its normative *Eigenart* dimension, the WBGU is expanding its own perspective on the Great Transformation; at the same time it is entering new territory in the analysis and evaluation of cities. The aim is to do more than introduce the need for local cultural diversity, the 'right to the city' and the recognition of creative autonomy into the discourse on urbanity and the future of cities. A further objective is to complement the concrete observations, analyses, evaluations and comparisons of cities made by different global and local actors (from municipalities to UN Habitat) by adding an indicator that is capable of describing *Eigenart*. A considerable amount of research work is still required to move closer to achieving this goal (Section 10.1.3). Even so, the above thoughts on the key categories can offer inspiration. Table 3.5-2 shows several proposals for possible indicators derived from the above-mentioned literature which need to be further developed; they can provide information on the three main priorities for observation. They need to be examined to determine their local and culture-specific relevance and suitability. For example, the importance of

Table 3.5-2

Ideas for indicators and sub-indices for the investigation of *Eigenart*.

Source: WBGU

Category	Indicators	Sub-indices
Requirements for urban quality of life	Walkability/cycleability	<ul style="list-style-type: none"> ➤ Short average distance and on-foot accessibility of places relevant to everyday life (work, consumption, leisure, social infrastructure) ➤ Safe and attractive cycle paths and footpaths ➤ Density or compactness and multi-functionality of city districts ➤ Footpaths as a percentage of the choice of means of transport (modal split)
	Number and types/ frequencies of use of (semi-)public and multifunctional spaces	<ul style="list-style-type: none"> ➤ Public parks and similar areas with diverse uses (e.g. lakes, playgrounds, sports facilities) as a percentage of total surface area ➤ Squares, public markets, libraries, religious institutions as a percentage of total surface area ➤ Frequency of use ➤ Use by different population groups ➤ Average length of stay ➤ Heterogeneity of the types of use (e.g. public events, meetings, demonstrations, social and leisure activities)
	Number and types of use of recreation areas	<ul style="list-style-type: none"> ➤ Public green and recreational areas as a percentage of total surface area per inhabitant ➤ Heterogeneity of the landscape, spatially enabled types of use ➤ Frequency of use ➤ Use by different population groups ➤ Average length of stay ➤ Heterogeneity of the current types of use (especially social and leisure activities, active movement)
	Liveability/city rankings	<ul style="list-style-type: none"> ➤ City's position in city rankings (e.g. 'Most Liveable Cities Index' in Monocle magazine; 'Liveability Ranking and Overview' of the Economist Intelligence Unit; 'Mercer Quality of Living Survey')
	Local identification and local identity	<ul style="list-style-type: none"> ➤ Extent of the population's local identification or local identity (partly measured as a subcategory of urban quality of life) ➤ Extent of local engagement (number of neighbourhood organizations and their activities, willingness to get involved, current citizen engagement) ➤ Existence and scope of participatory processes and participation of the city population
	Social cohesion	<ul style="list-style-type: none"> ➤ Level of social cohesion among the population or between different population groups (partly measured as an aspect of social capital) ➤ Extent of inclusion and social trust or level of social distrust and fear of crime
Innovativeness, creativity, connectivity	Spaces for experimentation, grey zones	<ul style="list-style-type: none"> ➤ Presence of spaces for experiments, e.g. 'unregulated' barren land, innovatively used vacant buildings, spaces for interim use concepts ➤ Presence of space pioneers (e.g. art in public spaces, innovative living concepts) ➤ Functional, informal settlements as a percentage of total surface area
	Social innovativeness	<ul style="list-style-type: none"> ➤ Number of bottom-up processes and urban-design or urban-development initiatives (e.g. cooperative building, inclusive urban design, urban gardening, etc.) ➤ Number and effectiveness of political funding programmes for social innovation ➤ Existence or number of real-world laboratories, urban transition labs or urban sustainability transition labs
	Economic innovativeness	<ul style="list-style-type: none"> ➤ Social entrepreneurship ➤ Number of employees in the creative field ➤ Number of start-ups ➤ Research and development activities ➤ Number of patents

public spaces for social interactions or local identification varies depending on the cultural region, since in some cultures social life takes place mainly in private spaces, in others also in public.

The WBGU proposes raising the status of *Eigenart* to that of a multi-dimensional construct; not only objective spatial conditions and observable phenomena of appropriation and diversity should be taken into account, but also subjective assessments by residents. In this context it can be useful to observe real settings directly on site (e.g. using the behaviour-setting approach) and combining statistical and survey data with visual material (video ethnography, photographic diaries). Furthermore, participatory survey methods are especially suitable for this purpose (transect walk, participatory appraisal).

3.6

Dynamics between the three dimensions of the normative compass

The normative compass aims to offer orientation for the urban transformation towards sustainability (Section 3.2). The three dimensions of the compass define the area within which cities should develop, as well as the conditions under which they can shape the transformation towards sustainability. The inferable requirements according to the normative view – such as ensuring inclusion and complying with planetary guard rails – are universal. However, their practical implementation in cities will be characterized by great diversity, which is also a result of incorporating the normative dimension of *Eigenart*. In view of the existing *Eigenart* of the cities and their very different starting positions – e.g. cultural and geographical circumstances – every city will have to draft and shape its own development pathway to sustainability. The differences can be extreme. For example, in the slums of the major cities of Africa the focus will be on access to minimum standards of social inclusion, while the great challenges for many cities in industrialized countries will lie in compliance with climate-change targets. However, sustaining the natural life-support systems and maintaining the minimum standards for inclusion are important goals for all cities and, at the same time, a prerequisite for ensuring that a city's respective *Eigenart* can evolve.

The three dimensions of the normative compass are not independent of each other but mutually affect one another (Figure 3.6-1). For example, there are interfaces between local environmental problems and inclusion. 'Access to a healthy environment' can also be seen generally as a dimension of substantive inclusion. The issue of water can be conceived of as a regional envi-

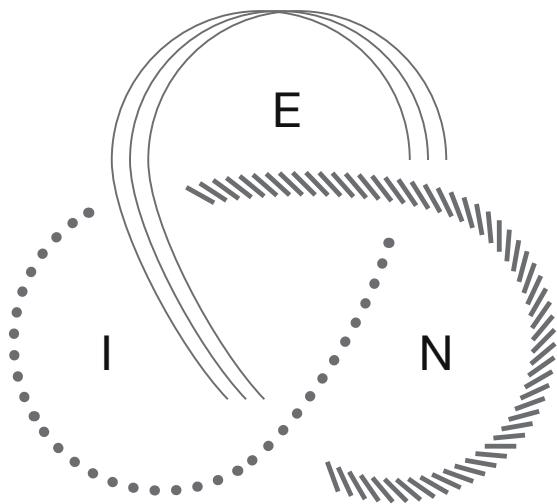


Figure 3.6-1

Normative compass for the urban transformation towards sustainability: the three dimensions – N: sustaining of the natural life-support systems (Section 3.3), I: inclusion (Section 3.4) and E: *Eigenart* (Section 3.5) – are not independent of each other but mutually affect one another. In the long term, observance of the planetary guard rails becomes a precondition for preserving humankind's natural life-support systems and therefore also for securing inclusion and *Eigenart* as a resource for urban quality of life and societal innovation. Inclusion should open up access to the principles of human security and development for all people; it is therefore also a foundation for the detailed design of *Eigenart*. *Eigenart*, in the sense of a diversity of urban spaces and transformation pathways, can, in turn, create a fertile medium for a creative transition to a sustainable urban society.
Source: WBGU; diagram: Wernerwerke

ronmental topic when it is a matter of the importance of the biogeophysical conditions relating to a city's water supplies (e.g. precipitation, glaciers, rivers, droughts, groundwater levels) or the sustainable use of these regional water resources (Section 3.3.2). The issue of water can also be conceived of from the point of view of supplies to the people; then the issue becomes 'access for all people to sufficient clean drinking water', a dimension of substantive inclusion (Section 3.4.1); compliance here is a *conditio sine qua non* for urban quality of life. In the long term, observance of the planetary guard rails becomes a precondition for preserving humankind's natural life-support systems and therefore also for securing inclusion and *Eigenart* as a resource for urban quality of life and societal innovation. Section 3.5.3 examines the close interaction between *Eigenart* and inclusion where, for example, inclusion is seen as a necessary precondition for the development of social cohesion, local identification and local identity.

The three dimensions of the compass can thus positively reinforce each other. If the focus is placed on a single dimension of the compass, however, this can also

3 The Normative Compass

trigger considerable trade-offs, which must be recognized and taken into account as early as possible. For example, in the WBGU's opinion, in view of the risk of breaching the 2 °C climate-protection guard rail, it is no longer an appropriate solution to first improve people's substantive inclusion via fossil-driven economic growth, and only later start repairing the environmental damage in the sense of sustaining the natural life-support systems. Similarly, prioritizing substantive inclusion while waiving political inclusion and participation will damage the *Eigenart* dimension, which will have negative effects on the quality of life of the urban population.

The challenges and priorities differ for individual cities. On the basis of settlement patterns analysed in Chapter 7, the WBGU has outlined the development risks of global change which are of great importance from the point of view of the three dimensions of the normative compass (Section 7.5). In view of the time pressure involved in the transformation, integrative, systemic solutions which embrace the entire normative compass presented by the WBGU are required from the outset. Its three dimensions must not be played off against each other; the aims of one dimension must not be achieved at the expense of another, since all the guard rails and dimensions need to be complied with or taken into account if quality of life is to be secured and guaranteed in a sustainable manner.

In terms of practical implementation, this represents a major challenge for cities. They are confronted with some fundamental questions: To what extent, for example, can the task of securing substantive inclusion and compliance with the planetary guard rails be made easier by technical solutions (decoupling of the first order), and what role will be played by social innovations and subsistence (decoupling of the second order; Section 3.5.3)? How can rapid action be combined with long-term thinking? In view of the great time pressure, how can the participation of the population in the planning and control processes be guaranteed (Section 8.3)? How can the dimension *Eigenart* be properly taken into account in times of rapid upheaval? How can innovation potential be made particularly productive for the transformation? How can transitory solutions be found in especially dynamic situations (e.g. accelerated levels of migration) in a way that satisfies all three dimensions of the normative compass? Every city is faced with the challenge of beginning a search and learning process to find solution pathways of its own for these difficult questions – pathways that are compatible with the long-term time scale of the transformation.

The WBGU is convinced that the development paradigm of the integrated approach to sustainability problems with a systemic view – as outlined in this chapter

and also often postulated internationally – offers good chances for processing these questions successfully.

The normative compass is a central reference point which can give cities orientation in their respective role in the Great Transformation. The following chapters are based on this concept and its three dimensions. This compass can also serve as a direction setter for the political message of this report – not least with regard to the Habitat III conference; the sustainable urban-development processes must be judged according to the integrated implementation of the different dimensions.

Exemplary transformative action fields

4

4.1

Transformative action fields: concept

In its report 'World in Transition – A Social Contract for Sustainability', the WBGU outlines the need to steer the development pathways of world society in the direction of sustainability in such a way that the planetary guard rails are observed. The necessary change for this requires a new basis, which the WBGU has called a 'new global social contract for a low-carbon and sustainable global economic system' (WBGU, 2011:1). The WBGU also identifies urbanization as one of the three main fields where policy-makers should begin working towards the transformation. This is partly due to the fact that urban regions are responsible for about 70% of global final energy demand, and that the urban population will have grown from just under 4 billion people today to 6.5 billion by the middle of the century (UN DESA, 2014). The 'urbanization' transformation field described by the WBGU (2011) forms the basis for the present report (Section 3.1).

In the following, the WBGU identifies exemplary transformative action fields, i.e. areas of urban development where it sees the biggest potential leverage effects for the urban transformation towards sustainability. The concept of transformative action fields is one of the main pillars of this report, both for describing the challenges of the urban transformation towards sustainability and for extrapolating action strategies and research needs (Chapters 9, 10). The selected action fields stand on the foundations of the normative compass presented in Chapter 3 with its three dimensions: (1) sustaining the natural life-support systems, (2) inclusion, and (3) *Eigenart* (character). These three dimensions define the area within which cities should develop, as well as the conditions under which they can shape the transformation towards sustainability.

Transformative action fields are thus large, overarching themes within the 'urbanization' transformation field. The choice of transformative action fields was made with a view to their importance for the transfor-

mation, their quantitative and systemic relevance, their urgency, and their potential for preventing path dependencies and maximizing co-benefits. The challenge was to give an idea of the breadth of the urbanization topic with a small number of transformative action fields, while avoiding anything that would narrow the perspective.

The transformative action fields identified by the WBGU constitute, *firstly*, five fields that are already being broadly discussed internationally, but which, against the background of the transformation, the WBGU places into a new context in relation to time horizons and overall scale:

- decarbonization, energy and mitigation of climate change in cities (Section 4.2.1),
- mobility and transport (Section 4.2.2),
- urban form (Section 4.2.3),
- adaptation to climate change (Section 4.2.4),
- poverty reduction and socio-economic disparities (Section 4.2.5).

Secondly, three additional transformative action fields were chosen which, by comparison, are still given too little political attention internationally, but are treated as priorities in this chapter:

- urban land use (Section 4.3),
- materials and material flows (Section 4.4),
- urban health (Section 4.5).

For all transformative action fields, the WBGU attaches particular importance to the actor and solution perspectives, and asks which actors and measures can have a transformative effect. Further overarching perspectives are the systemic questions of conflicts of objectives, co-benefits or blockades, and possible remote effects.

4.2

Internationally discussed fields

The following section describes selected transformative action fields which, in the WBGU view, are particularly relevant and are already being discussed internationally. The WBGU, against the background of the trans-

formation, places them into a new context in relation to time horizons and overall scale. These five action fields are: decarbonization, energy and mitigation of climate change in cities (Section 4.2.1), mobility and transport, (Section 4.2.2), urban form (Section 4.2.3), adaptation to climate change in cities (Section 4.2.4), and poverty reduction and socio-economic disparities (Section 4.2.5).

4.2.1

Decarbonization, energy and mitigation of climate change in cities

Cities are responsible for approx. 70% of global energy demand and global greenhouse-gas emissions (Seto et al., 2014). There are primarily two things involved when it comes to the transformation of the cities towards climate compatibility (WBGU, 2011): direct CO₂ emissions must be cut to zero, and the demand for energy must be contained in order to make the global energy transformation towards CO₂-emissions-free energy systems possible (Section 2.3). The emissions from building materials (Section 4.4.1) must also be taken into account, as well as 'grey energy', i.e. the energy that is expended directly and indirectly in the construction of buildings and infrastructure. Ultimately, cities must become independent of the steady inflow of fossil fuels. Millions of distributed combustion devices, such as stoves, heaters and vehicles, must be replaced by emissions-free alternatives. In most cases, this also applies (e.g. for health reasons; Section 4.5) to the combustion of bio-based substances (Grübler et al., 2012). At the same time, access to energy and appropriate infrastructure is yet to be provided for hundreds of millions of present-day – and billions of future – city dwellers.

The decarbonization of energy systems is essential for the transformation, although this can only be partly influenced directly in the cities. As a rule, cities cannot generate their own energy locally due to the high density of demand, but import either energy or energy sources. As a result, local energy production from renewable energies will continue to cover only a small fraction of local energy demand in cities in the future; in this context, Grübler et al. (2012:1311) cite a figure of less than 1% for megacities. Decisions at the city level therefore have less influence on the energy supply side than on the demand side.

A key starting point for the mitigation of climate change in cities is to reduce the amount of energy consumed by buildings. In 2010, buildings were responsible for 32% of global energy demand and 19% of energy-related greenhouse-gas emissions, 6.4% of which

were direct emissions (Lucon et al., 2014). According to analyses conducted by Ürge-Vorsatz et al. (2012:653), the amount of energy consumed by buildings can be reduced by 50–90% by holistically planned retrofitting, and new buildings can reduce their energy needs to 10–40% of the amount required by conventional buildings. Zero- or even plus-energy buildings, on the other hand, are only possible for selected building types and settlement structures, usually low-rise buildings and settlements that are not too dense. Overall, according to the authors' analysis, it would be possible to achieve a 46% reduction in the global amount of energy consumed by buildings by 2050 (Ürge-Vorsatz et al., 2012). One approach to improving efficiency is the concept of energy services, where users sign contracts on the provision of energy services (e.g. heat or light) instead of energy (e.g. natural gas or electrical energy) contracts; this increases the incentive for the supplying companies to provide these services as efficiently as possible.

Transport is another important lever for the mitigation of climate change in cities (Section 4.2.2). Starting points here include planning land use in a way that reduces the demand for motorized mobility, expanding local public transport, making improvements in efficiency, electrifying vehicles, and enhancing freight logistics (Gouldson et al., 2015). Direct and indirect cuts in emissions can also be achieved in waste management, for example by recycling, and by an integrative planning of infrastructures (e.g. energy, water, waste). Grübler et al. (2012:1311) come to the conclusion that systemic characteristics generally have a bigger effect on future energy demand in cities than those of individual consumers or of technological artefacts. For example, the percentage of traffic served by local public transport and unmotorized traffic has a greater impact on transport-related energy demand than the efficiency of the vehicle fleet. Because people in detached-house areas with passive house standards and hybrid cars may commute a long way to work, the demand for energy there can be higher overall than in more densely populated and compact cities with a high share of local public transport, pedestrians and cyclists, even if the buildings there are less well insulated.

Urban form has a considerable influence not only on the quality of life in cities (Section 4.2.3), but also on the demand for energy, direct and indirect emissions, material flows and waste production. One starting point here could be the management of urban growth with the strategic aim of reducing urban sprawl and dependence on cars (Section 4.2.3; Seto et al., 2014; Floater et al., 2014). Further starting points are the promotion of district heating or cooling systems and the use of waste heat (UNEP, 2015).

Several hundred million city dwellers in countries with low to medium income levels have no access to electricity, or cannot afford to use clean and safe sources of energy; this has considerably negative effects on the local air quality and on their health (IEA and World Bank, 2015). Many of these people live in informal settlements, a large proportion in Southeast Asia and Sub-Saharan Africa. They often lack access not only to electricity and modern energy for cooking, but also to clean drinking water and sanitation facilities. Obstacles to adequately supplying these people with energy are frequently related to the general way in which local governments treat informal settlements. Cost-effective and quickly implemented solutions are more sought after than large-scale redevelopments, which are dependent on the provision of an unrealistic amount of capital over long periods of time (Grübler et al., 2012). According to Cartwright (2015), the current technical advances in photovoltaics, storage technology and lighting could make a substantial contribution to reducing the demand for energy from large power plants in African cities, and simultaneously create local income opportunities. In the field of sanitation, too, there are technological alternatives to large-scale infrastructures, such as compost toilets or biogas systems, which provide energy as a co-benefit (Cartwright, 2015).

According to analyses conducted by Gouldson et al. (2015), a low-carbon development has direct economic advantages for cities. For example, investment in an energy-efficient infrastructure could already be recouped via saved energy within 16 years and lead to global savings of US\$ 16.6 trillion in the period from 2015 to 2050.

4.2.2 Mobility and transport

In all recent global reports on urbanization (e.g. UN-Habitat, 2013a; OECD, 2015a; UNEP, 2015), the integration of urban-transport planning into urban land-use planning is regarded as a central condition for the success of sustainable urban development. The dominance of private motorized mobility is seen as one of the main problems; it has greatly influenced the development of cities in terms of form, structure (urban sprawl) and function (strict functional separation). The consequence has been a self-reinforcing crisis of urban transport systems, in which, in a vicious circle, the response to rising vehicle numbers has always been an expansion of infrastructure capacity (UN-Habitat, 2013a:98). In many cities, this has subsequently led to an everyday routine of traffic jams combined with severe air pollution and continuous noise pollution –

and ever longer travel and transport times. The economic costs of urban traffic jams are estimated to be very high: e.g. in 2010 in the USA, the lost productivity and wasted fuel thus caused amounted to US\$ 101 billion or US\$ 713 per commuter (UN-Habitat, 2013a:60). In Buenos Aires, Mexico City and Dakar, the costs of traffic jams are estimated at approx. 3 % of GDP (UNEP, 2012a:34), and in Cairo at 4 % of GDP (UKAID and DFID, 2012:8). Because of their influence on physical activity, air quality, accident risk, noise pollution and psychosocial stress, transport systems have a considerable direct and indirect impact on the health of the urban population (WHO and UN-Habitat, 2010:111). WHO and UN-Habitat (2010) identify seven elements for improving urban transport and traffic systems. The starting point is the vision of a socially just and environmentally friendly barrier-free development of transport for all city dwellers, the creation of separate areas for non-motorized mobility, the improvement of vehicle standards, the use of economic instruments (taxes, fees) for containing traffic with a high level of air pollution, and measures to improve road safety.

A functioning public transport infrastructure and space for non-motorized mobility are also regarded as core elements for reducing urban inequality – i.e. for reducing the size of the ‘urban divide’ (UNEP, 2012a:34; UKAID and DFID, 2012). Urban population groups affected by poverty are disproportionately negatively affected when urban transport systems are ineffective, since they are usually the most dependent on non-motorized mobility and public transport systems (WHO and UN-Habitat, 2010). They often live and work directly on roads with heavy traffic and frequent tailbacks. These population groups are thus more exposed to air and noise pollution, accident risks and social isolation as a result of a lack of mobility options – all largely originating from motorized individual traffic. In this respect, the type of transport system and the resulting stresses have a negative impact on physical and mental health. Furthermore, the lack of usable means of transport hinder people’s access to healthcare (WHO and UN-Habitat, 2010:111). The conclusion drawn by most global urbanization reports that deal with this topic (UNEP, 2012a:34; UKAID and DFID, 2012; WHO and UN-Habitat, 2010; Sims et al., 2014) is that a policy of traffic planning which does justice to the right to basic mobility facilities, especially for the economically disadvantaged urban population, is a key element of socially inclusive urban development. If transport planning pursues objectives such as transport safety, general accessibility, time saving for poor population groups, emissions reductions, and minimizing impacts on the environment and human health, then the shaping of urban transport systems can be a cat-

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alyst for sustainable urban development (Sims et al., 2014:604). This can be achieved by giving priority to strengthening public transport systems, as well as pedestrian and cycle mobility.

Especially in developing countries and emerging economies, urban transport planning has greatly neglected the need for non-motorized mobility (UN-Habitat, 2009b: 156). At the same time, the services offered by public transport are very weak, so that this vacuum has been filled by private services such as mini taxis, jeepneys, matatus, tuc-tucs, rickshaws, etc. In their efforts to build public transport systems, developing countries and emerging economies have a chance to leapfrog the mistakes of the industrialized countries, which tried to fight traffic jams by increasing the capacity of the transport infrastructures, but in fact provoked additional traffic volumes (UNEP, 2012a:34).

As a result of this experience, urban transport planning is currently experiencing a paradigm shift in which the planners' understanding is expanding from that of mere infrastructure developers to promoters of urban mobility for all. This is termed the 'slow-road movement' and means that "urban planners are asserting their role over traffic engineers or, at least, adopting an integrated approach rather than one that reduces city function down to vehicle movement" (UN-Habitat, 2009b:127). As a result of this paradigm shift, UN-Habitat has become more specific (UN-Habitat, 2013a:198) and is calling for a holistic approach as well as systemic thinking and action: "It is essential that travel is recognized as a 'derived demand' – i.e. derived from the need for people to socially and economically 'interact'. The end or objective of most travel is to meet a friend, earn income, attend school or purchase a good, not movement per se". Accessibility is thus an important element of this paradigm shift. In accessible cities, not only are certain locations (e.g. workplace, homes) close together; these cities also have safe pavements and cycle routes and affordable, top-quality and low-carbon public transport options. The IPCC (Sims et al., 2014), LSE Cities et al. (2013), WHO and UN-Habitat (2010) argue in a similar way. In this context, UNEP (2012a:34f.) emphasizes the co-benefits of low-carbon, integrated transport development and calls for investment in projects that help reduce or avoid traffic volume. In addition to low-carbon drive technologies, a central element mentioned here is the promotion of pedestrian-friendliness in transport development (pedestrianization).

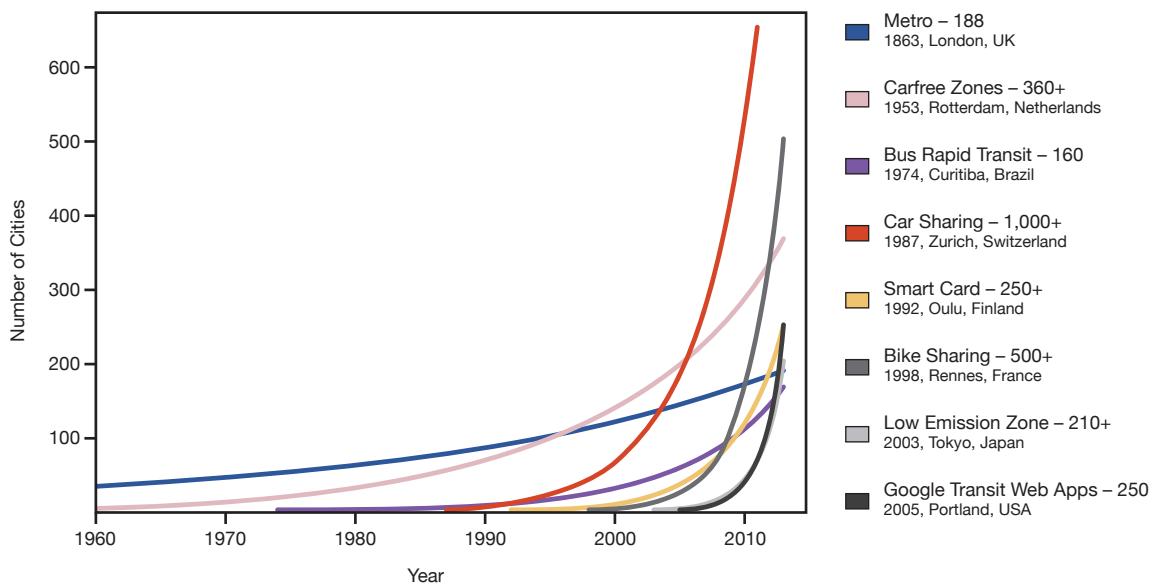
In its report 'Planning and Design for Urban Mobility', UN-Habitat (2013a:200f.) identifies six policy fields for a sustainable urban-transport policy. In addition to (1) the promotion of integrated transport and land-use planning, the report calls for (2) a regenera-

tion of urban transport planning, in particular the link between urban form and transport planning through the optimization of density and functional mixing. (3) It also identifies reorienting investment in transport infrastructure as an action field, particularly increasing the amount of public resources earmarked for transport infrastructures that benefit the majority of the urban population. The current tendency to build more roads and motorways, says UN-Habitat (2013a), should be corrected and more funds directed to non-motorized mobility and public transport infrastructures. In addition, (4) a great deal of weight is attached to inclusion in investment decisions to ensure that planning and investment decisions are socially inclusive and represent all groups of the population. Finally, the report calls for (5) the realignment of the urban institutions and urban governance towards these objectives and (6) a reform of the legal and regulatory framework to make the outlined measures possible.

At least in larger cities in industrialized countries there are initial indicators of a trend reversal in transport development, on which more sustainable planning and governance approaches can build (Figure 4.2-1). More and more cities are introducing environmental zones or banning motorized individual traffic from the inner cities. Today over 210 cities already have environmental zones and over 360 cities car-free zones. In 2000, only five cities offered bicycles for rent; in 2013 this service was offered in 678 cities in industrialized countries and emerging economies, and 186 cities had plans to set up rent-a-bike systems. In North America, the number of car-sharing users has increased from 12,000 (in 2003) to around a million (in 2013; GCEC, 2014:14). On the other hand, the spread of electromobility has developed more slowly than anticipated.

4.2.3 Urban form

Urban form has a considerable influence on many aspects of the transformation towards sustainability, e.g. on the mitigation of and adaptation to climate change, resource use, and access to adequate housing and public spaces. In addition, it has an impact on the local identification and identity of a city's residents. At the same time, the long life spans of buildings and urban infrastructures can lead to path dependencies (e.g. energy use, emissions, life styles and consumption patterns, etc.) which are difficult to change in the long term (Seto et al., 2014). On the other hand, a long life span can also have advantages in terms of resource efficiency or local identity. Urban development (formal or informal) is therefore a decisive lever for the initia-

**Figure 4.2-1**

Urban mobility in upheaval. First introduction and global spread of progressive approaches to planning and governance.
Source: based on Hidalgo and Zeng, 2013

tion of positive, but also negative path dependencies of cities.

The structural shape of cities is defined both by buildings and by the public or private free spaces determined by them. Depending on the dimension under observation (parcel of land, block, city district, entire city or region), different aspects come to the fore: while a parcel of land is marked mainly by the shape and material of individual buildings, when it comes to the city as a whole questions of density, use, interconnectivity and access become more relevant (Seto et al., 2014). In this context, there is always an interdependence between the structural aspects of the city layout and city outline and the social aspects of the perception and use of urban spaces (Mayer et al., 2011:63). This relationship reveals the added value that the urban spaces have beyond an abstract allocation of functions (Wolfrum and Nerdinger, 2008). According to Mayer et al. (2011), a high quality of the built-up environment leads to a higher level of acceptance among the residents or users, and thus brings more life into urban areas. The more possibilities of space appropriation there are, the more likely the urban population is to identify with the city. Architecture and urban development must offer a strong framework that can tolerate changes, additions and enhancements (Mayer et al., 2011:64). There can never be a constant, time-independent optimum in structural design because of the permanent changes taking place in the urban environment, life styles and preferences of the urban population. The built-up environment wears away and

the inhabitants and their life styles change. Buildings and outdoor spaces must therefore be able to adapt without losing quality (Mayer et al., 2011:64). According to Ascher (2011), “new urbanisms should be a flexible urbanism, aesthetically opened, reflexive, with active participation and, formally speaking, an urbanism of devices able to elaborate and negotiate solutions rather than drawing specific plans” (Ascher, 2001:85, cited in Duarte and Beirao, 2011:879).

Furthermore, the urban form of cities has a considerable influence on their use of resources and energy efficiency. For example, it is estimated that the worldwide building stock is responsible for approx. 31% of global energy consumption (Ürge-Vorsatz et al., 2012:653). In order to lower the high level of urban energy consumption, the energy efficiency both of buildings (building insulation) and of the entire city must be improved (Lucon et al., 2014; Seto et al., 2014; World Bank, 2010a).

In view of their geopolitical and cultural diversity, there is no generally valid ‘optimal’ shape or design for cities (Grübler et al., 2012:1387). Instead, the concept of the compact and well-mixed city offers orientation for locally appropriate solutions (Seto et al., 2014). The idea is that cities should be planned in a compact way, and existing towns densified. This makes it possible on the one hand to reduce the energy consumption and CO₂ emissions of cities, and, on the other, to improve the quality of life and the health of the inhabitants (Milner et al., 2012). However, possible conflicts of interest can also be observed in this strategy. For

example, if there is too much densification and there are not enough open and green spaces, the urban heat island effect is reinforced (Seto et al., 2014:977) and social problems exacerbated if population density and anonymity increase (Section 2.4).

According to UN-Habitat (2015a) the principles of sustainable city districts comprise, among other things, the following: a high (population) density (more than 15,000 inhabitants per km²); mixed land use (more than 40% of the ground-floor surfaces should be allocated for economic use); a good social mixture in the city districts (20–50% of the residential use should be allocated for low-cost housing); a limit on the number of single-family homes (less than 10% in a district); and the creation of adequate space for streets and an efficient street network (30% of the land should be made available for roads and traffic use). The compact city districts should furthermore make public life possible for the urban population, be bicycle- and pedestrian-friendly and affordable for all income groups (UN-Habitat, 2015a, b).

Even though these general principles of a sustainable urban form are known and supported internationally (UN-Habitat, 2015b), they are often not implemented. External influences such as planning regulations and economic factors still promote urban sprawl or the construction of low-density settlements with single-family dwellings. Similarly, the possibilities of passive or active energy saving in buildings or city districts are often not taken up due to the absence of any incentives, or out of ignorance on the part of planners and investors (Ürge-Vorsatz et al., 2012:702). The prerequisite for a transformative urban design is the development and implementation of locally adapted, adequate design strategies for low-carbon and people-oriented urban and city-district planning. In addition to the geographical circumstances and technical possibilities, the socio-cultural context in particular must be taken into consideration. In addition, the urban form should always take its orientation from the 'human scale' (Gehl, 2010; Box 2.4-3).

The compact districts and cities should be designed to be adaptable and flexible, making it possible to react e.g. to a change in life styles or to environmental disasters. Especially for cities in risk-exposed locations (e.g. storm and flooding risks), uncertainty-oriented planning can be a sensible option (Jabareen, 2013:222). After all, greater flexibility makes it easier to integrate new knowledge and technical innovations into the urban infrastructure. As many actors as possible should be involved in urban development when it comes to the urban form of a city. This not only increases the local identification of the residents, but also promotes the creative search process of transformative urban design (Section 8.3).

4.2.4

Adaptation to climate change

Climate change will increasingly impact indirectly and directly on city dwellers' living conditions. Climate risks in cities vary from region to region and are very uncertain. They can involve direct effects, such as temperature extremes, droughts or floods, or indirect effects like climate-related changes in food availability in the cities, or effects on the water-supply or electricity systems. Global climate change interacts with a city's climatic peculiarities (Rosenzweig et al., 2011). The urban heat-island effect is an example of this: concrete and other building materials absorb heat; evaporation and its cooling effects decline as vegetation is removed and surfaces are sealed.

It is estimated that a sea-level rise of half a metre could already more than triple the number of people at risk and increase more than tenfold the number of endangered assets (e.g. port cities or industrial installations; Hanson et al. 2011; Revi et al., 2014a: 19). The 20 most vulnerable cities in terms of their people and assets include Mumbai, Guangzhou, Shanghai, Miami, Ho Chi Minh City, Kolkata, New York, Osaka-Kobe, Alexandria, Tokyo, Tianjin, Bangkok, Dhaka and Hai Phong.

The aim must be to reduce such risks and to improve resilience and adaptation to climate risks. In the context of disaster prevention, cities must develop strategies to protect the population, prioritize future infrastructure investments, and integrate the mitigation of and adaptation to climate change in long-term planning. The costs can be considerable; adapting urban water-supply and sanitation systems in Sub-Saharan Africa alone is expected to cost US\$ 2.7 billion per year (without the cost of overhauling today's infrastructure; Revi et al., 2014a). Adaptation to climate change is an iterative learning process that should be incorporated into urban planning as a cross-cutting subject through both incremental and drastic measures (e.g. relocations, withdrawal from formerly populated areas).

The ability of cities to deal with climate risks can be significantly improved by complex urban risk governance and disaster preparedness (Butsch et al., 2016). Municipalities are at the centre of successful urban adaptation policies, because the successful adaptation of cities depends largely on its integration into local investments, policies and the legislative framework (Birkmann et al., 2010; Heinrichs et al., 2011). Concrete action fields include, for example, the protection of vulnerable population groups by building housing in more sheltered locations, improved integrated land-use planning, and changes in building regulations to make structures flood-proof (Revi et al., 2014a). Fur-

ther building blocks for improving crisis-management capacity include offering training courses for the population and boosting the capacity of the emergency services in the event of a disaster.

The decisive factor for urban climate-risk management is to take scientific expertise into account in decision-making processes. Scientists and vulnerable population groups should be involved in addition to the decision makers (Revi et al., 2014a). Adaptation measures should not only react to past experience, but must also anticipate future events and changes. Knowledge of future climate changes, however, is limited and involves inherent uncertainties.

There is also a need to reform university curricula, especially for students of urban planning and development, with the aim of placing more emphasis on the mitigation of and adaptation to climate change in cities (Revi et al., 2014a:585). The lack of valid and comparable data as a basis for urban-planning decisions and the lack of monitoring and evaluation systems, especially in developing countries, are further shortcomings that are frequently mentioned (UKAID and DFID, 2012).

4.2.5 Poverty reduction and socio-economic disparities

Overcoming extreme poverty and major socio-economic disparities in cities (urban divide) is described in many global reports on urbanization as one of the key challenges of sustainable, inclusive urbanization (Revi and Rosenzweig, 2013; UNEP, 2011b, 2012a; UKAID and DFID, 2012; LSE Cities, 2009). The Global Report of United Cities and Local Governments on Local Democracy and Decentralization comes to the following conclusion: "Putting people first means putting basic local services first" (UCLG, 2013:113). Although cities cannot break up the structures laid down by the national economic and political system, they do have room for manoeuvre when it comes to limiting social inequality and improving living conditions (LSE Cities et al., 2013).

In addition to the 'traditional' action field of poverty reduction, municipalities today must be able to respond to closely interrelated and growing multiple risks. The traditional focus on the creation of infrastructure for overcoming urban poverty is no longer enough: newly emerging multiple risks, such as environmental risks, must also be taken into account (UKAID and DFID, 2012). The report to UN Secretary General Ban Ki-moon, 'The Urban Opportunity: Enabling Transformative and Sustainable Development' (Revi and Rosenzweig, 2013), therefore identifies extreme poverty in cities and the growing vulnerability as a result

of climate change as central challenges. In order to reduce extreme poverty in cities, prevent the emergence of new slums, increase productivity and support sustainable development, cities must provide universal access to basic infrastructure and services: housing (affordable housing for all; Habitat II's motto: adequate shelter for all), water supply and sanitation, healthcare, waste management, low-carbon energy services and transport, and communication technologies. The Third Global Report of United Cities and Local Governments on Local Democracy and Decentralization (UCLG, 2013:30) concludes: "Access to basic services is key to improving the living conditions of city dwellers, the effectiveness of local businesses, the attractiveness of cities and, in the end, the competitiveness of national economies". Environmental protection and mitigation of climate change are further key action fields that are closely linked to fighting poverty. On the one hand, it is a matter of access to sufficient clean water and the reduction of air pollution. On the other hand, there should be investment in strategies for improving resilience to natural disasters, weather extremes and other climate risks which affect poverty groups with particular frequency (Revi and Rosenzweig, 2013).

An improvement in the living conditions of urban poverty groups can be achieved through an inclusive economic development policy which enables municipalities to fight poverty, unemployment, social deprivation and vulnerability by funding development programmes on youth employment, the empowerment of marginalized groups, and promoting gender equality (Revi and Rosenzweig, 2013). However, economic development can only have a positive impact on the living conditions of urban poverty groups if the importance of the informal economy is recognized and adequately taken into account. As regards practical measures, the report mentions the development of a system of urban entitlements (ensuring access to basic services), the creation of a social safety net, and offers by the public authorities to formalize informal activities. Municipalities should, says the report, make sure that, in addition to all the other actors (e.g. national governments, private investors, international implementing organizations), urban poverty groups are also given a voice and can help shape the improvement of their living conditions (Revi and Rosenzweig, 2013).

4.3

Transformative action field: 'urban land use'

Urban land makes up only a small percentage of the global land area. Satellite-based estimates of urban land use currently vary between 0.2 and 2.8% world-

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wide (Angel et al., 2005, 2011; Potere and Schneider, 2007; Seto et al., 2011). Although there is relatively little urban land, the influence of cities as drivers of global land-use trends is very large (Section 2.3.3.2). The use of land by and in cities and their surrounding areas is rising significantly as a result of the pressure being exerted by the number of people currently living in cities – 54% of the world's total of over 7 billion people (UN DESA, 2015). This leads to land shortages and increased competition for land use, because land is a limited resource in cities and – depending on the geographical location – also in suburban regions. Urban plots of land with different uses (e.g. for housing, business, infrastructure or green areas) compete with each other within cities, often embedded in a highly dynamic land and real-estate market.

As a result of the current urbanization, suburbanization and peri-urbanization processes (Section 2.2.1), farmland and uncultivated land on the city outskirts are continuously being converted into urban land and sealed. These are usually irreversible interventions in nature and the landscape (Seto et al., 2011:1). At the same time, the pressure is increasing on inner-city green areas, which, because of their central location, are highly sought-after as residential and office locations. It is predicted that future land consumption by cities will increase disproportionately to population growth. In developing countries, a doubling of the population is expected to lead to a tripling of urban area growth by 2030 (Angel et al., 2011). There is a great need for land, above all in the rapidly growing cities of Asia and Africa. Precisely here, however, rapid urban land consumption often encounters inadequate structures of land-use planning, as well as weak urban governance. The distribution, new and re-designation of land, and the management of urban land uses significantly influence the sustainability, functionality and quality of life of a city over a long period of time. The type and manner of urban land use are key and fundamental determinants of urban development as a whole.

In addition, urban actors have a considerable impact on land use in rural areas as a result of the need to supply the urban population with food, energy and raw materials, which are sourced outside of urban areas (Section 2.3.3.2), and the disposal of urban waste, e.g. in landfills outside of urban areas (Section 4.4). This urban-rural relationship leads to complex, fundamental problems for global and local land use; some of these are analysed in the following with regard to land in the city and its surrounding area (see Box 4.3-1 on the impact of cities on the use of land far outside of urban areas).

4.3.1

Urban land use

In the current global urbanization process, existing cities are growing and changing on an unprecedented scale. The stronger the dynamic with which cities grow and change, the more complex are the processes of urban-land development and use. As a rule, these processes are influenced by property-ownership systems, the sovereign or customary-law that govern them, and the related economic mechanisms on the disposal and use of land.

4.3.1.1

Land tenure systems

Worldwide there is a wide diversity of tenure systems regulating the use of land and the 'whether' and 'how' of the disposal of land – in this context particularly urban land. In addition to public or private land tenure, there are further systems which, based on complex cultural and historical influences, also recognize collective tenure categories.

Land can be divided up, i.e. plots of land are created for which ownership can be purchased. Legislation in each country governs who gains usage and disposal rights over land and how this is organized. Such rights can be derived from a fundamental right to property, as is regularly the case in the western industrialized countries. The owner can usually grant other people possession and thus the right to use the land. As a rule, urban land in industrialized countries is either publicly or privately owned. Other forms of rights of use, such as community use or traditional local rights, can be found in developing countries and emerging economies (Payne et al., 2014; UN-Habitat and GLTN, 2012). Not infrequently, different systems overlap, e.g. when the collective usage forms of rural areas meet urban models of private and public property as a result of urban expansion.

The disposal and use of land can be based on customary-law, religious or informal land-use systems (Payne et al., 2014; UN-Habitat, 2008; Box 4.3-2). Codified legal systems distinguish primarily between private and public property, but they also recognize community property. Private land ownership guarantees the owners (natural or legal persons governed by private law) a wide-ranging power of disposal over the land, i.e. a private owner can usually use, modify, let and re-sell the land. Furthermore, private property enjoys (constitutional) protection from state interference. At the same time, the owner has the option of excluding others from using the land. The main purpose of this form of property is to guarantee the individual use of land (Payne, 2001:417). One of the main dis-

Box 4.3-1**Land grabbing by urban actors**

Global urbanization not only has an impact on land use in cities and their surrounding regions; urban actors also influence the use of land in rural areas a long way from cities in many different ways, e.g. for food production, energy generation, space-intensive industrial production processes and leisure facilities (Section 2.3.3.2). With the growing concentration of economic activity in cities, especially in global cities (Section 2.2.1.5), their disproportionate control over spatially distributed resources such as agricultural land is increasing (Leon, 2015:257); this goes far beyond the cities' rural hinterland and has reached global dimensions. Cities or economic actors in cities are also exerting more and more influence on the utilization of areas that are not in their immediate vicinity. In addition to the indirect influence of cities on rural land use, so-called 'land grabbing' is a globally growing problem involving an urban and national expansion of spheres of influence. Land grabbing describes processes of legal or illegal appropriation of large areas of usually agricultural land located mainly in developing countries and emerging economies. As a rule, this appropriation of land – also referred to as land theft when it is illegal – is normally carried out by domestic or foreign public, semi-public or private actors, who use or acquire large areas of land by means of long-term leasing or purchase contracts. The land is mostly used for the production of food or energy crops to meet the food and energy needs of the investing countries or cities, or to make a profit

(BMZ, 2009:3). This land appropriation frequently involves the displacement of the local population – with direct consequences for the local economies and societies (FIAN, 2010). Approximately 70% of land appropriation currently occurs in Africa (Leon, 2015).

According to a study by J.K. Leon that analysed all legitimate land appropriations over 200,000 hectares since 2006, 23 of the 42 largest land appropriations had their base in so-called Alpha world cities, above all in New York and London, followed by Singapore, Seoul and Kuala Lumpur (Leon, 2015). According to the Globalization and World Cities Research Network (GaWC), Alpha world cities are those with the highest levels of global integration at the highest hierarchy level in global city networking – measured in particular by economic interactions with other cities (Leon, 2015). Further purchases have their base in 12 Beta world cities (according to GaWC's definition, these are cities that link a large region with the world economy), of which eight cities have a high level of global connectivity or at least a specialized role in resource extraction.

These patterns show that large areas of land are purchased especially by (private-sector) actors in cities where important global financial service providers are established (Leon, 2015). Because of the high concentration of financial and human capital in these cities, their influence on the regional hinterland and global rural areas is expected to expand further in the future (Leon, 2015:268). This illustrates the key role played by cities in local and global food security, as well as their influence on the rural population, whose lives are negatively affected by land grabbing.

advantages of these private land ownership models is seen in the limited access for low-income population groups and the fact that it is almost impossible for them to acquire land (Payne and Durand-Lasserve, 2012:12; Rolnik, 2012). Although a social responsibility of private property is laid down in many constitutions (e.g. Article 14(2) of Germany's Basic Law: "Property entails obligations. Its use shall also serve the public good."), the rights of private owners are often hardly limited in urban reality. Private ownership of urban land often prevents cities from engaging in sustainable urban planning. For example, densification frequently fails because private land owners do not want to build on their land. Furthermore, it is difficult for local governments to assert public-good-oriented interests against the interests of investors once the latter are the owners of urban land (Altrock and Bertram, 2012; Lenhart, 2001).

The counter concept to private ownership of land is public ownership, which is recognized by almost all societies. Whereas in socialist systems, as a rule, the state owns all property rights to land, in market economies public ownership often only covers a small percentage, mainly strategically important land or land reserved for municipal public services (Payne, 2001:417). For example, a considerable percentage of

public land in cities is currently devoted to road transport. In Europe and North America, this amounts to approx. 25% of the inner-city areas, in many cities in developing countries and emerging economies to less than 15% (UN-Habitat, 2015d).

Customary tenure systems usually relate to local land that is used jointly by a community or group defined by cultural identity or customs. The 'commons' can relate to land and infrastructures, e.g. irrigation systems. These customary systems usually evolved in (agricultural) societies in which there was hardly any competition for land, so that land itself had no economic value. On the other hand, the sustainable, joint use of the land was necessary for the survival of the community (Payne and Durand-Lasserve, 2012:13). During the transition to urban societies, these tenure systems were (or are) mostly complemented, superimposed and superseded by formal or informal systems (Durand-Lasserve, 2005). There are only a few, isolated customary tenure systems in Europe (e.g. in the case of local rights of way); in many developing countries and emerging economies, however, they are still widespread, albeit less so in cities than in the countryside (Payne and Durand-Lasserve, 2012).

In some countries and cities, special forms of land tenure exist for religious communities. This is the case

Box 4.3-2

Securing land rights in informal settlements

Informal and formal systems of land rights not only affect the emergence of informal settlements, but also in particular their consolidation process as a result of the unclear legal situation. This is made particularly difficult when different land rights systems overlap. Alongside the formal legal systems, many contracts and agreements are based on traditional customary rights, as well as diverse new, informal land-rights systems and practices (Magel and Wehrmann, 2006: 288). In the cities of Sub-Saharan Africa, for example, more than five different land-rights systems can overlap, leading to confusion and often to land conflicts (Wehrmann, 2008). In many cities, the formal and informal land markets are increasingly competing for land and housing space (Brueckner and Selod, 2009: 48); land prices and apartment rents in the informal areas are much lower than those on the formal land and housing market.

Even if the appropriation of informal settlements is frequently legitimized (e.g. by local customary law), their inhabitants usually have to live with the uncertainty that they can be expelled from their districts at any time. On the basis of prevailing legislation, local governments can clear an area at any time if the residents have no title to the land (UN-Habitat, 2014b: 11); moreover the people have no protection against the termination of their leases by informal landlords. To address this problem, attempts have been made for many years to make the residents more secure by awarding property titles, thus also increasing their willingness to invest in

their homes or city districts. Another aim in this context was to give them access to private-sector markets and to borrowing for further investments – covered by the property titles (de Soto, 2000).

On the basis of this model of private property titles, there is an international discussion on the ‘continuum of land rights’ (Figure 4.3-1). This places different forms of ownership and property into a linear model that describes a continuum from informal (insecure) ownership to formal (secure) private property (Payne, 2001: 418; Durand-Lasserve and Selod, 2009: 102f.; UN-Habitat and GLTN, 2012: 12). The original aim of this continuum was to illustrate the diversity of ownership models; however, in its practical application it revealed that many upgrading projects unilaterally promoted formally registered private property (Rolnik, 2012: 9). This often actually aggravated the housing shortage for broad sections of the population, since urban land prices and rents rose sharply. Furthermore, in development cooperation, the model blocked the testing of alternative rights of usage and disposal, which do more to promote poorer population groups’ access to the purchase of land and the associated housing (Augustinus, 2010: 131). In the meantime, the continuum of land rights is seen in a more differentiated way; the aim is to promote the rights of usage and disposal that guarantee the residents secure housing (Payne et al., 2014; Figure 4.3-1). Since ownership and the rights of usage and disposal are based on a wide range of highly diverse social and economic contexts, all things considered, there can be no universally valid ideal of urban land ownership. (Formally registered) private property is thus only one (secure) option among many

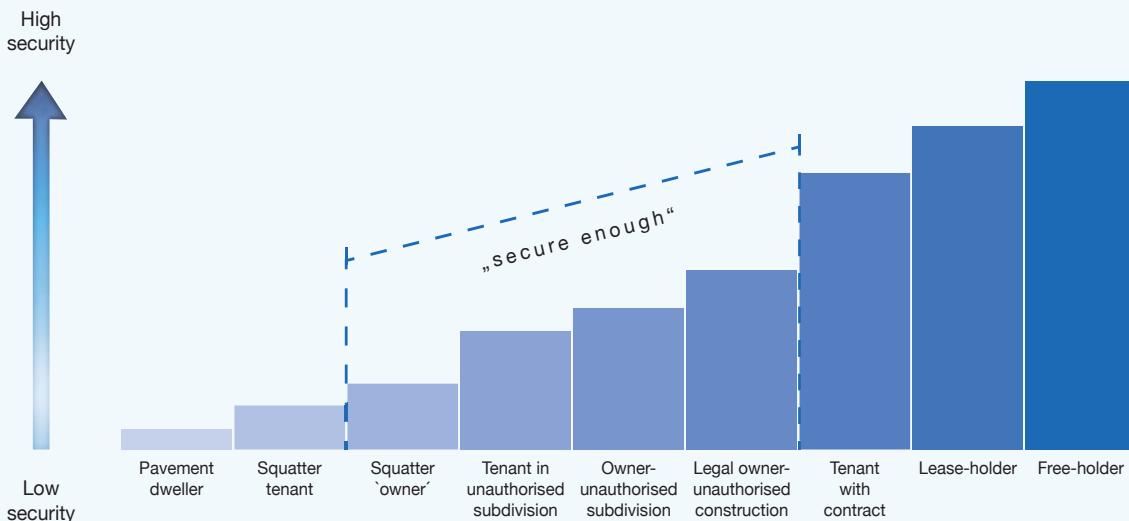


Figure 4.3-1

The continuum of urban land rights. The diagram illustrates conventional usage and disposal agreements and rights in the urban context. The arrangements on the left-hand side are highly uncertain (pavement dwellers, tenants in squatter settlements); further to the right they become more secure. The best protected are urban residents with formally and legally protected agreements (tenants, lease-holders, owners). However, it is also becoming increasingly difficult to achieve a more secure ownership status (the steps are growing higher). This is often connected with the inhabitants’ wealth or gender, social networks or even the political stability in a city. Especially in cities where state control is limited – and depending on the individual needs for affordable, flexible housing – informal agreements can also be ‘sufficiently secure’ to enable people to build up a livelihood and gain access to supply services – at least in the short-term. However, these types of settlements are threatened by eviction and destruction.

Source: Payne et al., 2014

multi-dimensionally interconnected rights and regulations (Payne et al., 2014; Rolnik, 2012:9f.; Farha, 2015).

Securing land rights is a key prerequisite for adequate housing, particularly for protection against eviction. In addition, such rights are often a prerequisite for the ability to claim political rights or for access to the formal labour market.

e.g. in Islamic societies, where individual concepts on access to and the use of land have survived parallel to the formal tenure system (Sait and Lim, 2006).

Informal tenure systems are found mainly in the cities of developing countries and emerging economies. They often develop where formal systems fail, because, for example, they cannot keep pace with the rapid population growth and the related demand for low-cost residential land (Rolnik, 2012:7; Section 7.3). In such cases, the inhabitants are virtually forced by necessity to occupy land illegally or build on land outside the legally standardized framework. There are frequently overlaps of formal and informal land use, e.g. if a property owner has a formal, legal title but permits informal use.

Compared to the changes in political or socio-economic systems, land tenure systems are relatively slow to change (Payne and Durand-Lasserve, 2012:15 ff.). Overall, it can be observed that there is currently a global trend from mainly collective systems to a growing or now-dominant form of individualized private ownership. This change is taking place in particular in the context of the formalization and allocation of land rights in developing countries (Box 4.3-2). This unilateral promotion of individualized private ownership, which is also propagated by many international organizations, has recently been facing criticism. This applies in particular to cities in developing countries, where the displacement of alternative ownership and usage models can lead to land conflicts (Wehrmann, 2007) and the permanent exclusion of low-income groups from land markets, since land prices increase as a result of the formalization process (Durand-Lasserve and Selod, 2009:110). There is a growing call, especially relating to developing countries, that (formally registered) private property should not be the only option promoted, but should simply function as one alternative among many – multi-dimensionally connected – models (Payne et al., 2014; Rolnik, 2012:9f.; Durand-Lasserve and Selod, 2009).

4.3.1.2

Trade with land and real estate

Plots of land can moreover be commodified, i.e. the land is legally regarded as an asset and traded accordingly. The prices for urban land and real estate, which are usually linked, are rising. This is a result of the rapid

The promotion of creative approaches to urban land, property and housing is key. In particular, the social function of ownership of land and real estate should be promoted, as should a diversity of owner models (Sections 4.3.3 and 7.3.5).

urbanization processes (Section 2.1) and subsequently the increasing demand for the ever scarcer available land. This frequently leads to the gentrification of districts, which, for example, develop into pure office districts or luxury residential districts as a result of the influx of well-to-do population groups.

The high level of demand for urban land worldwide has led to an increase in the national and international speculative land and real-estate business. It is believed that 60-70% of banking business transactions in industrialized countries are related to land and real-estate speculation (Turner, 2015). This is also reflected in the rising number of real-estate billionaires in the world. In 2015 alone, 25 new real-estate billionaires were listed in Forbes, so that in the meantime 157 of the listed billionaires make their money from real-estate transactions (Forbes, 2015). Over half of the 20 richest real-estate billionaires come from Southeast Asia.

Yet speculative real-estate markets often lead to major crises. There are many examples of 'burst real-estate bubbles', such as those that took place in Alabama and Chicago in 1810 and 1830, the 'Florida land boom' of the 1920s, the Japanese 'asset price bubble' from 1986 to 1991 or the Spanish real-estate crisis between 1985 and 2008 (Kennard and Hanne, 2015). The 2008 financial crisis, which escalated into a global crisis, also had its origins in overheated land and real-estate markets in the USA (FCIC, 2011).

Speculation with land and real estate is not a 'privilege' of western global cities. According to a ranking compiled by Cushman & Wakefield (2015), five African real-estate markets are listed among the ten markets with the best earnings prospects for global land and real-estate investments. However, the speculative markets often also result in high vacancy rates both in luxury real-estate and in formal and informal housing markets for lower income groups. In addition, real-estate transactions are prone to corruption and money laundering (Box 4.3-3).

4.3.1.3

Forms of urban land-use regulation

Land is the basis of all structural urban development. It is on this foundation that, for example, the urban form of cities and city districts develop – either formally planned or as a result of informal urbanization

Box 4.3-3**Corruption and money laundering on the land and real-estate markets**

The enormous profit margins of the land and real-estate markets are often achieved in opaque transactions. On the one hand, this makes this sector of the economy extremely susceptible to corruption, particularly bribery of public officials in land purchases or applications for building permits (e.g. in Cairo: Section 5.3). On the other hand, land and real-estate transactions also offer opportunities for money laundering, i.e. the introduction of illegally obtained money into the legal economic cycle (BKA, 2011; AUSTRAC, 2015; TI-UK, 2015; Story and Saul, 2015; Unger and Ferwerda, 2011). This danger is a particular threat in cities where access to land and real-estate ownership is not transparent. According to estimates by Transparency International UK, for example, a considerable proportion of luxury real estate in the centre of London, was perhaps bought with illegal funds (TI-UK, 2015), since in London anonymous offshore front companies from foreign tax havens have access to urban land and real estate. At present, about 36,240 property titles in London – an area of approx. 5.8 km² – are owned by anonymous foreign shell companies based in tax havens (TI-UK, 2015:3); nearly half of these properties are in the expensive inner-city locations of the City of Westminster, Kensington and Chelsea (TI-UK, 2015:16). The people behind the offshore shell companies cannot be identified from the land register, and, in the case of sale, the land and the real estate are sold together with the offshore shell company. These transactions can be very susceptible to money laundering. For example, off-

shore shell companies in tax havens were involved in approx. 75% of the (few) cases of corruption and money laundering in the real-estate industry that have been prosecuted in the UK (TI-UK, 2015:3). Because of the difficulties involved in investigating such offences, it must be assumed that the crime statistics only reflect a small percentage of the cases of both corruption and money laundering in the real-estate sector. The number of unreported cases of corruption is therefore generally estimated to be extremely high (BKA, 2014:12; Bannenberg, 2002). In the field of money laundering, the UN puts the criminal detection rate at less than 1% worldwide (UNODC, 2011a:7).

The susceptibility of land and real-estate transactions to corruption is not limited to the segment of global luxury real estate; it also affects ‘simple’ purchases of land and real estate. According to surveys conducted by Transparency International, land allocation is one of the three economic sectors most affected by corruption. For example, in a survey 38% of the Kenyan, 58% of the Indian, and 75% of the Pakistani respondents stated that they had to pay bribes for the registration or allocation of plots of land (TI, 2013). In China, too, where the state has the sole right of land ownership, the authorities investigated approx. 168,000 illegal land-use transactions in 2003 alone (Phan, 2005:22).

Overall it can be said that the land and real-estate market is highly susceptible to speculation and corruption. The high level of urbanization pressure and the growing shortage of land suggests that this problem is likely to worsen in the future. Countering this ‘urban land resource curse’ (Zinnbauer, 2015) will be one of the most urgent challenges of transformative land-use management.

processes. In addition, the use of the land is determined by the practices of city residents and visitors. Different basic functional uses can be distinguished in this context; e.g. the land is used for housing, working, commercial or industrial activities, as well as for transport, leisure and recreation. When land has several uses, it is said to have mixed uses. These different uses usually coexist horizontally, but – particularly in cities with a high level of (structural) density – they can also overlap vertically. Furthermore, individual uses can in turn have a decisive impact on land development in cities. For example, transport costs and routes have a considerable influence on site development and the density of urban areas (Seto et al., 2011:7).

Forms of sovereign usage regulations

The state regulation of land use in cities draws on the typical repertoire of governmental forms of action (laws, statutes, plans) and various control instruments (fees, rules or prohibitions, subsidies). They contain normative requirements on how an area of urban land should or may be used. The main purpose of the sovereign regulation of urban land uses is to control all forms of land use, which can be motivated by social,

spatial, ecological or economic use, or by a mixture of these aspects, depending on the underlying concept. The functions of sovereign regulation in relation to urban land are many and varied. For example, it can determine the density or height of buildings, introduce zoning schemes, impose certain uses or try to prevent growth outside certain limits (urban growth boundaries; Brueckner, 2009:4ff.; Henderson, 2009:26ff.). Although there are considerable differences between different legal systems when it comes to regulating land use in cities, it is possible to describe aims, functions and instruments in general terms. As a rule, to successfully apply and implement these instruments, land must be documented and secured (Section 4.3.3), and strong urban governance is required (Section 2.5).

Urban-planning instruments

Urban planning is the key instrument of sovereign usage regulation at the local level. In a multi-level system, urban planning is intermeshed with and influenced or even determined by higher levels of planning, e.g. national or regional plans. The main instruments of urban planning are zoning maps, master and development plans (including their written explanations),

which lay down requirements for the entire urban area or for city districts, e.g. on settlement types, forms and degree of building uses, etc. Urban planning regularly divides the cities into zones in which one use dominates (e.g. residential, commercial and industrial, green spaces), or, where applicable, a mixed use is permitted. Depending on the respective planning regime, however, these regulatory measures do not concern land-related zoning alone (this is often the case in the USA: e.g. McDonald and McMillen, 2012:439), but are linked with further planning objectives of the cities. For example, cities might promote developments to strengthen resilience against the effects of climate change, to manage reconstruction after conflict and disaster situations, or to reduce crime and violence in cities (UN-Habitat, 2009b: 13f.).

Urban planning can be used to overcome a wide range of challenges. In industrialized countries the focus is often on redeveloping already built-up areas (e.g. industrial wasteland, traffic zones, residential areas) and, related to this, overcoming the non-sustainable path dependencies of existing settlement structures (Section 7.4). In addition, there is often the challenge of minimizing and preventing further land sealing or urban sprawl in areas outside residential areas. One of the challenges in newly developing urban areas is preventing negative path dependencies (Section 7.2). In the meantime, various poverty-reducing and conflict-sensitive approaches to land development are also being used in the regulation of land use – particularly in periurban areas and above all in the growing cities in developing countries and emerging economies. These include e.g. 'guided land development', which aims to control the development of agricultural land into urban land by means of infrastructure-development measures. Land rights are re-structured via land pooling and/or land readjustment with the involvement of local actors, one aim being to generate space and financial resources for the infrastructure. Transferable development rights are used to separate the rights to use land from the rights of disposal, so that the owners develop land in certain regions favoured by the local government. An alternative is to assign the task of developing and administering land for the common good to community land trusts as non-profit cooperatives (Lipman and Rajack, 2011: 12ff.). Although these methods have even been implemented in a small number of autocratic states such as China, Rwanda, Singapore and some of the Gulf States, they often fail because of political, institutional, legal or financial obstacles (Payne, 2014:23).

Fiscal control instruments

Further sovereign control instruments include fiscal instruments such as taxes on land and property, on

the value appreciation of land and real-estate in infrastructure investments, and fees and charges for land use or infrastructure expansion (UN-Habitat and GLTN, 2011; Seto et al., 2014:964f.). At the same time, this tax revenue can be used for public investment. It is difficult to use these economic instruments in many cities, above all in developing countries and emerging economies, because the appropriate administrative structures either do not exist or do not function (Lipman and Rajack, 2011:7). But even in cities in industrialized countries there are often shortcomings in the taxation of land and real estate. Sometimes, for example, property acquisition tax is not paid on the sale of (privatized) urban plots of land. In a share deal, for example, it is not the real estate and/or the land itself that is sold, but, on a pro-rata basis, a company that owns the property or land. The company is sold pro-rata because property acquisition tax only falls due if 95% of the shares of a company are transferred to the purchaser. In Berlin in 2015, for example, the Canadian real-estate investor Brookfield was able to purchase land and real estate at Potsdamer Platz for € 1.4 billion without having to pay (an estimated € 84 million in) taxes to the city; Brookfield used the form of a share deal together with another investor, who acquired the much smaller share (Mortsiefer and Jahberg, 2016).

In addition, there are also indirect fiscal instruments of land-use regulation, i.e. regulations from other sectors have a strong impact on land use. This can relate to certain austerity programmes or the taxation of other assets. For example, in the USA a 10% increase in gasoline prices once led to a 10% reduction in construction projects in the periurban areas (Molloy and Shan, 2013). More recent control instruments also relate to a trade in land certificates (Box 4.3-4).

Transferability of sovereign regulatory systems

The different land tenure systems and instruments for the regulation of land use determine the development of cities around the world to varying degrees and emphasize different aspects (e.g. in relation to public-good-oriented urban planning in Brazil: Box 4.3-5). A specific system, in turn, consists of a large number of actors, processes, instruments and laws that establish both obligations and rights. Seen from a global perspective, however, the land tenure systems often also contribute to a wide range of urban issues – such as environmental problems, rapid urbanization or informality (UN-Habitat, 2009b). The causes are many and varied because tenure and planning systems around the world differ considerably, depending on the political, cultural or economic context (UN-Habitat, 2009b: 81). A blueprint-like transfer of planning systems or system components that have proved successful in one political or cultural con-

Box 4.3-4**Land consumption in Germany: sustainability strategy, instruments and potential new control approaches**

The demand for land in Germany is declining slightly, although it is still high for housing and transport purposes. For example, in 2008 the amount of land used for settlement and transport expanded by 95 hectares per day (Bock et al., 2011:21). The excessive use of land is also causing ecological damage in Germany. A loss of quality of life is expected in the future – e.g. as a result of desolation in urban locations caused by high vacancy rates in residential, commercial and retail properties, because the trend seems to be to erect new buildings in peripheral areas rather than exploit empty properties (Bock et al., 2011:28). In its sustainability strategy (2002), Germany's federal government therefore declared two national objectives for land-use policy to be achieved by 2020: the increase in the amount of land used for settlement and transport should be limited to 30 hectares per day, and the relation between internal and external land development should be 3:1 (Bundesregierung, 2002; Bock et al., 2011:41; Wunder et al., 2013:186f.). All levels of planning are to be responsible for implementing these objectives (Bock et al., 2011:45). The latest progress report on the sustainable development strategy, issued in 2012, shows that significant obstacles still need to be overcome to achieve the 30-hectare objective by 2020. Although the first-time use of land for settlements and transport fell to 77 hectares per day in 2010, the target will not be reached by 2020 if development continues at the present pace (Bundesregierung, 2012). The instruments available for reaching the target include the concept of internal development, land management (e.g. circular-flow land-use management and wasteland documentation), and the implementation of existing building and planning law (Bundesregierung, 2012). Circular-flow land-use management and trading with land certificates are briefly described in the following as examples of new potential approaches for achieving the objectives of the sustainability strategy.

Circular-flow land-use management

Circular-flow land-use management describes a management approach aimed at avoiding unnecessary wasteland as well as the use of new plots of land: 'The main priority of circular-flow land-use management is to systematically exploit all existing land potential, and only to allow new land to be used under certain conditions' (quote translated from the German: Preuss et al., 2007:11). The underlying philosophy is based on a formula of 'avoiding – recycling – offsetting' and is thus a form of 'land recycling' (Dosch et al., 2007:387). Developed and tested by the Experimental Housing and Urban Devel-

opment (ExWoSt) in its 'Land in a Cycle' (Fläche im Kreis) research programme, the approach is now being tested in the EU-funded project 'Circular Flow Land Use Management' in six pilot projects in the Czech Republic, Italy, Germany, Austria, Poland and Slovakia (CircUse, 2016; Preuss et al., 2007). The initial prerequisite for the introduction of the concept is the participation of as many governmental and private actors as possible at the various levels involved in the planning process (Preuss et al., 2011:15). The implementation of this approach requires a policy mix comprising, among other things, planning, information, management, cooperation, investment, financial incentives and amendments to the law (Preuss et al., 2011:16). Practical measures might include, among others, 'the closure of gap sites, the rehabilitation of wasteland, subsequent densification in the narrower sense [...], avoiding or overcoming building vacancies, [...] demolition, and otherwise unsealing and renaturation of land' (quote translated from the German: Windoffer, 2015:149). The concept of documenting plots of land as comprehensively as possible – and then to categorize and re-use them – appears promising. The results from the test regions will show how much political, financial and administrative effort this will require. Circular-flow land-use management could be combined with land-certificate trading, which could create economic incentives to strengthen internal development in cities (Preuss et al., 2011:19).

Trading with land certificates

Tradable land certificates is one of several ideas being discussed with the aim of limiting the rate at which new land is used for settlement and transport: every city or municipality is allocated limited land-designation rights in the form of certificates. If these are not sufficient, the city can either buy additional certificates from other municipalities or alternatively lower its need to designate new land by means of subsequent densification, gap-site programmes or similar ideas (Walz et al., 2009:2). The instrument of land-certificate trading is already in use to a limited extent in the USA and China, and its introduction in Germany is currently being assessed in a model project of the Federal Environment Agency, due to last until 2017 (Bizer et al., 2012; IW Köln, 2016). Land-certificate trading is supposed to minimize inter alia the costs of attaining a given land-savings target country-wide (e.g. the 30-hectare target already mentioned), as well as a reliable upper limit for land consumption in a relatively flexible planning environment (Bovet et al., 2011). Implementation might prove difficult, however, if financially weak municipalities have already designated too much land for development. Instead of simply withdrawing this land, there would instead be too many 'white certificates' on the market, thus hardly reducing total land consumption (Waltz, 2015).

text frequently does not work in other cities due to differences in resource availability and incompatible societal processes (UN-Habitat, 2009b; Rongwiriyaphanich, 2014:3). For example, the transfer of western planning systems to developing countries and emerging economies often fails because of the very different demands that are made on planning or because of the different gov-

ernance systems. Also the transfer of free markets and their influence on urbanization in developing countries is regarded as very problematic because of dysfunctional property rights systems (Cai et al., 2015:32).

Box 4.3-5**Examples of public-good-oriented urban-planning instruments in Brazil**

In Brazil, the urban-planning system was reformed in the late 1980s. Since then, among other things, the 'right to city' has been enshrined in the constitution. Articles 182 and 183 of the Brazilian Constitution on urban-development policy and acquisitive prescription are defined in greater detail in the 1990 Urban Statute. In order to ensure the social functions of a city, the Urban Statute stipulates, among other things, that urban property should be used for the public good, for the security and well-being of a city's inhabitants, and for the protection of the ecological equilibrium (Mengay and Pricelius, 2011:249). In addition to the social function of real-estate and land ownership, the guiding principles are the fair distribution of the costs and benefits of urbanization and the democratic management of the city (Rodriguez and Barbosa, 2010:25). Moreover, the 'right to city' (Box 3.5-1) is defined in Article 2(1) of the Urban Statute 'as a right to a sustainable city'. It is differentiated into a 'right to urban space, to housing, to sanitation, to urban infrastructure, to transport and public services, to work, and to free time (leisure) for the present and future generations' (Mengay and Pricelius, 2011:249). In addition to the legal protection of informal settlements afforded by Article 183 of the constitution, the Urban Statute defined a number of progressive instruments of planning and governance. Among other things, these aim to restrict speculation with land and real estate and guarantee socially compatible urban development. They include the following:

Master plans

All cities with more than 20,000 inhabitants are required to prepare master plans for urban development. The master plan is an integral part of the urban-planning process and is intended to develop guidelines and priorities for the urban budget (Article 40 of the Urban Statute; Furbino Bretas Barros et al., 2010). Unlike previous top-down planning instruments, broadly based citizen participation is required for the preparation of the (new) master plans. Cities that do not develop master plans as required can be denied access to federal funding for the infrastructure or the health system (Goldenfum et al., 2008: 4).

Zones of social interest

In order to create and/or maintain adequate, affordable housing, the local governments have the right to declare unin-

habited or unused areas, informally settled districts (favelas) and other regions to be zones of social interest (Zonas Especiais de Interesse Social – ZEIS). Unsettled and unused areas that have been declared as such may only be used for social housing. Furthermore, local governments can force the owners to make them available for such use. If a local government declares a favela as a ZEIS, the inhabitants of this land are protected from eviction. The intention is for the areas to be upgraded and used if at all, for social housing. The resettlement of people living in informal settlements is highly regulated, and local governments only have the right to relocate households in problematic areas (e.g. hillside slopes vulnerable to landslides), or to create infrastructure.

Compulsory use and compulsory parcelling

Cities can force owners of unused or underused plots of land to parcel them and use them for social housing. The owners are given deadlines. If these are not met, further compulsory measures can be taken (Furbino Bretas Barros et al., 2010:98ff.).

Progressive property taxes and expropriations

The city is entitled to levy a forced tax based on the value of the property, which increases the longer the conditions set by the city are not fulfilled. Thus, local governments try to make the speculative purchasing and holding of real estate unprofitable and to stop real-estate speculation. Property owners who do not comply with the conditions can be expropriated by the city. The city must compensate the owner and refund the value of the property. This can be done in the form of bonds that the city does not have to redeem for ten years (Furbino Bretas Barros et al., 2010:98ff.).

Impact of the constitution and the Urban Statute

Despite Brazil's comparatively progressive constitution in the field of urban development, and positive examples like Porto Alegre and Curitiba, 'since the 1990s at the latest, fragmentary development processes have become increasingly visible in the urban sphere' in Brazilian cities (quote translated from the German: Coy and Töpfer, 2012:9). This is due not least to the fact that, although the constitution and the Urban Statute provide progressive instruments, the local governments are frequently overtaxed when it comes to applying them. On the one hand, they lack the capacity to implement them in terms of planning and administration. On the other, the political will for implementation is not always present at the local level. Further municipal laws and regulations that would help supplement the Urban Statute have not yet been passed in the majority of the cities (Maricato, 2010:26).

4.3.2**Requirements of transformative land use**

In a temporarily open window of opportunity, the urban development and/or expansion process offers numerous options for making land use a lever for influencing the transformation process towards sustainability in cities and avoiding unwanted path dependencies. This requires a long-term vision oriented towards the WBGU's normative compass (Chapter 3), coupled with clarity on which

negative developments (e.g. irreversible overexploitation of resources) should be avoided.

4.3.2.1**Natural life-support systems, inclusion, Eigenart**

The WBGU's normative concept has three dimensions: the natural life-support systems, inclusion and *Eigenart*, which mutually influence each other and represent a framework for a sustainable development in the city (Chapter 3). Land use within the administrative urban

4 Exemplary transformative action fields

area and its extension areas is a key point linking all three dimensions; its design influences the interactions between the three dimensions.

- *Natural life-support systems:* Urban land use influences both the protection of ecological resources (e.g. the designation of different levels of protected areas with the aim of maintaining the urban ecosystem services), the fight against urban environmental impact (e.g. traffic/road networks, designation of ecological compensation areas, regulation of the degree of land sealing), and the global mitigation of climate change.
- *Inclusion:* Among other things, land use determines geographical access to and distribution of the technical and social infrastructure and can strengthen substantive inclusion (Section 3.4). The availability and location of land and the conditions of usage, for example, are important economic factors for the location of businesses and can strengthen economic inclusion. In the form of various land-use and ownership models, land use simultaneously determines the inhabitants' access to land, property and urban spaces – and sometimes also access to political inclusion in the city.
- *Eigenart:* Land use affects numerous aspects of urban *Eigenart*. The property models and corresponding regulations determine who has access to purchasing and using land and how plots of land can be used or developed. The urban cultural heritage (e.g. preservation of historical monuments in Germany) can also strengthen identity and diversity in cities and, in this way, open up opportunities for different transformation pathways.

The goal of transformative land use is to reach a balance of interests between the three dimensions and, simultaneously, to create sustainable synergies. Challenges can arise, for example, as a result of temporary population changes, as in Europe currently due to refugee movements (Box 4.3-6). When there is a shortage of space, there are many conflicts of objectives between all three dimensions (e.g. nature conservation areas versus industrial or residential areas versus meeting places), which need to be harmonized by long-term, holistic, adaptive and flexible planning and a locally adjusted land management.

4.3.2.2

Principles of transformative land use

Land and its use represents a key resource for the transformation towards urban sustainability. The WBGU advocates a form of land use that can make a crucial contribution to the Great Transformation. For this reason, the WBGU considers the following principles to be key and believes they should be taken into account

when facing the challenges and approaches involved in managing transformative forms of land use.

Minimize consumption of new land by 'decentralized concentration' and revitalization

Sustainable land-use management can help reduce land consumption in cities and city environs and, for example, stem building on agricultural land. Similarly, different measures can be employed to reduce land consumption when a settlement area needs to be extended as a result of population growth. These include in particular urban densification by the structural use of previously undeveloped or underused land within an existing development (BBSR, 2014a:5), e.g. by revitalizing industrial wasteland or inner-city districts. Urban restructuring should simultaneously be used to adapt cities to climate change and improve the quality of life in a city by leaving or extending green and open spaces to improve the urban climate (Section 4.2.3). Spatial planning should pursue objectives of 'decentralized concentration' to avoid unilateral concentrations and develop balanced, polycentric spatial and settlement structures (ARL, 2016).

Furthermore, a distinction must be made between a real scarcity of land and a forced scarcity of land, for example when inner-city areas of land or housing estates are abandoned or empty, or left to decay, as a result of land and real-estate speculation. This is the case, for example, in Cairo, where the estimated vacancy rate in the housing market is about 30% in both the formal and informal housing sector because of real-estate speculation (Sims, 2012; World Bank, 2008a). The scarcity of land in periurban areas or the huge areas of available land in the desert seem to play only a subordinate role (Box 5.3-1).

Orientation of urban land towards the common good

A not inconsiderable percentage of urban land should be reserved for forms of use that are oriented towards the common good. This should apply both to public and – to some extent – private land. In particular, this involves the designation and protection of public facilities such as parks, squares, playgrounds, cultural centres and other meeting places – also for urban-development projects carried out by private investors. Conflicts of interest between politics, administration, citizens and the private sector must be taken into account in land use. Against the background of a worldwide dominance of private investors in urban development, UN-Habitat also calls for the restoration of public authority in the planning and shaping of cities where urban development is dominated by private investment interests (UN-Habitat, 2013a).

Box 4.3-6

Challenges in the provision of housing in Germany as a result of the current refugee movements

In 2014 and 2015, more people migrated to Germany than at any time since the 1990s (Mediendienst Integration, 2016a). For 2014, net migration (= number of immigrants minus the number of people leaving Germany per year) came to an influx of approx. 550,000 (BAMF, 2014:6; Mediendienst Integration, 2016a). This influx includes all immigration to Germany, of which those seeking refuge are only one group. However, the number of applications for asylum also rose by 58% in 2014 compared to 2013 (BAMF, 2014:7). In 2015, the increase in asylum applications was even higher at 155% (BAMF, 2014:7). The official migration statistics are not yet available for 2015. However, based on the registration data for the first half of 2015, immigration for the full year is expected to be at its highest level since the introduction of the registration system in 1950 (Mediendienst Integration, 2016a). This means that Germany's federal, state and municipality governments, as well as civil society, face the challenge of responding quickly to this development by providing adequate accommodation and food for new arrivals, and offering them short-term and, where appropriate, long-term prospects. The current situation impacts on many points of the WBGU's normative compass and the challenges discussed in the report, because the issue is to accommodate migrants in such a way that particularly the requirements of substantive inclusion are met. The yet-to-be-created structural solutions and land-use strategies must comply with existing environmental-protection standards when it comes to adequate housing, mobility, access to healthcare, etc.

As a reaction to the influx of refugees and parallel to the change in asylum law, amendments to zoning laws were enacted in 2014 and 2015 to make it easier to change the use of buildings or construct new buildings to create refugee accommodation. The current amendment of section 246 of the Federal Building Code (BauGB), which entered into force on 24 October 2015, is intended to accelerate the accommodation of refugees by means of new construction measures (Bundesregierung, 2015). It allows deviations from several zoning requirements to facilitate new building and changes

in building use in residential and commercial areas, as well as in outer areas, in order to create new refugee accommodation or convert other buildings to this purpose. Overall, building permits can only be issued under these different standards up to the end of 2019, although this does not affect the duration of permits already issued (Krautzberger and Stürer, 2015). Section 246(14) of the BauGB contains a kind of catch-all deviation, according to which sections of the BauGB, or regulations enacted on the basis of it, may be waived – to the extent necessary – if all previous deviation possibilities of section 246 of the BauGB are not sufficient to provide urgently needed accommodation.

This amendment to the Building Code reveals not only collisions of interest between different dimensions of the normative compass (Chapter 3), but also other challenges for multi-level governance (Section 2.5, Chapter 8). On the one hand, implementation promotes substantive inclusion by making it easier to create new housing. On the other hand, deviations from environmental-protection and nature-conservation standards are legitimized. Shortened procedures mean that municipalities are not involved in the decision-making process in the usual way via building permits (Krautzberger and Stürer, 2015). This reduces the realization of *Eigenart* in the sense of the normative compass. In practice, the easing of zoning regulations for refugee accommodation will only deliver fast remedies if the local authorities are simultaneously equipped with more staff (Krautzberger and Stürer, 2015). It will probably only be possible to finally assess the true consequences for the structural environment after 2020. It is important to note, however, that particularly the deviations from existing environmental and building standards are only justified if they represent part of a short-term problem-solving strategy and do not lead to permanent changes involving path dependencies that have a negative effect on the environment. For instance, alternatives to container construction, such as wooden buildings, and the use of existing potential space – e.g. the structural extension of flat roofs, the use of empty buildings, or the interim use of buildings not designed as residential buildings – should be part of the short-term solution strategy (DIFU, 2015b:6; UBA, 2016). In the long term, the already existing maxims of mixed use and internal development should be part of the strategy (UBA, 2016) in order to prevent negative path dependencies.

Greater flexibility in land use: create public open spaces and spaces of encounter in the city

Urban meeting places of various kinds are important for urban coexistence and quality of life, as well as the social cohesion of a society. In addition to public spaces (e.g. public squares, roads and green areas), this also includes community facilities (e.g. social, cultural or religious community centres, clubs and sports grounds). These places offer space for social, cultural and sporting activities, for the development of social networks, civil-society engagement and cooperation, e.g. between citizens, the local government and city politicians. They are thus a key aspect for the formation of local identity (Section 3.5.3.2).

The privatization of public spaces and a lack of security in public areas are a danger for public open spaces and meeting facilities in cities, because they are often associated with the exclusion of certain population groups (e.g. the exclusion of the poorer population groups, dangers to women). Although the usability and liveliness of public open spaces can be influenced by spatial design – for example by taking visual clarity, orientation, accessibility and security into account in planning (BMVBS, 2009, Section 4.2.3) – the quality of urban areas is ultimately determined by how they are actually used by different groups.

Adaptability and reversibility of land uses

Since urban land is frequently used one-sidedly as a result of sectoral claims (e.g. traffic zones), a sustainable form of use should aim to make areas as adaptable as possible with regard to claims to their use. To this purpose, land should, for example, remain relatively unsealed, so that it can be adapted to new overall conditions and used to meet different needs (Section 4.2.3). This can become necessary, for example, as a result of permanent changes, such as a change in the urban climate with an increase in the frequency of heat waves, or reversible changes such as providing additional temporary accommodation for refugees.

4.3.3

Starting points for implementing transformative land use

The principles of a transformative form of land use (Section 4.3.2.2) provide a framework for urban development, but simultaneously require far-reaching change processes. In the WBGU's view, these processes can be initiated and implemented, e.g., via general management levers (Section 4.3.3.1) or special management models (Section 4.3.3.2). It is important that these instruments are seen in close connection with the complex negotiation processes of urban development. This requires the combination of sovereign and consensual instruments for land management, also taking into account informal processes and structures for the implementation of a resource-conserving, fair and multifaceted form of urban development.

4.3.3.1

General steering mechanisms

Transformative land use can be initiated via general management mechanisms. The aim, for example, is to diversify urban land-tenure forms and rights, document and secure plots of land, regulate uses in the context of local overall conditions, link informal and formal aspects of land use, and prevent corruption in the allocation and use of land.

Diversify urban tenure forms and rights

In order to remove urban land from the unilateral profit-focused logic of private owners and return it to the service of the common good, the acquisition of ownership of urban land (also by private individuals) must follow sustainable criteria and be governed by a wide variety of conditions (von Winterfeld et al., 2012). For example, land sales in cities could be made contingent on a social-impact analysis.

In view of the large number of tenure forms and

rights that exist worldwide, the wide range of alternative customary-law and informal tenure systems should be taken into account, especially in developing countries and emerging economies (Box 4.3-2). One-sided promotion of formalized private property seems unnecessary or even obstructive here, particularly with a view to the inclusion of the poorer population groups.

Urban property models should be made more complex in the sense of greater diversification. A fundamental prerequisite for this is the creation of legal foundations for an 'ownership constitution' that allow forms of community ownership of land in addition to public and private ownership. When developing the models, attention should especially be paid to promoting and implementing poverty-reducing and gender-equitable concepts.

Documenting and securing land

Plots of land are limited resources and should be documented and secured in this function, for example by the creation of a large-scale cadastral showing the individual plots that registers the rights of ownership and use; it should be generally accessible. Geographical information systems, also on the basis of high-resolution, multi-temporal satellite-image analyses, are a suitable instrument for inventory and planning. Improving the quality of the information base by enhancing information on land and assessing plot values is an important prerequisite for sustainable land management, particularly for coordinating the processes in the fields of planning, information, organization and cooperation, budget, marketing and enforcement (Bock et al., 2011).

Special instruments for documenting land may be needed in developing countries and emerging economies. For a long time, the received wisdom in these countries was that the only safe method of land distribution was the documentation of individual private property; today, by contrast, alternative instruments are being widely tested and applied. For example, the 'social tenure domain model' has been developed, which aims to document land in such a way that in particular the rights of the poorer population groups and women's access to land rights are taken into account (STDm, 2016).

Usage regulation schemes

Methods of sovereign usage regulation, e.g. planning, taxation, prohibitions or rules – taking into account the ownership constitution – can create a practical framework for transformative land-use management. Factors governing the success of such a form of land-use management include taking into account the subsidiarity principle and local conditions, involving all the relevant actors, creating enough capacity and resources

and redistributing them at the municipal level, as well as implementing and enforcing standards that have a sovereign claim to validity. Considering the diversity of urban development, no patent remedy can be developed; it is rather a matter of opening a corridor that can provide orientation. If a land-use system is to be reformed in a country, then an understanding must first be created of the framework conditions in that country (Palmer et al., 2009). The key questions for every local government are as follows: How is the political and economic power distributed? How does the ownership constitution function? What obstacles are there in the existing system?

For a transformative form of land-use planning, existing planning systems should be checked to determine whether they are appropriate under local conditions. After individually examining the above-mentioned overall conditions, the following areas in particular should be considered for a review and/or an adaptation of the planning system (in a similar way, for example, to UN-Habitat, 2009b: 18ff.):

- Subsidiarity principle, i.e. each task should be performed by the lowest level that is most suitable for it; consistent implementation of this principle;
- Participation of all relevant actors, irrespective of their economic or political power, in drawing up plans; mandatory inclusion of the dialogue results;
- Consideration of the normative compass as a target orientation;
- Creation of adequate financial and personnel capacities – not only for drawing up plans, but also for their implementation and enforcement;
- Integration of special management models (Section 4.3.3.2);
- Adaptability of the system to rapidly changing ecological, demographic or economic circumstances.

Planning measures should also be linked with other forms of sovereign influence such as taxes, charges and subsidies. Among other things, it should be ensured that the control systems are adapted to local conditions and can be enforced by the local administrations (UN-Habitat and GLTN, 2011). Furthermore, there should be no exceptions for privileged groups or tax loopholes via share deals (Section 4.3.1.3).

Taking into account local context-specific prerequisites and inclusion of informal practices

To achieve sustainable land-use management, the following local, context-specific requirements must be taken into account. The instruments available for land-use management (e.g. instruments of conflict management) should be adapted to the respective societal, cultural and religious systems and also take into consideration the different speeds of the transforma-

tion phases (gradual transformation and the promotion of acceptance). Moreover, depending on the context, capacity and expertise (e.g. on land documentation) must be created or expanded (skills, knowledge, archives, institutions). At the same time, as much transparency as possible should be generated (right to inspect plans, participation procedures, etc.) and the different regulatory models discussed (forms of information and dialogue; consideration of regional models such as social engineering, i.e. the regulation of ethnic proportional representation in residential areas like in Singapore).

Sovereign usage regulations often reach their limits when it comes to land-use management, especially if informal urbanization processes dominate a considerable proportion of urban development due to weak governance or erroneous planning strategies. However, if (public-good-oriented) informal negotiation processes are also taken into account, it can ideally become possible to shape land use in a social- and culture-specific manner. The use of adequate forms of negotiation or participation is important here (Section 8.3).

Corruption prevention

The allocation and use of plots of land offer numerous gateways for corruption, i.e. the 'abuse of entrusted power for private gain' (TI, 2014:3). This applies, for example, to bribery and taking bribes – in official acts or commercial transactions – involving people in the political sphere or the municipal administration, private individuals or companies (TI, 2011; UN-Habitat and TI, 2004). In addition, land and real-estate trading is also susceptible to a number of other crimes often associated with corruption such as embezzlement, fraud, extortion, false certification and money laundering (Søreide, 2014:2; Wells, 2014; Box 4.3-3). The United Nations Convention against Corruption has been ratified by 178 nation states (as per December 2015), but has had little effect to date in urban practice. In order to develop and implement future anti-corruption strategies for urban land use, all actors of urban governance must be involved in the fight against corruption (Section 8.2.3.3). Moreover, a form of integrity management covering the entire city should be developed, with a view to transparent and fair land use. In particular, the implementation of transparency in land and real-estate transactions can make a significant contribution to preventing corruption.

4.3.3.2

Special management models

The WBGU defines special management models as various practical ways to create 'spaces for experimentation' for the development of cities in the direction of

the transformation. In particular, these models make it possible for land to be used by different actors for largely non-commercial purposes, e.g. interim usage models, shared space approaches and the urban commons.

Reversible land use: interim usage

The demand for urban open spaces and recreation areas can be met by a more flexible approach to the types of land use. One example is the interim usage of buildings or land whose original use has been abandoned; a different use is allowed temporarily until the subsequent use can be realized. Typical interim uses are gardens, public green areas, sports facilities, art and culture (studios and galleries), catering, offices and shops, social facilities such as youth clubs, temporary accommodation (e.g. student halls of residence, social housing projects) and commercial use (e.g. markets, crafts). Interim users can be individuals, clubs, neighbourhood groups or small businesses. The duration and intensity of use can vary. Examples include Mellowpark in Berlin, where, on the initiative of young people, a sports ground was created on a former factory site, or the use of the city of Bremen's former freight station by artists, musicians and students (BBSR, 2008). As in the case of open spaces, the interim use can thus contribute to bringing more life into city districts and protect empty buildings and unused land from decay and vandalism. Furthermore, citizen participation can be stimulated and discourses initiated on the development of the city.

Flexible use of space: shared space

An example of flexible use and a way to enhance the quality of time spent in public spaces is the concept of 'shared space', a planning approach aimed at the interim and multiple use of public spaces. The approach was developed in the 1990s on the basis of findings from behavioural and environmental psychology and has been realized recently in street spaces particularly in western European cities (primarily Sweden, Denmark, the Netherlands and the UK) and the USA (Hamilton-Baillie, 2008). Streets with a very low speed limit or designated as (temporary or permanent) car-free areas are used by people to simply spend time, stroll, play, engage in sports or celebrate street festivals (e.g. Mumbai: Section 5.2; Shared Space Network, undated). Various cities, such as Jakarta, Bogotá or Bangkok, are already experimenting with the concept, which to some extent can be applied to individual streets, districts or entire cities. There is also a global car-free day, 21 September, the aim of which is to show how urban quality of life can be improved by reducing the amount of car traffic (World Carfree Network, 2012). The con-

cept of the multiple use of street areas is a good example of how functional separation in urban development can be overcome by a more flexible use of space and replaced by a mixture of uses (Hamilton-Baillie, 2008). The concept can also be applied to squares, parks or school playgrounds, which can temporarily be made available to different user groups. This requires in particular the participation and communication of different actor groups, who must develop informal negotiating mechanisms for the different demands and needs (Section 8.3).

Urban commons

Commons have played a major role in the history of many cities. In many cases, resources, e.g. water or land, were jointly regulated and managed. The majority of these commons have been privatized over the last centuries. For several years now, the debates on the commons have seen a revival – at least in academia. The work of Elinor Ostrom in particular illustrates the principle of community management with an institutionalized local collaboration between the people affected as a (more sustainable) alternative to public or private control (Ostrom, 1990). Based on the general theories on the commons, many debates have also developed in the urban sphere on the 'urban commons' (Dellenbaugh et al., 2015; Ferguson, 2014). Here, too, the issue is usually not so much the city as a resource, but rather the processes (urban commoning) in which groups of city dwellers share responsibility for urban projects. These can relate to quite small individual projects like community gardens, car-sharing concepts, food cooperatives, or, on a larger scale, to jointly regulated neighbourhoods. In many cases, urban-commons projects involve bottom-up processes that initiate social networks, development opportunities, flexibility and creativity in the city and can thus have a positive influence on sustainable urban development. There is therefore a lot of potential for synergies with the normative compass. The extent to which this concept can be extended to the city-district level has yet to be researched (Box 10.1-8).

As with other primarily bottom-up processes, here, too, attention should be paid to questions relating to the legitimacy and transparency of processes and projects, group affiliation and the problems of different societal power structures and interests. Moreover, rules of urban commoning must be observed in the urban sphere, too, to ensure that a form of sustainable management is achieved that simultaneously allows the inclusion of the residents and promotes the *Eigenart* of the urban space area. This does not only apply to organizing community management. In the context of transformative land-use management, local gov-

ernments should actively create control mechanisms that make it possible to designate and secure public spaces, as well as urban community areas of land that are removed from the market-based exploitation logic. Here, the state's role is, to some extent, that of guarantor of a space of possibilities for the development of commons (von Winterfeld et al., 2012:42), and for the creation of urban laboratories on certain urban topics. The rules on sustainable management should be primarily determined by the groups themselves, to ensure that room for manoeuvre remains for a transformative development.

Community-based housing

Community-based housing can help reduce the dominance of real-estate investors in urban development and prevent, or at least contain, speculation with land and real estate in the city. In addition to the approaches described above, which concentrate on jointly used, often public or semi-public plots of land, there are also concepts which aim to strengthen the community component in the residential sphere by means of a 'social architecture' (Jarvis, 2011:560). The 'cohousing' approach is a form of housing in which the private living area is reduced in favour of community areas for social interaction (Jarvis, 2011). The approach is widespread in the USA, the UK, Sweden and Japan, for example, where there is an attempt to counter growing social isolation with joint residential projects (Jarvis, 2011; Krokfors, 2012). Community-based residential concepts therefore offer an opportunity to combine financial advantages with social (e.g. joint child care, support for older people) and ecological benefits (e.g. lower resource consumption by sharing kitchen devices, lower rate of land consumption). Since the 1990s, numerous housing cooperatives have also emerged in Southeast Asia, South America and Africa, where they aim to create living space for poor population groups in particular (Ganapati, 2014).

Alongside community-organized forms of living (Section 6.3.4), there are also joint building ventures in which a group that wants to build realizes its own building project with professional support. Self-organization can have various advantages, e.g. lower costs or community-based residential forms. But these can vary greatly. Joint building ventures are also seen as being positive for urban development, since they can help stabilize inner-city districts and promote the advantageous integration of social, economic and ecological aspects of sustainability (Smith, 2015). Joint building ventures can be organized in different ways. The legal form usually depends on whether the group wants to generate property ownership, pay rent or live as a cooperative. In addition to this idea, in Germany

individual residential and settlement projects have also merged to form a holding company to purchase houses as a community (Mietshäuser Syndikat, 2016). Each of the individual projects has the legal form of a GmbH (limited liability company) and a housing association that has committed itself to solidarity-based transfers. The housing associations design their residential project in terms of the level of rent, assignment of apartments, etc. However, the ownership rights of the real estate do not lie with the housing association, but with another limited company (in German GmbH), in which, in addition to the housing association, the apartment-house syndicate is represented as a shareholder. Each has the same number of votes, so that the sale or conversion of land and real estate are only possible by mutual agreement. The aim here is to prevent speculation with the projects and to secure housing in (inner) cities that remains affordable in the long term.

The different forms of cooperative housing projects mentioned here as examples show how problems of urban land use (e.g. high land prices) can be mitigated in the residential sector and how community-based, self-determined action, inclusion and *Eigenart* can be strengthened in city districts. Furthermore, these collective forms of urban property and/or urban living can also contribute towards a new (transformative) societal discourse about how land in cities should be used in the future.

4.3.4

Consequences: moving towards transformative land-use management

Land is an essential urban resource. This is why the distribution of urban land among different owner groups (e.g. municipality, private individuals, businesses) and the management of its uses are key factors in urban development, as regards both social aspects of urban coexistence and the structural design of cities and city districts. Land-use management is relevant to most of the transformative action fields considered in this report, and thus constitutes a decisive lever for the transformation of the cities towards sustainability. In order to prevent negative path dependencies, transformative land use should primarily take its orientation from the goals of polycentric spatial and urban development, the minimization of land consumption, the orientation of urban land towards the common good, greater flexibility and adaptability in land use, and a sustainable urban form (Section 4.2.3). These goals can also be described as principles of transformative land use and, in order to be able to implement them in cities, the ownership constitutions and their design elements

must make this possible and be adapted if necessary.

The ‘urban land’ resource is limited, and competition for land ownership and land uses is correspondingly keen. The decision as to who (or which actor group) will determine future land uses in a city is usually already taken when the land is distributed or the property-ownership models are chosen. The distribution of urban land is dominated today mainly by land and real-estate markets, which have a strong influence on how plots of land are overbuilt and city districts are designed. As a result – especially in the cities of the developing countries and emerging economies – the poorer population groups are pushed not only out of the inner-city areas, but also out of the entire formal land and real-estate market. In addition, the designing and shaping of the city is subordinated to the market interests of individual investors, real-estate and property developers, sometimes involving high vacancy rates due to speculative land and real-estate transactions.

Coupled to the private land and real-estate markets in most countries, the land-use models that predominate worldwide are those which grant the owners a far-reaching power of disposal over their property. Although the property owners’ power of disposal can be shaped and limited by sovereign regulations, for example for the benefit of the public good, such instruments are quite weak in most legal systems and have little impact in practice. As a result, the control that state actors have over urban developments is limited. This applies above all to cities in developing countries and emerging economies, although the power of local governments to shape and develop their cities has also dwindled in industrialized countries – despite the higher degree of formalization – as a result of the dominance of land distribution to private owners.

For a transformation of the cities towards sustainability and the necessary implementation of the principles of transformative land use, local governments should be empowered to steer urban-development processes. A distinction should be made here according to the extent to which urban governance has the capacity and power, for example, to establish a formalized land market or to levy property taxes. If necessary, support should be given to tenure systems (committed to the common good) which have become established under customary law or informally outside the formal system. The integration of such customary systems can make it easier e.g. to ensure the safety and legitimacy of housing for all population groups. An important factor in this context will be how government decision-makers come to an understanding with informal actors in the future (Section 8.3). In industrialized countries, too, a greater diversity of tenure systems should be promoted for the

urban transformation towards sustainability. In particular, the urban commons and other community-based models of urban use and design can – with appropriate goals – promote transformative land-use management. In addition, the public sector should ensure that the urban common good is taken into consideration to a greater extent, also in private real-estate projects.

A variety of land tenure systems and a stronger commitment of private owners to the urban common good can also limit the speculative – and often corrupt – trading in land and limit the dominance of investors and property and real-estate developers in (global) urban development. A first possibility of change towards transformative land use is offered by the general management mechanisms (Section 4.3.3.1) – i.e., in addition to the diversification of urban ownership models, documenting and securing land, usage regulation schemes (above all with the involvement of all relevant actors), the prevention of corruption and, where appropriate, the involvement of informal practices. What is needed here is the development of further instruments. The special management models, such as shared space concepts and urban commons projects (Section 4.3.3.2), also offer starting points for direct implementation. Because of the diversity among cities, however, each local government must judge which levers can enable it to implement the objectives of transformative land use on its respective territory, thereby taking into account (national) legal, cultural and socio-economic principles.

4.4

Transformative action field: ‘materials and material flows’

The history of human civilization is closely connected with the use of materials, which has increased in scope and complexity and was made possible by the rapid growth in the use of energy. Differences across the world are considerable – the concentration of wealth among a relatively small percentage of humankind is also manifested in the control of the material flows (Smil, 2014).

Cities are the hubs of global material flows. The construction of new infrastructures alone, made necessary by urbanization, requires a considerable input of material. The sectors involved include building and construction materials, but also technical infrastructure. At the same time, because of the demand for foodstuffs and non-durable consumer goods, cities are places where resource flows are channelled. Here, too, a considerable increase is to be expected as a result of urbanization and ‘catch-up’ development.

The increase in material and resource flows involves various problems when it comes to sustaining the natural life-support systems (Section 3.3). On the one hand, the use of materials can be connected to undesirable side effects that occur before actual use. These include environmental damage caused by mining, e.g. the large-scale conversion of unspoilt landscape into opencast mines, the lowering of groundwater levels, or risks from toxic excavated material or effluent, but also e.g. CO₂ emissions generated in the production of cement, which is then used as a building material (Section 4.4.1). Then there is the environmental damage that occurs after use, e.g. the problematic effects of plastic waste that ends up in the oceans (WBGU, 2013), or toxic waste, e.g. from electronic waste (Section 4.4.3). On the other hand, certain key resources could become scarce in a few decades if extraction continues unabated. This is the case, for example, with phosphorus, which is essential for agricultural food production (Section 4.4.2) and with rare earths, which are used in the production of electronic components (WBGU, 2011:42).

The increase in material and resource flows leads to further problems. In many developing countries and emerging economies, working in the mining sector involves a high level of risk for the workers because of the lack of compliance with minimum labour standards (ILO, 2015). There are also societal risks involved with the mining of resources in fragile countries: e.g. corruption and fighting for control of lucrative deposits; this can trigger violent conflicts that last for years (conflict minerals, e.g. in the Congo: UNEP, 2012b:24; Open Society Institute, 2005).

The way materials and resources will be handled in the future is a core element of the transformation towards sustainability in cities and affects all the dimensions of the normative compass described in Chapter 3. In many parts of the world, substantive inclusion, e.g. access to adequate housing, food or mobility, will require an increase in the use of materials, and in resource flows. Cities will thus be faced with the task of using all the options at their disposal to contain the negative effects of material and resource flows; at the same time, they will have to adapt to the scarcity of key resources. As a rule, it will be a matter of locally adapted solutions that take the cultural diversity of the people and cities into account. These affect the choice of building materials, for example, using a combination of traditional and innovative materials depending on the climate zone. In reality, however, fashion trends have a considerable influence here (Section 4.4.1; UN-Habitat, 2015e). Similarly, neither the handling of waste and sewage nor the development toward a circular economy can be mastered using globally uniform solutions.

The dimension of *Eigenart* (Section 3.5) is thus of great

importance for the transformation in the field of material and resource use.

The possible solution for the problems discussed here differ according to the settlement patterns (Chapter 7). In *informal settlements* little planning is involved in building the structure and in controlling the resource flows, although these are smaller because of the often lower levels of income and consumption. There are many informal elements of a circular economy – e.g. waste collectors – but they are often unacceptable in terms of health protection and living conditions. The chances of upgrading, developing and converting these systems should be examined. In *mature cities and city districts*, the buildings and infrastructure are largely complete; waste and recycling systems are usually in place and these could be further developed in the direction of the circular economy. However, the transition to the circular economy can be impeded by path dependencies. In the case of *newly planned cities and city districts*, a large building stock is erected in a short time, which, from the perspective of resources, should remain in use for as long as possible. The opportunity of new planning also lies in designing the resource flows from the outset and making them sustainable.

The WBGU looks at the following three topics as examples of different problem situations: building materials, phosphorus and e-waste.

4.4.1 Building materials

With increasing prosperity in many parts of the world – as manifest particularly in urban areas – more and more infrastructure has been built, and its rate of expansion has accelerated. In this context, concrete has developed into the most important man-made material. In 1950, about the same amount of steel and cement was produced worldwide; by 2010, steel production had risen by a factor of eight, the production of cement by a factor of 25. The production of these materials involves considerable CO₂ emissions (Box 4.4-1). Between 1945 and 2010, 60 billion tonnes of cement were produced (with corresponding emissions of approx. 40 billion tonnes of CO₂) and used in construction in the form of 500 billion tonnes of concrete: 60% of this in the period from 1990 to 2010 and 35% between 2000 and 2010 (Smil, 2014). Global demand for cement is increasingly being dominated by China (39% in 2002, 58% in 2012; Armstrong, 2013). In the three years from 2008 to 2010, China used 4.9 billion tonnes of cement – more than the USA used in the entire 20th century (4.56 billion tonnes; Smil, 2014).

This dominance of individual building materials is

Box 4.4-1**Emissions footprint of infrastructure building materials**

The emissions footprint of infrastructure building materials is made up of energy-related emissions (i.e. which can be influenced by the energy mix and the specific energy requirements of the manufacturing process) and process-related emissions. The latter arise, for example, in the manufacture of cement by burning the base material limestone to lime, which is then the raw material for cement clinker ($\text{CaCO}_3 \rightarrow \text{CaO} + \text{CO}_2$). According to a study conducted by the Öko-Institut (Hermann et al., 2012), the sum of the energy-related and process-related specific emissions averaged 0.8 tonnes of CO_2 per tonne of cement clinker in Germany in 2007; about 65% were process-related emissions.

The manufacture of iron and steel, too, generates not only

energy-related, but also process-related emissions, first and foremost in primary production, i.e. in the production of pig iron from iron ore ($2 \text{Fe}_2\text{O}_3 + 3 \text{C} \rightarrow 4 \text{Fe} + 3 \text{CO}_2$). In the EU, the emissions average 1.63 tonnes of CO_2 per tonne of crude steel, which could be reduced to 1.33 tonnes of CO_2 with existing technologies. An emissions reduction of more than 90% would be possible by capturing and storing the resulting CO_2 (Hermann et al., 2012). An alternative would be the reaction with hydrogen (Table 4.4-2).

Process-related CO_2 emissions are also generated in the production of aluminium. They are produced in primary aluminium production, during which an electrical current is sent through carbon anodes in a melting bath; during this process the anodes are slowly consumed (anode erosion) and CO_2 released (Hermann et al., 2012).

According to Hermann et al. (2012), cement and iron-and-steel production alone was responsible for 80% of all process-related emissions in Germany in 2008.

increasingly reflected in cityscapes. Reinforced concrete is the preferred material for high-rise building (Figure 2.3-5). Structures erected in this way offer more space and are usually more distinctively visible than buildings made of traditional, endemic materials (e.g. wood), leading to a dominance of this building material in the cityscape and, simultaneously, to a partial standardization of cityscapes in the course of globalization. As a rule, infrastructure building materials remain in the city for quite a long time and are an important determinant of their physical dimension. The building and dismantling of a city's infrastructure also determines how material flows are directed through the city (e.g. central water supply versus decentralized systems; waste disposal).

However, the production and the use of building materials are also themselves associated with externalities. This means that every decision on the use of building materials has to fundamentally weigh up (ecological) investment costs against variable costs; i.e. by investing more in the fixed infrastructure, other material flows can in turn be reduced or made more sustainable. For example, investment in the water grid can lower leakage and thus increase the water-flow rate.

One example is the infrastructure built to date from reinforced concrete. According to Smil (2014), it is expected that a significant percentage of the infrastructure will have to be replaced after 2030 due to the sharp rise in the use of concrete since the 1990s. Apart from weather-related effects, air pollution and wear and tear, the use of inferior materials and short curing times (usually for cost reasons) cause the concrete infrastructure to deteriorate prematurely. This can be counteracted by maintenance measures (Section 4.4.1.2), but this is no longer possible after a certain level of decay

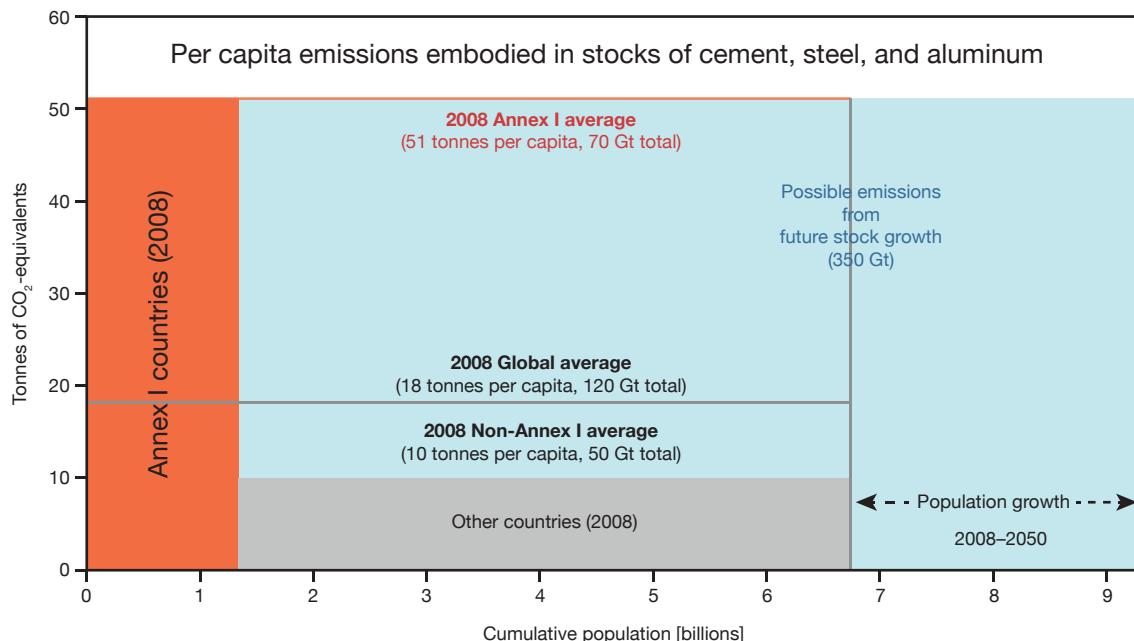
has been reached.

Buildings erected by the Romans are one example of concrete's long durability. They have stood the test of time thanks to the use of certain minerals and longer curing times (Jackson et al., 2013), so that some buildings are still preserved. If a similar technology were used today, concrete infrastructures could reach service lives of up to 1,000 years (Mehta and Langley, 2000).

The decay of the concrete infrastructure will affect China most of all, where massive amounts of poor-quality concrete have been used which is also exposed to severe environmental influences and industrial pollutants. It is reported that in the USA a significant percentage of the concrete infrastructure (e.g. bridges, schools, roads, wastewater treatment plants) is already in a poor or very poor condition, so that considerable investment will be needed to stop the process of decay. Transferring this experience to China, it is expected that about 100 billion tonnes of concrete will have to be replaced after 2030 (Smil, 2014). High-quality recycling is not possible with concrete, although it can be crumbled to create filling material for new concrete structures. Although this leads to a reduction in the amount of newly produced concrete needed, the crumbling process itself is energy-intensive, so that the overall effect on emissions is unclear (Fischedick et al., 2014).

4.4.1.1**Assessment of infrastructure building materials according to the WBGU's normative compass**

The topic of building materials has implications for the *inclusion* dimension, since infrastructures and buildings are essential for securing substantive inclusion, e.g. for access to adequate housing or grid-bound supply systems such as water or energy. In the course of ever-in-

**Figure 4.4-1**

The existing infrastructure's CO₂ footprint, based on emissions from the use of cement, steel and aluminium; extrapolation of future emissions from additional infrastructure expansion up to 2050. It is assumed that the global per-capita footprint will increasingly approach that of the industrialized countries and that the world population will grow to 9.3 billion people.

Source: Müller et al., 2013

creasing urbanization and a need to catch up in many cities, a further increase in the demand for infrastructure building materials can be predicted. Infrastructure building materials are also highly relevant from the perspective of the dimension of *sustaining the natural life-support systems*, since they already generate a considerable proportion of global CO₂ emissions today. The cumulative CO₂ footprint of the global infrastructure inventory in 2008 was estimated at about 120 Gt of CO₂, with industrialized countries accounting for about 70 Gt (Müller et al., 2013). This corresponds to an average per-capita infrastructure footprint of approx. 50 tonnes of CO₂ in industrialized countries. If this level (i.e. these per-capita emissions related to the development of infrastructure) were transferred to the rest of the world, then, assuming an increase in the world's population to 9.3 billion people by 2050, this would result in a figure of 350 Gt of CO₂ for the emissions from the construction of new infrastructures (Müller et al., 2013; Figure 4.4-1). It is therefore necessary to develop emissions-free processes for providing infrastructure building materials by 2070. The need to reduce emissions will mean considerable restrictions on the design of urban infrastructure, in terms of both building materials and urban form. Taking into account the *Eigenart* dimension is highly important, also in view of the regional variations in the use of building materials.

The current development reveals a mixed picture. While the use of building materials makes inclusion possible for a growing world population, the remaining CO₂ budget in relation to the 2°C guard rail is becoming more and more restricted. In the case of *Eigenart*, no one-dimensional development can be observed, although globalization tends to contribute to a standardization of the inner cities (central business districts) and their structural design. The challenge lies in reconciling all three dimensions of the normative compass while keeping a lookout for possible conflicts of objectives and for co-benefits.

4.4.1.2

Solution approaches in the city

The following section outlines design options for urban infrastructure, which in principle make it possible to reconcile sustaining the natural life-support systems with the inclusion and *Eigenart* dimensions. The primary search direction in this context is the prevention of emissions from building materials; Box 4.4-2 offers a systematic classification on this. Table 4.4-1 shows options for preventing emissions for the examples of cement, iron and steel, and aluminium.

The decarbonization of the energy system is shown to be a necessary, but not sufficient precondition. Corresponding options have already been discussed in detail by the WBGU (2011). Examples of options for

Box 4.4-2**System for avoiding emissions from building materials**

Ehrlich and Holdren's IPAT analysis (1971) – or the Kaya identity for CO₂ emissions – can be used to determine options for reducing CO₂ emissions (F) generated by infrastructure construction (Müller et al., 2013). F stands here for the CO₂ emissions, P for population, S for the service level of the infrastructure, and M for material input.

$$F = P \cdot \frac{S}{P} \cdot \frac{M}{S} \cdot \frac{F}{M}$$

Assuming that the population size (P) is given, and the service level – i.e. the benefits that the population draws from whatever causes the emissions (S/P) – is defined along the lines of the current reference level in the industrialized countries, then future CO₂ emissions from infrastructure expansion can only be reduced in two ways: either by reducing the consumption of material per service unit (M/S), or by reducing the emissions intensity (F/M) of the building materials used. In order to determine the input-oriented environmental impact of products and services, material consumption per service unit shows the total amount of resources used for this product or service (Ritthof et al., 2002).

Options for reducing emission intensity include cutting energy input per tonne of material, and reductions in both process-related emissions and the carbon intensity of energy

conversion. Since energy is a high cost factor in the building-materials-processing industry, the energy-efficiency potential is often already largely exhausted. That is why the decarbonization of energy conversion is the primary option for reducing emission intensity. Energy-related emissions in cement production can be completely avoided in theory; by contrast, process-related emissions are not completely avoidable, so that a further reduction in emissions would only be possible by the capture and storage of CO₂ (CCS). Hermann et al. (2012) mention a further possible way to reduce process-related emissions in cement production: the substitution of part of the cement clinker by blast-furnace slag from the production of pig iron or fly ash from the flue-gas cleaning of coal-fired power plants. However, they point out that the availability of these substances is limited and substitution is only possible within limits for reasons of product quality.

In steel production, emissions could be reduced to 1.33 tonnes of CO₂ per tonne of crude steel by using the best available technologies. A complete reduction in emissions could be achieved by using hydrogen in oxygen reduction (Table 4.4-2) or by means of CCS.

Research is currently ongoing in the aluminium industry on the development of inert metal anodes, which, when used in aluminium production, would no longer generate process-related CO₂ emissions (Box 4.4-1).

Options for reducing material consumption per service unit are more diverse, since they always also involve the development of new (in some case not yet known) product and system structures. Table 4.4-1 gives an overview of the various avoidance options.

other action fields are outlined in the following paragraphs.

Reducing the emission intensity of process-related emissions: the example of ecologically optimized concrete

The production of ecologically optimized concrete does not aim to substitute concrete as a building material completely, but rather to ecologically optimize its manufacture. In Germany, research is currently being conducted on this subject at the TU Darmstadt. By reducing the water content, switching to a high-performance superplasticizer, and greatly increasing the content of limestone meal, the clinker content is significantly reduced, while retaining the concrete's compressive strength. Overall, the cement-reduced 'eco-concretes' reduce specific emissions by approx. 30 to 60% compared to conventional concretes currently in use (TU Darmstadt, undated). In view of the target of achieving zero emissions by 2070, however, even in such an improved process, the remaining CO₂ emissions would still have to be avoided, e.g. by means of carbon capture and storage (CCS).

Reducing the emission intensity of process-related emissions: hydrogen-based process for the production of iron

Steel is essentially produced via two processes: 'iron ore to steel' and 'scrap to steel'. When iron ore is used as the base material, initially it is reduced to obtain pig iron. The pig iron is subsequently converted into crude steel at the downstream oxygen-converter steel works; it can then be further refined depending on the desired application (Stahl Online, 2016).

The blast-furnace process is currently the most common – and the only large-scale – process available for iron production. It generates process-related CO₂ emissions, since carbon is normally used for the reduction of the iron ore. The most important source of carbon is blast-furnace coke.

To produce the reducing gas carbon monoxide, hot air (at a temperature of 1,200°C) is blown into the blast furnace, which reacts with the coke, generating temperatures of up to 2,200°C. This high temperature causes the water vapour in the hot gas to split, creating hydrogen as a further reducing gas (Stahl Online, 2016). The resulting gases rise and react with the oxygen contained in the iron ore in several successive reactions, thus reducing the ores to pig iron.

An alternative process for producing iron is the

Table 4.4-1

Exemplary options for the prevention of emissions from building materials. The table provides an overview of the different approaches, which are illustrated by exemplary options.

Source: WBGU

Avoiding emissions from building materials				
Building materials	Reducing material consumption per service unit (M/S)		Reducing emission intensity (F/M)	
	System level	Product level	Process-related emissions	Energy generation
	Cement		- Ecologically optimized concrete - CCS	
Iron and steel	Urban form: densification (note conflicts of objectives)	Use carbon composite materials, substitute alternative materials e.g. eco-concrete, wood, clay, brick, stone	Use hydrogen-based process in steel production	Decarbonize the energy system
Aluminium			Substitute anodes in aluminium manufacture	

reduction of the iron ore using hydrogen only (Table 4.4-2; Sastri et al., 1982; Lin et al., 2003). Further research is still needed here, however, since this process cannot yet be controlled as stably as the carbon-based process route.

Reducing the emission intensity of process-related emissions: development of inert anodes in the production of aluminium

Research has been ongoing since the 1970s on the development of so-called inert (i.e. chemically unreactive) anodes, since the carbon anodes used during the electrolysis of aluminium are consumed (Box 4.4-1). The life span of a typical carbon anode is approx. one month when the electrolysis unit is working at full capacity. The anode's service life could be increased by a factor of 25-30 by using inert anodes that do not react with the electrolyte (Pulm and Raupenstrauch, 2014). The anode production processes that are no longer needed would save energy and cut greenhouse-gas emissions. The use of inert anodes could generate energy savings of between 7 and 27% in primary aluminium production.

Reduction of material consumption per service unit at the product level and substitution of emissions-intensive materials

Future building materials should ensure the achievability of climate targets and be available on a large scale, so that inclusion targets can be reached. In the WBGU's opinion, the *Eigenart* dimension should also be strengthened by using locally available building materials. Options include such materials as clay, brick, stone, bamboo and wood, which have a long history but were, in some cases, displaced by the materials of the Industrial Revolution, or else are only used regionally. They might therefore have greater potential in the light of modern processing possibilities. In addition, there are recent technical alternatives in the field of building materials which are currently under development, or for which processes still need to be developed but which are thought to be feasible in principle.

- *Timber construction* is technically so highly developed that a large number of mature solutions are already available for most building-related applications in cities. Bamboo, which is relatively unknown as a building material in the West, is characterized by high

Table 4.4-2

Chemical reactions in the production of iron. The left-hand column shows the carbon-based reaction chain in the blast-furnace process commonly used today; the right-hand column shows the hydrogen-based reactions.
Source: Bažan and Kret, 2015

Reaction with carbon monoxide (CO)	Reaction with hydrogen (H ₂)
$3 \text{Fe}_2\text{O}_3 + \text{CO} \rightarrow 2 \text{Fe}_3\text{O}_4 + \text{CO}_2$	$3 \text{Fe}_2\text{O}_3 + \text{H}_2 \rightarrow 2 \text{Fe}_3\text{O}_4 + \text{H}_2\text{O}$
$\text{Fe}_3\text{O}_4 + \text{CO} \rightarrow 3 \text{FeO} + \text{CO}_2$	$\text{Fe}_3\text{O}_4 + \text{H}_2 \rightarrow 3 \text{FeO} + \text{H}_2\text{O}$
$\text{FeO} + \text{CO} \rightarrow \text{Fe} + \text{CO}_2$	$\text{FeO} + \text{H}_2 \rightarrow \text{Fe} + \text{H}_2\text{O}$

mechanical strength and great elasticity (earthquake-proof); at the same time, it can be sourced sustainably and inexpensively. There are many arguments in favour of wood from the environmental standpoint. It is a renewable resource that can be produced in a sustainable way in multifunctional forests (Wegener, 2013). Wood stores CO₂ while the trees are growing. While it is being used, i.e. over many decades, this amount of CO₂ is therefore removed from the atmosphere. After demolition of a building, the wood is an excellently recyclable material, making its cascade use possible and further extending the storage time. In order to ensure the sustainability of wood as a building material, however, strict demands must be made on land management; competition for land use (from food production, ecosystem conservation, bioenergy, conversion to bio-based products, mitigation of climate change) must be taken into account (WBGU, 2009a). There is a considerable need for research in this field (Box 10.1-2).

- Clay is an alternative to concrete, particularly for residential buildings. Clay building materials can be used in different proportions and with different techniques in many parts of a building. Clay building materials can be unshaped or moulded building materials made of unfired clay. Adding supplements of mineral or vegetable origin can reduce drying shrinkage and crack formation, increase the material's tensile or compressive strength and abrasion resistance, or reduce its water sensitivity, thus broadening application possibilities (Dachverband Lehm, 2016). The advantages of clay are that it is often available locally; it is also unlimitedly recyclable, giving it great potential for a circular economy. Its production requires little energy, it is pleasant to process and it does not emit pollutants.
- *Carbon-concrete composites* are made of fibre-reinforced concrete, which, in terms of material input, represents a potentially more efficient and therefore more environmentally friendly alternative to steel-reinforced concrete. Textile-reinforced concrete is based on the idea that a reinforcement that

does not corrode requires no (or only a very thin) concrete cover. In this way, the amount of concrete that is needed can be greatly reduced. Carbon composite materials are also highly suitable for use in the maintenance of existing structures such as bridges or houses, so that their life expectancy can be extended by 50 to 100 years (Reuter, 2014). In addition to the better technical properties and the advantage that energy consumption and CO₂ emissions in the manufacture and repair of buildings can be significantly reduced, textile-reinforced concrete also offers new creative possibilities as it allows structures to be lighter and more filigree. Carbon-fibre-reinforced plastics are based on a similar idea; they, too, have very advantageous mechanical properties in terms of malleability, stability and light weight. However, these plastics only have an advantage over other building materials in terms of their CO₂ footprint if the material can be fully recycled and form part of a circular economy.

- A reduction in material consumption per service unit at the system level can be achieved by a variety of structural and demand-side measures. One example is the creation of a higher level of density in cities. Bettencourt and West (2010) show that larger cities and cities with a higher density are more resource-efficient. This can be explained by positive network effects. However, high densities also lead to conflicts, e.g. in the form of increased stress for people (Section 2.4.1).

4.4.2 Phosphorus

All living things, including our crops, need phosphorus to build and operate their bodies. As a chemical element, it is just as important as the oxygen in the air we breathe. From a global perspective, phosphorus is a limited, non-substitutable resource and indispensable for modern agricultural production in the form of phosphate fertilizer. Phosphorus is therefore of strategic importance for the food security of the world's pop-

ulation and for the growing demand for bioenergy and bio-based products (Amundson et al., 2015; WBGU, 2014b; Section 2.3.3.2).

The way phosphorus is managed today essentially follows the classic linear economic model. After mining, the mineral phosphate rock is transported and turned into phosphate fertilizer for use in plant production (Elser and Bennet, 2011). The phosphorus then either enters animal production via animal feed – with the animals' excreta usually being reused in agriculture – or, after human consumption of vegetable or animal-based foods or through the use of biomass, it finds its way into sewage or waste streams, where it could, in principle, be recycled. Considerable quantities of phosphorus enter the environment in the course of all its transformations, particularly in its use as a fertilizer and in the treatment of sewage. The primary effect of this is the eutrophication of aquatic ecosystems and corresponding restrictions on ecosystem services (Carpenter and Bennet, 2011).

Phosphate fertilizer is produced from mineral phosphate rock, which only occurs in a few places in the world. Depending on demand dynamics, it is estimated that the deposits will last between 30 and 300 years (Cordell and White, 2011; WBGU, 2014b), although estimating the size of reserves and how long they will last involves considerable uncertainties (Cordell et al., 2009; van Kauwenbergh, 2010; Reijnders, 2014). Rising demand, declining quality and the geographical concentration of deposits worth mining (Morocco controls more than three-quarters of global phosphorus reserves: Cordell and White, 2011) have led in recent years to sharp price increases and considerable price fluctuations (Amundson et al., 2015). A shortage of phosphorus and the price rises this would cause would represent huge global challenges, not least in view of the population development.

The supply of phosphorus is a relevant topic from the cities' perspective, firstly because the demand for food and other bio-based products is concentrated in cities, and secondly because many of the solutions have to do with urban infrastructure (e.g. recovery from sewage) and urban ways of life.

As a limited resource of the Earth system, phosphorus is important from the point of view of sustaining the natural life-support systems (Section 3.3). The WBGU has proposed stopping the loss of phosphorus as one of the planetary guard rails, and formulated the target of reaching a global recirculation of phosphorus by 2050 (Section 2.3.3.4; WBGU, 2014b). Phosphorus is also highly relevant from the point of view of the inclusion dimension, because wasteful use of phosphorus could endanger people's access to food in the foreseeable future (Section 3.4.1). In addition, effective phos-

phorus recycling in cities requires the enhancement of the sewage infrastructure, which is already necessary in order to achieve SDG no. 6 "Ensure availability and sustainable management of water and sanitation for all". Phosphorus is also important in relation to the dimension of *Eigenart*, because, although the loss of phosphorus is a global sustainability problem, the solutions must be set up locally and take the locally existing conditions into account (Metson et al., 2013). Particularly the ways in which people deal both with food (e.g. loss of foodstuffs, nutritional habits) and with faeces (e.g. use in agriculture) are greatly influenced by culture and can differ considerably from one place to another (Crews et al., 2013).

In the context of the efficient use of phosphorus, several co-benefits in addition to cost savings can be identified from a systemic perspective. Reducing losses of food during its journey from the farm to the plate, and reducing the amounts of animal foodstuffs consumed not only reduce the pressure on land use and soils in general, but also lead to less phosphate being used in agriculture and thus also to less phosphate pollution of aquatic ecosystems. The latter is also a co-benefit of a precise dosing of fertilizers optimized to local conditions. Furthermore, improved phosphorus recycling (e.g. in sewage treatment plants) reduces the pressure on resources and the pollution of the environment with nutrients. Diets with fewer animal-based products (meat, dairy products) not only decrease the demand for phosphorus and the ecological footprint, they are also healthier (WBGU, 2011, 2014b).

Despite the obvious relevance and the existing uncertainties with regard to the future availability of phosphorus, the topic is not yet adequately represented on political agendas (WBGU, 2014b: 38). As yet there are no global agreements on the sustainable use of phosphorus (Johnson and Bennet, 2011; WBGU, 2014b). First attempts at formulating objectives at the global level have been made (e.g. Griggs et al., 2013; Sutton et al., 2013; WBGU, 2014b; UNSDSN, 2013; UNEP-IRP, 2014), but the topic was not included in the 2030 Agenda and the SDGs. If the implementation of the objectives remains unsuccessful, a specific international instrument should be set up (WBGU, 2014b). The European Parliament has advocated almost completely recycling phosphorus by 2020 (European Parliament, 2012). In Germany, too, the recovery of phosphorus is already anchored in the 2013 coalition agreement (CDU et al., 2013).

Solution approaches in the city

The WBGU considers it expedient to initiate immediate measures on the efficient use and recycling of phosphorus worldwide (WBGU, 2014b). A transformative

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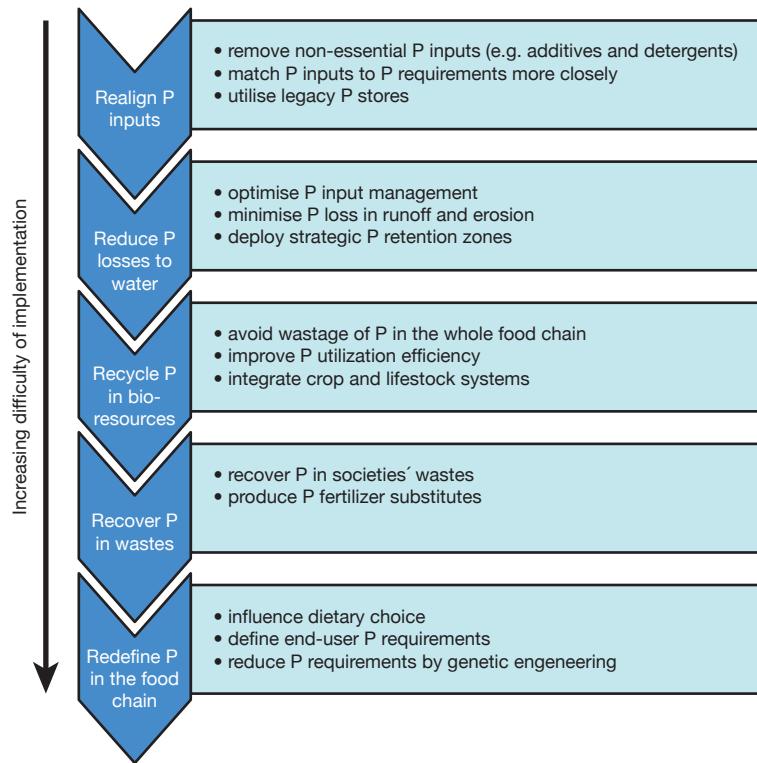


Figure 4.4-2

Strategy to reduce Europe's dependence on phosphorus (P) derived from phosphate rock. The measures of the different steps become more difficult to implement from top to bottom.

Source: Withers et al., 2015

change would seem necessary for this; an incremental improvement of existing systems will not be enough (Metson et al., 2013). 'The Sustainable Phosphorus Summit', a scientific conference held in Phoenix, Arizona, in 2011, issued the recommendation that the human phosphorus cycle should be closed. For Europe, Withers et al. (2015) recommend a five-stage strategy to reduce dependence on mineral phosphorus (Figure 4.4-2).

Some of the solution options affect agriculture (e.g. efficient handling of phosphorus fertilizers, manure and slurry) and mining (developing new mineral sources and technical procedures). The following approaches are particularly interesting from the point of view of the city (Crews et al., 2013):

- **Reduction of losses:** Any loss of food not only means a larger ecological footprint in the food sector but also an inefficient use of phosphorus, and should be avoided. Currently, about 80% of the phosphorus used for food is lost along the chain from the farm to the plate (Childers et al., 2011a, b).
- **Nutritional habits:** A high proportion of meat and dairy products in nutrition also leads to a larger ecological footprint and a greater demand for phosphorus; it is also problematic from a health point of view (WBGU, 2014b).
- **Recovery from waste streams:** The use of technical or biological processes makes it possible to recover phosphorus from urban sewage and organic waste;

the recovery of phosphorus from ash after sewage-sludge or waste incineration also seems possible. In Germany, the amount of phosphorus contained in sewage sludge is estimated at approx. half the amount of the phosphate fertilizer that is imported (Pinnekamp, 2013). The separation of biowaste and paper from the domestic waste stream facilitates the recovery of phosphorus. Customized technical solutions are available for the various local conditions (e.g. water availability) and project scales.

4.4.3 Electronic waste

The rampantly growing demand for electrical and electronic goods (referred to in the following section as electrical appliances) – such as smartphones, laptops, televisions and electrical household appliances – in wide sections of the industrialized countries has given rise to a waste problem with dimensions and consequences that extend as far as the slums in developing countries and emerging economies. Electronic waste (WEEE – Waste of Electrical and Electronic Equipment), or e-waste, is one of the most rapidly growing sources of waste in the world (Cucchiella et al., 2015; Baldé et al., 2015; Lundgren, 2012). It is driven by increasingly faster production cycles and shorter product life-cycles, by rising consumption in developing countries and emerg-

ing economies and, not least, by a widespread 'throw-away' mentality. Germany generates more e-waste than any other European country (roughly 1.8 million tonnes per year), while Europe produces the highest volume of e-waste worldwide (approx. 11.6 million tonnes, or an average of 15.6 kg per person per year; Baldé et al., 2015). It is estimated that 16–38% of the e-waste officially collected in the EU is exported to countries outside the EU (Baird et al., 2014).

The growing populations and increased consumption in cities not only make them the most important source of e-waste, but also an obvious birthplace for solutions to the consumption and waste-disposal problems involving electrical appliances. The consumption of electrical appliances gives rise to several problems, not only for the environment but also for people. Valuable elements such as gold, silver and rare earth elements are essential components of electrical appliances, and mining for them has grave environmental impacts; it often takes place in countries with few environmental regulations, violent conflicts (UNEP, 2012b: 24), or weak occupational health and safety measures (ILO, 2015). Toxic substances (e.g. lead, mercury, brominated flame retardants) in e-waste place great demands on recycling and disposal (Wäger et al., 2012). Recycling and disposal often take place in developing countries and emerging economies, where the valuable components are frequently recovered under catastrophic conditions for humans and the environment (Lundgren, 2012). At the same time, the export of used or repairable electrical appliances (Usable Electrical and Electronic Equipment – UEEE) ensures access to, among other things, cell phones, computers or washing machines for a large proportion of the world's population who otherwise could not afford such goods (Manhart et al., 2011; The Basel Convention, 2011; Amoyaw-Osei et al., 2011). Professional recycling and reuse of used appliances in combination with a consumer culture of heightened awareness and more stringent legislation on the production and disposal of electrical appliances offer significant chances for a more sustainable approach to the use of electronic commodities.

Sustainable management of e-waste

The necessity of integrating e-waste into an ecologically and socially sustainable recycling system is essentially a challenge for the cities. Urban agglomerations are the main sources and collecting points for e-waste, and are consequently predestined as locations for its recovery. Approx. half the electrical appliances legally or illegally disposed of in 2014 originated in Europe (11.6m tonnes), the USA (7.1m tonnes) and Japan (2.2m tonnes; Baldé et al., 2015), i.e. from industrialized countries with a high degree of urbanization. The

disposal of damaged or old electrical appliances is often not based on existing legal frameworks (Huisman et al., 2015). Only 35% of all the e-waste in Europe in 2012 was correctly disposed of or recycled (Huisman et al., 2015). The remaining 65% (6.15m tonnes) was either exported (1.5m tonnes), illegally moved to other EU member countries (3.15m tonnes), used for spare parts (750,000 tonnes) or disposed of along with household waste (750,000 tonnes; Baldé et al., 2015).

The 'premature obsolescence' of electrical and electronic appliances and the widespread 'throw-away' mentality in industrialized countries (Cooper, 2005) exacerbate the problem of e-waste. The design of the appliances sometimes makes them difficult to repair and reuse (DTIE, 2007; Bakker et al., 2014; Prakash et al., 2016). Electrical appliances should, therefore, be designed in such a way that they can be easily repaired or their parts easily replaced (Section 9.3.2.2; Box 10.1-2).

The e-waste problem has two dimensions: the production dimension (which is directly linked to the consumption wishes of the population) and the disposal or recycling dimension. Solution approaches for the production dimension exist, but are rarely implemented. According to the 'polluter pays' principle, stronger obligations should be imposed on the manufacturers of electrical appliances to make production as sustainable as possible and to ensure competent recycling at the end of the appliance's service life (Prakash et al., 2016). First steps in this direction have been taken in the Ecodesign Directive of the European Union (EU, 2009), the Directive of the European Parliament and of the Council on waste electrical and electronic equipment (EU, 2012) and the Electrical and Electronic Equipment Act (ElektroG, 2015) recently passed in Germany. The WBGU believes that efforts should be taken to create comprehensive legal frameworks to make companies producing socially and ecologically sustainable electrical appliances more competitive. These could include, for example, minimum legal requirements on working conditions, even if the appliance is produced in third countries, or the specification that only non-hazardous raw materials are to be used. Despite all the efforts that have been made, due diligence guidelines (OECD, 2013b) have not yet been implemented in binding laws.

Global problem of urban origin

A significant proportion of globally generated e-waste finishes up in informal recycling depots in developing countries and emerging economies (Wittmer et al., 2010; Baldé et al., 2015; Rucevska et al., 2015), as currently it is much less expensive to dispose of e-waste products there. According to estimates, only approx. 10% of the e-waste is expertly recycled or disposed

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of (UNODC, 2013:103). In Accra (Ghana), Mumbai (India), Guiyu (China) and other cities in developing countries and emerging economies, e-waste recycling has grown into an independent business sector (mainly at the informal level) which is the only source of income for hundreds of thousands of people. At the same time, however, it is a source of dramatic health and environmental risks (Lundgren, 2012). Toxic e-waste, mixed with functioning or repairable used appliances from affluent cities, e.g. in Europe and Northern America, are shipped to the informal recycling depots of the developing countries and emerging economies. However, there is also a major cross-national flow of e-waste within the industrialized countries, as well as between the developing countries and emerging economies (Huisman, 2015). Up to now, the consumption of electrical appliances in developing countries and emerging economies has been only a fraction of that in industrialized countries (Baldé et al., 2015). Growing middle-classes and the resulting intensification of consumption will increase the demand for electrical appliances many times over. The development of a comprehensive recycling infrastructure in the industrialized countries will consequently not suffice to cope with the growing challenge of e-waste. The legal and structural prerequisites also need to be created in the metropolitan areas of the developing countries and emerging economies to ensure environment-friendly and socially compatible e-waste recycling, with the ultimate goal of incorporating e-waste into a circular economy.

Urban challenge

Changing people's attitudes to the production, consumption and disposal of electrical appliances can open up potential for sustaining the natural life-support systems and strengthening inclusion (Section 3). The informal recycling of e-waste provides a livelihood for hundreds of thousands of people (Lundgren, 2012) and needs to be transformed in such a way that they are not robbed of their means of existence. The recycling of e-waste in developing countries has so far mainly been a lucrative business due to cheap labour and a lack of occupational health-and-safety and environmental regulations (Rucevska et al., 2015), while official recycling companies only rarely appear to be able to recycle e-waste profitably.

Local projects, such as the promotion of recycling collectives in cities, can successfully lead to an improvement in the working conditions in e-waste processing and, at the same time, secure the livelihoods of the usually marginalized population groups in the informal recycling sector (Buchert et al., 2016; Section 6.6.1). Educational campaigns on the health risks of e-waste recycling could be offered at the municipal

level in developing countries and emerging economies to improve safety standards for the workers (Lundgren, 2012). In Europe, harmonized processes for registering used appliances in buyback and recycling centres could greatly simplify the documentation and supervision of these material flows. Urban infrastructures for properly processing or disposing of e-waste, along with digital material flow monitoring, could form the basis for coping with the global environmental problem of e-waste (European Commission, 2015c).

Technological and ethical guidelines for the development of electrical and electronic appliances

Attention should already be paid during the design and development of electrical appliances to maximizing their service lives (Cooper, 2005; Bakker et al., 2014) and making repairs and recycling as straightforward as possible. The recyclable raw materials should be easy to remove, while a modular design should, as far as possible, make it easier to separate the many different components in electrical appliances.

Many of the raw materials used in information and communication technology equipment stem from sources that are neither ecologically nor socially sustainable (Asner et al., 2013; Ali, 2014; Kaiman, 2014). This applies not only to cheap, mass-produced goods but also to better-quality electronic articles. The manufacturers of electrical appliances should, therefore, be placed under greater obligation to ensure the sustainability of their raw-material sources and transport routes.

At the intergovernmental level, existing regulations prohibiting exports of e-waste to third countries should be tightened (e.g. the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal). At the same time, the recycling and disposal chain for e-waste should be placed on a sustainable foundation from the national to the local level (Section 9.3.2.2).

Strengthen the Basel Convention and implement national guidelines

The Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal (passed in 1989, in force since 1992) and its contractual amendments (e.g. the Ban Amendment) offer a framework for monitoring the international trade in e-waste. Although the convention has been signed by 183 member states (status in February 2016), the 1995 Ban Amendment, for instance, has not yet come into force, and these international regulations have little practical effect, as confirmed by the statistics of the Interpol report on the illegal trade in e-waste (Huisman et al., 2015).

The massive extent of this international trade makes adequate monitoring of the export of used electronic goods difficult, not only at the destination port but also in the country of origin. Suitable national monitoring mechanisms ought to be implemented in the countries of origin, e.g. the documentation and monitoring of the used-devices recovery chain (repair or recycling), to prevent e-waste from disappearing into illegal channels (Rucevska et al., 2015). A seamless chain of responsibility based on extended manufacturer responsibility could curb the illegal transnational flow of e-waste (OECD, 2015; Section 9.3.2.2).

4.4.4 **Conclusions: towards sustainable material management**

In this section on the transformative action field of materials and material flows, three aspects have been singled out as examples: building materials, phosphorous and e-waste. These examples alone suffice to demonstrate that this topic poses substantial challenges for cities.

Material flows will expand considerably in many parts of the world due to the 'catch-up' development in many countries and the process of urbanization. The use of materials and raw materials has hitherto largely followed a linear path: raw materials are made into products that are sold, used and ultimately disposed of. Today, 80% of non-durable consumer goods still follow this linear archetype; they end up in landfills, in waste incineration systems (Ellen MacArthur Foundation, 2014) or uncontrolled in the environment. Even in the case of long-term applications such as building materials, the length of use is shortening in many cases (Section 4.4.1). Where resources are finite, this 'linear economy' (throw-away economy) is associated with shortages, price hikes and price volatility. In addition, raw-material extraction and processing, as well as waste disposal, have substantial negative impacts on the local and global environment and on health. Examples include greenhouse-gas emissions, toxic substances released into the environment, and persistent substances that accumulate in undesirable places (Section 2.3). In developing countries and emerging economies, production processes that are linked to the globally rising material flows are also commonly associated with inhumane working conditions.

The overarching goals of a sustainable material and resource economy include avoiding the negative impacts of raw-material mining and production, the emission or accumulation of undesirable or toxic substances, and hazardous impacts on people and the envi-

ronment along the entire life cycle, as well as ensuring the use of raw materials for the future (OECD, 2012a; UNEP, 2012b: 176). Using resources as efficiently as possible and reducing the material flows take priority in all considerations. This includes a vision for sustainable consumption and lifestyles. Cities – as the centres not only of industry but also of the consumption, waste and recycling economies – play a decisive role in implementation (Hoornweg et al., 2013).

Further starting points include reducing ecological footprints (e.g. by substituting materials) and closing material cycles on a scale that is suitable in each case. The challenge is complex, as each specific material flow must be examined individually. For some groups of substances it makes sense to close the cycle inside the city and its immediate environment, e.g. in the case of sewage treatment, ensuring maximum recycling of biomass and nutrients, particularly phosphorous, and their reuse as an agricultural input in the areas surrounding the cities. Other material flows require a special recycling process (e.g. rare earth elements) that does not need to be available in all cities, but can be organized under a division of labour between the cities and the industries located there. Last but not least, there are some material flows in waste recycling that are intercontinental and of major importance, e.g. the trade in waste paper and scrap metal.

These complex processes require a systematic approach that tracks the entire value chain from raw-material extraction to production, use and recycling – and ensures that the cycle is on an appropriate scale. Thinking in terms of material flows and life cycles, and paying attention to the impacts of emissions or waste products in the various stages from production, transport, consumption, through to waste treatment, are important approaches towards a sustainable circular economy (UNEP, 2012b: 176). This requires the integration of the many different responsibilities with regard to the product life cycles.

The principles of sustainable materials management and the circular economy include the efficient use of resources (ores, minerals), also to minimize the ecological damage caused by exploration and mining. Industrial waste should not end up in landfills but, as far as possible, be used as an input for other industrial processes. Toxic and accumulating substances should be avoided to the greatest extent possible and, if indispensable, should remain in the industrial cycle and not end up in the environment. Substances whose production involves process-related CO₂ emissions (e.g. cement) should either be substituted, or the CO₂ generated should be separated for safe, long-term storage, as the zero emissions required for the mitigation of climate change cannot otherwise be achieved (Section 4.4.1). For reasons of climate protec-

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tion, the long-term changeover from a fossil-based to a bio-based chemical industry is indispensable. Bio-based material flows in all fields, from nutrition to industry, should be as efficient as possible (e.g. to reduce food losses), as the potential for sustainable biomass production in agriculture and forestry is limited (WBGU, 2009a). At the end of its life cycle, biomass should contain as few pollutants as possible (e.g. heavy metals or toxic organic substances), so that it can be released again into the biosphere. Plant nutrients should not be allowed to enter the atmosphere or bodies of water, and phosphorus should be recycled as far as possible. When handling waste, emissions, e.g. methane and toxic substances, should be avoided (Section 2.3.4.3).

The transition to sustainable materials management and a circular economy will mean a fundamental change in the existing industrial and urban systems. It should be regarded as an important module in the Great Transformation towards sustainability, and be carried out on a similarly long-term time scale as the decarbonization of the energy systems, sustainable land use and water management, and other global challenges. In view of these challenges, an incremental improvement in the efficiency of the existing systems will not be sufficient. On the contrary, a transformative change is required (Preston, 2012). This applies all the more in view of the fact that the sub-processes towards sustainability mentioned are closely interconnected and offer substantial opportunities for co-benefits. Some examples of these kinds of synergies are given below:

- The circular economy saves raw materials that would otherwise have to be extracted from mines using a lot of energy and causing environmental damage and land degradation. At the same time, environmental impacts, greenhouse-gas emissions in the production chain, and even the need for landfills, decrease, reducing health impacts and hygiene problems.
- The cascade use (i.e. repeated use over different stages) of organic material – e.g. with subsequent biomethane production (as a sustainable energy source for mobility or cogeneration systems), followed by composting and use in agriculture or forestry – closes regional cycles, reduces the demand for fertilizers that are in limited supply (phosphorus) or consume a lot of energy (nitrogen), and cuts greenhouse-gas emissions from landfills.
- Food wastage is likely to increase significantly without preventative measures (ISWA, 201). Avoiding these losses reduces the demand pressure on global land use (Section 2.3.3.2) and, consequently, the loss of natural ecosystems with their biological diversity; it also avoids greenhouse gases emitted by the production chain from field to landfill.
- The informal waste industry established in many

cities in developing countries and emerging economies offers further synergy opportunities (Section 2.3.4.3). Improved working conditions and reduced negative health impacts, while simultaneously using and promoting know-how on material flows and recycling, lead to a more sustainable use of resources and to an improved quality of life for the employees.

4.5

Transformative action field: 'urban health'

4.5.1

Urban health as a resource and as a goal of urban transformation processes

Urban health is both a goal and a resource of the urban transformation towards sustainability and therefore a key action field. On the one hand, access to healthcare and a healthy environment are essential aspects of the substantive inclusion of a city's residents and therefore relevant components of the Great Transformation. On the other hand, health represents an important resource when designing transformation processes, inasmuch as a civil society can only take an active part in these processes when people's basic needs are largely met. Health is an essential prerequisite for ensuring that people can earn their living, live a self-determined life and enjoy quality of life (Section 2.4.1.1). It is therefore regarded as a key indicator of the development of urban societies and has been laid down, for example, in the SDGs of the 2030 Agenda and in the Human Development Index as a goal in its own right.

Depending on their level of development, location and size, cities exhibit specific possibilities and risks for their population in the field of health. On the one hand, they can offer more favourable conditions for promoting and maintaining health than rural and more isolated places of residence, because they offer better access to private and public healthcare facilities, denser social networks and higher earnings. This correlation is referred to in the literature as the urban health advantage (Galea and Vlahov, 2005; Galea et al., 2005; Glouberman et al., 2006). Urban middle classes can furthermore accelerate positive developments as a stabilizing force in the whole of society (Barbiero, 2014). Also, cities in developing countries and emerging economies often have better access to health knowledge than rural areas, partly because it is easier to spread information through the media. On the other hand, people in cities are exposed to specific health stressors such as noise, air pollution, increased density and higher crime and accident rates. In addition, especially in developing

Box 4.5-1**Salutogenic understanding of health**

The concept of salutogenesis was developed and coined in the 1980s by the medical sociologist Aaron Antonovsky. His aim was to establish a holistic understanding of health in research and practice that focused on the development and maintenance of health in the context of a dynamic process incorporating biological, psychological and social factors. This brings the individual elements of achieving and maintaining health to the centre of attention, i.e. the extent to which people use the resources and contexts available to them to keep them healthy. A sense of coherence has been identified as the cen-

tral factor, a basic cognitive and motivational-emotional attitude that is stable over time. When people experience their environment as coherent, consistent and meaningful, they have better a chance of processing critical life events and dealing with the burdens of disease. Also important are a sense of autonomy and possibilities for self-regulation (Seligman and Csikszentmihalyi, 2000), as well as the degree of people's integration into social networks, and their opportunities to be active (Bandura, 1982; Leppert et al., 2008). These act as protective factors and resources for resistance, making it possible to develop resilience, i.e. the ability to successfully cope with stressors. At the same time, they strengthen the self-responsibility of the individual as a mature and responsible citizen.

countries and emerging economies, many people live in slums or informal settlements in inadequate housing conditions (UN, 2015d) often also characterized by a lack of access to clean drinking water and sanitary facilities, thus harbouring a high level of health risks (Box 2.1-1).

One of the objectives of the urban transformation must, therefore, be to consolidate the resources and potential for a healthy childhood and life in cities and, at the same time, to minimize the burdens and obstacles. Due to the long-term consequences of factors that are beneficial or detrimental to health (e.g. exercise-promoting cities with lots of greenery versus the use of toxic building materials and high exposure to emissions in childhood), the path dependencies in this field are very high. The promotion of health is therefore essential as a component of sustainable urban development.

Health promotion is an important cross-cutting subject; a holistic way of looking at it and processing it can create many synergies. For example, many environment-protection measures directly or indirectly benefit health and vice versa (e.g. co-benefits in the case of air pollution: Box 4.5-4). In addition to its relevance to transformation, the WBGU has, therefore, also selected urban health as a transformative action field. After all, promoting the health of poverty groups is an important way to mitigate social inequalities (Section 4.2.5).

Health from the salutogenic perspective

The WBGU bases the following analysis on a salutogenic understanding of health. Unlike the pathogenetic approach, which focuses on the development of diseases and the factors involved, health from the salutogenic perspective is not only seen as a condition where illness is absent; rather, attention concentrates on the factors, conditions and interactions that serve the maintenance and promotion of health as a dynamic process (Box 4.5-1). This view is reflected in the WHO's definition of health: "Health is a state of complete phys-

ical, mental and social well-being and not merely the absence of disease or infirmity" (WHO, 2006a:1). The WBGU focuses on people as active agents who use the resources and contexts available to them in order to feel or become healthy. The analysis of urban health, therefore, must focus on those resources in the urban space on which people depend in order to promote and maintain good health. To this purpose, studying how to enable people to use the available resources, and how to promote the necessary skills and coping strategies, is also important. In addition to the study of resources, the stressors (e.g. air pollution) should therefore also be looked at; these are increasing dynamically – especially in the fast growing and densely populated cities in developing countries and emerging economies – and represent a particularly important burden and obstacle to transformation (Section 2.4.1.1).

Urban health in politics and research

As a result of the growing global urban population and the health consequences of rapid urbanization, the topic of urban health has been receiving an increasing amount of attention in the fields of research and politics in the last few years. For example, the WHO declared 2010 to be the Year of Urban Health. In this context, UN-Habitat and the WHO published a report on health inequalities in cities (WHO and UN-Habitat, 2010). However, UN-Habitat itself has not yet taken urban health on board as a priority topic. Overall, only few reports by international organizations that focus on cities treat the subject as a priority (Section 2.6). The Fifth IPCC Assessment Report (Revi et al., 2014a) addresses the topic of human health in cities as a key risk of climate change. Furthermore, the focus has progressively been moving towards preventive healthcare in cities as a result of the increasing attention paid to non-communicable diseases, which are believed to be spreading as a result of global urbanization, among other factors (in 2012, the United Nations adopted a

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declaration on the prevention and control of non-communicable diseases).

One problem here is the difficult situation regarding data availability; the data for urban areas are neither adequate nor sufficiently differentiated, making comparisons between cities and between urban and rural areas difficult (Caiaffa et al., 2013; Friel et al., 2011; Neiderud, 2015). Studies are usually cross-sectional rather than longitudinal in design, and the results are difficult to generalize, especially between cities in industrialized countries on the one hand and developing countries and emerging economies on the other. Often the data are not even comparable within the same country (Rydin et al., 2012). Despite a range of different approaches, there is no comprehensive methodology for analysing the interrelationships between aspects of the urban environment, urban design and the health of the population (Rydin et al., 2012).

In 1984, the WHO founded a global project called Healthy Cities, a network for supporting local governments in the field of health promotion through political self-commitments, institutional change, capacity building, partnership-based planning and innovative projects. Today it is made up of more than 1,000 cities. Case studies on the participating cities have shown that many of them, primarily in developing countries and emerging economies, have problems implementing inter-sectoral holistic measures. Overall, the measures actually taken have evidently not matched the objectives (Rydin et al., 2012). The lack of capacity and scarce financial resources represent further barriers (Rydin et al., 2012). A study in the USA mentioned the following barriers, among others, to holistic health promotion: insufficient budgets for measures and infrastructures in the public health field, the difficulty of influencing decision-makers (e.g. due to a lack of understanding of public health), and the difficulty of developing a common comprehensive strategy with different stakeholder groups. The most important priorities for the future were identified as increasing budgets and integrating health into other sectoral legislative areas (such as transport or housing). Another problem area mentioned was the proper training of staff (Hearne et al., 2015). Furthermore, linear or cyclic planning approaches are unsuitable for improving urban health because urban systems are so complex (Rydin et al., 2012).

Since health often tends to be seen from a sectoral and pathogenetic perspective, attitudes to public health in many cities in developing countries and emerging economies, and to a lesser extent also in industrialized countries, still focus excessively on disease control and not enough on the holistic and salutogenic promotion of health (Box 4.5-1; Herrick, 2014, 2015; Vla-

hov et al., 2010). Another reason why urban health has so far been neglected in developing countries and emerging economies stems partly from the perception, based on the presumed health advantages of cities, that urban residents received better services than the rural population (Vlahov et al., 2010). Only within the last decade has the focus turned more towards improving (both preventive and curative) urban health. In India, for example, the National Rural Health Mission was initially adopted in 2005 with the aim of improving the rural population's access to primary healthcare, since the urban population were generally regarded as better provided for. Not until 2013 did the adoption of the National Urban Health Mission follow, which explicitly concentrates on the health of the urban poor by improving infrastructures and healthcare services (Barbiero, 2015; MoHFW, 2012). Recently, the spotlight has increasingly been trained on the large differences in health status between different population groups within a city (WHO and UN-Habitat, 2010).

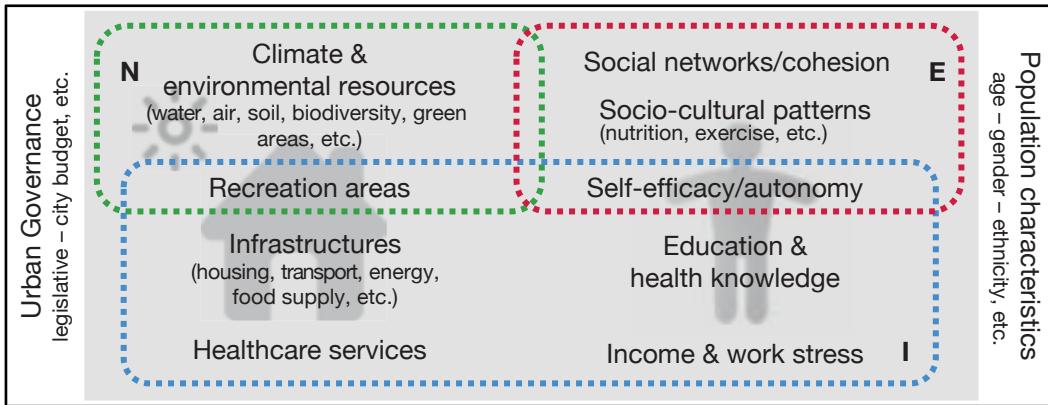
Overall, urban development policy in many places is not yet sufficiently geared towards meeting the current and future ecological, social and economic challenges, such as growing poverty or climate change, and the resultant health burdens. This neglect has already had negative effects – e.g. on environmental health, disease transmissions, urban safety and security, mental health and well-being (Barbiero, 2015), and will continue to do so unless active countermeasures are taken.

4.5.2

Importance of urban health for the transformation process

Resources and burdens for urban health are interconnected in a complex combination of effects. The individual elements can be assigned as follows to the three dimensions of the normative compass – i.e. the natural life-support systems, inclusion and *Eigenart*:

- *Natural life-support systems*: On the one hand, urban health is influenced by global climate change through its direct effects (e.g. heat waves) and indirect effects (e.g. drinking-water shortages; Section 2.3.4.4). On the other hand, the local environmental determinants vary, depending on local climatic conditions and the availability of natural resources. Local ecological stressors for health include soil, water and air pollution, noise, heat islands, floods and droughts, as well as a high population and traffic density (Section 2.3.4). Resources for health, by contrast, include green areas, which for example serve as ecological compensation areas and simultaneously as areas for leisure and physical

**Figure 4.5-1**

Urban-health resources and burdens. The health of the urban population is influenced by a large number of resources and burdens; these can be subdivided according to contextual, i.e. spatial factors (e.g. infrastructures) and compositional factors, i.e. resulting from the structure of the urban society (e.g. social networks, education). These factors influence each other and have different effects on population groups, e.g. depending on age or gender. Urban governance affects health, among other things by its control, financing and administering of urban services and infrastructures, as well as by the population's possibilities for participation. N = sustaining the natural life-support systems; I = inclusion; E = *Eigenart*.

Source: WBGU

exercise (Section 2.4.1.1). Protection against and resilience to environmental pollution are correspondingly important preconditions for health promotion.

➤ **Inclusion:** Health is greatly influenced by substantive inclusion: directly through access to preventive and curative healthcare services (e.g. size and equipment of the public and private health sectors, existence of a health insurance system for all population groups), and indirectly through access to health-affecting infrastructures like housing, food and drinking-water supplies, and safety/security (Section 3.4.1). Incomes and working conditions (economic inclusion: Section 3.4.2), participation and codetermination rights (political inclusion: Section 3.4.3) are also important resources. The key aspect in the inclusion dimension is equity within a city. Special attention should be given to the needs of marginalized or vulnerable groups (e.g. children, people with disabilities, women in patriarchal societies).

➤ **Eigenart:** The ability to create and maintain health is influenced by the urban form, but also by locally specific everyday practices and socio-cultural patterns in the use of space and lifestyle. A spatial design that encourages people to take physical exercise has an effect on their health only if, for example, socio-cultural standards or everyday schedules (time availability) allow it. Socio-cultural factors also play an important role when it comes to health-related modes of behaviour, e.g. dietary patterns and habits that partly also correspond with the spatial environment (e.g. access to fresh food). Last but not least,

social cohesion and low social disparities, which increase resilience against stress, have a positive correlation with a society's state of health. A high degree of societal self-organization can also make it easier to realize small-scale health-promoting projects.

Figure 4.5-1 shows key resources and burdens for urban health which can be subdivided according to contextual, i.e. spatial factors (e.g. infrastructures) and compositional factors, i.e. resulting from the structure of the urban society (e.g. social networks, education). These factors also mutually influence each other, e.g. the design of recreation areas and the local climate. The impacting factors have different effects on population groups, e.g. depending on age, gender, lifestyle or ethnic affiliation. Urban governance affects health, among other things, by its control, financing and administering of urban services and infrastructures, as well as by the population's possibilities for participation.

Synergies and trade-offs in the transformative action field of urban health

In cities, health-related impacting factors are interconnected in a particularly large number of ways because urban systems are complex; these factors can generate both synergistic and blocking effects between the dimensions of the normative compass.

Strong synergies can be found between the fields of environmental protection and health promotion, e.g. in the case of air pollution. In the inclusion dimension, the promotion of healthy living conditions in the areas of housing or work help increase resilience in dealing with

stress. Co-benefits via a healthy living environment can be achieved primarily by improving building standards (ventilation, heating, etc.; Rydin et al., 2012). Furthermore, creating healthy living environments can cut costs in the curative sector. In addition, an urban society's social cohesion, social capital and local identification are important factors in health protection. Deficiencies in the healthcare infrastructure can be better compensated in communities that espouse solidarity.

There is a trade-off between the dimensions of sustaining the natural life-support systems and inclusion, particularly between resource protection and resource demand, e.g. in the supply of water, food, energy and building materials. Apart from the overexploitation of resources, however, supply deficits often also exist, especially among poorer population groups in developing countries and emerging economies. When seeking to achieve equity and protecting resources, it is not only a question of governance mechanisms and technical solutions for increasing efficiency; there are also other important starting points, such as changing patterns of consumption and behaviour (e.g. lifestyles of the wealthy classes). There can be further trade-offs between sustaining the natural life-support systems and a city's economic strength or the income it generates. If there are no or only lax environmental controls, this can lead to severe environmental degradation and thus to health problems. On the other hand, tax revenue from the economy is also key, e.g. for financing social services. Individual income, too, is a key factor influencing health, especially in countries without – or with only poorly developed – insurance systems. All trade-offs can develop into obstacles standing in the way of the urban transformation to sustainability.

The effects of urban-planning interventions on health are not always directly foreseeable or causally explainable due to interactions and feedback loops (e.g. between the public transport system and individual mobility behaviour) or because of time differences between cause and effect (e.g. emissions and respiratory diseases; Rydin et al., 2012; Vlahov et al., 2010). This is especially true of non-communicable diseases, which can have various different causes (Section 4.5.3.1). In addition, interventions on these issues have different effects also because of the population's heterogeneity.

In the action field of health, too, transformation means leveraging the potential for synergies, solving trade-offs and overcoming obstacles. However, the starting conditions vary considerably across regions and societies, so it is important to take account of local path dependencies, regional development speeds and resource availability, as well as differences in the local governments' legal and financial room for manoeuvre.

The next section provides an overview of specific negative health impacts in cities.

4.5.3 Key challenges

It is difficult to give a generalizing outline of the global urban population's state of health and quality of life, which is closely related, because both factors are strongly influenced by the respective urban living conditions and healthcare systems, as well as the socio-cultural behaviour patterns of the urban population. Although some health issues and resources are common to all cities (Section 4.5.2), the urban disease burden varies greatly (Neiderud, 2015). The following is a brief overview of three key challenges in the field of urban health: (1) the increase in non-communicable diseases, (2) the risk of urban epidemics and new infectious diseases, and (3) the increase in intra-urban health disparities.

4.5.3.1

Increase in non-communicable diseases and spread of unhealthy lifestyles

A global increase in non-communicable diseases (e.g. cardiovascular diseases, cancer, chronic respiratory diseases and diabetes) can be observed; the number of illnesses is increasing, especially in developing countries and emerging economies, causing a higher rate of premature deaths (WHO, 2014a, b). In addition to rising life expectancy, the global urbanization process is discussed as a major factor in this development which, particularly in developing countries and emerging economies, can involve changes in lifestyles and consumption habits in the fields of nutrition and mobility. At the same time, urban stressors such as noise, density, environmental pollution and stress caused by precarious living and working conditions have a negative influence on people's health and induce them to engage in unhealthy lifestyles (WHO and UN-Habitat, 2010; Bai et al., 2012).

The most important health-threatening factors in this context are overweight, lack of exercise, and tobacco and alcohol consumption (WHO Europe, 2015b; Oyebode et al., 2014; WHO, 2014a, b). Overweight in particular is one of the major health challenges. While 61% of the population in the Americas and 59% in Europe are reckoned to be overweight, the figure is currently lowest in South-east Asia at 22% (WHO Europe, 2015b).

In industrialized countries, the dietary and mobility patterns that can lead to overweight are in some cases very similar in both urban and rural areas (USA: Liu et al., 2008; Wang et al., 2002; Sweden: Sjöberg

et al., 2011). By contrast, there are still major differences between urban and rural residents in developing countries and emerging economies – with some exceptions (e.g. Russia: Wang et al., 2002; West Bank: Hanan et al., 2001) – and everyday dietary and exercise routines change considerably when people migrate from the countryside to the city. More children, adolescents and adults in the city are overweight or have high blood pressure. Although they suffer less from under-nourishment and malnutrition, they often tend to eat unhealthy food and take less exercise than rural inhabitants (India: Yadav and Krishnan, 2008; Ebrahim et al., 2011; Raj et al., 2007; China and Brazil: Wang et al., 2002; South Africa: Peer et al., 2013).

Non-communicable diseases can not only lead to a loss of quality of life, mainly due to their chronic nature and gradual progression, they can also cause premature death. Loss of quality of life, measured in disability-adjusted life years (DALYs, i.e. the total number of productive years lost to early mortality or disability), varies greatly between industrialized countries, emerging economies and developing countries. According to estimates, the percentage of DALYs caused by non-communicable diseases will increase between 2008 and 2030 by 37% in developing countries, 11% in emerging economies and 3% in industrialized countries (Nikolic et al., 2011).

Apart from the social costs, non-communicable diseases also cause high economic costs due to the necessary long-term treatment costs. They can have a significant impact on the urban economy (e.g. pressure on the public healthcare and social systems, falling productivity and tax revenues), on the healthcare systems (e.g. high demand for medical services, high treatment costs, costs of adapting the healthcare systems to the increasing burden of disease), and on households and individuals (e.g. as a result of falling incomes, reduced capabilities and diminished well-being; Nikolic et al., 2011). The costs for individuals are especially high in many cities in developing countries and emerging economies (with a high degree of variance between countries) due to the frequently lower standard of services in the public healthcare sector. This can exacerbate health disparities, because high costs are a key barrier to poverty reduction and sustainable development (WHO, 2014d).

4.5.3.2

Urban epidemics and new infectious diseases

The risk of the epidemic (i.e. short-term sharp increase in the incidence of diseases) and endemic (i.e. long-term accumulation of diseases in a region) spread of infectious diseases – such as dengue fever, SARS, multi-drug-resistant tuberculosis and, recently, the Zika virus – is rising in many cities as a result of various

factors. While the 'old' infectious diseases (e.g. types of diarrhoea and malaria) are still prevalent in many cities in developing countries and emerging economies, urban epidemics and the 'new' infectious diseases represent a special challenge for urban systems worldwide. The new infectious diseases include, on the one hand, diseases emerging for the first time (e.g. H1N1, HIV/AIDS) and, on the other, diseases that have been known for a long time, but are now spreading anew as a result of frequent occurrences in a new region (e.g. dengue fever), changes of habitat or in the micro-organisms themselves, or drug resistance (McCloskey et al., 2014).

The ever closer connections between cities as a result of travel, as well as regional, national and international migration movements, are increasing the global risk of epidemics. For example, in 2003, the SARS virus was spread primarily via urban flight hubs. These pandemics (i.e. global-scale epidemics) have massive effects on city life (Quinn et al., 2010). For example, in Liberia's capital Monrovia, the city district of West Point, a slum with 75,000 people, was placed under quarantine and virtually left to its own devices during the Ebola epidemic (Snyder et al., 2014). Migration movements do not only represent a threat because of highly infectious diseases themselves, but also in relation to the spread of animal disease vectors (e.g. sand fleas, bed bugs) and multi-drug-resistant germs (Neiderud, 2015).

Furthermore, the spread of infectious diseases such as tuberculosis or flu infections is exacerbated by high population densities, as well as unhygienic conditions, inadequate basic infrastructure and insufficient efforts to control disease vectors, especially in the cities of developing countries and emerging economies (Neiderud, 2015). On the individual level, the quality of housing as well as dietary patterns significantly influence the immune status of the urban population and thus their susceptibility to infectious diseases.

In addition, the adaptation of disease vectors to urban systems can cause major problems for urban health. The mosquito *Aedes aegypti*, which transmits the dengue fever virus, the Zika virus and other diseases, only lays its eggs in artificial water containers. The number of dengue-fever cases has risen drastically over the last 40 years and is estimated at 390 million infections per year (Neiderud, 2015). Migration, livestock markets and animal husbandry in cities also encourage the spread of diseases between people and animals. Up to now, this form of transmission has been more concentrated in rural areas, as in the case of leishmaniasis (transmitted by sandflies) and leptospirosis (transmitted mainly by rats and mice; Alirol et al., 2011; Neiderud, 2015).

Climate change exacerbates the risk of infectious

diseases spreading in cities to varying degrees. While flooding significantly increases the risk of infectious diseases and the risk of accidents, warming favours the spread of vectors, such as certain types of mosquitoes. Both in the tropics, the subtropics and temperate latitudes, this leads to a further spread of e.g. malaria, dengue fever, borreliosis, schistosomiasis, hantavirus and West Nile Fever (Watts et al., 2015; McCloskey et al., 2014; Adelphi et al., 2015). The direct and indirect effects of climate change will affect a growing number of people in the future and threaten to undermine the fundamentally positive social and economic development of the last 60 years in many cities (Watts et al., 2015).

New global problems are arising as a result of anti-microbial resistance, i.e. micro-organisms (viruses, bacteria, fungi or parasites) that no longer respond to drugs (WHO, 2014e). This makes standard treatments ineffective, the infection is more difficult or even impossible to control, the duration of the disease and the stay in hospital increases, as does the risk of disease transmission and mortality (WHO, 2014e). Microbial resistance can affect strains of bacteria that cause frequent infections such as bladder infections or pneumonia, but also tuberculosis, malaria and HIV/AIDS (WHO, 2014e).

Complex interactions between different socio-ecological factors can turn cities into 'breeding grounds' for disease outbreaks (Alirol et al., 2011). Capacities for the early detection of disease outbreaks and their containment vary greatly from one city or country to another. Important prerequisites for the early detection of epidemics are health-monitoring systems where new cases are reported quickly to the relevant authorities.

4.5.3.3

Health disparities: a global urban challenge

The health status of the urban population varies widely both within and between cities. One factor that exacerbates health disparities is when there are large socio-economic differences within the population, involving different standards of living, modes of behaviour, and opportunities for accessing preventive and curative healthcare services.

As a rule, the member states of the European Union provide adequate healthcare, e.g. by statutory health insurance, and health programmes at the city level aim to improve the urban living environment (e.g. WHO European Healthy Cities Network). Even so, there are still major differences depending on geographical region, socio-economic status, ethnic affiliation and gender (WHO Europe, 2014). For example, rising living standards in Europe have not reached all social classes in cities (UN-Habitat, 2013b). Behavioural health risks,

such as overweight, lack of physical exercise or high consumption of tobacco and alcohol, are more pronounced among lower socio-economic income groups (WHO Europe, 2012).

City dwellers in developing countries, but also in some emerging economies, suffer more frequently than city dwellers in industrialized countries from a triple disease burden consisting of infectious diseases, non-communicable diseases, and accidents and violence (WHO and UN-Habitat, 2010). Urban poverty groups (Box 4.5-2), who have inadequate access to infrastructure, are more prone to infectious diseases (Neiderud, 2015). In a study conducted in Dhaka, the capital of Bangladesh, the incidence of tuberculosis diseases among slum dwellers was almost twice the national average and four times as high as the city average (Neiderud, 2015). Many diseases could be prevented by improved sanitary facilities and sewage systems in marginal communities. In many countries, however, the focus is still on treating diseases, not on preventing them by improving the infrastructure (Neiderud, 2015; Section 4.5.1).

In addition, urban poverty groups often receive poorer healthcare than others, e.g. as a result of financial or geographical barriers to healthcare services and/or a lack of knowledge about diseases (Butsch, 2011; Bork et al., 2010). Furthermore, informal structures are also becoming established in the health sector (Bork-Hüffer and Kraas, 2015). Inadequately monitored chronic diseases represent an insidious, but urgent public-health problem, especially among urban poverty groups (WHO, 2013; Kroll, 2013). This raises the risk of concomitant diseases; e.g. diabetes increases the risk of tuberculosis threefold (WHO, 2011b), diminishes quality of life and can lead to an untimely death. The spread of unhealthy lifestyles among poverty groups is also a growing problem in developing countries and emerging economies. For example, these groups often eat street food, fast food or processed food, which can lead to malnutrition, overweight and dental problems, thus making them more susceptible to both infectious and non-communicable diseases (WHO, 2010).

Overall, intra-urban health disparities worldwide cause high societal costs, because the greater vulnerability of urban poverty groups – and the frequently related higher disease burden – stands in the way of improvements in living conditions and can force a household even deeper into poverty. If a business-as-usual scenario is pursued, it is estimated that between 2011 and 2025 non-communicable diseases will cause economic costs amounting to US\$ 7,000 billion in developing countries and emerging economies (WHO, 2014d). Furthermore, the prevalence of infectious diseases like dengue fever or tuberculosis also increases

Box 4.5-2

Differences in health status between the urban and rural populations in developing countries and emerging economies

In some cases in developing countries and emerging economies, the health of urban poverty groups is worse than that of the rural population. According to a report by WHO SEARO (2011), the health status of the urban poor population is deteriorating in Asian cities. For example, in the case of many health indicators – e.g. the incidence of tuberculosis and HIV infections, or access to health facilities – urban poverty groups in India are in a worse position than the average of the total population. Access to water and sanitation is a little better than for the poor in rural areas, but it is still considerably lower than the national average. Data from Bangladesh show that living conditions (housing quality, access to clean drinking water and hygienic sanitary facilities) are the main determinants of health. Since poor health makes it more difficult to improve people's incomes and education status, health promotion is an important lever in the fight against poverty (WHO SEARO, 2011).

In India in 2005, for example, the level of chronic malnutrition among children under the age of five in the poorest urban quintile (the poorest 20% of the urban population) was 56%, i.e. higher than in rural areas (51%). In 2005, the proportion of obese women in India over 30 years old was 1.2% in rural areas compared to 1.7% in the poorest urban quintile and 11.2% in the richest quintile. In Peru, the vaccination rate among children under the age of one in rural areas was 85% in 2004, slightly higher than that of the poorest urban quintile (81%); by contrast, the percentage of obese women over 30 in the poorest urban quintile was 14%, higher than in rural areas, where it was 9%. In 2006, 93% of women in rural areas of Namibia had a knowledge of HIV/AIDS, compared to 88% of the poorest urban quintile and 97% of the richest urban quintile (WHO, 2016a). There is a risk that, together with the increase in socio-economic disparities in cities around the world, health disparities will continue to grow. These are not only caused by the different degree of exposure to health risks, but also by unequal access opportunities to health services. However, intra-urban health disparities are only slowly moving into the focus of research and policy-making (WHO and UN-Habitat, 2010).

the vulnerability of higher income groups in a city. Ultimately, the (urban) population all over the world is at risk from pandemics and microbial resistance.

4.5.4 Potential and levers

When prioritizing action fields in the sphere of health, it is important to note that health-related problems and resources can vary greatly between cities. Notwithstanding this need for differentiation, the WBGU has selected three priority transformation challenges in the action field of urban health, which in many cities have hitherto not been given enough attention on the political agenda, or have not been adequately implemented (above all in developing countries and emerging economies), because of their complexity and need for long-term planning horizons. At the same time, these challenges are regarded as essential for promoting the health of the urban population as a prerequisite and goal of transformation. Two of them can be assigned primarily to the resources for promoting health: food security and quality and the creation of recreation areas are cross-sector topics. In line with the chosen salutogenic approach (Box 4.5-1), these two exemplary resources belong primarily to the preventive field, or serve to improve urban quality of life and thus the resilience of the urban population. Air pollution is an exemplary obstacle; although it has been on research and political agendas for a long time, the measures taken to date are not yet enough to ensure a comprehensive

transformation, because profound solutions require holistic, cross-sector action approaches. Although access to and the composition of healthcare services are also a key action field in the area of urban health, this field is not at the focus of attention here because the structure of the healthcare system depends mainly on national framework conditions; moreover, the subject is already well established on the international agenda, e.g. by the efforts of international organizations such as the WHO.

4.5.4.1 Food security and food quality

Global challenges of food production and food security

Nutrition and land use as a resource base are essential elements of the Great Transformation, which is why land use was highlighted as one of three transformation fields in the WBGU's report 'World in Transition – A Social Contract for Sustainability' (WBGU, 2011). The world's population, which will continue growing at least until the middle of this century, is just one of the drivers that lead us to expect a strong boost in demand for the products from land use. The growing demand for bioenergy, the conversion from fossil-based to bio-based products, advancing land degradation, negative effects of climate change on agricultural production, and the need to further develop a worldwide system of nature reserves are important additional drivers (WBGU, 2011). Further factors include the conversion of agricultural land into settlement areas, chang-

ing consumer styles with a growing demand for animal products (meat, eggs, dairy products), food waste by consumers and disintegrated markets (Hirth, 2015; Strüver, 2015). The globally changing dietary patterns could even lead to a situation in which global population growth does not remain the most important driver of the global demand for agricultural land (Kastner et al., 2012). It is estimated that about a third of the food produced worldwide for human consumption is thrown away, goes bad or is otherwise lost (RUAf, 2015a). The amount of food waste will continue to increase, caused in particular by the globally growing middle class (WRAP and NCE, 2015).

An expansion of agricultural production is therefore essential for global food security and is addressed, for example, by SDG no. 2 'End hunger' in its targets 2.3-2.5. Cities only produce a small proportion of the food consumed there (Gómez-Bagethun et al., 2013); they are almost completely dependent on imports from outside (Grewal and Grewal, 2011). Even intensive farming methods could never fully meet the cities' own needs. At the same time, the level of self-sufficiency in the nation states is declining. Globally, just under a billion people depend on world trade to supply their food (Fader et al., 2012).

Food availability and dietary patterns in cities and their health implications

A balanced, vitamin- and mineral-rich diet is considered an essential prerequisite for a healthy immune system, affording protection e.g. from cardiovascular diseases or flu infections (WHO, 2004; Rastogi et al., 2004). Incorrect and poor nutrition, i.e. an unbalanced or insufficient supply of essential nutrients, as well as undernourishment or overeating can lead to permanent health problems. Food security is influenced by food availability, access to food (determined by incomes and markets), food preparation (eating practices, knowledge of nutrition and hygiene, etc.) and the stability of the food supply (Crush, 2014).

In the cities of the industrialized countries, the main problems from a health perspective relate to overweight and unbalanced diets; the problematic factors from the resource perspective are the high levels of food wastage and consumption of animal products. Per-capita meat consumption in industrialized countries (79.3 kg in 2013) is much higher than in developing countries and emerging economies (33.3 kg per capita; Heinrich Böll-Stiftung, 2015). The differences are even more glaring at the national level: in 2012, the per-capita consumption of meat (beef, pork, poultry) was 114.5 kg in the USA, compared to 80.4 kg in Europe, 57.8 kg in China and 4.1 kg in India (Heinrich Böll-Stiftung, 2015). There are also often large disparities in dietary patterns

within cities. The lower the socio-economic status, the more unhealthy the food consumed becomes; this is frequently coupled with limited access to healthy food in low-income city districts (Smith et al., 2010). The spread of 'food deserts' (i.e. areas where affordable, healthy nutrition is difficult to find) in the cities of the USA, Canada and the UK represents a major problem for supplying the population with quality food, especially in city districts with a low income level (Gordon et al., 2011; Walker et al., 2010). In Toronto, for example, 12% of households had problems of food security due to financial difficulties in 2011/2012 (Tarasuk et al., 2014).

In the cities of developing countries and emerging economies, undernourishment and malnutrition are still widespread, particularly among poor sections of the population. In India's cities in 2005, for example, 40% of children below the age of five suffered from chronic malnutrition; in 2010 the corresponding figures were 28% for Rwanda and 31% for Tanzania (WHO, 2016b). At the same time, the prevalence of obesity in the cities is increasing and amounted, for example, to 6% (2005) in India, 6% (2010) in Rwanda, 13% (2010) in Tanzania, and 19% (2008) Bolivia. While overweight used to affect mainly the upper classes (e.g. in Tanzania 5% of women in the poorest quintile, as opposed to 20% (2010) in the richest), poor population groups are also increasingly affected in many countries; in some developing countries and emerging economies the gradient is slowly reversing. For example, in Bolivia 19% of women in the poorest quintile were obese in 2008, compared to 15% in the richest quintile (WHO, 2016b). The increasing availability of cheap, calorie-rich and nutrient-poor food is a growing health risk, particularly in cities (Crush, 2014). In addition, the dietary patterns in the urban middle classes are changing in emerging economies as a result of improved earnings. In the BRICS countries, meat consumption rose by 6% per year between 2003 and 2012. Although in India, for example, a vegetarian way of life has socio-cultural roots in Hinduism and Jainism, Western diets are considered modern. The keeping of animals in cities (often informal, sometimes illegal) also increases the risk of the spread of infectious diseases such as avian influenza (Heinrich Böll-Stiftung, 2015). The increasing availability of large supermarket chains in cities also ultimately leads to a change both in the range of food on offer and in consumption patterns (Crush, 2014).

Levers for nutrition and healthy dietary patterns in cities

In view of the growing demand for resources for food production, the spread of unhealthy dietary patterns, and the continuing problem of malnutrition among

urban poverty groups, the key questions are as follows: How can the energy and resource intensity of food production be reduced through measures in the cities? How can food security be ensured? And how can healthy dietary patterns be promoted? The WBGU regards the following levers as key:

- *The improvement of food availability* in cities can be achieved in particular on three levels: (1) Markets must be better regulated to cushion the impact of price fluctuations and stabilize supply chains and food markets. This also includes the creation of adequate food-processing and storage facilities in cities. The aspect of market stabilization is addressed by SDG no. 2.c. (2) Urban planning must ensure the local availability of affordable and healthy basic foodstuffs by means of requirements planning (avoidance of food deserts). (3) Food availability in cities can be promoted by supporting urban and peri-urban agriculture. This can be done either by market-oriented cultivation or by using private gardens and public community gardens to strengthen self-sufficiency. Agricultural land in urban and peri-urban areas must be secured for the purpose. In Zurich, for example, 10% of the city's surface area is made available for multi-functional agricultural use (RUAf, 2015a). Urban agriculture can shorten food chains and promote local economies. This also applies to the direct marketing of agricultural products, e.g. in the form of farmers' markets (RUAf, 2015a). (4) Emergency supplies to the needy must be strengthened. Another possibility, in addition to distribution measures organized by local authorities and aid organizations, is to set up food-collection and distribution points for the needy; these are usually organized by civil-society groups (for Toronto, see Rosol, 2015).
- *Reduction of food wastage*: Another key starting point is to minimize food wastage (resource intensity; SDG no. 12.3). This can be done at the system level by improving the regulation of markets, e.g. by preventing food from rotting as a result of inadequate delivery chains. The discarding of food by the retail trade should be avoided; e.g. supermarkets could donate food to charitable organizations, food banks and sharing initiatives. The food could also be used as animal feed. On the other hand, there should be a campaign to change consumer behaviour by developing a new awareness in cities. This would comprise on the one hand minimizing the consumption of meat and milk products and, on the other, more awareness in dealing with foodstuffs and ensuring that food is not thrown away.
- *Promotion of healthy dietary patterns*: Awareness-building is an important instrument for a diet

of appropriate quality. It is not only a matter of passing on knowledge (e.g. nutrient content of different food products, *inter alia* by dietary guidelines), but also of training skills (e.g. food preparation, self-cultivation of fruit and vegetables) and the promotion of health-promoting environments (e.g. improving the availability of healthy foodstuffs), in order to actively promote changes in behaviour (Hawkes, 2013; Box 4.5-2). Initiatives can be launched by municipal governments, NGOs or private businesses. These initiatives can be rooted in different contexts, e.g. in the retail trade, the catering industry, schools or health facilities (Hawkes, 2013). Restaurants in New York City are obliged to disclose the calorie values of their dishes, for example (Barbiero, 2015).

Urban agriculture

Urban agriculture comprises fruit and vegetable growing in cities and their environs and can be supplemented by animal husbandry (Drescher and Gerold, 2010). It can involve very different forms depending on the cultivation methods and products, the economic context and the societal background. These forms vary greatly between commercial farms (e.g. intensive vegetable cultivation in greenhouses) on the one hand, and urban market gardening for individual, self-supplying households (e.g. allotments, roof and home gardens) and community gardens with collective management on the other.

Urban agriculture is not a new phenomenon. In Germany, for example, it was launched in cities in the 19th century in the form of 'poor people's' or 'workers' gardens' to improve the population's nutritional situation (Drescher and Gerold, 2010). Today in Germany approx. 5 million people use allotments; in Berlin alone there are 67,000 plots and 738 associations (Bundesverband Deutscher Gartenfreunde, undated). The FAO (2016) estimates that 800 million people worldwide practice urban agriculture. Hamilton et al. (2014) estimate that about 266 million households are involved in urban agriculture in the cities of developing countries and emerging economies, 182 million households in Asia alone. Especially in the cities of developing countries and emerging economies, urban agriculture is often informally organized, sometimes even stigmatized as backward and therefore often not yet adequately integrated into urban-planning processes. The FAO therefore supports initiatives to recognize urban agriculture as a legitimate form of land use and economic activity (FAO, 2016). In Kathmandu, for example, the establishment of allotments on roof terraces has been promoted by training programmes, demonstration plots and the provision of budgets since 2012 because of the lack of available land (RUAf, 2015b).

4 Exemplary transformative action fields

Although self-sufficiency cannot be achieved by urban agriculture even in shrinking cities (Grewal and Grewal, 2011), it can make a contribution to food security, especially for urban poverty groups (Badami and Ramankutty, 2015). Furthermore, allotments, community and school gardens offer many positive health-promoting aspects. They can improve the access of the urban population, above all poverty groups, to healthy and affordable food and strengthen their knowledge about nutrition. They also help preserve culture-specific nutritional practices, promote the self-preparation of food, counter the trend towards processed and fast food, and raise awareness for the ecological effects of global food production. Other positive aspects are the physical exercise involved in garden work and the exchange of ideas with other people. They also provide ecological benefits by making the use of water and nutrients more efficient, closing material cycles in the city, shortening transport routes and reducing the amount of food waste. Urban gardens also create new green areas on abandoned land, which promotes biodiversity and recreational activities. Community gardens usually also function as rendezvous and meeting places in the neighbourhood, since they are often not only places for joint gardening, but also provide a location for a wide range of social and ecological projects (BBSR, 2015; Chapter 6.4.2). The latter strengthens local identification and social cohesion and thus the urban population's resilience. For example, community gardens also offer nature-like places for children and young people and can thus have stabilizing effects especially in disadvantaged city districts (BBSR, 2015).

4.5.4.2

Health-promoting urban environment

Challenge and relevant action fields

The creation of healthy urban living environments is a prerequisite for urban quality of life in a people-friendly city. However, urban quality of life is only realized if the spatial possibilities are noticed and recognized and used for health-promoting purposes. By way of example, 'walkability', i.e. an appropriate degree of freedom to walk on roads and public spaces (Section 2.4), only contributes to health if the corresponding practices develop (Richard et al., 2009). In the same way, some stressors, such as high density in the urban environment, only cause stress if they are subjectively evaluated as stress, i.e. whenever the person concerned has no strategies for managing or controlling the situation (Lazarus and Launier, 1981; Lazarus and Folkman, 1984; McEwen, 1999). Particularly in urban environments where sensory overload can become a problem, coping mechanisms are likely to be quickly exhausted,

leading to stress symptoms (e.g. headaches, lack of concentration), longer-term health problems (e.g. sleep disorders, cardiovascular diseases) and mental stress (e.g. depressive disorders, ADHD; Kuo and Taylor, 2004).

Integrative approaches of health promotion therefore begin with an interactionistic human/environment model; they then strategically couple the improvement of living environments with the promotion of individual and collective health-related knowledge and actions (Box 4.5-3) and ways of strengthening coping strategies and resilience (Stokols, 1992).

The promotion of a healthy living environment touches on almost all areas of urban life. The following deals with an example of an action field that the WBGU believes to be of global importance for healthy living environments: the creation and design of spaces for recreation and activities.

Effect of spaces for recreation and activities on people's health

A key element of healthy urban living spaces and an anchor point of intersectoral urban development is having enough space for recreation and activities, e.g. green areas, sports facilities, children playgrounds and public spaces for all urban population groups. Research has shown that the availability of nature and experiencing nature in particular has a positive influence on psychological well-being and health, both directly and indirectly (Shanahan et al., 2015a; van den Berg et al., 2007; Gidlof-Gunnarsson and Ohrstrom, 2007; Section 2.4.1.1). Three cause-and-effect relationships can generally be distinguished in this context (Shanahan et al., 2015b). Green spaces have a direct effect on people's health, for example because they reduce heat stress by regulating temperatures in urban areas. Further direct effects include the reduction of UV radiation by trees or improvements in air quality. Green spaces have indirect effects on people's physical health by encouraging them to take exercise, e.g. because the ground is soft and they offer aesthetic variety – depending on moderating factors such as social norms and physical abilities. Increased physical activity in turn counteracts lifestyle diseases such as high blood pressure and overweight. And last but not least, mental health is positively influenced by spending time in green spaces. Just looking at green spaces helps people relax and reduces tiredness and attention deficits (Section 2.4).

Access to recreational areas and green spaces is essential if children in cities are to grow up healthily. Spending time in green areas can reduce concentration disorders and hyperactivity, particularly in the case of city children (Kuo and Taylor, 2004). Simply having a view of greenery out of the window at home increases

Box 4.5-3**Utilize urban resources: promotion of health information and health-related behaviour**

The provision of health-promoting offers and infrastructures, e.g. cycle paths and footpaths, parks or healthy food, does not inevitably lead to changes in health-related behaviour and the state of health of the urban population. Planning that is not needs-oriented can cause barriers, which can be removed by enabling the population to participate in planning processes. Another important barrier can be health knowledge, which is essential for access to, as well as for understanding, evaluating and using, health-related information on health promotion, disease prevention and monitoring, and healthcare (WHO, 2013). Furthermore, strengthening self-efficacy and social capital is important for developing people's locus of control (i.e. the subjective assessment of their own ability to control situations and events) and thus their active health-related behaviour (Bartley, 2004). This applies in particular to people in socially disadvantaged or marginalized city districts and to people who are at challenging phases of their lives (e.g. starting a family, old age), because people's potential access to

health-promoting structures (e.g. to doctors, parks, markets) varies widely within and between the cities, in a similar way to the contextual conditions (e.g. health insurance system). Moreover, the approach in many health facilities is often still dominated by a highly pathogenic attitude, where the focus is more on prescribing medication (in some cases involving overtreatment and overmedication) than on promoting the patients' health competence. An integrated approach thus also requires some rethinking in the healthcare sector.

Key actors in the promotion of health information and health-related behaviour are the local health authorities; they can, for example, provide health-education campaigns in schools and launch health programmes (e.g. the Anganwadi programme in India to promote maternal and child health). In addition, NGOs work particularly with vulnerable groups, e.g. residents of marginal settlements, on such topics as healthy nutrition and health knowledge, or they function as pilots assisting with access to public health facilities (e.g. Uplift India). The International Union for Health Promotion and Education has set itself the aim of reducing health-related inequality worldwide, among other things through knowledge generation and capacity building on health promotion and education.

children's ability to concentrate (Taylor et al., 2002). Playing regularly in green spaces also improves social contacts and strengthens coping strategies and the resilience of children in low-income households (Flouri et al., 2014).

Guidelines for the creation and design of spaces for recreation and activities

When looking at recreational areas and green spaces, the respective city's *Eigenart* should be taken into account in two ways: in terms of the availability of the spaces and with regard to their use. For example, the number and distribution of green and recreational areas is influenced by the historically evolved urban form, the design and accessibility of built-up and non-built-up areas, the type of vegetation, climatic conditions and the population density. In addition, the local urban practices of space appropriation and production must be considered. i.e. social norms, attitudes and preferences.

A global examination of the two aspects in relation to urban areas is hampered by the fact that available research into the connection between nature (in the city) and health mainly concentrates on North America and Europe (Keniger et al., 2013). Cultural factors can have a considerable influence. Although green areas in cities are in general appreciated to a similar extent in various cultures (for a comparison between the USA, Ireland and Senegal, see Newell, 1997), parks are used in different ways in different societies. Whereas the most important uses in northern European cities are active and often individual pursuits such as sports or

walking the dog, studies from Turkey, for instance, show that parks are used more for relaxing activities like picnics and resting (Özgüner, 2011). In China, the relevance of parks for such social activities as excursions with family and friends is increasing (Jim and Chen, 2006).

Finally, when designing a health-promoting urban environment, the fair distribution of access to conveniently situated green and recreation areas also plays an important role. Studies from North America show that significantly fewer green and recreation areas are available in city districts with low-income residents and minorities (Pham et al., 2012; Tooke et al., 2010). A study from England shows that the inhabitants of socially disadvantaged districts regard green areas as unsafe or inaccessible and have negative attitudes towards these spaces (Jones et al., 2009). Attitudes and orientations towards nature have a greater influence on how urban green spaces are actually used than their availability. Although recreational and green areas are used most when they are only a few minutes' walk away (Greenhalgh et al., 1995), people with a positive orientation to nature are willing to travel quite a long distance to reach them (Lin et al., 2014).

Efforts to upgrade city quarters by means of greening strategies can also have unwanted social consequences. For example, a study of American and Chinese cities shows that establishing green and recreation areas in disadvantaged city districts can lead to an increase in the cost of living and to low-income groups being displaced (Wolch et al., 2014).

In the context of inclusion, it is important to exam-

ine the needs of groups with limited possibilities, such as children, the elderly and people with disabilities (Thompson, 2002). For example, children prefer 'nature' to be as 'wild' as possible; they also like wasteland and places with certain potential dangers where they can play and explore their limits unobserved (Herrington and Studtmann, 1998; Halseth and Doddridge, 2000). This is particularly relevant against the background that children in urban areas have less and less autonomy and increasingly spend their time in built-up, monitored areas offering few possibilities for free movement.

In general, it can be said that urban recreation facilities should be available and easily accessible, and should offer a variety of different practices (e.g. physical exercise, social interaction and encounters). They should also conform with different everyday practices, and ensure safety and security by means of intelligent lighting, for example. Adaptation to typical, local practices and a high level of acceptance can be made possible by involving the population in planning processes; this also reinforces inclusion and social cohesion (Colding and Barthel, 2013; Seeland et al., 2009), as well as the *Eigenart* of a place. A participatory approach can also bring to light potential conflicts between the population's preferences for specific forms of green-space design and ecological sustainability. For example, a study in Australia shows that urban residents mostly prefer green areas with non-indigenous plants that are hardly adapted to local conditions – a preference which ecologically is not very sustainable (Trigger and Head, 2010).

Examples of the creation of health-promoting environments

Small parks (pocket parks) or small public city gardens are one way to create easily accessible recreation and activity areas that can be integrated into the population's everyday lives. These small parks are green areas located in densely built-up residential areas; they are no more than 5,000 m² in size, have a minimal number of plants, are accessible to the public, but separated from the environment by visible boundaries (Peschardt et al., 2012).

The city of Copenhagen has integrated the promotion of small parks into its urban-development concepts. 14 pocket parks had been created by 2015, so that 90% of the population can now reach a park, beach or port in no more than 15 minutes (Section 5.4.5). In a project in New Orleans, urban wastelands were converted into a Kid's Café Pocket Park in cooperation with neighbourhood residents. Children – especially from difficult backgrounds – are supplied with food and drink in the café; at the same time they can play in the garden, par-

ticipate in projects and grow their own fruit and vegetables (APA, 2015).

These examples illustrate promising projects and initiatives. Systematic evaluations of good examples of projects to create health-promoting environments point to the need for inter-sectoral and interdisciplinary cooperation (Srinivasan et al., 2003). Institutional, scientific and private actors from the fields of health, transport, environment and social affairs should develop joint strategies with the participation of the people affected. Such cooperation requires a lot of preparation, but it can function as an important lever for a holistic view of healthy urban living spaces. Pocket gardens, for example on converted wasteland, can be regarded as a first step here that can be implemented quickly, requires no major investments or structural changes, but generates far-reaching effects.

4.5.4.3

Health impacts of air pollution

Air pollution in big cities represents the most serious environmental health risk (WHO, 2014c; Section 2.3.4.1). 4.3 million deaths worldwide in 2012 were attributed to indoor air pollution, caused mainly by smoke from open cooking fires and heaters, machine emissions in badly ventilated workshops and tobacco smoke (WHO and UN-Habitat, 2010); this is the equivalent of about 7.7% of total mortality (WHO, 2014b). Outdoor air pollution caused 3.7 million deaths worldwide in 2012 (WHO, 2014a). Transport, power stations, industry and open fires (waste, biomass, heating, cooking) were the main causes (Lelieveld et al., 2015; WHO and UN-Habitat, 2010). Forest fires (in Southeast Asia, but also in North America) are another significant source of air pollution in cities and contribute to an increase in chronic respiratory diseases (UN Habitat, 2010b).

By far the largest proportion of these deaths occur in low- and middle-income countries in Asia and Africa (WHO, 2014a, b; Section 2.3.4.1). In China, air pollution is one of the most common of all causes of death (Lelieveld et al., 2015). It is often the people in low-income neighbourhoods who suffer above-average exposure to air pollution (WHO and UN-Habitat, 2010). Health-damaging urban air pollution is composed mainly of particulates and various harmful gases (Section 2.3.4.1). The diseases triggered by air pollution primarily affect the respiratory system (e.g. acute diseases of the lower respiratory tract, chronic obstructive pulmonary diseases, lung cancer) and the cardiovascular system (e.g. myocardial infarction, stroke; WHO, 2014a, b).

A transformation is necessary not least to avoid the feared doubling of global mortality by 2050, which

could otherwise happen as a result of outdoor air pollution (Lelieveld et al., 2015). Cities have a major contribution to make here. In the last few decades, technical solutions (e.g. switching to different fuels, catalytic converters and filters, motor design) and political instruments (e.g. threshold values, emission standards, prohibitions, taxes and levies, incentive mechanisms and education) have been developed to ensure the effective combating of air pollution. The experience that has been gained in long-standing megacities (e.g. Los Angeles or Mexico City) offers valuable guidelines for an effective clean-air policy in today's rapidly growing cities in developing countries and emerging economies (WMO and IGAC, 2012). Consistent environmental and health policies on regulating combustion processes inside and outside buildings (open fires for waste incineration, heating and cooking, large-scale industry and power plants, transport, tobacco smoke) are the key to success (WHO and UN-Habitat, 2010; WMO and IGAC, 2012).

In Europe, the remaining issues of urban particulates can be solved if the existing rules are resolutely enforced and the best technically available technologies are used (Kiesewetter et al., 2015). These techniques and instruments are also used in the dynamically growing cities of developing countries and emerging economies; however, the progress made in this way is often thwarted by the rapidly increasing overall use of fossil-based energies (UNEP, 2012b). For this reason, an incremental strategy there does not seem to be enough; rather, an attempt should be made to pursue a consistent transformative strategy aiming at the full decarbonization of energy systems (WBGU, 2011, 2014a).

On the one hand, it is a matter of framework conditions which are decided at the national level, e.g. fixing source-related thresholds or levying taxes. A reform of energy subsidies could reduce the number of premature deaths caused by air pollution by more than half (Coady et al., 2015). On the other hand, the WBGU recommends that cities follow a cross-sector, public-good-protecting, long-term and transformative strategy encompassing transport, buildings, energy production, industry and waste disposal (WHO and UN-Habitat, 2010). Measures to combat air pollution are very efficient because they make it possible to avoid health impairments and the high costs generated by health consequences and fatalities. The multiple co-benefits that can be achieved through such a transformation (health protection, mitigation of climate change, sustainable energy supplies, food security and noise prevention) are described in Box 4.5-4.

4.5.5

Conclusions: transformation pathways of urban health

Cities offer specific opportunities, but also risks for urban health. Living conditions, quality of life and the disease burden vary worldwide both between and within cities. The aim of the urban transformation is to strengthen resources and the potential for a healthy childhood and life in all cities, and to minimize stress and pollution. The WBGU sees three key challenges here: (1) the increase in non-communicable diseases and the spread of unhealthy consumption habits, (2) the risk from urban epidemics and new infectious diseases, and (3) the increase in urban health inequalities. These challenges require a salutogenic (Box 4.5-1), cross-sector and holistic way of looking at urban health.

However, active health protection is difficult because of the path dependencies in many cities; these are a result of the complexity of the effects and conditions described above (Section 4.5.2), the often delayed impact of stress and pollution and, linked to this, the fact that it takes a long time before many interventions have any visible effect. Here, contextual factors resulting from the urban form correspond in very different ways with compositional factors resulting from the structure of the population, and lead to very different actions in the urban area. Furthermore, the coordination of health-related interventions usually comprises long-term planning horizons and several responsible planning institutions that, in certain circumstances, may represent different interests and have to coordinate their projects. In addition, the room for manoeuvre in shaping and planning is greatly influenced by the national legal framework and local resources.

Ultimately, cities must decide individually which are the most urgent action fields. The WBGU regards two health-promoting resources as central starting points for the promotion of urban health: one is diet, and the other is spaces for recreation, exercise and meetings. Measures in the field of diet should involve improving food security, promoting healthy diets, and reducing food wastage and the consumption of emission-intensive food. Healthy living environments should inter alia be created by ensuring the accessibility of high-quality green areas to promote social interaction and physical exercise, thus helping to improve the resilience of cities. In these two areas it is important to bear in mind that simply making offers available is not enough; rather, health-related knowledge and actions by the population should be encouraged in a targeted way. These measures can also include small-scale, self-organized projects such as urban gardens or pocket parks, which can fulfil complex social and ecological functions.

Box 4.5-4

Fighting air pollution as an example of co-benefits

Air pollution is one of the most important environmental issues (Section 2.3.4.1). This problem and its solutions are linked in many respects with other issues and topics in the urban environment. The systemic interrelationships and the possible co-benefits that result are briefly examined here. Combating air pollution is a strategy that pays off in multiple ways:

- **Health:** Only about 160 million urban residents worldwide breathe clean air (GEA, 2012:1380). According to the World Health Organization, a total of approx. 7 million premature deaths are caused each year by indoor and outdoor air pollution (WHO, 2014a, b; WHO Europe, 2015:3). Cardiovascular and respiratory diseases are the biggest health risks from air pollution and are caused by particulates and noxious gases. The combustion of fossil and biogenic fuels in furnaces, power plants and motors is essentially responsible for air pollution (see Figure 2.3-6 on regional distribution). The follow-up costs are high. The economic costs of the health consequences and fatalities caused by air pollution in 2010 were estimated at US\$ 1,575 billion for the WHO European Region (WHO Europe, 2015a:viii). UNEP (2014:43) quotes figures of US\$ 1,700 billion for all OECD countries and US\$ 1,400 billion for China in 2010. Extreme air pollution, as can be observed on a regular basis in Asian cities, is also one of the obstacles preventing people from taking exercise and meeting in public places. Worldwide, the number of premature deaths from outdoor air pollution could even double by 2050 (Lelieveld et al., 2015).
- **Mitigation of climate change:** The scenarios for combating climate change have considerable co-benefits for air quality in cities and corresponding effects on health, especially in developing countries and emerging economies (Scovronick, 2015; IPCC, 2014c). This is a result of the phasing out of fossil fuels – indispensable in order to mitigate climate change – which are responsible for a major share of urban air pollution. Since combating air pollution is an urgent
- **Access to clean energy:** Access to modern energy for all people has long been a demand in the field of sustainable development (WBGU, 2004:125ff.; Section 3.4.1). Particularly in the field of indoor air pollution, the implementation of this requirement would significantly reduce the health burden in developing countries, because replacing biomass, coal or kerosene as heating and cooking energy by clean forms of energy such as gas or electricity would make a considerable contribution to solving the problem.
- **Food security and ecosystems:** Burning fossil fuels is also the main cause of air pollution with tropospheric, ground-level ozone. Since the contamination with ozone impedes plant growth, reducing the use of fossil fuels has a positive effect on ecosystems, including agricultural ecosystems. Strategies for reducing tropospheric ozone and particulates from combustion processes could prevent between 0.7 and 4.7 million premature deaths by 2030, and simultaneously increase harvest yields by 30-135 million tonnes (Shindell et al., 2012). Exposure to ground-level ozone is already reducing the yields of important food crops (Section 2.3.4.1).
- **Noise:** The conversion of traffic systems away from fossil fuels and towards electromobility and new mobility strategies – with the aim of preventing air pollution – avoids the noise caused by internal combustion engines and represents a significant co-benefit for quality of life (Box 2.4-2).

In a similar way, approaches aimed at reducing air pollution should not be pursued in isolation, but be systemically embedded; for example, there are considerable synergies between the mitigation of climate change and other objectives (Box 4.5-4). Technical and legal solutions, structural investment and changes in individual behaviour (e.g. switching to public local transport, cycling and walking) should be taken into account as part of an integrated concept. The improvement of urban health can therefore only be successful by ensuring the participation and communication of different actors – e.g. the local government, the private sector, academia and the citizens.

political concern, especially in some Asian cities, and offers significant improvements in quality of life and health, the corresponding strategies can be used to achieve maximum co-benefits for the mitigation of climate change (West et al., 2013; Bollen, 2015). Conversely, policies aiming at mitigating climate change have great co-benefits for air quality, which, in the short term, can offset a large proportion of the costs of reducing greenhouse-gas emissions (Thompson et al., 2014). Pursuing climate-change-mitigation and clean-air strategies in an integrated manner achieves a greater overall co-benefit than the pursuit of only one strategy; the benefit from the improvement in air quality is greater in the short-term than the benefit for the mitigation of climate change (Bollen et al., 2009).

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- **Transformative action fields: conclusions**

Sections 4.2 to 4.5 set forth transformative action fields that are relevant in different manifestations for all cities. Approaches and basic directions were outlined for the urban transformation towards sustainability, on the basis of which cities can develop their own transformation pathways and strategies. However, the individual transformative action fields should not be considered in isolation, as they are closely interconnected at the local level. For example, there are strong interactions between local environmental protection, health and poverty reduction, and between mobility and transport, land use and urban form. Interventions in individual fields therefore often have an effect on

other action fields, or require prior measures in other areas. At the same time, the close interconnections between the transformative action fields offer considerable potential for exploiting synergies and pursuing different objectives in an integrative manner by making systemic changes. A special opportunity is offered by measures that have not only short-term but also long-term benefits in diverse sectors – such as combating air pollution (Box 4.5-4).

The analysis of the action fields clearly shows that the current trends in urban development need to change significantly. This applies, *first*, to the physical development of cities, their urban form, their connectedness and their infrastructure and buildings. The next two decades will offer a window of opportunity, as a considerable proportion of the urban infrastructure will be newly built, re-built or expanded during this time period (Section 2.1). How this development is shaped will largely determine whether the natural life-support systems can be sustained and whether all people can be given opportunities for substantive inclusion. The *second* issue involved is the way in which people live together and interact in the city. The WBGU envisages cities in which the people are not only users but also designers of their urban environment, so that creativity and diversity are nurtured and made use of. The reduction of poverty and of socio-economic disparities is not only a goal, but also a prerequisite for the transformation of cities.

Taken as a whole, the action fields' overarching goal for cities targets moderate densification, resource conservation, and a conversion to a circular economy; it also aims for them to be energy-efficient and emissions-neutral in the long term, and to be marked by socially mixed districts in which the urban societies are substantially involved in urban development. Polycentric spatial-development concepts could help avoid disparities between social and economic areas and counteract potential agglomeration disadvantages in growth regions. Cities should, in future, offer all people not only affordable housing and access to basic infrastructures, but also public open spaces that allow and foster social contact and coexistence. Infrastructures should promote the health of the residents, ensure adequate air quality and avoid hazardous materials. Cities should become resilient to climate risks and other hazards.

The analysis of the transformative action fields makes it clear that these goals can only be achieved on the following conditions: if there is a departure from the paradigm of the car-friendly city; if new cities and infrastructures are increasingly built using climate-friendly building materials and not on the basis of emissions-intensive reinforced concrete; if there are efforts to achieve a fundamental change in existing industrial and

urban systems towards the sustainable management of materials and a circular economy; and if a suitable balance between densification and public green and open spaces is found in the cities. In relation to health, a paradigm change should take place that leads away from a sectoral, illness-focused approach towards a holistic, resource- and process-oriented perspective of urban health. Land-use management is a key lever in urban transformation and also forms the basis for designing many other action fields (e.g. by means of land-use and property rights). Due to the dominance of the land and real-estate markets and the widespread corruption in urban decision-making processes, land use today is not usually oriented towards the common good. Responsibilities, therefore, need to be reassigned, property and land-use rights clarified, and urban spaces used more frequently in future for the common good. The transformation will require political inclusion to be made possible, innovation stimulated and processes identified which focus attention not only rhetorically on the people in urban development.

Cities and urban societies can thus become central arenas of the transformation towards sustainability. The goal for all cities must, therefore, be to become capable of meeting these challenges. The action fields analysed show that the responsibilities are spread among the city population, the local governments (and other governmental levels), urban planners and private-sector actors respectively. The local and cultural prerequisites vary widely, so that there can be no blueprints; each city must find its own appropriate practical applications. Cities should, therefore, develop specific transformation strategies that the urban stakeholders can agree on. In this context it is important that these strategies are oriented towards a long-term horizon (up to 2050 and beyond).

It is important that participation possibilities be soundly rooted in the institutions of urban development, in order both to integrate the urban societies into the development and implementation of such strategies, and to empower people to make them capable of active inclusion. To also win over urban societies for projects with long-term effects, it should be ensured that the urban population can also benefit from them in the long run, and e.g. not be forced out of city districts after they have been upgraded. The many different property models discussed in connection with land-use management offer starting points in this context (Section 4.3).

All the action fields offer a distinct benefit in the spirit of the transformation towards sustainability, but some of them only show effects in the long term. The externalities of existing structures, and thus the costs of 'inaction' (e.g. the costs of traffic jams, long-term

4 Exemplary transformative action fields

health risks, climate change), should be made transparent in order to motivate transformative action and the requisite initial investments, and also to overcome undesired path dependencies.

Negotiation processes will be necessary in most of the action fields to reconcile the diverse interests within the cities with the requirements of transformation. Due to the substantial uncertainties and the need to adapt to new insights, the impacts of climate change and the changes in the dynamics of urban development, attention needs to be paid to reversibility and adaptability in urban development. This includes the possibility of expanding, reusing or decommissioning infrastructures, as well as greater flexibility in land use (Section 4.3). Another challenge is the immense time pressure involved in creating the infrastructures to support the people in rapidly growing cities. To avoid undesired path dependencies, transitional solutions should be taken into consideration, without losing sight of the transformation goal.

In all action fields it becomes clear that, in many cases, functional boundaries of the systems that need to be transformed do not correspond to administrative boundaries (e.g. traffic systems, energy systems, material cycles), so that local governments not only have to involve the urban population, but also need to network closely with other actors. Consequently, it is absolutely essential to coordinate responsibilities between cities, their surrounding regions and the national level.

The analysis of the transformative action fields suggests that urbanization can be brought into alignment with a transformation towards sustainability. The prerequisite for this is that the cities not only acknowledge their commitment to the transformation rhetorically, but also go on the offensive in implementing the elements of transformation outlined in the fields. An adequate provision of funding and responsibilities is a key requirement to enable local governments to do justice to their role. Chapter 8 develops a concept of transformative governance that takes on these challenges.

Cities in the global transformation process

5

5.1 Introduction

On the one hand, cities have a great deal in common and show many similarities in terms of structures, processes and actors, because of their functions, tasks and their many and varied interrelations. On the other hand, international comparisons reveal great heterogeneity and big differences in development dynamics among cities, since they vary considerably in terms of their history, their geographical location, their political, socio-cultural, economic and environmental factors, and also as a result of the different classes of city size and functional types (Section 2.2.1).

This chapter describes the urban-development patterns of eight selected example cities or city districts to illustrate different urbanization paths and resultant path dependencies against the background of the complex interplay of historical, cultural, socio-economic and environmental development contexts (Section 2.2.2). This holistic and synergistic observation of individual cities aims to raise awareness of the diversity of the respective underlying development and design pathways, specific fields of tension, and conflict patterns, and at the same time to encourage an exploration of urban transformation processes in several directions and to develop individual solution approaches that are customized to the local context. This requires a profound understanding of the complexity and interlinkages of urban-development processes. At the same time, on the basis of the normative compass developed by the WBGU and its three dimensions of sustaining the natural life-support systems, inclusion and *Eigenart* (Chapter 3), references will be compiled on specific deficits and solutions to specific urban developments which, when taken all together, can contribute to a great urban transformation.

The WBGU has chosen the following cities and city districts as examples for analysis: Mumbai (India), Cairo (Egypt), Copenhagen (Denmark), Guangzhou (China), the Ruhr area (Germany), Kigali (Rwanda), São Paulo

(Brazil), and the city district of Novi Beograd (Serbia).

Two city examples from European industrialized countries indicate the challenges created by the structural change of evolved structures. The example of the Ruhr metropolitan region illustrates the complex challenges of the structural change caused by de-industrialization, and the potential of polycentric structures. Copenhagen is well-known for its initiatives on environmental protection and its people-oriented urban development, although there is still a need for action, e.g. in reducing emissions and in the field of equal opportunities within the population.

The city examples from emerging economies and developing countries (Egypt, Brazil, China, India and Rwanda) represent cities with a high level of urbanization dynamics in the development context, but which are in different phases and are following different urbanization paths as a result of diverse political and socio-economic system conditions. Since it was founded, Mumbai has experienced marked growth and expansion processes as well as several major upheavals (e.g. independence, liberalization policy). Despite its many problems caused by overload, the city is regarded as a source of hope for the emerging middle class and the urban poverty population. In Cairo, a dualism of informal or unplanned urban areas on the one hand, and newly planned satellite cities in the desert on the other, has developed, caused by decentralized-informal and parallel centralistic-formal urban-development processes. In Guangzhou, politics and the economy are key drivers of a rapid, controlled urbanization in the course of a 'red capitalism' (Lin, 1997). Despite its political heritage as a post-conflict city and the predominantly informally organized urban development and services, Kigali is pursuing ambitious targets, aiming for ecologically compatible modernization by means of economic growth. São Paulo underwent rapid growth phases between the 1940s and the 1980s and is today trying to counter the declining importance of its Central Business District by means of inner-city revitalization in combination with participatory procedures.

The transformative action fields identified in

5 Cities in the global transformation process

Chapter 4 are also addressed with reference to the individual city examples. For example, the various sections deal in greater detail with the starting points of informal settlements, climate-change-related natural risks and participation in Mumbai, and in Cairo with the transformation of land use. Health-related factors are also addressed, e.g. the availability of recreation areas or the existence of environmental stressors in Copenhagen, Cairo and Mumbai. Another topic discussed in the individual chapters is the decarbonization strategies pursued in the individual cities and their significance for the Great Transformation, often embedded in long-term urban-development visions.

As regards the estimates of greenhouse-gas emissions and energy use in cities and settlements listed in Chapter 5, it is important to note that these are, in general, extremely diverse and rarely comparable. This is partly due to a lack of standards, e.g. in relation to emissions allocation, data quality and calculating methods, and to a lack of data, particularly in developing countries and emerging economies. In addition, the number of newly published studies cannot keep pace with the rapid urbanization process, so that no systematic, up-to-date overview exists (Seto et al., 2014:936). The figures cited by the WBGU for individual cities can therefore only serve as a rough orientation and should certainly not be used for a comparison of the cities.

5.2

Mumbai: transformation of a colonial metropolis into a globally networked megacity

Mumbai, the economic capital of India, represents cities that have a long history of early colonial internationalization and globalized development, as well as of cities in developing countries that have experienced manifold transition processes. Therefore, diverse and complex historical path dependencies exist that can likewise shed light on the development context of other cities and megacities. This is also true in regard to the increasing tertiarization of the economy, i.e. the shift from an industrial economy to a service economy, which is strongly linked to the erosion of Mumbai's former economic pillar, the textile industry. Due to Mumbai's long history of migration, the city is characterized by broad ethnic and religious diversity, multicultural coexistence, as well as ethnic and religious conflict. The urban society is likewise shaped by strong socio-economic disparities. Mumbai is also of interest in terms of the existing material, financial and human capacities for an urban transformation towards sustainability: these include the presence and efficacy of an active civil society that simultaneously faces the challenges

of improving the coordination of activities and avoiding clientelism. Basic changes, such as a conversion to energy-efficient and resource-saving infrastructures, or the establishment of social dialogues and economic retraining programmes, could significantly improve the population's quality of life.

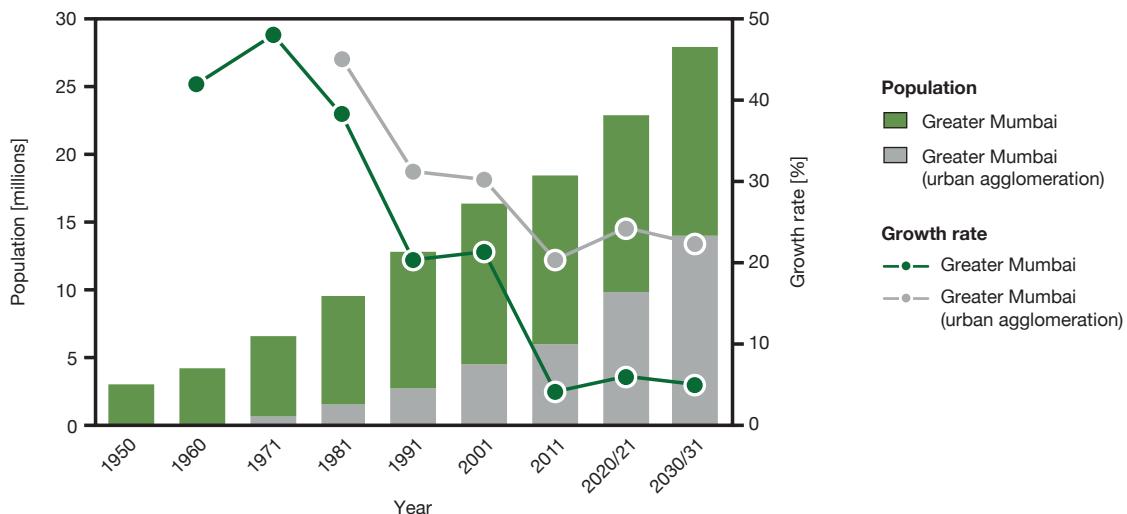
5.2.1

Transformation of a colonial metropolis into a globally networked megacity

Since its founding in the 16th century, Mumbai has experienced a profound process of growth and expansion often marked by upheaval and change. The end of British colonial rule in 1947, the decline of the textile industry in the 1970s and 80s, and the liberalization policies instigated since 1991, which accelerated urban modernization and development, were all decisive in the evolution of the city. Accordingly, the city has been shaped by different forces: "Constructed by colonial rulers, reshaped by national leaders, and pulled in opposing directions by the global economy, [Mumbai has] been viewed as both [a location] of imperialist impositions and sources of indigenous power" (Bora and Mokashi-Punekar, 2011:154). Following independence, urbanization processes intensified in Mumbai. Administratively, the city is known as 'Greater Mumbai' (GM), which consists of the peninsula (city district) and the suburbs (suburban districts), and is administered by the Municipal Corporation of Greater Mumbai (MCGM). Between 1960 and 2001, population growth was between 42 % and 20 % per decade (Figure 5.2-1). At the time of the last census, in 2011, 12.4 million people were living in Mumbai on an area of 458 km²; with an average of 27,160 inhabitants per km² (and up to 110,000 inhabitants per km² in some metropolitan areas), the city has one of the highest population densities in the world.

Future growth will take place above all in the suburban districts and the extended metropolitan area, the Greater Mumbai Urban Agglomeration, or GMUA (MCGM, 2014). The GMUA was founded in 1973 and, in addition to Greater Mumbai, encompasses seven other municipal corporations (Thane, Kalyan, Ulhasnagar, Mira, Bhiwandi, Navi Mumbai, and Vasai Virar City) and nine municipal councils. The GMUA extends across 4,355 km² and, in 2011, had a population of 18.4 million inhabitants.

Mumbai displays the typical characteristics of a megacity in an emerging economy: high population growth, a large informal sector, an overstretched infrastructure, and manifestations of ecological overload (Jain et al., 2013). At the same time, there are severe socio-eco-

**Figure 5.2-1**

Population growth in Greater Mumbai and the Greater Mumbai Urban Agglomeration: absolute growth and growth rate.
Sources: MCGM, 2014; UN DESA Population Division, 2014

nomic disparities between the very rich, internationally educated and the very poor, illiterate population groups, as well as between members of the different castes, ethnic groups, and religions. About half of the population live in slums, most of which lack basic services. Standing in contrast (Figure 5.2-2) is the growing number of modern office towers, shopping malls and gated communities. The real-estate market in Mumbai is one of the most expensive in the world. The growing socio-economic disparities are leading to increased societal fragmentation, and are straining social cohesion. This societal schism is also found in the business world. Mumbai is considered one of the important national and international economic and financial centres. At the same time, a large portion of the population is employed in the formal low-wage sector or the informal sector. In this context, the business areas and sectors are closely intertwined at various levels; the export firms, for example, benefit from cost-effective suppliers operating in the informal sector.

Despite these problems, Mumbai has high levels of civic commitment, numerous grassroots movements, social tolerance, and a powerful sense of place identity. The resulting social pluralism, innovativeness and creativity in society are important resources for the preservation and expansion of resilience (Jain et al., 2013).

5.2.2

Sustaining the natural life-support systems in Mumbai

Because the infrastructure is overstretched, the environment in Mumbai is under great pressure, above all from increasing air and water pollution. Other problems include inadequate waste disposal, the general lack of protection of ecological compensation areas, and degrading biodiversity. At the same time, the demand for resources is rising due to changing consumption patterns and further rising population figures. Climate change threatens to exacerbate existing problems.

**Figure 5.2-2**

Inner-city disparities in Mumbai in a confined space: slum settlement in front of high-rise buildings in old industrial areas, 2010.

Source: Frauke Kraas/WBGU

5.2.2.1

Local environmental problems

The biggest emission sources of air pollution are industry, vehicle traffic, construction and transport dust, and fermentation gases produced by unremoved waste and sewage. Measurements of six pollutants (SO_2 , NO_2 , SPM, NH_3 , lead, benzopyrene) taken at various locations in Mumbai revealed that the national limits for at least three pollutants (SO_2 , lead, benzopyrene) were exceeded at all the locations. The maximum thresholds for particulate matter were also often exceeded.

Despite high absolute CO_2 emissions, per-capita emissions in Mumbai, at about 1.84 tonnes (Ramachandra et al., 2015:489), are still relatively low compared to many other cities. The share of renewable energies, primarily hydropower, is 21 % (Economist Intelligence Unit, 2011a). Energy consumption, at 6.5 MJ of energy per US\$ of GDP (Economist Intelligence Unit, 2011a), is relatively high; this can be explained by, among other things, low energy efficiency and high emissions intensity.

The average daily demand for drinking water is 4 million cubic metres, but only 3.4 million cubic metres are provided per day. With an average daily per-capita consumption of 268 litres, the actual consumption varies greatly, since not all households are connected to the water supply network. Especially slums erected after 1995 lack access to a water connection. Furthermore, the existing water supply network is in need of renewal; leakages cause water loss and also increase the risk of contamination by service-water intrusion. As not all households have water meters linked to the payment system, incentive schemes for water conservation could be expanded. Water is usually provided for only two to six hours per day. The water for Greater Mumbai is obtained for the most part from lakes fed by rainwater (the most remote lake is 173 km away). Various projects (in particular dam construction) are underway to expand drinking water capacities (MCGM, 2014).

Not all households in Mumbai are connected to the sewage system. It covers only about 60 % of the urban area of Greater Mumbai, reaching 42 % of the population and 2 % of the slum population. Therefore, only 63 % of the sewage generated (2.7 million cubic metres per day) is processed in sewage-treatment plants. An expansion of capacity is planned, but sewage treatment remains a major problem. The approx. 1,500 km of sewers are in part over 100 years old and in major need of rehabilitation (MCGM, 2014). The serious contamination of the rivers and coastal zone of Mumbai is due to the lack of wastewater treatment.

In Greater Mumbai, approx. 7,800 tonnes of waste (630 grammes per capita) and 4,700 tonnes of construc-

tion and demolition waste are produced daily, of which only around 10 % is recycled (369 tonnes of organic waste and 250 tonnes of recyclable materials); the remaining waste is disposed of, untreated, in landfills or by illegal dumping (MCGM, 2014). Approx. 83 % of the generated waste is collected. 52 % of all households are covered by a house-to-house waste-collection system; 48 % must bring their waste to collections sites. As a result, households dispose of their waste to some extent via illegal dumping in open sewers or spaces. Low recycling rates, improper landfilling practices, and the lack of waste separation result in high environmental costs; furthermore, the city has major difficulties in providing new landfill areas.

Although the low level of land use (a result of the high population density) can be assessed as ecologically positive, problems nevertheless exist in regard to nature conservation. Approx. 28 % of the total area of Greater Mumbai consists of natural, open spaces, above all forests, lakes, mangroves, wetlands, and the Sanjay Gandhi National Park (Figure 5.2-3). Nevertheless, urban development in Mumbai usually pays scant attention to the preservation of ecosystems and biodiversity that could contribute towards the conservation of environmental health (MCGM, 2014). In the latest development plan, the municipal government focuses on strategies for protecting ecologically sensitive areas of high biodiversity, restoring ecosystems, and extending inner-city blue-green networks (MCGM, 2014).

5.2.2.2

Impacts of climate change

Mumbai is affected by climate change – above all changing precipitation regimes and urban heat effects (IPCC, 2014c). While extreme heat waves were previously rare along the west coast of India, their intensity and frequency are projected to increase sharply by 2070 (Murari et al., 2014). Floods, caused by heavy rains and inadequate drainage systems, pose a significant health threat and economic problem for the city (Box 5.2-1). Mumbai's climate is characterized by the monsoon. Of the average annual rainfall of 2,000 mm, about 70 % falls in July and August (MCGM, 2014). To date, the most intense flooding occurred in July 2005, when nearly 1,000 mm of rain fell within a 24-hour period (Ranger et al., 2011). Increasing precipitation levels as well as torrential rains and thunderstorms are being observed in Mumbai; such weather patterns are expected to increase further in the coming years (Rana et al., 2014; De Sherbinin et al., 2007). Today, Mumbai is one of the 20 cities worldwide in which people and goods are most affected by coastal flooding, and this will foreseeably still be the case in 2070 (IPCC, 2014 c). Hence, the risk of extreme floods and, in turn, coastal

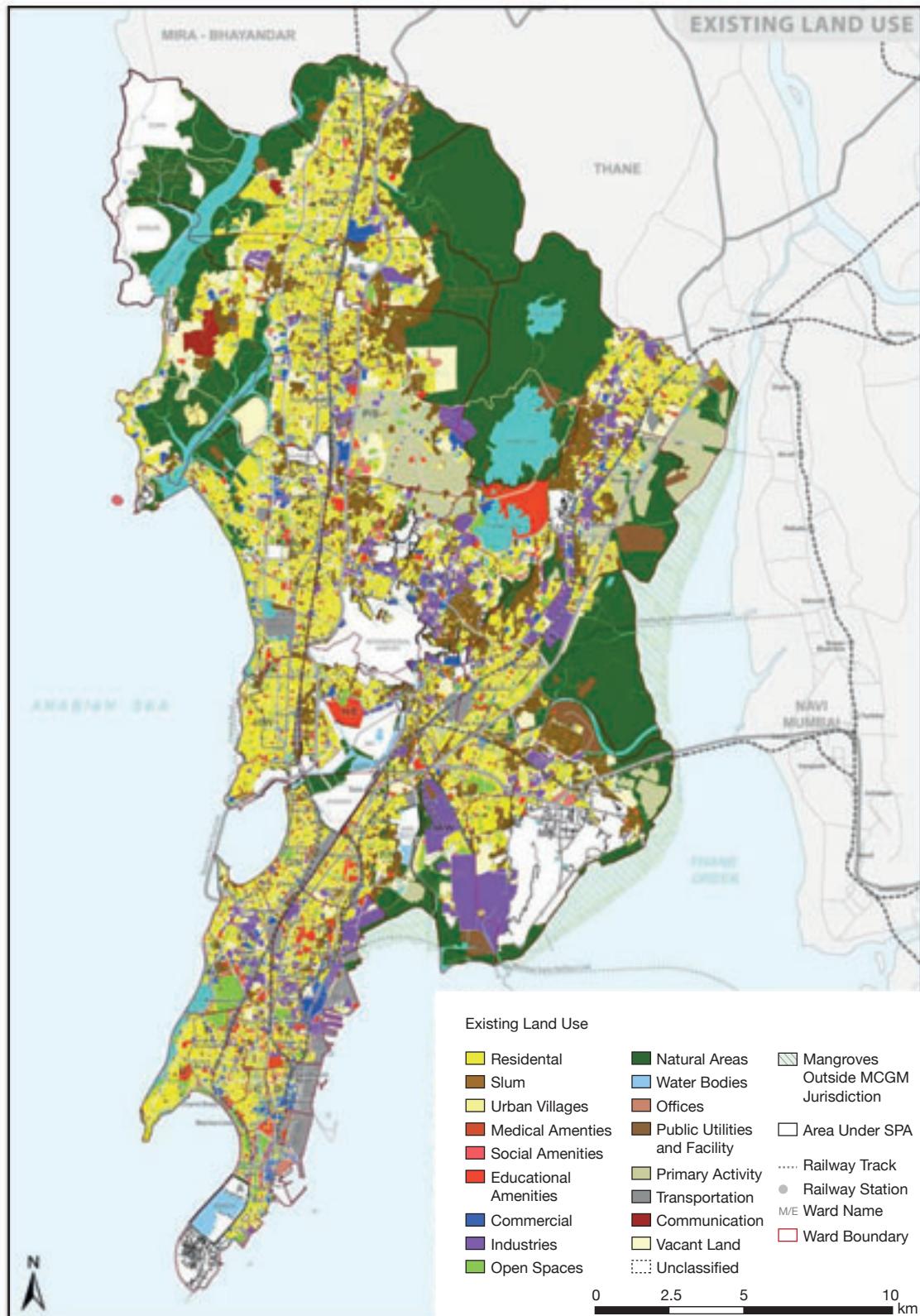


Figure 5.2-3
Land use in Greater Mumbai.
Source: MCGM, 2014



Figure 5.2-4

Impact of rising sea levels on Mumbai: in the event of a 4°C increase (left) and 2°C increase (right) in temperature.
Source: Climate Central, 2015

erosion and landslides could more than double by 2080 (Ranger et al., 2011).

The flood risk is exacerbated by Mumbai's natural characteristics, as well as by anthropogenic factors. Some areas of the southern peninsula lie just above sea level, and are thus particularly vulnerable to the approx. 3.3 mm rise in sea levels encountered annually during the last two decades (1993–2012; Unnikrishnan et al., 2015; Figure 5.2-4). The impact of rising sea levels will be intensified by anthropogenic interference – especially the dense settlement of the immediate coastal areas, resulting in extensive erosion of shorelines, as well as increasing land subsidence due to groundwater extraction and the increasing weight of buildings (Gupta, 2009). The drainage system – consisting of rivers, large and small open channels and underground canals, reservoirs and pump stations – is in need of renovation due to its advanced age. Channels are often clogged by waste, and the natural drainage systems as well as the stormwater storage capacity have been significantly affected by urban construction activities and buildings (MCGM, 2014). The sewage problems are also exacerbated by the destruction of mangrove forests by private contractors, the violation of coastal protection zones, the uncontrolled population growth due to migration, and a lack of clarity in coordination and cooperation between the numerous private and public actors and institutions (Bhagat et al., 2006). The ongoing urbanization process in Mumbai, which often lacks an adequate planning framework, will further increase flood risks (Ranger et al., 2011).

5.2.2.3

Measures for sustaining natural life-support systems

In 2008, the Indian national government adopted a National Action Plan on Climate Change which, among other things, provides for the expansion of solar energy and energy conservation in the building sector (reinforced by a tightening of existing building regulations; Pandve, 2009). The city of Mumbai, however, still does not have a climate plan; instead, to date only sporadic measures have been taken, e.g. in the area of 'green building' or limits on fuel-based emissions (Alankar, 2015). Mumbai is a member of the C40 city network, which aims to promote local strategies for combating climate change through effective collaboration between cities. In the case of Mumbai, however, neither emissions data nor emissions targets are listed on the C40-network homepage to date (C40, 2015 b).

Other laws and initiatives that have been adopted at the city level by the MCGM relate to, for example, the legally prescribed collection of rainwater and grey water in buildings, waste-management improvement, school campaigns to raise awareness, the promotion of local public transport, the promotion of waste recycling, and a ban on plastic bags. The municipal government also encourages civil-society initiatives: the Advance Locality Management Programme, for example, encourages citizens to join together in neighbourhood committees to keep their local environments clean and reduce waste (Economist Intelligence Unit, 2011a; Section 5.2.3.3). The success of the individual measures is difficult to verify, however. The authors of the STEPS Centre ('Social, Technological and Environmental Pathways to Sustainability') study reveal that

there is a huge gap between legal regulations and the actual implementation of projects in Mumbai, and that the implementation of local laws is also impeded, for example, by the government of the state of Maharashtra (Alankar, 2015). Among other things, not only are there no uniform standards for 'green buildings', but violations of environmental regulations are not penalized, and the tax incentives for ecological building are negligible (Boyd and Ghosh, 2013). The existing legislative initiatives and practices for combating climate change, for resource protection and for improving the quality of the environment have not led to a significant rethinking or the introduction of a transformation process. To a greater degree, for example, a business-as-usual scenario with a 'green veneer' is being pursued in the economic sector, which results in the vulnerable population groups bearing most of the costs arising from environmental planning and regulations (Alankar, 2015).

5.2.3 Inclusion in Mumbai

5.2.3.1 Substantive inclusion

Mumbai's economic strength is reflected in the Human Development Index (HDI), which ranks Mumbai at 0.842, much higher than the national Indian average of 0.504 (UNDP, 2011). While the indicators for income and education are above the national and state averages (literacy rate, according to the 2011 census: Mumbai 90 %, Maharashtra 82 %, India 74 %), the health indicator is slightly below the average (Yashwantrao Chavhan Academy of Development Administration, 2014). This can be attributed to the difficult urban living conditions in Mumbai, e.g. the high population density, the large proportion of slum inhabitants, the poor infrastructure, and the environmental pollution.

The HDI obscures the immense socio-economic disparities. While the rising middle classes, where possible, draw upon private services and goods (e.g. gated communities, private schools, private healthcare), the lower income groups usually suffer the most from the inadequate public infrastructure, particularly in the fields of water supply, sewage and waste disposal, and sanitation facilities (Section 5.2.2). As the residential districts of the lower income groups are usually located in areas of greater environmental degradation, considerable environmental injustice exists (e.g. in regard to access to green spaces). Yet the middle and upper classes can only protect themselves to a limited extent from some factors: the daytime noise levels throughout

the entire city, for example, exceed the threshold value of 55 db (in residential areas, it is approx. 63-73 db; in high-traffic areas, 65-85 db). Although quiet zones have been established, particularly in residential areas, the threshold limits are usually exceeded in such areas, too (MCGM, 2014).

Urgent action is required above all in the provision of affordable housing, the expansion of the transport system, access to public health and educational institutions, as well as in the improvement of environmental health.

According to official statistics, 42 % of the population live in slums (MCGM, 2014; Box 5.2-1), which differ significantly in regard to their structural design, infrastructure provision (access to drinking water, sanitation facilities, sewage system, waste management, flood protection, etc.) and legal status (Joshi et al., 2002). The provision of basic services also depends on whether a slum is officially registered with the municipal government (approx. 85 % of the slums are registered). In informal slums, service provision varies depending on the property owner, e.g. the central government, the railway authorities, or a private owner (Zerah, 2014). Often, the land-ownership status of the slums is unclear, which leads to considerable insecurity for the inhabitants (Patel, 2004). The slums of Mumbai are not only inhabited by people below the poverty line, but also include members of the lower middle class. According to the data of the National Family Health Survey 2005/06, 10 % of all slum households in Mumbai are considered poor, compared to only 3 % of all households in non-slum areas. Although 79 % of the poor live in slum areas, the slums can nevertheless not be equated with poverty (Gupta et al., 2009).

In view of the continually increasing population, decreasing household sizes, and increasing incomes, the demand for housing in Mumbai will continue to grow. This is further exacerbated by the space requirements of the business sector. Approx. 60 % of the city area (271 km²) is developed, with 103 km² for residential use (38 % of the developed area), 13 km² (5 %) for commercial use, 22 km² (8 %) for industrial use, and 91 km² (33 %) for public services and transport (Figure 5.2-3). The percentage of publicly accessible open spaces (playgrounds, recreation areas, parks, and gardens), at 1.24 m² per person, is extremely low (MCGM, 2014; Figure 5.2-6). Furthermore, the open spaces are often privately owned or in a state of neglect due to lack of maintenance. Despite the sought-after separation of residential and commercial areas, the land-use structure is tessellated and mixed. Due to the lack of open spaces, the city requires a holistic urban redevelopment and renewal with a good transport system, access to public facilities, and environmental protection (MCGM, 2014).

Box 5.2-1

Climate change and flood risk in Mumbai

The most severe flooding to date occurred in 2005. It proved to be the most expensive disaster of all times for the Indian insurance market, which found itself liable for an estimated US\$ 770 million (Ellenrieder, 2006). This event led to a greater awareness of the economic and social impacts of global climate change for Mumbai. It is estimated that by 2050, economic damage caused by extreme flooding could reach approx. 64 billion INR (or approx. €842 million) (Kumar et al., 2008).

The annual floods of varying intensity have direct and indirect consequences. In 2005, numerous districts were swamped by up to 3 metres of water; normally, the flooding depth during the monsoon season is 0.5 to 1.5 metres (Gupta, 2009). As slums are generally located in high-risk areas (Figure 5.2-5) and the shacks are usually low structures and not very sturdily built, it was above all the inhabitants of slums who suffered the loss of their homes and belongings (Hallegatte et al., 2010; Kraas et al., 2011).

Numerous people drowned, were killed by collapsing structures, or electrocuted. The floods also triggered many landslides. After the floods, contaminated drinking water caused hundreds of people to become ill with gastro-intestinal diseases, including cholera and dysentery. Chemicals, primarily from informal industrial companies, also entered the water network (Ellenrieder, 2006). The transport system collapsed, and many shops and offices were closed, resulting in great economic losses (Revi, 2008). The severity of the impact of the floods was also linked to poor governance, as the various institutions were incapable of coordinating the necessary measures (Zérah, 2014).

Proposed solutions: crisis prevention and civil-society disaster relief

The Municipal Corporation of Greater Mumbai (MCGM) is responsible for risk prevention and adaptation. The first Greater Mumbai Disaster Management Action Plan was drawn up in 2007. The plan includes a physio-morphological, meteorological and socio-economic risk analysis of the urban region and its individual city districts in regard to eight risk factors (vulnerable settlements, floods, fire, earthquakes, landslides,

road accidents, industrial accidents and cyclones), and lists response and prevention measures. The measures called for are divided into three thematic units: improvement of the infrastructure, development of communication and information systems, and analysis of land-use policies and planning. An updated version, the Mumbai Disaster Risk Management Master Plan, was adopted in 2010. That same year, the Mumbai municipal government released guidelines specifically for flood protection and prevention (MCGM, 2010).

In addition to the municipal government, local CBOs and NGOs also play an important role, since the bulk of disaster relief was performed informally as neighbourhood and family assistance. This includes sharing food reserves, providing shelter, and cleaning the streets after flood events. One reason for the great need for neighbourly assistance is the poor accessibility of broad sections of the town for relief workers. The number of NGOs in India is high in general, and especially high in Mumbai. During disasters and emergencies, these organizations are included in the emergency response as part of community-based disaster management. Their local roots enable them, to some extent, to function as a link between public institutions and the (informally settled) marginal population (Kraas et al., 2011; Peters et al., 2015).



Figure 5.2-5

Informal settlements in Mumbai are often found alongside infrastructure lines and in high-risk areas. Pictured here is an informal settlement along a railway line.

Source: Frauke Kraas/WBGU

The public transport system in Mumbai is severely overloaded: 7 million people use the local railway system every day, an additional 5.5 million use the public bus system. As capacities have not kept up with demand, each train carries about 2.5 times the maximum permitted load. Approx. 51 % of all road users are pedestrians, only about 2 % motorists. Nevertheless, vehicle traffic increased by 137 % between 1991 and 2005, bicycle traffic by 306 %. Between 1996 and 2005, ownership of private cars increased from 5 % to 8 %, and could reach 20 % by 2031. On the whole, infrastructure development has not been able to keep up with the increase in traffic, the result being traffic jams which, in addition to contributing to noise and

air pollution, also cause significant delays. Due to rising real-estate prices, a growing number of the working population have to travel ever-greater distances to get to work (MCGM, 2014).

Various projects aimed at regulating traffic are being planned, including the Eastern Freeway and a monorail system (MCGM, 2014). At present, private vehicles still make up a relatively small percentage of transport in Mumbai, but their share will probably increase steadily in the coming years unless there is massive investment in local public transport now. Traffic and transport projects that favour individual vehicle traffic and toll motorways tend to benefit the upper class, while many people of the lower and middle classes have to travel on

**Figure 5.2-6**

Open urban spaces in Mumbai are rare. The Oval Maidan is popular among the city's inhabitants for sports and leisure activities. The colonial Churchgate Terminus is in the background.

Source: Mareike Kroll/WBGU

overfilled buses and trains for several hours every day.

The municipal government is responsible for public education and healthcare provision. The MCGM offers free primary education and maintains 1,255 primary schools, 109 secondary schools, and 430 privately supported primary schools. Due to the uneven distribution of the schools, some areas – especially those with a high proportion of slums – are under-served (MCGM, 2014).

The number of publicly operated healthcare facilities is also far from sufficient, so that large portions of the population must rely on private, fee-based healthcare facilities; these are preferred because they provide better care and better services (MCGM, 2014). As already shown by the example of the HDI, the poor quality of life in Mumbai has a direct effect on the health of the population and in turn burdens the healthcare system. Negative impacts are also generated by the extreme air and noise pollution, the monsoon-season flooding, the poor quality of drinking water, the inadequate lighting and ventilation conditions, as well as the inadequate water and sanitation facilities in schools. The high levels of pollution contribute to a broad proliferation of diarrhoea, tuberculosis, hypertension, malaria and diabetes (MCGM, 2014). At the same time, the lack of recreation areas, minimal physical exercise, job-related and private stress, and health-impairing behaviour (e.g. alcohol consumption) negatively affect resilience and promote the increase of non-communicable diseases, above all diabetes, high blood pressure and cardiovascular disease (Mohan et al., 2011; Gupta and Ahuja, 2010; Rajan and Prabhakaran, 2012). Mental illness as a result of urban stress is also on the increase (Shidhaye and Patel, 2012).

5.2.3.2

Economic inclusion

Over the last four decades, the primary and secondary sectors have continuously declined to the current 1% and 31%, respectively, in favour of the tertiary sector, which, according to estimates, should grow from the current 68% to 81% by 2034. The decline of the textile industry, of world importance during the colonial period, began in the 1960s due to mechanization and the relocation of labour-intensive production stages. As the orientation towards services increased, five new economic clusters formed in Mumbai: financial services, information technology and related services, media and entertainment, logistics and storage, and the production of export-oriented high-quality goods. These specializations in the global economy also require that Mumbai increases its attractiveness as a location, above all in regard to quality of life and real-estate prices. Important challenges confronting the city's development, therefore, are the provision of land for social and physical infrastructure and a regulation of the real-estate market (MCGM, 2014; Section 5.2.6).

The transformation from an industry-based to a services-based economy was accelerated by the economic reforms of the New Economic Policy begun in the early 1990s (Nissel, 2004; Stang, 2002). The massive privatization of state-owned enterprises led to significant losses of formal employment, as well as to a marginalization of many workers (Vyas, 2009). At the same time, the amount of informal employment has risen sharply since the 1990s. The number of jobs emerging in the informal sector appears to be greater than in the formal sector (MCGM, 2014). According to the Municipal Corporation of Greater Mumbai, the percentage of those employed in the informal sector in 1998 was 38% – the 'dark' figure must be assumed to be higher (MCGM, 2005). Other estimates lie at 68% (Jain et al., 2013). Those working in the informal sector are often subject to poor working conditions, low wages and long working hours, and lack employment security and rights as well as social security benefits. The fields of work (e.g. trade, industry, housekeeping) and the working conditions vary greatly, so that general assertions are not possible (see, for example, the study on the street vendors of Mumbai: Saha, 2011). The overall employment rate in Mumbai in 2011 was 38% (56% for men, 16% for women; MCGM, 2014).

GDP rose by 13% per year between 1993/94 and 2010/11; the share of national GDP is consistently about 3%. In Mumbai, per-capita GDP is three times the national per-capita income. The monthly income of 50% of all households, however, is less than 20,000 INR (approx. €260); at the same time, the cost of living is much higher than the national average. The real-

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estate market is also among the most expensive in the world.

5.2.3.3 Political inclusion

Voter turnout

In Mumbai, elections for the local government are held every five years. The elected city representatives of the municipal government have an advisory function, and the mayor has only limited powers. The executive power lies in the hands of the municipal commissioner, a government official appointed directly by the federal government (Urban Age Programme, 2008). Local elections are perceived by the public as being less important, and the election turnout is usually under 50 % (Zérah, 2014). According to Zérah (2014), the election campaigns of the various parties seldom introduce ideas on urban-development strategies and laws, or issues of public interest, but, instead, concentrate more on access to resources for specific interest groups, e.g. neighbourhoods, religions, or castes.

NGOs and CBOs

India has, in general, a strong NGO scene that has emerged from philanthropic and religious movements (Herrle et al., 2013). Mumbai also has a vibrant and active civil society. Two participatory approaches can be roughly distinguished: NGOs, which often act as intermediaries between the population and the municipal government, and community-based organizations (CBOs) – such as neighbourhood committees (also known as ‘mohalla committees’ in Mumbai), residential welfare associations, or advanced locality management groups (ALMs) – in which the citizens themselves are the central actors.

In the 2014–2034 development plan (MCGM, 2014), the municipal government encourages citizens to participate in urban-development processes in the form of neighbourhood committees in order to improve communication between citizens and the municipal government. The objective is often the improvement of services and the improvement of the environment in a neighbourhood. To promote increased transparency, local representatives of the municipal government are supposed to be accountable for the development processes. In 2007, 648 groups were registered in the city’s Advance Locality Management Programme. The groups concern themselves with their immediate neighbourhood (e.g. with recycling and the composting of organic waste), while the city ensures the regular cleaning of the areas and deals with residents’ complaints as a matter of priority (Zérah, 2014). The result is an institutionalized dialogue between citizens

and the municipal government. Not all ALMs are active, however; the groups work particularly well in locations with a specific history or identity and a correspondingly high level of social cohesion within the neighbourhood (Zérah, 2014). Other programmes involving the municipal government and neighbourhood committees include the Slum Adaptation Programme, the Slum Sanitation Programme, and the Clean Mumbai Initiative (Shankar, 2013).

The networking of the CBOs at city level and above is usually carried out by NGOs, which enable an exchange of knowledge. There are approx. 2,800 registered NGOs in Mumbai (Shankar, 2013). They are primarily engaged in the major problem areas of the city and concern themselves with spheres of public space, housing, education, sanitation, waste management and cleanliness (Shankar, 2013). The projects usually include stakeholders from the municipal government, the private sector and citizens. The Mumbai Water Front Centre, for example, developed from an initiative begun by residents in the neighbourhood of Bandra, who wanted to convert the coastal strip (formerly a landfill site) in their area into a vibrant, useful public space. Citizens, planners and actors from the city and private sector made the coastal park possible. Today, it serves as a recreational and meeting place, and is used both for sports and cultural events (Shankar, 2013). Another example is the Urban Design Research Institute, which is committed to the preservation of the city’s cultural and historical heritage. This NGO works together with neighbourhood committees, government representatives and the private sector to raise awareness of the urban cultural heritage and to preserve it through collaborative projects (Shankar, 2013).

In the field of slum rehabilitation (Box 5.2-2), the ideas of the alliance of Mahila Milan, SPARC and the National Slum Dwellers Federation are seen as a good model (Sections 6.2.2 and 6.4.1). Their methods, and to some extent their philosophy, have been adopted in many other countries, and they are internationally networked (Herrle et al., 2013). They have gained access to the legislative level of India due to their ability to mobilize, their media presence, and their clear vision (Herrle et al., 2013).

The diversity and modes of action of the CBOs and NGOs in Mumbai reveal the remarkable initiative, creativity and perseverance of the citizens in tackling existing problems (Shankar, 2013). They contribute to improving the quality of life and networking of the citizens. Communication between the citizens and the municipal government, and involvement in participatory processes, are especially important courses of action for transforming the historically more common ‘top-down’ planning processes. Also important are the

Box 5.2-2**Strategies for slum rehabilitation in Mumbai**

Slum rehabilitation (Section 7.3.1.2) in Mumbai is shaped by legislation at different levels of government, as well as by civil-society agencies.

National government level

There are several national programmes, such as Basic Services to the Urban Poor, Integrated Housing and Slum Development Scheme, Affordable Housing Partnership, Interest Subsidy Scheme for Housing the Urban Poor, and Integrated Low Cost Sanitation Scheme (Government of India, 2011). Among the obstacles faced by slum-rehabilitation measures in India is the incomplete database (Nijman, 2008; Government of India, 2011). In India, there is no uniform definition of what a slum is, which complicates quantitative analysis and comparability. In general, the influence of the central government is seen as weak; it is exercised primarily via the allocation of budgets and the enactment of national laws, which the states do not have to follow (except on areas of land that belong to the central government, such as military areas; Nijman, 2008; Burra, 2005).

Local government level

In 1995, the Slum Rehabilitation Authority was founded which, as a planning authority, puts forward proposals for the planning and refurbishment of slums in Greater Mumbai. Between 1950 and 1970, slums were usually simply levelled, but in 1971 slum-upgrading measures were introduced. Since 1995, the policy primarily pursued is that of slum rehabilitation. All slums erected before 1995 can participate and, according to Nijman (2008), have the right to be legalized and protected from destruction. At the Slum Rehabilitation Authority, slum residents can apply for permission for a renovation project, which means that the land rights are transferred to them, and a private builder constructs houses on the land for the residents. The builder is, in turn, compensated by being awarded unneeded land on which he can construct profit-bringing structures (mechanism: high land prices; land sharing). This approach, however, is regarded as having failed (Nijman, 2008) because, for one thing, only a few households have achieved improved living conditions and, for another, the actual residents were driven out by later costs such as taxes. The location of many slums is too unattractive, and the areas too small, to attract private investors. Furthermore, each slum population must agree on a strategy, which is difficult because of the prevailing heterogeneity of residents and interests.

Nijman (2008) describes the method used in Mumbai for dealing with the slum problem as a neoliberal, market-based approach that has caused a shift from government intervention to free-market economics (with an increasing involvement of private construction companies and financial institutions). Furthermore, responsibility has shifted from the nation state to the local government, and from the government to civil society. According to Nijman, NGOs have entered the power vacuum left by the state. The author, however, views their role in urban governance as problematic due to, among other things, their lack of democratic legitimacy and accountability.

Civil society and NGOs

Because of the obvious failure of governmental management (Roy, 2008), civil society has taken on an important role in urban development. While middle-class citizens organize

state-sponsored Advanced Locality Management Groups (ALM Groups) to address grievances (Baud and Nainan, 2008; Ganapati, 2008), several NGOs have committed themselves to the improvement of living conditions in slums (Appadurai, 2001; Burra, 2005; Patel and Arputham, 2007; Ramanath, 2009). The most influential NGOs are Mahila Milan, SPARC and the National Slum Dwellers Federation, who have formed an alliance and work without party-political affiliation (Section 6.2.2; Appadurai, 2001; Herrle et al., 2013). There are also a number of NGOs that are organized according to the land-owners in the slum areas. For example, in Mumbai there are the Railway Slum Dwellers Federation, the Airports Authority Slum Dwellers Federation, the Pavement Dwellers Federation, and Dharavi Vikas Samiti. This shows that the negotiation of solution strategies greatly depends on who owns the land (Burra, 2005).

NGO strategies in Mumbai include, among others, the mobilization and organization of slum dwellers, savings and credit groups, infrastructure projects (such as houses and sanitation facilities), the development of alternative proposals to slum resettlement (especially in Dharavi), the clarification of land rights, mapping and surveying of slums, exchange of information (local, national, international), the networking of slum dwellers, and house exhibitions on adequate, appropriate planning, and capacity building at the municipal government on the topic of slums. The Community-Led Infrastructure Finance Facility programme enables NGOs to persuade the local government, the private sector or international assistance programmes and development institutions to finance infrastructure projects. The larger NGOs are increasingly entering into partnerships with the local government. The measures are extremely diverse and based at different levels. The strong involvement of civil society in Mumbai has, in the meantime, come to serve other municipal governments as a model (Burra, 2005).

Conclusions

To what extent Mumbai can be assessed as a positive example in regard to slum rehabilitation is difficult to judge. Such an assessment is very dependent on the individual projects and actors involved. Past major local-government projects can be rated as negative – for example the Bandra Kurla Complex, which involved widespread expropriation. Dharavi is also a critical case. Time and again since 1997, international construction companies have presented proposals for redeveloping Dharavi, but all which have run aground due to the resistance of the population (insufficient residential space; only residents who had already lived there prior to 2000 would be assigned units). According to the current plan of the Slum Rehabilitation Authority, each Dharavi family registered on the electoral list of 1995 is to receive a free residential unit of approx. 68 m² (SRA, 2015).

Positive rehabilitation examples are found above all among the smaller, in-situ projects (Section 7.3.1.2) such as Ganesh Nagar. There, due to the high homogeneity of the group, the slum residents were able to formulate unanimous interests and, thanks to many years of cooperation with an NGO, effectively articulate them (Nijman, 2008). The building measures were implemented by their own cooperative and funded by a loan from the HDFC Bank (with CORDAID as guarantor; SRS, 2015). In Mumbai, NGOs can be viewed in a positive light when it comes to the improvement of living conditions in slums and their actions as intermediaries between slum dwellers and local government.

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documentation of the projects, capacity building for participation procedures, and the formation of networks between the NGOs and CBOs.

The reach and influence of civil-society bottom-up projects are nevertheless limited. For one thing, there is a danger, particularly among neighbourhood groups, that they will give preference to their own vested interests (e.g. their rights as taxpayers in the case of citizens of the middle and upper classes) over the interests of society as a whole. For another, it has been shown that NGOs' measures (e.g. in slum areas) are particularly successful when the given NGO has a strong connection and basis of trust with the local population (Zérah, 2014). Thus, the risk arises that less privileged and especially vulnerable groups of the population in particular are either excluded or benefit least from successful projects (Baud and Nainan, 2008).

5.2.4 Eigenart in Mumbai

The current and future development of Mumbai is determined by the city's historical and socio-cultural development. In the following section, the importance of urban built, cultural heritage on place identity, cultural diversity, social cohesion and creative autonomy for Mumbai is examined by means of examples.

5.2.4.1 Urban cultural heritage and place identity

Historical squares and buildings are important, identity-imparting urban elements in an increasingly globalized world with an ever-more homogeneous, often postmodern architecture. The peninsula of Mumbai is characterized by its colonial past. By 1948, more than 16,500 colonial structures and residential streets had been built there in the Neo-Gothic and Indo-Saracenic styles and with Art Deco designs, including representative buildings (e.g. the Chhatrapati Shivaji Terminus railway station, previously known as Victoria Terminus, the main building of Mumbai University, and Crawford Market) and numerous architecturally unique streetscapes and ensembles. Since the onset of liberalization policies in 1991, a new cityscape has come to the fore: large-scale construction projects, office buildings, high-rise estates and expansive shopping malls have begun to supplant the colonial heritage. 'Urban regeneration', particularly in the outlying districts, is an excuse for the demolition and redevelopment of entire neighbourhoods. Thus, significant portions of areas that local residents strongly identify with are at risk of disappearance. To be sure, the representative administrative, commercial and residential structures in Mumbai's

administrative centre remain untouched by the construction boom and are protected by the Heritage Conservation Act; yet even these old buildings are marked by structural neglect; they are not being revitalized and lack municipal control, so that their future is uncertain (Kraas et al., 2014).

Apart from the protection of historical monuments, which was institutionalized in 1995, there have been growing signs of a reassessment in recent years: urban heritage and the preservation of old buildings are beginning to play a role in the new image of the cosmopolitan city. The visible testimonies to the unique development history are gaining importance as distinctive features and one-of-a-kind attractions, also in regard to tourism. Civil-society groups such as the Urban Design Research Institute have also begun campaigning for increased awareness and the preservation of the urban heritage (Section 5.2.3.3). As a result, the urban cultural heritage that is increasingly endangered by postmodern urban development is now being recognized as an important resource for place attachment and place identity.

5.2.4.2 Cultural diversity and social cohesion

Mumbai's individual character is also influenced by the great social heterogeneity of the populace in regard to their background (according to the 2001 census, 44 % of all city residents were born outside of Mumbai), religion and socio-economic status. A large number of ethno-religious groups influence social coexistence in the city. In addition to the two main religious groups, the Hindus and Muslims, the Parsees and Jains also play a central role in the development of Mumbai. Many religious and linguistic communities form separate sub-groups within the city life; in the ethnically distinct residential areas, specialized institutions, religious centres, restaurants, professions and traditions can be found that reflect the practised cultural traditions (e.g. the 'towers of silence' for the burial rituals of the Parsees).

Now, as in the past, the social cohesion of the society is endangered by conflicts between different groups. Drastic societal caesuras include the 1992-93 riots between Muslims and Hindus, which left 900 people dead (Hansen, 2000), and the attack on the Taj Mahal Palace Hotel in 2008 by Islamic terrorists that resulted in about 170 deaths. Hindu national or regional movements (e.g. the Shiv Sena party's demands for special privileges for native-born Maharashtrians), the increased fragmentation and polarization of society (Gandy, 2008; Nissel, 2004), and the discrimination against women (Khan, 2013) all contribute to social tensions. While Mumbai once called itself the woman-friendliest city in India, the economic, political and

social transformation processes of the past years have increasingly been worsening the safety situation for women (Khan, 2013).

Despite the sometimes adverse living conditions and social disparities, Mumbai is often depicted as the 'City of Possibilities' (Bora and Mokashi-Punekar, 2011:159) with which people can identify. Still, competing, sometimes contradictory, identities exist: for example, partly from a cultural perspective and partly from a right-wing nationalist perspective spread by the Shiv Sena party, ethnic groups that are native to Maharashtra view Mumbai as 'Maharashtrian City'. In turn, ethnic groups with a migration background identify with Mumbai as a cosmopolitan city of great social diversity (Zerah, 2014; Bora and Mokashi-Punekar, 2011). According to Bora and Mokashi-Punekar (2011), when Bombay was being renamed Mumbai in 1995, the Shiv Sena party specifically tried to undermine the cosmopolitan character of Mumbai by emphasizing Maharashtrian claims on space and history in Mumbai.

Overcoming socio-economic disparities is thus all the more important in order to reduce social tensions in the future, while the strengthening of civil society and place attachment are likewise important resources for social transformation.

5.2.4.3

Urban creative autonomy

Urban design in Mumbai is currently very much determined by national and international private-sector actors. Due to the extreme density of development, the availability of open spaces is limited. Important meeting places include publicly accessible locations such as parks and religious centres, but also private spaces or locations with limited access such as shopping malls, cafés and restaurants (where the urban upper and middle classes isolate themselves). Temporary space appropriation takes place, for example, during the numerous festivals that are celebrated on the streets and squares (Shankar, 2013). Leisure time, however, is extremely limited due to the long working hours (in both the formal and informal sectors) and commuting times. In a study conducted by the Young Bombay Forum, of the over one thousand employees between the ages of 21 and 35 years questioned, most stated that they spend approx. nine hours a day at their workplace and one to three hours a day commuting between workplace and home. Thus, little time remains for social contacts or sport (Roy, 2012).

At the economic level, the appropriation of space by informal agents (e.g. vendors on streets and squares, or the use of residential areas for production and trade) is common practice. The informal appropriation of open spaces and pavements for residential purposes must

also be taken into consideration. In contrast to the usually organized processes of space appropriation found in cities in developed countries, in Mumbai it is often an individual survival strategy. This flexibility and innovation in regard to overcoming everyday problems, however, also provides the basis for a creative approach to problems and the development of innovative fields of employment. One example of this is the 'dabbawalas', informal deliverymen who pick up metal containers containing homemade meals from private households and deliver the food to the household members at work (Shankar, 2013). This service, a highly specialized informal service that supplies about 5,000 people with an income, enables workers to eat fresh, hygienically prepared and inexpensive food at their workplace (Mumbai Dabbawala, 2015).

Nakamura (2014) describes the informal and improvisational forms of space appropriation in Mumbai, which have existed since the city was founded, as a tactic of the poor to implement their right to the city. This innovativeness, creativity and flexibility are also important resources for dealing with the challenges of transformation.

5.2.5

Visions of future urban development

Due to Mumbai's highly dynamic growth, the development of its urban landscape has to date been based more on erratic 'catch-up' development than on forward-looking, integrated planning concepts (Urban Age Programme, 2008). Although topical urban-planning concepts do exist, what has been lacking so far is a coherent, people-oriented vision of the future that places the central focus on the quality of life of the entire population.

A variety of visions have been developed for the city of Mumbai (e.g. the City Development Plan of 2005, or the Business Plan for MMR of 2009) that have aspired to transform Mumbai into a metropolis of international standing. In the latest, comprehensive development plan for the period 2014–2034, the guiding principle is formulated as follows: "To enable the transformation of Greater Mumbai into a global city that is inclusive, sustainable, liveable, and efficient" (MCGM, 2014:232). The plan focuses on three concepts: competitiveness, inclusiveness and ecological, sustainable development.

The shortage and correspondingly high price of land are identified as the main barriers to competitiveness. There are plans to mitigate these disadvantages through flexible regulation, mixed use, the expansion of public transport, the creation of zones for economic development, and the improvement of quality of life

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for the city inhabitants. Inclusiveness in society is to be enhanced by a reduction of slums and social disparities. This is to be achieved by improving public transport, enhancing the city's walkability, strengthening social institutions, integrating informal markets, allowing the flexible, mixed use of areas, facilitating participatory local planning, promoting social mixing in the residential sector, and creating barrier-free environments. At the same time, more areas are to be provided for social and public purposes, in particular through more flexible, transparent and participatory planning as well as the rehabilitation and restructuring of existing buildings. This is to be achieved through polycentric and transit-oriented development and neighbourhood renewal (e.g. of large slum areas, old inner-city areas with strongly degraded infrastructure, and industrial wastelands), as well as by making space available by accessing open land and land with a low density of use that is not located within environmentally sensitive areas. With only 22 km² of land at hand, however, land availability is extremely low, which is why an important strategy is the redesign and conversion of structures and already developed areas (Section 4.3). Mumbai is exposed to significant ecological risks due to the city's vulnerability to natural disasters (particularly floods and earthquakes), the degraded infrastructure, and the extreme pollution. Therefore, ecologically sensitive natural resources are to be protected, climate protection institutionalized, and environmental pollution reduced through the expansion of the public transport system and sustainable technologies (MCGM, 2014).

With the development plan, the municipal government is addressing the key social, ecological and economic challenges which need to be tackled with flexible and participatory planning approaches. In view of the scale of the challenges and the time factor, it would seem of essence to initiate comprehensive transformation processes urgently. Pethe et al. (2014) have pointed out, however, that development plans based on technical principles cannot withstand the current economic dynamics and spatial restructuring in Mumbai. Also, the current and strongly market-based approach of the urban development in the city contradicts the proclaimed aspirations of reducing disparities and poverty, and improving quality of life for the entire population. Last but not least, many national standards (e.g. the amount of available open space per inhabitant) cannot be implemented in Mumbai due to the shortage of land.

5.2.6

Conclusions and future transformation pathways

Against the background of 'catch-up' urban development and the expected future growth, Mumbai faces pivotal transformation challenges, above all in regard to the provision of housing and basic services for the general population, the reduction of socio-economic disparities, the expansion of municipal infrastructures, and the management of multiple social and economic risks. Due to the great shortage of land, the municipal development must take place predominantly on already developed land within the scope of neighbourhood renewal. Also, in view of the effects of climate change, a balance must be found between further growth and ecosystem conservation, the scarcity of natural resources, and the protection of the population and infrastructure. Overcoming local environmental problems appears to take priority over climate protection in Mumbai's current urban planning, yet the two aspects are closely interlinked.

During the last two decades, urban development in Mumbai has been driven by modern, market-based processes aimed at promoting the city's attractiveness as a business location. The modernization processes, however, seem to also exacerbate the socio-economic disparities within the population. Thus, the promotion of the location and/or the creation of income-generating opportunities, the preservation of natural resources, and the improvement of quality of life for the entire population seem to be conflicting goals for the time being.

In view of the anticipated expansion of the city and the necessary restructuring of already-developed urban areas, the intelligent use of resources and emissions reduction should be more strongly anchored in the urban planning. Although per-capita emissions in both India and Mumbai are still low by international comparison, the growing urban middle and upper classes are exhibiting increasing resource-consumption levels and unsustainable lifestyles. The proper response here would be to work (at various political levels as well as through civic engagement) towards decoupling quality of life from resource intensity by means of leapfrogging. In addition to energy-efficient urban redevelopment, satisfying basic human needs – especially for weaker socio-economic groups – and improving quality of life represent additional important challenges in the transformation process. At the same time, the high degree of informal processes and structures in the residential sector, as well as in commerce, industry and services, represents a special challenge for urban governance.

In the current urban-development plan (2014–2023), the city of Mumbai addresses the key challenges

with various measures that are intended to increase competitiveness, reduce disparities and poverty, and promote environmental protection. Furthermore, Mumbai is a member of international city networks such as ICLEI – Local Governments for Sustainability (Section 6.2.3) and the C40 Cities Climate Leadership Group (Box 2.5-6). Validation of the success of individual projects, however, is hampered by the lack of available data. Moreover, the strategies planned for the future development of the city seem to be following the logic of ‘business as usual’ scenarios; although individual measures will lead to a certain amount of progress, to date there is no evidence of any profound and systematically managed transformative change.

Nevertheless, Mumbai possesses important, locally specific resources for a transformation towards sustainability, including place identity, civic engagement, great flexibility, diversity, creativity and innovation. In Mumbai (and generally speaking to a great extent in India), it has been shown that the forces of civil society can take on an important role as change agents (WBGU, 2011; Chapter 6) and initiate transformation processes which can be upscaled through cooperation with other actor groups (such as, in particular, the municipal government). This process could function as an important foundation for the institutionalization of participatory, flexible planning and implementation processes in order to avoid negative path dependencies. Up to now, these resources have helped ensure that, despite the great spatial, social, economic and political challenges posed by its rapid urbanization, Mumbai has remained a remarkably resilient city (Jain et al., 2013).

5.3

Cairo: metropolis between an authoritarian state and weak governance

The Greater Cairo area (Cairo, Giza and Qalubiya), with its approx. 18 million inhabitants, is not just the only megacity in the Arab world, but (hitherto) the largest on the entire African continent. The pressure from urbanization is still high: the city is expected to grow at an annual rate of 2.11% over the next ten years (UN-Habitat, 2014c: 64). Cairo is Egypt’s political, economic and cultural centre with strong – albeit gradually declining – influence on the whole region. The socio-economic and cultural split in Egyptian society is reflected spatially by considerable fragmentation. While the formerly prosperous inner-urban areas, which have had a formative cultural influence on the city, decay, the middle and upper classes are increasingly withdrawing to the state-funded satellite cities in the desert. The majority of those remaining in the inner-city area are

poorer population groups, who are constantly extending the area in urban-development processes that are outside government control. Approx. 65% of the metropolitan region’s population today live in these so-called unplanned settlements, which develop mainly on agricultural land (UN-Habitat, 2011b). The majority of them are functional or functioning city districts, characterized by strong social cohesion (UN-Habitat, 2011b). Precisely this informal urbanization process, which generates functioning city districts as though ‘on autopilot’, is considered almost a success story – compared to developments in many other megacities in developing countries and emerging economies (Sims, 2012: 267). Although these informal development processes cannot be evaluated in isolation from Cairo’s specific geopolitical characteristics (policy of desert cities, ban on settling on agricultural land; Section 5.3.1.5), they do give an indication of possible minimum standards or requirements for an autonomous development of liveable urban areas. By way of contrast, the desert cities can illustrate where the limits or perhaps the potential of (state-funded) new planned cities might lie. Possible ways in which a transformation towards sustainability might also succeed in Cairo best become apparent by looking at the formal and informal processes together.

5.3.1

Parallel cities

Greater Cairo has the highly heterogeneous cityscape that is typical of megacities. However, three urban types have become more pronounced here than in comparable agglomerations: the formal urban areas, the informal urban areas, and the newly planned ‘desert cities’ (Sims, 2012; UN-Habitat, 2011b; Dorman, 2013; Figure 5.3-1). These urban area types, which exist in parallel in many areas, not only differ in their urban design and social organization, they are also subject to different economic and governance structures.

5.3.1.1

The formal core-city areas

The ‘formal’ urban areas are made up of the core-city areas that grew historically over a long period of time or developed legally under a statutory planning regime. This applies in Cairo to the Islamic old town district, to the Belle Époque inner city that evolved under European influence, and to areas of urban expansion that were designated as such up to the 1950s. Until then the ‘new inner city’ was the place of residence of the colonial powers and Egypt’s upper classes. The majority of the poorer sections of the population lived in

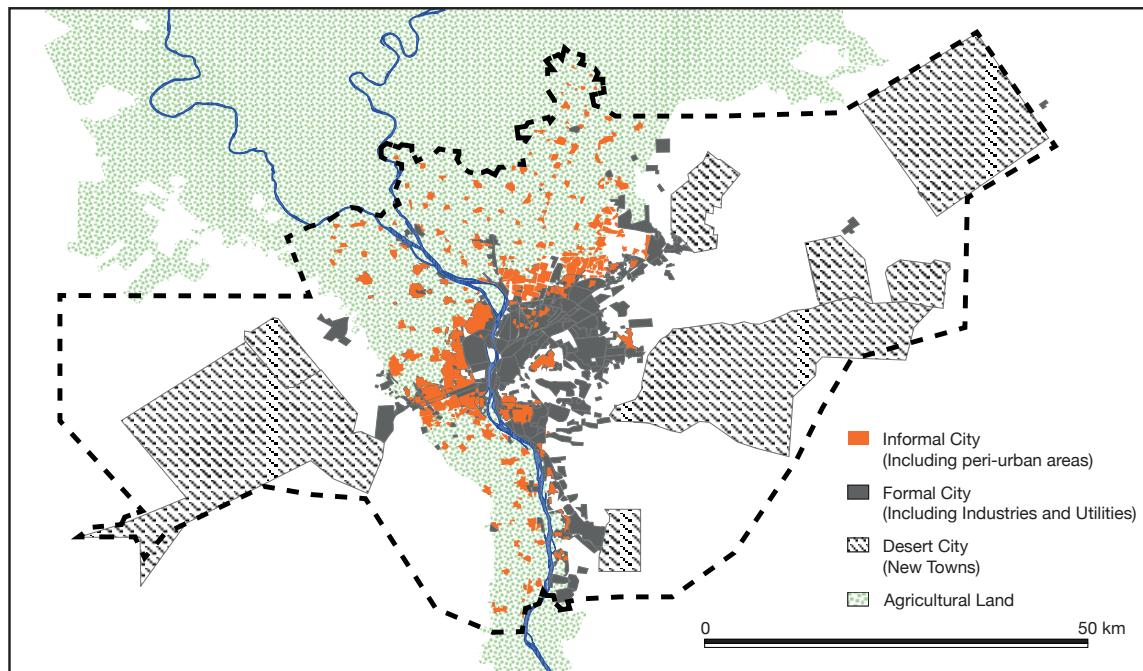


Figure 5.3-1

Settlement regions in Greater Cairo.

Source: Sims, 2012

the Islamic old-city districts. Separate social and political organizations reflect this spatial separation (Ismail, 2014:270).

Egypt's government stepped up its investment in social housing after the country became independent in 1952. Primarily rented apartments were state-subsidized and secured an almost unlimited right of residence at low rents for the tenants and their heirs (Sims, 2012:51). This made private investment in rented apartments economically uninteresting. After the Six Day War in 1967 and the ensuing clashes with Israel, the Egyptian state largely withdrew from both housing construction and the development of Cairo's infrastructure. After the end of the war in the mid-1970s, President Sadat proclaimed his policy of 'opening the door' to private investment (*Infitah*). This was a departure from Nasser's socialist-inspired policies and placed greater emphasis on investment from Western countries. The promotion of the private market economy led to Cairo's first real-estate boom, which changed the cityscape of the formal core-city area with new tower blocks, hotels and office buildings. At the same time, the state developed the city's technical infrastructure by investing, among other things, in major urban motorways, the first metro lines and the improvement of the sewage system (Sims, 2012:52). The urban expansion areas – such as the 7,000-hectare Madinat Nasr with numerous

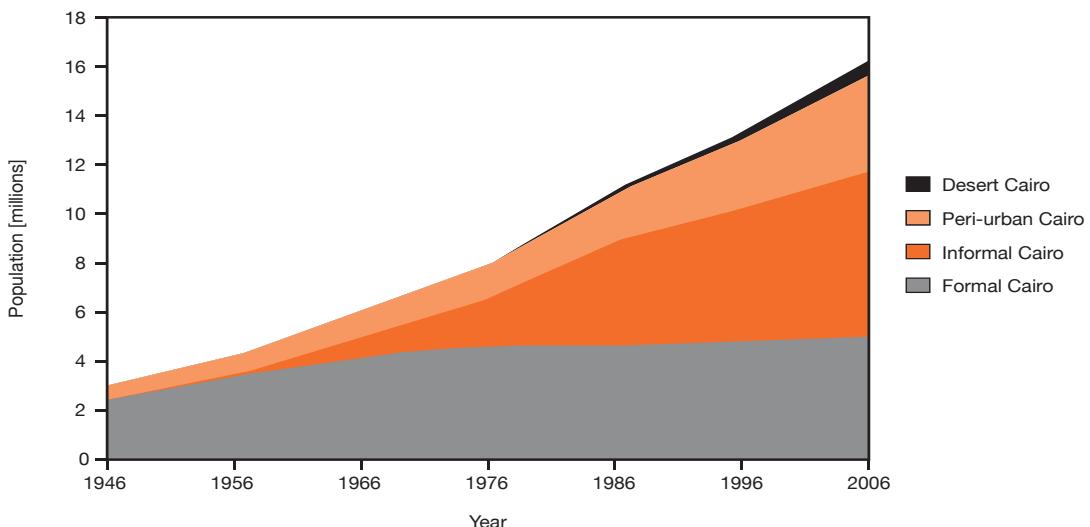
government buildings – were also further developed.

Nevertheless, the formally planned and built inner-urban areas struggled to assimilate Cairo's rapidly growing population. While the informally developing areas (Section 5.3.1.3) recorded average annual growth rates of 2.57% (peaking at 4.7% in Manshiet Nasser and El Kanka), the formal areas recorded hardly any population growth at all (0.4%; World Bank, 2008b). In 2006, only about 5 million people, i.e. hardly more than 10 years before, lived in the formal core areas of the city (Sims, 2012:59; Figure 5.3-2).

5.3.1.2

The desert satellite cities

Since the 1970s, urban planning has increasingly focused on the construction of satellite cities in the desert around Cairo. In order to protect the agricultural land on the outskirts of the city, the idea was to settle the growing population outside the cultivated fields of the Nile Delta (Schechla, 2015:134). The satellite cities 6th of October, 10th of Ramadan, 15th of May, al-Ubur, al-Shuruy, Sheikh Zayed, New Cairo and al-Badr were planned on the basis of the 1977 'New Town Programme' (Law no. 59, 1979) in the Cairo metropolitan area. The central Egyptian planning authority (General Organization for Physical Planning – GOPP) wanted to settle about 10% of Greater Cairo's total population –

**Figure 5.3-2**

Population growth in the different settlement types in Cairo.

Source: Sims, 2012

approx. 1.7 million inhabitants – in the desert cities by 2005. Although these projects used up a large proportion of Cairo's total investment volume, they have not been able to meet the high expectations of population settlement up to now. Up to 2006, the new cities absorbed only 3.7% of the population – 601,000 people – instead of the planned 10% (Sims, 2012:171ff.).

The main cause of this lack of success is seen in the fact that housing was created almost exclusively for the middle and upper classes. The few projects that were designed for the low-income population were for the most part not accepted by the targeted groups. The residents missed their social networks, and there were few job opportunities in the surrounding area – or else no affordable transport with which to reach more distant workplaces. Furthermore, the homes were often still too expensive for poorer population groups.

Despite the poor overall record of the Egyptian satellite city model, the current government is still promoting expansion into the desert. A lot more public money is still being spent on the development of the new satellite cities than on informal settlements (Schechla, 2015). Moreover, in 2015, the Al Sisi government adopted a plan to build the 'Capital Cairo' project. Over the next seven years, a completely new city is to be built between Cairo and Suez, following the example of the new towns in the Gulf States (Figure 5.3-3). The costs are said to be largely financed by a real-estate fund based in the United Arab Emirates. In addition to new economic sectors, the 'smart city', designed for four million inhabitants, is also supposed to incorporate Egypt's government centre in the future (Tharoor, 2015). This would lead to profound changes for 'Old Cairo' if a large proportion of the economy, government employees and authorities that are relevant for the residents – such as the Mogamma (Egypt's central administration building) – were to move. Up to now, these aspects hardly seem to have been taken into consideration in the government's or investors' feasibility studies.

**Figure 5.3-3**

Advertising poster at the 'Capital Cairo' investors' conference in Sharm El Sheikh, 2015.

Source: Amr Hassan

5.3.1.3

The informal settlements

The phenomenon of informal settlements did not make itself felt to any appreciable extent in Cairo until the late 1960s and was a result of increasing country-to-city migration and a worsening housing shortage for low-income population groups (Abdelahlim, 2010:3; Dorman and Stein, 2013:10). Informal settlements – i.e. settlements built in violation of applicable building

and planning law and which develop largely outside state control (Section 7.3.1) – evolved on state land, desert areas at the city fringes or on private agricultural land. The latter accounts for by far the largest share with approx. 81% (World Bank, 2008b:82) and is likely to continue to experience the biggest settlement growth (Sims, 2012:112). Unlike the formal core-city areas, the informal settlements continued to grow during the war years, since they continued to absorb most of the migrants from the rural areas as well as many refugees from the Suez region (Séjourné, 2009:18). After the Infitah open-door policy began, construction activity in the formal urban areas picked up, but continuing population growth increasingly exacerbated the lack of housing for lower-income groups (Dorman, 2013:1590). Parallel to this, an increasing amount of money was remitted by Egyptian guest workers from the Gulf States back to Cairo, some of which was invested in the construction of informal residential buildings (Séjourné, 2009:18; Sims, 2012:64). In the meantime, these settlements, known colloquially as *ashaw'iyats* ('random'), are home to over 65 % of Cairo's population (UN-Habitat, 2011b:13). Especially after the January revolution in 2011, construction in these areas increased strongly again (Sims, 2013:73), so that it can be assumed that the proportion of people living in informal settlements has risen further.

The quality of construction of the reinforced-concrete skeleton buildings filled with fired bricks is generally good, since the building contractors often build for their own needs. The buildings, which are erected with minimal distance between them, have five to eight floors on average, and in some parts of the city as many as 15 floors (Abdelhalim, 2010; Figure 5.3-4). According to UN-Habitat – in contrast to many informal settlements in Africa, Asia or Latin America – Cairo's mostly multistorey informal settlements do not reflect absolute poverty by international standards; rather, the residential areas offer 'adequate' housing (UN-Habitat, 2011b). This means that the majority of settlements are solidly built and have access to basic urban infrastructures. Although the building fabric hardly differs from that in formal urban areas, the standard of urban infrastructure here is often lower than in the formal parts of the city (Mayo, 1982:3). Since 2009, these settlements have been classified by the government as 'unplanned areas' (Khalifa, 2011:41). Because they are de facto tolerated by the government, the residents' status has become 'quasi-formal'. They need not fear eviction (Abdelhalim, 2010). The inhabitants can even claim a permanent right of abode if they can prove that they have paid their electricity bills regularly over a certain number of years (Séjourné, 2012:104).

Although the informal settlements do not reach the



Figure 5.3-4

Informal settlement on agricultural land in Greater Cairo.

Source: Gesa Schöneberg/WBGU

standard of formal urban areas – especially in terms of technical infrastructure, open spaces, recreation areas and inner-city transport connections – the advantages outweigh the disadvantages for the majority of the inhabitants. For example, the building and rental costs in the informal settlements are well below those of the formal urban areas, and the purchase price of a housing unit is about half as much (UN-Habitat, 2011b:16). But above all, there are plenty of (informal) income sources in the direct neighbourhood. The strong social networks in the informal settlements play a prominent role in people's search both for housing and for work. They also offer a neighbourly, usually family-based life (Sims, 2012:120).

Unlike the informal settlements, which are regarded as well-functioning, Cairo also has so-called slums, i.e. settlements where more than half of the population live in inadequate housing without basic services (Section 7.3.1, Figure 5.3-5). According to UN-Habitat, slums make up about 17% of informal settlements nationwide (UN-Habitat, 2013a:148). According to the Informal Settlement Development Facility (ISDF), the proportion of unsafe areas (a term used to distinguish them from unplanned areas) is even lower at only 5–10% (UN-Habitat, 2011b:32). In these areas, the government pursues different strategies depending on the state of the settlement; these can range from demolition to upgrading (Khalifa, 2011:45).

5.3.1.4

Cairo: on the verge of collapse?

Governing megacities is a major challenge all over the world. This applies all the more to cities that have developed – and still are developing – largely independently of government control. Cairo's urban governance is marked by the centralistic state structure and urbanization processes which – although hardly planned – enable the city to basically function.

Box 5.3-1**Vacancy levels in the (informal) real-estate sector in Cairo**

Although the data on informal settlements might suggest otherwise, many apartments are standing empty in Cairo. As early as 2006, the level of vacancies in all formal and informal settlement types was estimated at 25–30% overall (World Bank, 2008a; Sims, 2012:165). The highest vacancy level at this time was recorded in the newly planned satellite cities. After the revolution in January 2011, construction activity intensified, especially in the informal sector, with the result that the number of unoccupied apartments has further increased there, too. Current estimates suggest that the supply of apartments in the informal settlements currently greatly exceeds the demand for housing.

This phenomenon is deeply rooted in Cairo. Not only real-estate companies, but almost every Cairo resident with sufficient financial resources has been – and still is – involved in building and speculating on the housing market. For decades, land and property ownership has been regarded as the safest form of investment – in contrast to savings or company shares. This development is also encouraged by the fact that there is no property acquisition tax, and that the collection of the already low property tax is hardly ever enforced (Sims, 2012:167). As a result, land and real-estate ownership causes no costs and makes this type of capital investment (or speculation) with real estate for ‘everyone’ very attractive.

In addition, parallel to the official registration of land, many quasi-legal practices have become established that allow quick and cost-effective sales of property and real estate (Sims, 2012:153). However, little research has been done on the informal real-estate market in Cairo.

'Lame Leviathan'

Cairo's administration is characterized by a centralistic, autocratic state, which is repeatedly accused of having a traditionally cumbersome bureaucracy that in the meantime is regarded as extremely corrupt. In this respect, the Egyptian state is also called a 'Lame Leviathan': on the one hand authoritarian and dominant, on the other ineffective and lethargic (Dorman and Stein, 2013:7). In the field of Cairo's urban development, this already becomes apparent in the confusing diversity of actors and their interrelations. Alongside the responsible nation-state institutions, a large number of ministries and countless other state and private organizations are involved. There are almost universal complaints about poor work organization, lack of expertise on the part of the staff, and poor cooperation between the various institutions (Dorman, 2013:1586).

The local level in Cairo is seen as correspondingly weakly equipped, lacking trained personnel and finan-

cial resources. Although the governorates (muhafazats) have their own planning departments, their staff are inadequately trained; they are also dominated by the national planning authorities. The great dependence of the local level on central government is also illustrated by the fact that the central government appoints the city's governor. Since the mid-1990s, the post of governor have been largely given to former high-ranking members of the army (approx. 50–80%) or former leading police and secret-service agents (approx. 20%). There are also a lot of ex-officers in the local administration. They receive relatively high salaries and also benefit from – legal and illegal – opportunities for side-earnings (Sayigh, 2012, Section 5.3.2.4).

The central government also controls the governorates' budgets. About 80% of the local budget is allocated by the central government and only 20% raised by local tax revenues and charges. Most of this budget (as a rule 55–70%) flows into the local administrative apparatus, only 10–20% on average into the direct financing of urban-development projects. The overall amount available to the local administration is approx. 5% of the Egyptian state budget (Sims, 2012:254).

To date, after reversing the interventionist development programmes of the 1960s and 1970s, the Egyptian government has been unable to develop urban policy in the direction of alternative, liberal or participatory measures. The lack of local democracy and the rejection of decentralized administrative structures reinforce the problem of inadequate control. Although the state demands central control of its administration – as it repeatedly demonstrates with far-reaching top-down decisions – at the same time, this policy is indirectly countered by clientelism and informality (Ben Néfissa, 2009:195).

**Figure 5.3-5**

Informal settlement (unsafe area) on escarpment edge in Cairo.

Source: Gesa Schöneberg/WBGU

The basic city

The failure of the local level often leads to an ‘overall urban collapse’ in large agglomerations. According to David Sims, the fact that Cairo – despite many problems – does not collapse is due to the functioning of a small number of urban infrastructures. (Commercial) state enterprises operating throughout the metropolitan area provide basic urban infrastructures. Not the local governments, but the supervising national ministries are responsible (Sims, 2012:253). Since the budgets at the national level in Egypt are significantly larger and the structures more solid, these companies also operate more reliably than firms that report to the local level. As a result, services have been successfully organized in most – even informal – urban areas in the fields of water and sewage, energy supply, the main transport routes and telecommunications (World Bank, 2008b:86; Sims, 2012:258ff.). Although there is a lack of city-wide coordination, this kind of private-sector ‘basic services’ has made it possible, even in informal settlements, to install urban infrastructures relatively quickly without the planning and control of the city administration. The importance of these companies and their services is also illustrated by the fact that, in Egypt, proof of having paid one’s electricity bills over a number of years is recognized as a document for securing one’s right of abode (Section 5.3.1.3). This also shows how in Cairo a centralistic, autocratic, formal sector and a decentralized, informal sector can work together in certain areas.

5.3.1.5

The geopolitical context of Cairo’s urban development

The reasons for both the parallel city types and the functionality of the unplanned settlements can be found in the overall geopolitical conditions of Greater Cairo. For example, Cairo has the special feature that, in addition to the private agricultural land of the Nile Delta, large stretches of state-owned desert land are available that can be used by the government as ‘compensation areas’ for inner-city development. This has meant not only that new desert satellite cities could be planned and built, but also that all the industries developed over the last 30 years could be located in the desert areas, thus avoiding social and ecological conflicts with inner-city areas. Most gated communities and shopping centres were also developed in these areas. The fact that the (large-scale) land and real-estate development was concentrated in the desert areas was, in turn, due to the fact that the conversion of agricultural land was strictly prohibited. At the same time, the lack of adequate housing in the formal urban area forced informal settlers to move to this agricultural land (GOPP et

al., 2012:159). Since the settlers primarily chose locations close to existing urban areas or the surrounding villages, there was an ‘organic’ urban expansion with very high density, and these settlements could subsequently be supplied cost-effectively by the neighbouring infrastructures (Sims, 2012:270). In this way, the ‘desert cities policy’, in connection with the bans on settlements on agricultural land, allowed the emergence of the organically grown informal settlements in and around Cairo.

5.3.2

Cairo’s challenges and starting points for the transformation process

Some of the blockades and path dependencies that stand in the way of the transformation towards urban sustainability in Cairo are set out below based on the dimensions of the WBGU’s normative compass: sustaining the natural life-support systems, inclusion and *Eigenart*. In addition, reference is made to selected topics in order to explain possible ways of overcoming problems, and accelerating and upscaling helpful measures; the roles of individual actors are highlighted and the current urban-development strategy discussed.

5.3.2.1

Sustaining the natural life-support systems in Greater Cairo

Like most cities of the Global South, Cairo is confronted by considerable environmental problems. This applies in particular to air pollution, waste disposal and access to (safe) water. Emissions and energy consumption are expected to increase considerably over the next few years (World Bank, 2010b). Since Cairo extracts about 95% of its water from the Nile, climate change and the associated threat of water shortages could become a serious problem for the city. Up to now, the city has not adopted any fixed targets for climate-change mitigation, and there are only sporadic public or private initiatives on climate protection

Planetary guard rails (climate and resources)

Although Egypt (and in particular Greater Cairo) is one of the biggest emitters of CO₂ in Africa (Barthel and Monqid, 2011), by African comparison the city is assigned an average rating in the Green City Index (Economist Intelligence Unit, 2011b). At 8.0 GJ per capita per year, energy consumption is nevertheless high, also compared to the overall African average of 6.4 GJ. According to official figures, approx. 70% of the city’s power comes from natural gas (Economist Intelligence Unit, 2011b:45). However, these figures

do not take into account the high consumption of diesel required for generators in informal settlements. Nevertheless, the city's CO₂ emissions are comparatively low by global comparison. An inner-city comparison shows that the newly built desert cities have a significantly worse carbon footprint than the highly densified formal and informal inner-city areas. Because of their large surface areas and the long commuting distance to the inner city, the residents there are very dependent on cars. This traffic induced by the new desert cities is responsible for much of the city's overall air pollution (Box 4.6-1). On the other hand, the high density of the formal and informal mixed-use inner-city areas means that there is little traffic there. Public transport covers most transport needs. This causes considerably less specific CO₂ emissions than motorized, individual traffic. In addition to the public buses and private minibuses, Cairo also has a Metro that handles about 17% of the traffic.

➤ *Energy saving in the construction sector:* Although the overall quality of building in Cairo is relatively solid, little attention has been paid up to now to energy efficiency. Not only in the informal settlements, but also in the newly planned city districts and the satellite cities, the buildings are poorly insulated and hardly shaded. Little research has been conducted in Cairo to date in the field of (cost-effective) passive or active energy-saving approaches in the construction sector. Following the model of Leadership in Energy & Environmental Design (LEED), since 2009 there has been an Egyptian Green Pyramid Rating System (GPRS) for classifying resource-saving and sustainable building methods. However, this is ignored by the private construction firms. The government has not launched any funding programmes for energy saving in the construction sector up to now.

➤ *Renewable energies:* Renewable energies are hardly used at present in Cairo; the same applies to the rest of the country. According to estimates, Egypt generates about 3.93% of its energy from hydropower and 1.66% from wind and solar energy (AHK, 2013). In 2011, the government launched a development programme aimed at increasing renewable energy's share of the energy mix to 20% by 2020 (UN-Habitat, 2014c: 78) – 6% was to be generated from hydropower, 12% from wind power and 2% from other renewable sources such as solar energy (AHK, 2013). Since 2014, there have been further initiatives to promote the use of solar and wind energy. For example, the Egyptian government has launched a funding programme involving feed-in tariffs for solar and wind power plants (Prime Ministerial Decree no. 1947) and passed a law on

building solar and wind power plants (Renewable Energy Law No. 203).

Local urban guard rails

Local environmental problems that are often discussed include air pollution (by industry and vehicular traffic), waste disposal (Box 5.3-2) and the ruthless exploitation of resources (e.g. the destruction of agricultural land; UN-Habitat, 2011b). Moreover, the water quality and sanitation systems are not adequate in all areas – and are partly responsible for the spread of diseases (UN-Habitat, 2011b: 52–74). The problems are very similar to those of other cities (e.g. Mumbai; Section 5.2), so that these points are not elaborated further here.

➤ *Air pollution:* Cairo is one of the cities with the worst air pollution in the world (Leitzell, 2011). According to the WHO, a day's breathing in Cairo is the equivalent of smoking a packet of cigarettes (Khaled, 2013). Pollution from fine particulate and suspended particulate matter significantly exceeds the WHO's thresholds. The main cause of this is seen in industry; its plants were built without environmental restrictions, and corresponding emissions have been produced for decades (Sherif, 2014: 197). On the other hand, the pollution caused by the rapidly rising motorized individual traffic continues to worsen. According to a study by the Ministry of State for Environmental Affairs (MSEA), automobile emissions contribute approx. 33% of pollution from fine particulate and suspended particulate matter (TAD-AMUN, 2014b). These emissions will rise further, because private automotive traffic is expected to increase by approx. 5.6% over the next few years (Sims, 2012: 236). Furthermore, the 'black cloud' that descends over Cairo at the end of every summer is notorious. This is the time when the farmers burn their agricultural waste in the Nile Delta. Cairo's topography and the dry climate exacerbate the situation, because many forms of pollution that drift in across the vast desert 'hang around' the Nile Delta and are rarely rained out (Leitzell, 2011). In addition, waste is often still incinerated in the open air on the outskirts of the city (Sherif, 2014: 197). Accordingly, Cairo's residents often suffer from respiratory diseases (Abdel-Halim et al., 2003).

➤ *Destruction of resources to create residential space:* Egypt has very little agricultural land. Most of it is located in the Nile Delta, and the metropolis of Cairo is located at its mouth. The growth of the city by informal settlements is increasingly destroying agricultural land in peri-urban areas. State bans have been unable to prevent these developments up to now, so that further losses of agricultural land can be

Box 5.3-2

Actors in waste disposal

The disposal of waste is a serious environmental problem in Cairo, as in many cities. Of the approx. 17,000 tonnes of waste produced every day, only approx. 11,000 tonnes is collected, so that 6,000 tonnes remains untreated in the streets or in the River Nile – or is incinerated somewhere (El Deeb, 2013). However, in Cairo the informal recycling sector has been successfully integrated into the city's waste-management system. The Zabbaleen, a Christian minority in the Manshiet Nasser informal settlement, have specialized for decades in collecting and recycling rubbish from the inner-city areas. It is estimated that the Zabbaleen collected approx. 8,000 tonnes of municipal waste in 2012 (El Deeb, 2013). The recycling rate is over 80% (UN-Habitat, 2011b:69). The city did not support this informal recycling structure for a long time. Rather, they tried to block it – for example in 2004 by offi-

cially hiring private companies (with much lower recycling rates). In addition, an important source of income was taken away from the Zabbaleen in 2009 by ordering the compulsory slaughter of their approx. 300,000 pigs – an important element in the recycling of organic waste – because of swine flu (UN-Habitat, 2011b:72) – an unnecessary measure for Cairo, according to international opinion (Kingsley, 2014). However, the majority of the population were not satisfied with the public waste-disposal service. They were used to having their waste picked up by the Zabbaleen at the door – a service the companies did not offer. Because of the great dissatisfaction among the population and the commitment of NGOs, the government has now changed its policy and is trying to integrate the Zabbaleen into the municipal waste-disposal system (Kingsley, 2014). This means that actors of the informal economy can conclude contracts with the city for the first time, enabling them to give their operations a formal legal status.

expected in the future. Since there are de facto no formal rules on distances between buildings in informal settlements, and land design is primarily geared towards maximizing profits (i.e. in particular by creating as much living area as possible), lighting and ventilation are problematic because the buildings are built very close to each other. The positive aspect of this development is that the high density of the informal settlements in Cairo allows short distances, so that they function as mixed-use areas offering residents a wide range of employment opportunities in the immediate vicinity.

5.3.2.2

Inclusion in Greater Cairo

The situation as regards inclusion in Cairo is closely linked to the overall political situation in Egypt. Since the revolution of January 2011, the country and its capital have been in a political transition phase, the outcome of which cannot be (clearly) predicted. Currently, this means that a large proportion of the residents are not included politically. This applies both to individual participation in political processes (the banning or prosecution of certain groups) and to local representations (dissolution of the Local Councils since 2011). Furthermore, great disparities are emerging in Cairo as a result of the large socio-economic differences among the urban population. Despite good provision with basic services compared to other megacities, active inclusion in the urban processes is only open to a minority.

Substantive inclusion

The provision of (basic) urban services is largely stable in Cairo, and even in the informal settlements the

residents have access to water, sanitation, enough food and permanent shelter almost everywhere (Section 5.3.1.3). According to a UNDP study, 99.9% of households already had access both to running water and to sanitary facilities in 2004 (UNDP, 2005:212). However, this very positive data situation ignores the fact that especially poorer population groups have to struggle with long water cuts and poor water quality (UN-Habitat, 2011b:52ff.). Also, around a third of the water is lost because of leaks (UN-Habitat, 2014c:88). The limited availability of fresh water in Egypt, 97% of which is dependent on the Nile, means that more water shortages can be expected in the future (UN-Habitat, 2011b:54).

The level of security is rated relatively high in the entire metropolitan area of Cairo compared to other megacities in Africa or Latin America. Security is generated above all by the social networks in the neighbourhoods. After the January revolution, the overall security situation deteriorated primarily as a result of politically motivated attacks (mostly on government buildings and facilities) and an increase in petty crime (often targeting tourists).

In general, it can be said for Cairo that, despite a relatively good provision of basic services, there are large qualitative differences in the implementation of substantive inclusion. It is only the poorer sections of the population who suffer from bad conditions, since the middle and upper classes can fall back on private goods and services (private education, private healthcare, gated communities).

Political inclusion

The political situation in Egypt is still unstable in the wake of the 2011 revolution, the military coup and the

assumption of power by President Abdel Fattah al-Sisi in 2013. The initially strengthened forces of political Islam, who had been especially active in Cairo's informal settlements, have been weakened since the removal of President Mursi from office. Many members and sympathizers of the Muslim Brotherhood have been condemned to death in the past months. At the same time, Egypt remains a deeply religious country. In addition, liberal and secular parties have many supporters, mostly in the cities. Yet the secular parties and activists are also subject to repression. Overall, political participation in Cairo is currently only possible to a very limited extent.

➤ *Constitution and constitutional reality:* The Egyptian constitution of January 2014 extended the list of fundamental rights. In addition to civil and political rights, it also contains economic and social rights – such as the right to adequate, secure and healthy housing (Article 78). Equal rights for men and women are guaranteed, as is a right to culture. However, in the Egyptian constitutional reality many fundamental rights only apply with restrictions. For example, the demonstration law, which came into force in November 2013, imposes considerable restrictions on freedom of assembly. Demonstrations are subject to approval, and there is a general ban in some locations. Violations can lead to the imposition of long prison sentences. The freedom of the press is also severely restricted. A new anti-terrorism law came into force in August 2015 which allows the imposition of fines for reporting that does not conform to the official government line. The independence of the judiciary is currently regarded as questionable (Amnesty International, 2015c; Wischmeyer, 2015; Aziz, 2016).

Conflicts between members of different religions often turn violent. Although the constitution guarantees freedom of belief, freedom of worship (e.g. building places of worship) is reserved for the revealed religions (Muslims, Christians, Jews). Massive conflicts repeatedly break out over the construction of Coptic churches in Cairo, whose followers make up about 6–10% of the population. The situation of women is also marked by insecurity. According to a UN survey published in 2013, 99.3% of the women and girls questioned reported that they had been sexually harassed and consequently no longer felt safe in the streets or on public transport (UN Women, 2013). Gang-like, organized attacks on women have been perpetrated several times on the fringe of demonstrations in Cairo in recent years (Kingsley, 2013; UN-Habitat, 2014c:87). According to Human Rights Watch there were, for example, at least 91 attacks on women in June 2013

alone during protests on Tahrir Square (HRW, 2013). Although they are punishable by law, attacks, sexual harassment and rape are often not prosecuted. This makes the inclusion of women in political processes much more difficult in the urban sphere. Nor do urban lifestyles protect Egyptian women from the practice of genital mutilation, which continues de facto even though it has been illegal since 2008. According to UNICEF, 85% of women in urban areas have been subjected to genital mutilation, compared to 95% in rural areas (UNICEF, 2011:6). Overall, it appears that in Cairo women are massively discriminated against in politics, on the labour market and in areas of social coexistence. The cultural role patterns are so deeply embedded in society that top-down rules adopted in this field can hardly remedy the situation (UN-Habitat, 2014c:87).

➤ *Local co-determination:* At present, Cairo's inhabitants only seldom participate in local decision-making processes. On the one hand, the local level only has narrow decision-making powers because of the centralized state structure. On the other, the former Local Popular Councils (LPCs) did not represent the residents; they were mostly made up of high-ranking members of the ruling state party. The reputation of the LPCs in the population was very poor because of widespread corruption and mismanagement (Shehayeb and Abdelhalim, 2012:48). They were dissolved in 2011 and have not been re-constituted to date.

➤ *Co-determination in informal areas:* Many informal settlements organize themselves with their own authorities, which are independent of official structures. These authorities are largely based on a form of culturally rooted 'natural leadership'. Although these forms have little in common with the democratic processes of the West, in some cases they have proved to be a very effective basis for participation projects (Shehayeb and Abdel Hafiz, 2006). To date, these informal structures have not been used by local governments. Apart from culturally rooted power structures, 'new' processes also exist in informal regions. For example, the Izbrit Khayrallah settlement is known to have had so-called neighbourhood leaders (sheikh al balad) since the 1990s. Originally, they were only responsible for dividing up the land within the area; they were then able to extend their function within the community on the basis of the trust they enjoyed. In the meantime, they take on more far-reaching social tasks and e.g. organize projects of the neighbourhood organizations (Deboulet, 2012:219).

Economic inclusion

Cairo is Egypt's economic centre and generates about two thirds of the country's gross national income (UN-Habitat, 2011b:88). Before the January 2011 revolution, the annual growth rate was estimated at 4–7%. State-owned enterprises and the Egyptian military play a major role in the economic life of the country and the city (Section 5.3.2.4). Moreover, the private sector is dominated by family businesses, some of which are of considerable size. Many of Cairo's residents work in the service sector, mainly in public service or for state-run enterprises. However, the unemployment rate is high in Cairo. In 2009, the government estimated the unemployment rate at 12%, with 80% of those affected younger than 29. Women in particular are affected by high levels of unemployment. According to the African Development Bank, only 15% of women, compared to 80% of men, were employed in 2009 (UN-Habitat, 2014c: 90f.). Overall, it is estimated that over 60% of Cairo's workers are employed in the informal economy (Singerman, 2015).

5.3.2.3

Eigenart in Greater Cairo

The metropolitan area of Cairo has a large number of urban identities. For centuries, Cairo has been regarded as one of the spiritual and cultural centres of the Arab world. This is reflected among other things in countless monuments (e.g. the Islamic old city has been a UNESCO World Cultural Heritage Site since 1979) and religious institutions (e.g. the Al-Azhar University and Mosque, an influential Sunni Islamic centre, or St. Mark's Cathedral, seat of the head of the Coptic Orthodox Church). In addition, areas dominated by a more Western cultural scene can be found, mainly in the inner-city boroughs. The informal settlements have identity spaces of their own. Although these are also characterized by architectural aspects, they are primarily a product of their residents' social networks.

Cultural differences and socio-economic disparities

Egypt is greatly influenced by Sunni Islam. About 90% of the population are Sunni Muslims, while Coptic Orthodox Christians represent the largest religious minority with approx. 6–10%. Cairo's middle and upper classes are more secularized compared to other parts of the country and also take their orientation from Western cultural traditions, e.g. with the first opera house in the Arab world, museums, galleries, the film industry, cafés and street art. However, at present, artists are suffering greatly under the regime's censorship (Lehmann, 2015). But for the broad masses in Cairo, religion, too, remains the most important formative cultural influence. The Pharaonic heritage, with its

thousands-of-years-old treasures, is seen by the majority of the population not so much as their own heritage, but as a source of tourist revenue.

The socio-economic class to which a person belongs thus seems to have a strong impact on their cultural identity. In Cairo, this is also illustrated by the parallel city types (Sections 5.3.1.1–5.3.1.3). For example, the new cities in the desert are pure residential settlements for wealthy population groups; their spatially monotonous design hardly lends itself to generating place identity. Yet the new cities around Cairo have become a symbol for everything that characterizes 'modern' Egypt, including large shopping centres, golf courses, private hospitals, private universities, etc. Even 'integrated developments' can be found that aim to create a form of 'urbanity' far away from broad masses. According to David Sims, it is precisely this 'modern, I-am-not-in Egypt aspect' that helps explain the enthusiasm of the urban middle and upper classes for the new cities (Sims, 2015: 284).

Creative autonomy

In Cairo, urban design is very much directed by top-down processes. In this context, the (national) planning authority GOPP concentrates primarily on the strategic planning of Cairo (Section 5.3.2.5) and on planning major infrastructure measures. The design of urban space, e.g. in the new cities, is usually the domain of national – and recently even international – real-estate developers. As a rule, the few green and recreational spaces in the formal urban areas are not freely accessible to the public, and are often regulated by membership (e.g. in the Gezira Club) or entrance fees. Even the Al-Azhar Park, built by the Aga Khan Foundation, is sealed off from the adjacent Islamic old town, and visitors have to pay an admission fee at the entrance – which can practically only be reached by car. Consequently, these areas – like the 'semi-public' shopping malls – are basically reserved for the urban middle and upper class.

Overall, public spaces in Cairo's inner city are used primarily as transport routes or retail space. Public squares played a special role during the Arab Spring. The importance of this use has declined due to the current restrictive policies, which, among other things, severely curtail freedom of assembly. Only Tahrir Square seems to be rooted in the collective memory of the city as a place symbolizing togetherness (Souefi, 2014; Figure 5.3-6).

Unlike the formal city districts, the residents of informal settlements take a more active role in the development processes of their districts. However, here, too, the production of space is greatly influenced by economic interests, since the main aim is to maximize prof-



Figure 5.3-6
Tahrir Square, November 2012.
Source: Gigi Ibrahim/flickr

its on plots of land. The resultant high density not only means that the buildings are poorly lit and ventilated, it also prevents the development of public green and recreational areas because of the lack of open spaces. The (narrow) roads also offer little room for social encounters. Even so, they are used as trading centres for the informal economy, which, in turn, can function as a social frame of reference – outside private premises.

Especially after the 2011 January revolution, there was a strong increase in civil-society initiatives on city-district development (Ibrahim, 2014). Religious groups joined forces, as did ‘popular committees’ (Bremen, 2011:75). Moreover, many neighbourhood projects emerged, ranging from urban beautification initiatives (e.g. painting initiatives) to ‘Right to the City’ campaigns (Box 3.5-1). Many of these groups were initiated by students, but in many cases could not stabilize after the revolution.

In addition, even in many unplanned settlements, urban design is increasingly being influenced by actors of the (informal) real-estate economy. Although this is well-known (World Bank, 2008b:92), there has been little research on this phenomenon (Box 5.3-1).

Social cohesion

Socio-economic disparities have a strong impact on Greater Cairo. They have been given structural shape and become separated in the course of the development of parallel city types (Sections 5.3.1.1–5.3.1.3). Within these city types there are distinct social networks with deep roots in Arab-Egyptian culture. They are primarily based on family structures and religious affiliation and are most marked in the informal settlements. Alongside social identity, they also ensure social control and, to some extent, take the place of non-existent legal regulations (Section 5.3.2.2; Figure 5.3-7). Even parts of the informal markets are based on social rules: infor-

mal real-estate developers (in the local environment) can gain legitimacy, for example, by investing in charitable causes (schools, mosques; Deboulet, 2012:218).

Overall, the social cohesion of society and social subgroups is very fragile in Egypt. Alongside socio-economic divisions, there are strong separations between conservative Islamic groups, liberal-democratic groups, and the ‘military caste’ that developed from the Mubarak regime. The events following the January revolution in particular clearly showed how little these different groups cooperate with each other. Rather, the presidencies of both Mohamed Mursi and ex-general Abdel Fattah al-Sisi further exacerbated the division of Egyptian society with the efforts of the respective ruling party to enforce their own vested interests (Müller-Mahn and Beckedorf, 2014:19).

At present, it is impossible to predict what effects the revolutionary events will have on Cairo society in the medium and long term. During the revolution, the media and researchers frequently emphasized the great importance of social media for the networks of the mostly young demonstrators (UN-Habitat, 2014c:86). Even if some authors now believe this influence was exaggerated (Robertson, 2013), the new media at least enabled a section of young Egyptians to communicate in a way that was largely independent of the state, and to launch and organize urban projects. The popular committees were also often organized via Facebook groups (Bremer, 2011:89ff.). This experience of urban co-determination independent of the state via



Figure 5.3-7
Social life in public space: Istabl Antar informal settlement in Cairo.
Source: Gesa Schöneberg/WBGU

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social media could also have a long-term impact on the younger generation.

5.3.2.4

Actors in the development process of natural life-support systems, inclusion and Eigenart

Cairo's urban fabric is caught between the conflicting priorities of informal settlements and new cities; many aspects relating to sustaining the natural life-support systems, inclusion and *Eigenart* overlap here. The actors in these formative processes for the city can initially be studied separately from each other. The main driver behind the development of the new desert cities is the government (Box 5.3-3), which has been closely inter-linked with the military and the economic elite in Egypt since independence in 1952 (Sayigh, 2012:4). The military not only has many individuals in the government (Sayigh, 2012:10ff.), it is also significantly involved in many economic activities in the country with its own companies (Müller-Mahn and Beckedorf, 2014:16; Abdul-Magd, 2013). Its influence extends far beyond the military sector. It has a virtual monopoly when it comes to land in desert areas that is being released for conversion into building land in the Cairo metropolitan area. Building firms owned by military personnel also take part in civil infrastructure projects outside public procurement procedures. Furthermore, politicians and the military are closely interconnected with the real-estate companies that make big profits on the building projects in the desert new towns (Elshahed, 2014). These non-transparent ties between politicians, the military and business became stronger under Mubarak's government. The actors had access to comprehensive opportunities for self-enrichment (Müller-Mahn and Beckedorf, 2014:16). The 2011 January revolution basically did nothing to change this non-transparent power constellation (Müller-Mahn and Beckedorf, 2014:16), and the influence of the military currently seems to be strengthening again under the al-Sisi government.

Ever since foreign nationals were allowed to acquire land in 2007, foreign real-estate funds have also been investing heavily in Cairo. At present, the most prominent example is the newly planned 'Capital Cairo' project, where primarily investors from the United Arab Emirates are involved (Tharoor, 2015). However, this development would not be possible without the urban middle and upper classes, who are withdrawing to the satellite cities – albeit in smaller numbers than expected.

The actors in the informal districts are much more difficult to identify. The public sector's involvement in the processes here is less direct. As already shown, it promotes informal urbanization indirectly through its planning strategies (Piffero, 2009:89; Section 5.3.1.5).

The corruption in the city administration also has an effect here, e.g. by tolerating illegal construction projects in exchange for bribes (Piffero, 2009:90; Nada, 2014:22).

However, the most important actors in the informal settlements are the residents, frequently represented by so-called natural leaders (Section 5.3.2.2). On the one hand, they influence cultural diversity and creative autonomy, (informal) inclusion and the high density of residential development. On the other hand, they are also responsible for the destruction of agricultural land. Moreover, the actors of the (informal) economic sectors, especially the informal private developers, also play a vital role in the development of these areas. This group is often identical to that of the residents. In addition, there are also many NGOs, most of which deal with issues of (substantive) inclusion and *Eigenart*, and CBOs and religious groups, which frequently also secure political influence for themselves through their involvement (Haenni, 2009). In selected areas, a decisive role is played by major international organizations such as the World Bank, the United Nations Development Programme (UNDP), UN-Habitat, the United States Agency for International Development (USAID), the Japan International Cooperation Agency (JICA), Agence Française de Développement (AFD) and the German Society for International Cooperation (GIZ). While several international actors are helping with the strategic planning of the entire urban area – e.g. UN-Habitat was involved in the Cairo 2052 Urban Development Strategy (Section 5.3.2.5) – others are focusing more on individual upgrading projects. The GIZ has been active in Cairo's informal regions for years and runs further projects in the fields of sustainable infrastructure, governance, environmental and climate change, as well as economic development and employment. As one of the few actors dealing with the topic of climate change in Cairo, it also takes part in the 'Cairo Climate Talks'. This cooperation event initiated by the German Embassy in 2011 offers regular discussions with various stakeholders on issues of environmental sustainability; cooperation partners include the Egyptian Ministry of Foreign Affairs, the Ministry of State for Environmental Affairs (EEAA), the German Science Centre (DWZ), the German Academic Exchange Service (DAAD), and the Egyptian German High Level Joint Committee for Renewable Energy, Energy Efficiency and Environmental Protection (JCEE).

Despite the tense political situation and the government's aim of basically withdrawing from 'Old Cairo', the government side, too, has been making positive noises in the meantime. For example, informal urbanism is attracting greater attention: a separate ministry, the Ministry of Urban Renewal and Informal Settlements

(MURIS), was founded in 2014 to replace the Informal Settlements Development Facility (ISDF). The minister at the time had her political background in the Egyptian citizens movement and was trying to give more prominence to the topic of informal settlements and the right to adequate housing (Schechla, 2015: 141). In May 2015, the first Egyptian Urban Forum was held in Cairo, staged by the MURIS together with the Ministry of Housing, Utilities and Urban Development (MHUUC) and UN-Habitat. Following the example of the World Urban Forum, stakeholders and actors from all three areas of the city met for a symposium here for the first time and discussed developments in Cairo (and the Habitat III process). The MURIS was dissolved again in late 2015 without explanation. It remains to be seen to what extent the MHUUC will adequately pursue the themes of informal urbanism.

Despite the difficult political situation, Cairo has networks of urban stakeholders operating both in the old-town districts and in informal areas. Especially since 2011, urban researchers have been increasingly teaming up with urban activists. For example, the TADAMUN initiative – which is supported by the American University in Washington, DC, and the Takween Integrated Community Development Group, among others – aims to encourage the residents of Cairo to actively demand their ‘Right to the City’ on the basis of the Egyptian constitution. The group, which refers to its work as ‘analytical activism’ (Singerman, 2015), regularly publishes articles on the topic of city and society in Cairo, and also actively participates in urban-development projects. Many NGOs in Cairo also cooperate to form larger alliances – e.g. Egyptians Against Coal or the Network of Women’s Rights Organization – so as to present a stronger profile, particularly when confronting politicians.

5.3.2.5

Urban Development Strategy: Cairo 2052

After the ‘Cairo 2050’ urban-development plan was sharply criticized because of its focus on luxury mega-projects and the associated mass resettlements (Amnesty International, 2011a; Tarbush, 2012), the planning authority GOPP and UN-Habitat developed the Greater Cairo Urban Development Strategy (Cairo 2052) on behalf of the Ministry of Housing, Utilities and Urban Development (MHUUC). It was published in 2012. The vision of the future Cairo is integrated in a national development strategy and focuses on the creation of social justice, economic competitiveness and environmental friendliness in the urban region. Further aims for the coming decades include the improvement of quality of life, the establishment of a knowledge-based economy, the improvement of environmental condi-

tions and the transport system, the development of the new cities into new centres, the creation of tourist centres in the historic city fabric, and the establishment of an effective governance system for the management of the development projects. The intention is to implement this guideline through various strategies in Greater Cairo. Overall, the revised strategy focuses less on luxury projects and pays more attention to the interests of the population, who are now to be more intensively involved in the process. However, the main focus of development will still be on the new cities – although hitherto it does not take into account the plans for the new Capital Cairo, which were commissioned by the president’s office independently of the Cairo strategy.

Although the Urban Development Strategy relates more closely to the city’s existing problems and challenges than the original vision, it remains to be seen to what extent the individual projects will be able to steer Cairo’s development. Fears are already being expressed that the participation of residents could be misused to legitimize elitist urban-development projects, and that the implementation of large-scale projects could still lead to the expulsion of residents (TADAMUN, 2014a).

In the WBGU’s opinion, however, because of its integrative approach, this strategy could lay an important foundation stone for sustainable development in the city, which needs to be further developed in all areas of the natural life-support systems, inclusion and *Eigenart*. Although the strategy shows initial signs of a switch from incremental improvements towards an overall strategy, the leverage effect of these changes will be too weak to ensure the success of Cairo’s transformation towards a sustainable city. One of the biggest challenges will lie in the future governance of Greater Cairo. Yet, especially the different experiences from the decentralized informal governance of the unplanned areas on the one hand and the centralistic-autocratic governance of the new cities on the other, could help develop a Cairo-specific form of transformative governance (Chapter 8).

5.3.3

Conclusions

Greater Cairo has changed dramatically over the last few decades. The modest city of the 1950s has developed into a gigantic metropolitan region. In the meantime, the government has not only withdrawn from most of the (‘unplanned’) urban areas, but is also resorting to the solution of a new ‘smart city’ far outside the governorate’s borders. In this respect, the future of the Cairo metropolitan area is more than uncertain. For example, it is impossible to predict whether and to what extent

Box 5.3-3

Urban land use in Cairo's informal settlements

The way land use (Section 4.3) is currently organized in Greater Cairo reveals many negative path dependencies. The unconnected new satellite cities use a lot of land and cause high levels of air pollution because cars are the dominant means of transport. Growing informal settlements destroy agricultural land. By way of contrast to land use in the new cities, wide areas of Cairo's informal regions are characterized by an 'organic' form of settlement with high density and mixed uses. After the government had largely either ignored or tolerated this form of settlement in the 1970s and 1980s (Dorman, 2007; Piffero, 2009:90), various strategies and laws have since been introduced aiming to upgrade certain areas and contain the growth of informal areas. In general, two strategies are pursued: preventive measures aim to limit the future informal conversion of agricultural land, and interventionist measures aim to upgrade or, where deemed necessary by the authorities, clear existing informal settlements. In Cairo, the interventionist measures of the Informal Settlements Development Facility (ISDF) focus exclusively on unsafe areas, i.e. areas with inadequate living conditions that account for a relatively small proportion of Cairo's settlement area. In the WBGU's opinion, although Cairo's informal settlements are deficient in terms of their land use (Section 5.3.1.3), an urgent necessity for the transformation would be to steer the growth of informal settlements.

Preventive regulatory measures

The Egyptian government has pursued various preventive measures to regulate urban growth and contain the consumption of land, especially the destruction of arable land. The Informal Settlements Belting Programme (Tahzim = controlled expansion) was introduced as a set of regulatory measures to stem informal urban growth. The aim was to contain and steer informal urbanization by keeping certain development corridors free and providing alternative settlement areas (World Bank, 2008b: 15; GOPP, 2012: 160). Another regulatory measure was to compile land-use plans (detailed plans) for planning settlement areas. Both were to be implemented on the basis of urban strategic plans (Nada, 2014: 3).

In practice, these methods have met with little success so far. The implementation of the Urban Growth Boundaries (UGBs) failed due to a wide range of obstacles and blockades; for example, even designating the areas proved to be difficult. The city administration was often overtaxed and, according to employees of the GOPP planning authority, the boundaries were often not drawn up on the basis of urban-planning criteria, but primarily followed the dynamics of local power interests (Nada, 2014: 9). Furthermore, it is also considerably more attractive for the land owners not to abide by prescribed UGBs. This is based primarily on economic reasoning. In informal settlement processes, by (illegally) converting agricultural land into building land, land owners can build (or contract building) on nearly 100% of the space available – without the expense of additional infrastructure costs. If they participate in the Tahzim Programme, only half of the land can be sold as building land, because approx. 50% has to be set aside for infrastructure and public areas. In addition, costs would be incurred for the provision of infrastructure, and taxes might be payable on any increase in property value (World Bank, 2008b: 16). Since hardly any sanctions are ever imposed for non-compliance with the UGBs in Cairo, it is not very attrac-

tive for the land owners to abide by them (Nada, 2014).

The General Department for Planning and Urban Development (GDPUD) – with the assistance of experts registered by GOPP – is responsible for compiling the detailed plans provided for under building and planning law. The plans are to lay down the land uses and integrated urban-development and landscape projects of an area on the basis of the strategic plans. Frequently, there is a lack of financial and human resources for drawing up and implementing the plans. Although Cairo – unlike many other cities in Egypt – has an approved Strategic Plan and designated areas for some UGBs, implementation also remains difficult here. In particular, the often inadequate land registration represents a major obstacle in the implementation of the plans (Nada, 2014: 12). In addition, the construction requirements specified in the detailed plans are too cost-intensive to build affordable housing and cannot, therefore, be implemented by the lower income groups (Nada, 2014: 17). These groups are thus again driven to settle in areas informally (GOPP, 2012: 159).

Preventive market-based measures

The state can levy a tax on the profits made between buying and selling a property in order to contain land speculation and to channel possible increases in value to the general public, i.e. to the municipality. This taxation of increases in land value was already laid down by law in Egypt in the 1950s; however, it has proved to be an ineffective instrument. This is mainly due to inefficient tax collection by the frequently overburdened local administrations (Nada, 2014: 19). There was a tax reform in Egypt in 2008, which was modified again in August 2014. Its aim was to improve tax collection and tax income at the local level, especially in low-income areas, and to reduce land speculation (TADAMUN, 2015). Up to now, this legislation (too) has had little impact on building practices in Cairo.

Obstacles and blockades impeding land-use management in Cairo

Although the challenges of land-use management are fundamentally different in the informal areas compared to the new desert cities, there are some parallels with regard to the obstacles and blockades encountered. In both cases the frequent lack of power of the local administration in Cairo impedes the implementation of the land-use management instruments. This is favoured by centralism in Egypt, which currently seems to be strengthening even further. Even the UGBs, which were originally the responsibility of the local level (Law no. 3, 1982), are to be fixed by the national planning authority GOPP according to the planning legislation of 2008 (Nada, 2014: 18). Furthermore, local taxes are still collected centrally even under the reformed tax law, so that the local level can determine neither what it raises taxes on and at what rates, nor how to spend its revenue (TADAMUN, 2015).

Although the Greater Cairo Urban Development Strategy (incrementally) addresses a large number of obstacles and blockades, Cairo's real-life urban and land-use policy is downright contradictory. While the private sector generates lucrative profits with urban-development projects and speculation with land and real estate in the desert (Sims, 2015: 267), the public sector continues to provide the necessary land at a very low selling price – and tax-free or at a very low tax rate (World Bank, 2006: 18). As a result, possible benefits – which could be used e.g. for social housing – are not reaped. On the other hand, the government asks international donors for donations or loans with which to build infrastructure or housing for poor population groups (UN-Habitat,

2014d). Overall, Egypt's centralized state and administrative structure, and the related weakness of local governments, is currently obstructing the implementation of planning instruments for land management.

Transformative land-use management in Cairo

A change in the system of land-use management could help steer the urbanization processes in Cairo in the direction of the transformation towards sustainability. Positive effects could be achieved especially by linking up with the action fields of mobility (Section 4.2.2), urban form (Section 4.2.3), and materials and material flows (Section 4.4). The strategies pursued by the city and the government to date have been largely ineffective, and even the current Urban Development Strategy will hardly be able to make use of the transformation

potential of urban land use. In particular, there is a lack of realistic implementation strategies. Locally adapted management mechanisms (Section 4.3.3) must be developed to make the principles of urban land use (Section 4.3.2.2) effective, also in Cairo. In addition to the search for creative instruments of land-use management that are above all more mindful of the common good, the transitory element of the reversibility and adaptability of land should be taken into account more fully. Moreover, an integrated city-wide strategy that includes all population groups is important for the management of transformative land use. As regards implementation, another decisive aspect is how a (transformative) form of urban governance might develop in Cairo (Chapter 8) that, for example, can stem the widespread corruption (Sections 5.3.2.2 and 5.3.2.4).

the necessary resources will be provided to modernize the transport and energy systems. In general, it is to be feared that, as a result of the relocation of large sections of the high-income population groups to the new Capital Cairo, living conditions in the existing urban area will adjust in a negative way. The prospects of a transformation process being initiated by a proactive state in Cairo are therefore extremely unfavourable.

Despite this adverse starting position, however, Cairo has the potential to initiate fundamental changes towards a transformation beyond incremental improvements. Especially the experience that has been gained from the development of Cairo's different city types could be used in future to trigger significant changes. For example, although on the one hand the informal settlements (and informal economies) in Cairo are an expression of political failure, on the other hand they also reveal the chances offered by urban self-organization. Both the local and the national government levels can learn from good practices and the flexibility of the informal sector and make use of these both to initiate transformation processes and to develop transformative governance in Cairo. Informality does not exist detached from the formal context, but shares with it many points of contact and overlaps (Box 5.3-2); these can be further developed. Furthermore, thanks to decades of national and international research, Cairo has the ability to recognize and use potential – provided that the public sector also gets involved. Although the capacity of the public sector in Cairo is limited at present, it does have the potential to reinforce such processes positively, 'if the goals are right'. At best, this can be negotiated and implemented in an 'urban social contract' (Section 8.5) for Cairo (first approaches were seen e.g. at the Egyptian Urban Forum; Section 5.3.2.4). However, these developments are currently under serious threat from worsening inclusion deficits. If the inclusion of the population can be greatly scaled up,

and existing rudiments of progressive urban-development strategies further developed, the transformation towards sustainability could also succeed in Cairo. In Cairo, too, reversibility and adaptability must be incorporated as principles of urban development (Section 4.2–4.4), so that negative path dependencies can be avoided on the road to transformation.

5.4

Copenhagen: a people-oriented pioneer of sustainable urban planning

Denmark occupied one of the highest country rankings in the World Happiness Report (Helliwell and Sachs, 2015) in 2015 for the third year running. Frequently voted the most liveable city in the world (by the journal Monocle in 2014, for example), its capital Copenhagen probably contributed to this result. Whenever good examples of people-oriented, sustainable urban planning in Europe are needed, Copenhagen's innovative transport and land-use planning strategies are cited. The WBGU also sees Copenhagen as a pioneer and an example to be followed in many respects. The Danish capital exhibits the attributes of a typical (Western) European metropolis that has developed over many centuries, is continuing to grow and demonstrates strong governance. It is therefore well suited to showcasing transformation pathways from which other cities with similar basic patterns and conditions can learn.

Copenhagen is an example of mature cities in industrialized countries that face the challenge of breaking away from unsustainable path dependencies, containing their impact on climate change and – as in Copenhagen's own case as a coastal city – adapting to the possible consequences of climate change. In this regard, Copenhagen has set itself ambitious goals, such as becoming the world's first carbon-neutral city by

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the year 2025 (Section 5.4.2). Conducive conditions for a transformation towards sustainability are visible in the Danish capital. For example, the city sets itself both local targets (e.g. to promote sustainable mobility, inclusion and diversity) and targets for its contribution to the global transformation (e.g. CO₂-reduction targets, commitment to city networks and to fossil-fuel divestment by the local government).

Copenhagen is also a model of good governance by a 'strong government' for which citizen participation and empowerment have an important part to play. Bottom-up activities are often tolerated here and, in some cases, actively encouraged by the local administration.

At the same time, the example of Copenhagen illustrates how lofty ecological ambitions lead to conflicts of interest. Despite its ambitious targets and positive endeavours, challenges remain with regard to the normative compass and the Great Transformation proposed by the WBGU. These challenges can in turn lead to setbacks and unintentional side-effects.

5.4.1 From Viking settlement to metropolitan area

What was once a Viking settlement and today spreads across the islands of Zealand and Amager has been Denmark's capital since the 13th century (Statistics Denmark, 2015). Modern Copenhagen is divided into spatial entities such as the Metropolitan Area, the Capital Region and the City of Copenhagen. The Metropolitan Area encompasses the cities of Copenhagen and Frederiksberg plus five other former administrative units (OECD, 2009). In 2009, its 2.4 million inhabitants accounted for 44 % of the Danish population (OECD, 2009). From the perspective of the national administration, however, the Metropolitan Area does not constitute an administrative unit. The Capital Region is inhabited by 1.77 million people (Citypopulation, 2015) and includes 29 municipalities, including Copenhagen itself. On 1 January 2014, the City of Copenhagen had 728,243 inhabitants in an area measuring 179.3 km². This is equivalent to a population density of over 4,000 people per square kilometre (Statistics Denmark, 2014: Table 399).

In 2009, Copenhagen was home to the best universities in the country (OECD, 2009). The economy in the Metropolitan Area is heavily service-oriented (e.g. high-tech firms) (OECD, 2009). Cross-border economic cooperation is underpinned by infrastructure elements such as the Øresund Bridge between Copenhagen and Malmö (Sweden). The city's location on the Øresund and a generous array of green areas and recreational spaces (Section 5.4.5; Figure 5.4-1) gives the local population the potential for a high quality of life.



Figure 5.4-1

Vibrant outside space near the Danish Royal Library in Copenhagen.

Source: Naotake Murayama/flickr

5.4.2

Transformation in Copenhagen: openness to experiments and innovation

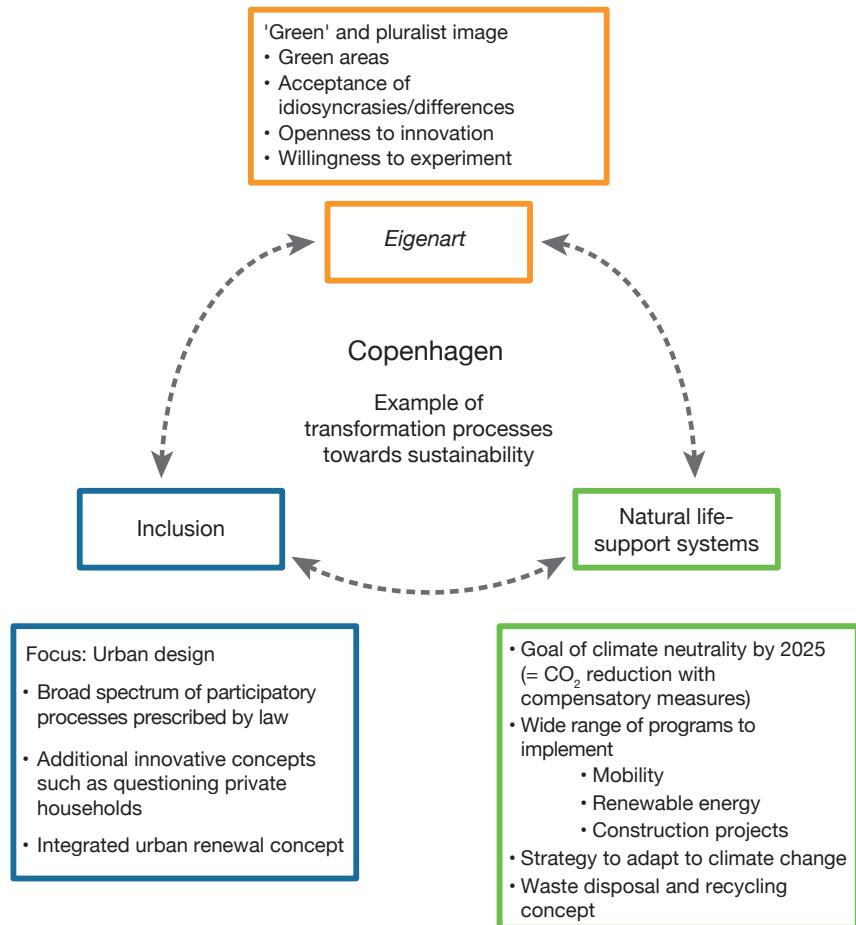
In line with the WBGU's understanding of transformation, Copenhagen is a good example of a European city that faces up to the challenge of a transformation toward sustainability, sets ambitious goals and demonstrates promising strategies.

With a view to sustaining natural life-support systems (Section 3.3), Copenhagen aims to become the world's first carbon-neutral capital by 2025 (City of Copenhagen, 2012). However, the goal of carbon neutrality does not equate to the goal of reducing CO₂ emissions to zero, which, in the WBGU's view, should be targeted by 2070 at the latest (Section 3.3.1). According to the city's plans, Copenhagen will continue to generate CO₂ emissions even after 2025, especially in the transport sector. Carbon neutrality is to be reached by supplying electricity from renewable sources to other parts of Denmark to replace the use of power generated using fossil fuels. Copenhagen will then credit the resultant emissions reductions to its own account to compensate for its residual urban emissions (City of Copenhagen, 2012). This kind of compensation is only possible for a transitional period, however: by 2035, Denmark wants to decarbonize its entire electricity and heating sector (City of Copenhagen, 2012). The WBGU believes that the city should develop strategies to reduce residual urban emissions to zero in real terms after 2025. Compared to other cities around the world, however, Copenhagen's targets can be regarded as an outstanding interim milestone along the road to zero emissions (i.e. the elimination of CO₂ emissions from fossil-based sources). At the same time, the Danish government has undertaken to supply energy for the whole country without the use of fossil-fuel resources

Figure 5.4-2

Transformation process in Copenhagen. Copenhagen is an example of a process of transformation towards sustainability which is already underway. Positive strategies exist with regard to sustaining natural life-support systems and inclusion, two qualities of the normative compass (Chapter 3). Examples include the goal of carbon neutrality by 2025 and a wide range of participatory processes which are prescribed by law. These factors translate into a green and pluralist image which is part of Copenhagen's *Eigenart*, the third quality in the normative compass; and this is only one of the possible interactions between all three qualities. For example, the city's image can promote achievement of the goals of both sustaining natural life-support systems and political inclusion.

Source: WBGU



or recourse to nuclear power plants by 2050 (Danish Government, 2011). Specifically, these objectives have been enshrined in the 2014 Danish Climate Change Act. Though it does not prescribe specific CO₂-reduction targets, this law does create a regulatory and institutional framework, e.g. by setting up a Climate Council (Danish Climate Change Act, 2014; Schlacke, 2016). In addition, Copenhagen has resolved to develop a strategy that precludes further investment in fossil energy carriers and expedites divestment from oil, coal and gas (Mattauch 2015).

Strategies for political inclusion in the Danish capital range from forms of participation prescribed by law to creative informal processes. It is therefore reasonable to speak of a kind of 'transformative culture of participation' (Agger, 2010:542; Holm and Kamara, 2001:59ff.; Gottschalk, 1984).

The example of Copenhagen reveals challenges in terms of the cost of both living and housing. Urban-development upgrades have, for example, pushed up prices and driven out low-income households. Local government is deploying ambitious social-policy measures and fighting inequality in an attempt to combat this trend. In

this context, considerable importance is attached to cultural diversity and the inclusion of migrants and people with varying cultural backgrounds. Bearing in mind that Denmark's national policy is visibly tending in the other direction at the present time, this is quite remarkable.

Copenhagen also deviates from the norm in the field of urban planning and development: its abandonment of car-friendly urban planning, its urban-development experiments to promote cycling, and its acceptance of oddities and idiosyncrasies such as Freetown Christiania are just a few examples. The *Eigenart* of the City of Copenhagen is, first and foremost, that it goes its own way and is open to innovation and experimentation.

Figure 5.4-2 summarizes Copenhagen's approaches to the transformation process relating to the three dimensions enshrined in the WBGU's normative compass.

The sections that follow describe and assess Copenhagen's characteristic attributes, problem areas and solution strategies for the three dimensions covered by the normative compass: sustaining the natural life-support systems, inclusion and *Eigenart* (Chapter 3).

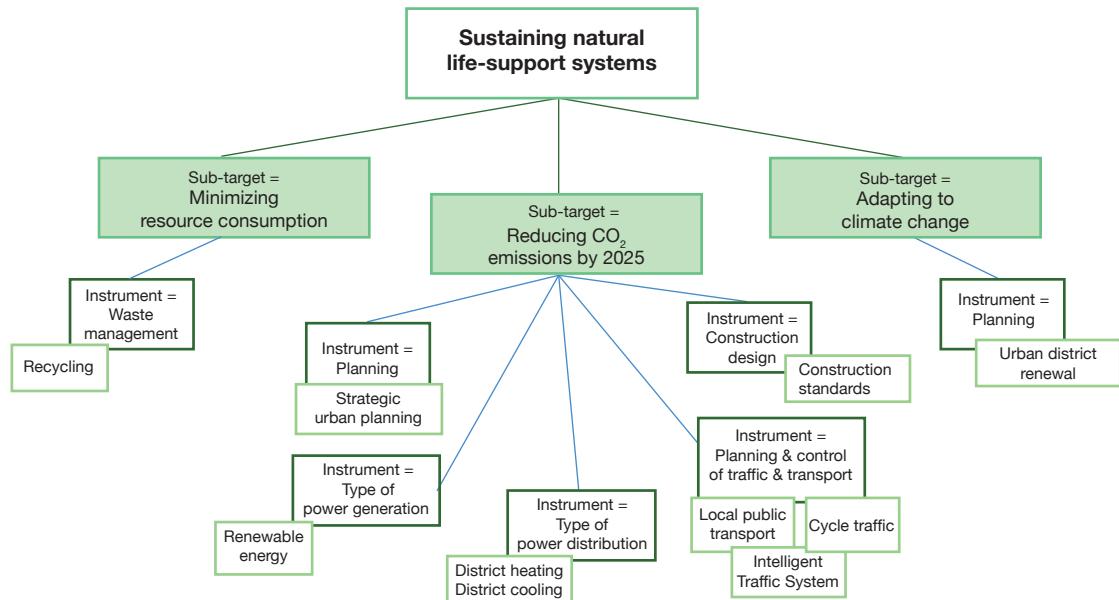


Figure 5.4-3

Sustaining natural life-support systems in Copenhagen. Several sub-targets specify how natural life-support systems are to be sustained – for example by minimizing resource consumption and reducing CO₂ emissions by 2025. Instruments such as waste management and transport planning and control are used to achieve the defined goals and are themselves operationalized through concrete measures such as recycling and an intelligent traffic system.

Source: WBGU

5.4.3

Natural life-support systems: good practices with co-benefits

Copenhagen is rising to the challenge of breaking away from unsustainable path dependencies. On the one hand, it wants to limit its contribution to climate change; on the other, as a coastal city, it sees itself forced to adapt to the possible consequences of climate change. At the same time, Copenhagen faces the challenge of finding innovative ways to deal with resource consumption.

At a glance, Figure 5.4-3 shows all the targets and tools for sustaining the natural life-support systems used by Copenhagen and evaluated by the WBGU. Examples are provided as illustrations for each of the three sub-targets: CO₂ reduction by 2025, minimization of resource consumption, and adaptation to the consequences of climate change. Copenhagen's activities focus primarily on meeting the city's carbon-reduction target by 2025.

5.4.3.1

Planetary guard rails: climate and resources

Copenhagen is regarded as a model city in the fight against climate change. In 2012, it claimed to have reduced greenhouse-gas emissions by 40 % since 1990 (City of Copenhagen, 2012).

Its stated aim is to be carbon-neutral by 2025 (City of Copenhagen, 2012; for a discussion of the term from the WBGU's perspective, see Section 5.4.2). To achieve this goal, the city must consume less energy and generate a sufficiently large surplus of energy from renewable sources to offset the emissions it continues to produce – for example through traffic and transport – provided that this surplus replaces electricity generated from fossil fuels in other parts of Denmark (City of Copenhagen, 2012:5). To move towards this interim milestone, Copenhagen is adopting a broad spectrum of measures in power generation and distribution, traffic and transport, construction and planning. For the remainder of this section, the WBGU will focus on a small number of particularly important measures.

Climate-protection measures in Copenhagen: district heating and traffic management

Copenhagen has operated a district heating system since the 1920s that serves as an example worldwide (UNEP, 2015:72). Since the 1970s, the city has been converting this system to make itself independent of fossil fuels (City of Copenhagen, 2014a). For example, heat and waste heat generated by waste incineration at other plants is pumped through the district heating grid to 97 % of the city's households. However, since the system derives nearly a quarter of its heat from coal and a further 13 % from oil and gas (data from 2010),

Table 5.4-1

Energy sources for the supply of district heating to Copenhagen in 2010.
Source: European Green Capital, 2015

Source	[GWh]	[%]
Wood pellets	477	11
Straw	217	5
Waste (renewable portion)	1,693	39
Waste (fossil portion – plastic)	434	10
Coal	998	23
Oil and diesel	260	6
Natural gas	304	7
Total	4,340	100

it is not yet independent of fossil fuels (Table 5.4-1).

As well as reducing CO₂ emissions compared to conventional oil and gas-fired heating (e.g. oil-fired central heating), other benefits of this system are that it is highly efficient and gives local residents a low-cost heating system (City of Copenhagen, 2014a; UNEP, 2015:10). The long-term goal is for the system to do without fossil fuels entirely. To this end, cogeneration, biogas and biomass are to be used in the future (City of Copenhagen, 2014a:32). Biomass, however, could exacerbate land-use conflicts, thereby making a direct and indirect contribution to problems of food security and nature conservation (WBGU, 2008). The use of geothermal energy is part of Copenhagen's long-term strategy for its district heating system (City of Copenhagen, 2014a:32).

In summer, two district cooling systems set up to complement the district heating system use excess heat from the heating systems. Compared to the otherwise customary air-conditioning systems, the district cooling system consumes 80 % less electricity and causes 70 % fewer CO₂ emissions (City of Copenhagen, 2014a).

One special characteristic of the city is its extensive network of cycle paths (OECD, 2009:100; Pucher and Buelher, 2007). Between 2006 and 2012, around 35 % of commuters used their bicycles to travel to work or, for example, university. The aim was to raise this figure to 50 % by 2015 (OECD, 2009:100; City of Copenhagen, 2014a). In 2014, local government information indicated that the proportion already stood at 45 % (City of Copenhagen, 2015c). Incentives have been created by making it easier to cross over between cycle paths (a 'no-missing-link' strategy), for example, and by phasing traffic lights to ensure a wave of green lights for cyclists.

Regarding infrastructure, in 2009 the OECD noted deficiencies in congestion reduction and the ability to reach central Copenhagen from outlying areas (OECD, 2009:24). To ease its congestion and emission prob-

lems, the city created an integrated mobility system designed to simplify the use of, and changes between, different means of public transport such as buses, trains and the underground system. The aim is to further reduce CO₂ emissions by 2025 by means of a higher proportion of cyclists, new fuels and propulsion systems for motorized vehicles, the public transport system, and an intelligent traffic management system (ITC; City of Copenhagen, 2015a). For example, traffic lights will be phased so that buses have to stop less frequently (City of Copenhagen, 2015a). In addition to lower emissions, the city hopes its traffic and transport strategy will also increase quality of life and improve the health of the urban population (City of Copenhagen, 2014a). As far back as 2009, 72 % of the activities available in Copenhagen (in parts of the Metropolitan Area, including the Capital Region) were reachable on foot from public transport stops or stations (Scheurer, 2010; Table 1). Various incentives aim to make it as easy as possible for local residents to use less emission-intensive means of public transport. There are now plenty of opportunities to park bicycles at stops and stations, for instance. A single ticket is valid for all means of public transport, and online information about possible delays and alternatives to selected routes is updated constantly (City of Copenhagen, 2014a).

Adaptation to climate change

As climate change advances, Copenhagen's position on the Baltic Sea exposes it to a greater risk of storm tides and extreme weather events (OECD, 2009:100). The city has developed a climate-adaptation concept that evaluates the challenges – such as heavier precipitation, rising sea levels, higher average temperatures and the heat-island effect – which the city could face as a result of continuing climate change (City of Copenhagen, 2011). The adaptation concept formulates specific solution strategies for the individual challenges. In the long term, for example, the mixed system of wastewater and

rainwater is to be converted to separate drainage systems. In the short term, public green areas will be used to drain off extreme precipitation (Haghigatafshar et al., 2014:166). A storm that brought torrential rain in 2011 and caused damage to key infrastructure also prompted the city to ratify a 'cloudburst management plan', one aspect of which prescribes how extreme precipitation is also to be drained via roads (Haghigatafshar et al., 2014:166). St. Kjeld is the first district in which structural conversion work has begun to make the district resistant to the consequences of climate change that Copenhagen fears. Structural alterations include such measures as converting asphalt road surfaces into green areas (City of Copenhagen, 2013a, b).

Resources: waste management

In its 2009 study, the OECD noted that 32 % of Copenhagen's waste was already being recycled (OECD, 2009:97). The city aims to restrict waste incineration strictly to waste that cannot be either reused or recycled (City of Copenhagen, 2014a). With this in mind, a resource- and waste-management plan up to 2018 has been drawn up. In 2018, 45 % of all household waste should be recycled, with the Danish capital becoming a 'zero-waste city' by 2050 (City of Copenhagen, 2014a).

5.4.3.2

Local urban environmental problems: potential for improvement on air pollution

Air pollution is still a problem in Copenhagen. While the concentration of sulphur in the air is low by OECD-wide comparison, concentrations of nitrogen oxide and particulate matter are comparatively high (OECD, 2009:24, 95; Section 2.3.4.1). These are caused by the transport sector and wood burning (OECD, 2009:95). The Danish Ecological Council has noted that Denmark and Copenhagen are not fully compliant either with the European Union's air-quality requirements (Directive 2008/50/EC) or with national emission ceilings (Directive 2001/81/EC; Danish Ecological Council, 2014:6, 18). The EU threshold for nitrogen oxide, for example, is exceeded. Low-emission zones were introduced in Copenhagen back in 2007, although the Danish Ecological Council rates their effect as minor (Danish Ecological Council, 2014:22). The Council recommends measures such as introducing various particle filters and age limits for motor vehicles (Danish Ecological Council, 2014:26). In the WBGU's opinion, this kind of incremental step can be useful as an interim solution, but should be complemented by a transformative perspective (Section 4.2.2).

This perspective is in place at the national level: Denmark's national strategy (Danish Government, 2011) formulates the fundamental goal of eliminating the

use of fossil fuels, also for the transport sector, which would lead to substantial improvements in air-pollution control. At the same time, the strategy calls this goal into question by pointing to uncertainties about technological feasibility. The City of Copenhagen has not adopted this fundamental goal. Instead, it continues to calculate and plan on the basis of a significant share of fossil fuels in the transport sector (Section 5.4.2).

5.4.3.3

Relevant actors in efforts to sustain natural life-support systems

In Copenhagen, the most potent actor with regard to sustaining natural life-support systems is the public sector – in particular the local government and local administration. In the case of measures for which the national government is responsible, such as the preparation of a national decarbonization strategy, decisions are made by legislation. The same is true for measures specified by the EU. The resultant planning tasks must be implemented by the local government. The city's residents are included and can participate in the city's planning processes (Section 5.4.4).

5.4.4

Inclusion: promotion through strong management

The WBGU draws distinctions between substantive, economic and political inclusion as the three dimensions of inclusion (Section 3.4). Substantive inclusion refers to access to the means to satisfy people's basic needs (e.g. access to resources, infrastructure, services and education). In the WBGU's view, economic inclusion involves in particular integrating urban residents into the labour market. Political inclusion comprises the rights to vote, access information, participate, appeal and file lawsuits. In contrast to the sustaining of natural life-support systems, Copenhagen does not pursue a single, strictly defined inclusion strategy. On the contrary, widely differing measures underwrite (or, in isolated cases, fail to underwrite) the WBGU's categories of substantive, economic and political inclusion. Economic inclusion is largely available to the residents of Copenhagen, for OECD analyses indicate relatively small economic disparities as a downside to economic performance (OECD, 2009:14). With regard to substantive inclusion, the WBGU sees the ability to meet fundamental human needs as critical. Here again, Copenhagen guarantees a high standard, although educational opportunities and opportunities to gain access to living space for all local citizens need to be improved (Section 5.4.4.1). All residents of the Danish capital can exercise

the rights of political inclusion called for by the WBGU, although a degree of leeway exists with respect to participatory rights, e.g. with regard to active involvement in shaping decisions.

As with the sustaining of natural life-support systems, Copenhagen's local government is again a key player in the field of inclusion. It creates many of the *de facto* conditions for all three forms of inclusion and puts the relevant legal conditions in place.

5.4.4.1

Substantive inclusion: disparities in housing, education and healthcare

Copenhagen sets high standards in meeting the fundamental needs of its residents. These needs include access inter alia to the technical and social infrastructure and to municipal services (water, healthcare, land and housing, clean air, education and mobility).

However, housing prices and rents rose considerably in the period from 1995 to 2006. Compared to the rest of the EU, Denmark has the highest housing costs relative to income (29 % of income; IW Köln, 2012; OECD, 2009:24). Copenhagen is seeking to respond to these price increases by adopting social policy measures and combating inequality. In this context, great importance is attached to the inclusion of migrants and people with different cultural backgrounds. The Inclusion Barometer for 2014 shows that the city has made progress, above all regarding unemployment (the distribution of work across different groups) and the number of recipients of public welfare benefits. By contrast, its attempts to meet other objectives, such as promoting participation and fighting poverty, are stagnating, while efforts to remedy disparities in education have actually regressed (Inclusion Barometer, 2014). The OECD, too, has noted sizeable discrepancies between the performance of Danish and foreign children in the Danish school system (OECD, 2009:68). School drop-out rates in Denmark are higher among foreign pupils than among Danish pupils (OECD, 2009:68). Although geographical segregation in Copenhagen is modest compared to other cities (especially those in the US), segregation in education is very high (Schindler-Rangvid, 2007). Children with a migration background in particular have less access to education, even if they live in similar districts to children of Danish origin. Migrants are making up an increasing proportion of lower income groups (Larsen and Hornemann Möller, 2013). And even though the middle class has grown vigorously in recent years, poor population groups still account for about 20 % of the total population.

Green areas are unevenly distributed in Copenhagen. Especially in districts with a high population density, the percentage of open spaces often falls below the

city's overall average of 29 %. Local government has set itself the goal of making Copenhagen Europe's greenest capital (OECD, 2009) and has ratified concrete targets to provide recreational green areas for local residents. By 2015, 90 % of the city's population should be within a 15-minute walk of the nearest park, beach, natural open space or swimming pool (European Commission, 2014). In 2007, this target had been met for 60 % of the people of Copenhagen, with locals visiting these facilities every second day and staying for an average of an hour (OECD, 2009). Another aim was to double the number of visits by local residents to urban parks, natural open spaces, the sea, swimming pools and beaches by 2015 (European Commission, 2014).

5.4.4.2

Political inclusion: multi-level system with a culture of participation

In the context of individual political inclusion, the WBGU proposes that every urban resident should have the right, either in person or via the agency of a nominated proxy, to access information about those urban affairs that concern or are of interest to him or her and are within the jurisdiction of local government. Residents should also be able to assert this right and have the right to play an active part in relevant decision-making processes.

The WBGU believes that the framework within which these rights of individual political inclusion can be guaranteed is created by various aspects of good (urban) governance (Section 2.5.5). Like every city, Copenhagen is part of a (multi-level) system of governance (Figure 5.4-4). Copenhagen is a good example of how local stakeholders and especially local governments – despite, or perhaps because of their integration in national and supranational legal, economic and political affairs – can not only make individual political inclusion possible, but can also promote and strengthen it. Accordingly, this section begins by introducing Copenhagen's legal and political environment, before discussing the guaranteed rights of inclusion, taking into account the role played by specific local stakeholders, in particular the local government and local administration.

Multi-level governance system in Copenhagen

International treaties have an impact on Copenhagen, as does European, national and regional legislation. Copenhagen's commitment to international city networks makes it an actor in its own right (Section 5.4.6). At the same time, life and the underlying (political) decisions in the city are shaped by many stakeholders: from the local government and administration to urban residents and the real-estate industry as non-state

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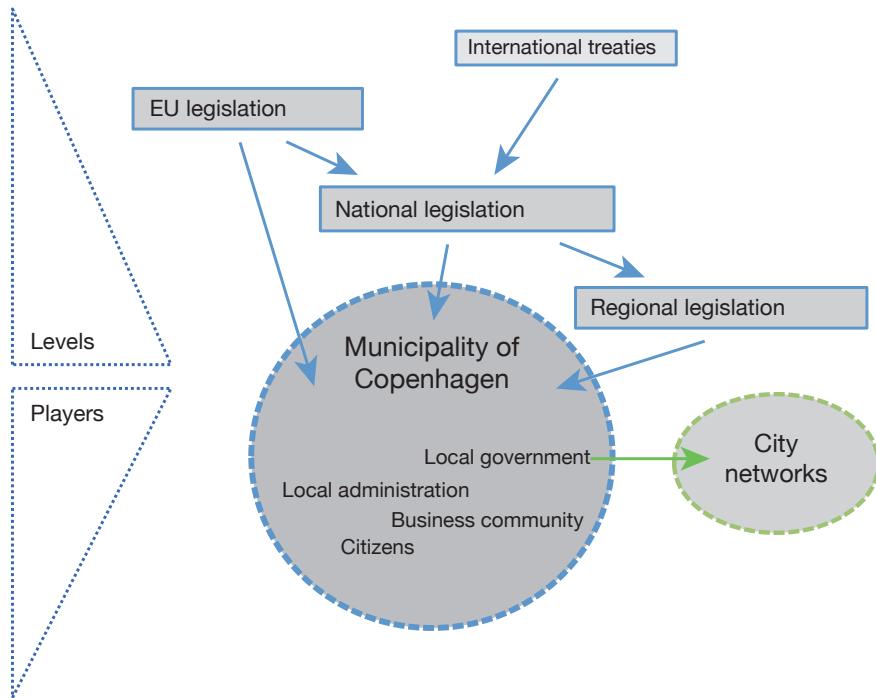


Figure 5.4-4

Copenhagen in the context of urban, (supra)national and global governance. The municipality of Copenhagen is affected by the international, European, national and regional governance levels. The Danish capital also participates in city networks. Within the municipality, the local administration and local government, private enterprise and citizens are among the relevant actors. The result is a complex web of governance involving interactions and influences both within the municipality and affecting the municipality from outside. Source: WBGU

actors (Figure 5.4-4).

Pursuant to the 1985 European Charter of Local Self-Government, which was ratified in 1988, international law requires Denmark to uphold the principle of local self-government (Greve, 2012). For example, the charter requires suitable administrative and financial capacity to be established. The latest monitoring report gives a rating of 'exemplary' to Denmark's 2007 Municipal Reform, the involvement of municipalities in matters that concern them, and local participation (CLRAE, 2013). It identifies room for improvement in relation to a clearer delimitation of municipalities' competencies and the provision of both adequate and fair financial resources for local government (CLRAE, 2013).

As a member of the European Union, Denmark is also bound by the legal acts of the EU, which it must, where necessary, translate into national law. This requirement relates, for example, to guarantees that primary legislation must respect the right to local self-government (Article 4, paragraph 2 of the Treaty on European Union, TEU) and the principle of subsidiarity (Article 5, paragraph 3 of the TEU).

The Danish constitution presupposes the existence of municipalities (LGDK, 2009) and delegates a number of public tasks to them, subject to state supervision (NYU, 2015; CIA, 2015). The regions and municipalities are entitled to perform all tasks that are not deemed the responsibility of national government or of a different municipality or region (LGDK, 2009). The constitution also guarantees self-government of each municipality's own affairs, subject to supervision by national

government (LGDK, 2009; Greve, 2012: 137).

Since the latest reform of local and regional structures in 2003-2007, Denmark has had 98 municipalities and five regions. Copenhagen is situated in the Capital Region (Hovedstaden). An elected regional or local body governs in each region or municipality (NYU, 2015; CIA, 2015; LGDK, 2009). Given the differing tasks assigned to each, the relationship between the municipalities and the regions does not constitute a classic subordination relationship (LGDK, 2009; Greve, 2012).

Denmark's municipalities assume more far-reaching competencies, enjoy greater financial independence and are therefore more important than the country's regions (OECD, 2009: 208). The regions cannot raise their own taxes. Providing healthcare and regional development are their core tasks (OECD, 2009: 209). By contrast, Denmark's municipalities handle a broad range of tasks, including the implementation of national policy on public services (e.g. the disbursement of unemployment and health-related benefits), education, culture and infrastructure. Since the most recent reform, land-use planning, environmental protection and water management have, in particular, been included in the responsibilities handled independently by Denmark's municipalities (LGDK, 2009).

The Capital Region involves the municipalities in drawing up the Regional Development Plan (Regional Development Plan for the Capital Region: OECD, 2009). The Capital Region has a Municipal Contact Council (KKR) to coordinate its 29 municipalities (OECD,

2009:216). Transport, however, is a good illustration of the complex management problems that face such a region: the national rail authority operates regional trains, whereas Frederiksberg and Copenhagen each run their own metro line. Movia, a utility operated by the Zealand Region, the Capital Region and a number of municipalities, operates the bus system for Copenhagen and the Zealand Region (OECD, 2009:218), and the large number of stakeholders in this arrangement creates harmonization and coordination problems.

Copenhagen's local government comprises a 55-member city council with seven committees (for finance, culture and leisure, children and youth, health and nursing care, social services, technology and the environment, and employment and integration; City of Copenhagen, 2015b). The individuals who chair these committees are called mayors. Presided over by the Lord Mayor, the city council has the authority to issue guidelines for the work of the committees and the local administration (OECD, 2009:229). Each of the committees has its own dedicated administrative apparatus (Section 2.5.1.1).

City-district renewal projects in Copenhagen are indicative of the kind of problems that can arise from the governance structures described above. In Denmark, city-district renewal projects are rooted in national policy guidance that is implemented on a local level by the local government, the local administration and private actors (Engberg and Larsen, 2010). Moreover, the Copenhagen model of committees described above adds horizontal tensions to these possible vertical conflicts, as the individual councillors and their administrative apparatus also have to coordinate activities with each other (Engberg and Larsen, 2010:555f.) – for example when two projects in the same area coincide but have differing time frames and different financial resources (Engberg and Larsen, 2010:562). Two administrative committees (for technology and the environment and for employment and integration respectively) involved in two different city-district renewal projects can draw on scientific support to develop a Strategic Working Agenda to pre-empt such coordination problems (Engberg and Larsen, 2010:556). For example, the agenda 'maps' existing projects to improve transparency and coordination between the various administrative departments (Engberg and Larsen, 2010:563ff.).

In terms of its income, Copenhagen enjoys considerable independence from national government. Local tax receipts account for the largest share of local government finance (Figure 5.4-5), followed by charges. Allocations of national government funding make up the smallest component of the municipal budgets.

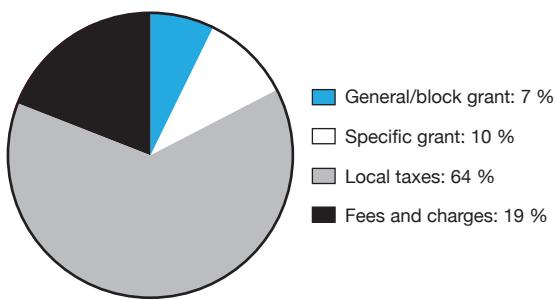


Figure 5.4-5

Principal sources of local government revenue in the Capital Region Copenhagen in 2007.
Source: OECD, 2009

Guarantees of political inclusion in Copenhagen

- *Voting rights:* Every four years, eligible voters in Denmark can cast their votes for the national parliament (Folketing), the regional council and the city council (Danish Constitutional Act, 2015; Capital Region of Denmark, 2013; City of Copenhagen, 2014b). All Danish citizens, EU citizens and all nationals of other countries who have lived in Copenhagen for at least three years are eligible to vote at the local level (LGDK, 2009).
- *Access to environmental information:* Denmark, an EU member state, ratified the Aarhus Convention that came into force in 2001 (WBGU, 2011:222f.) and implemented it into national law. There is also a series of national commitments regarding access to environmental information, such as the disclosure of data (active environmental information; OECD, 2008). For example, an environment report and the country's sustainable development strategy are published at four-year intervals (OECD, 2008). Under Danish law, all natural and legal persons are entitled to access environmental information (passive environmental information) without having to assert any special interest in such information. Grounds for refusal are given if inquiries are too general (OECD, 2008).
- *Citizen participation:* In Denmark, citizens have been involved in planning processes and decisions about environmental matters since the 1980s (Agger, 2010:542; OECD, 2009:237; Gottschalk, 1984; Edwards, 1988). Anchored in law, Danish rights to information and participation often open up opportunities to shape and improve developments. As a result, a culture of participation has emerged that is not prescribed by law. Public hearings for plans and programmes are compulsory – for all planning phases in the case of land use and environmental project planning (OECD, 2008). Under Danish planning law, plans must be made accessible in the public

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domain for at least eight weeks, and planning authorities are free to solicit the further involvement of local residents (ARL, 2015b). To encourage participation in the Regional Development Plan for the Capital Region, for example, citizens were specifically requested to air their views on the plan to ensure that participation was not restricted only to those organizations and institutions that always have a say (OECD, 2009:237).

The Local Government Act allows municipalities to conduct 'advisory referendums' (LGDK, 2009). In several Danish municipalities, the city councils also work with an assortment of public-participation models that are not required by law (LGDK, 2009). Advisory committees are set up for local development plans, for example. Citizens' involvement in these committees can in turn take various forms. In some cases, participation is open to everyone. In others, citizens are selected to ensure as representative a composition as possible (LGDK, 2009). Although it is under no legal obligation to do so, the City of Copenhagen operates a 'sub-council' model in twelve administrative districts. Made up of political representatives and representatives of local institutions and organizations, these sub-councils are tasked with setting up contact between the City Council and the local population (LGDK, 2009). At regular intervals, Copenhagen publishes its Environmental Accounts, which disclose the city's resource consumption, how it deals with waste, and details of traffic volumes (Brüel, 2012). The city also strives to go beyond the requirements for participation enshrined in planning legislation, for example by publicly presenting and discussing local plans (Brüel, 2012). Moreover, residents of Copenhagen are involved in specific projects such as city-district renewal projects (Savini, 2011; Franke and Strauss, 2005; Gutzon Larsen and Lund Hansen, 2008).

- *Rights of appeal and the right to file lawsuits* are guaranteed to individuals and organizations by the Danish constitution and administrative law. There is, for example, a right of access to the courts, especially in the context of environmental affairs. Another possibility is the simple legal option of appealing to the Danish ombudsman (OECD, 2008). Court decisions are legally binding; those of the ombudsman are not (OECD, 2008).

5.4.5

Eigenart in Copenhagen

According to ratings published by lifestyle magazine Monocle, in 2014 Copenhagen was the 'most liveable

city in the world' – for the second year in a row. The journal's comparative analysis of cities took account of aspects such as public safety, architecture, access to nature, climate, weather (e.g. the number of days of sunshine) and international connectivity. According to the UN-Habitat City Prosperity Index, Copenhagen is also one of the cities that boast a very solid prosperity rating (measured by five criteria: productivity, quality of life, infrastructure development, equity and inclusion, and environmental sustainability). The Danish capital stands out in particular for its score on equity and inclusion (UN-Habitat, 2013a).

One reason for this result is the City of Copenhagen's demonstratively open approach to diversity and its active efforts to promote innovation and culture. The former is all the more remarkable in light of the somewhat conservative-nationalist policies pursued by the Danish government, which Copenhagen actively opposes with a consciously cosmopolitan and tolerant image. At the same time, the city's ambitious and people-oriented urban-development policy probably also contributes to this image. Copenhagen does indeed evidence distinctive attributes in the field of urban planning and development: its abandonment of car-friendly urban planning and its urban-development experiments to promote cycling are just two examples (Section 5.4.3).

Above all, the City of Copenhagen's *Eigenart* is that it goes its own way and is open to diversity, experimentation and innovation. For this reason, the section that follows focuses first and foremost on the city's strategies and activities to promote cultural and social diversity and, hence, to reinforce social cohesion and the ability to innovate. This is followed by a discussion of Copenhagen's commitment to people-oriented urban planning and to activities in the field of autonomous urban design.

5.4.5.1

Cultural diversity, place identity and social cohesion

5.6 million people lived in Denmark on 1 January 2014 (Statistics Denmark, 2014). At that time, 11 % of the population were migrants or their descendants. By contrast, Copenhagen has a far higher proportion of residents with a migration background, with a figure of 22 % in 2010 (Cities of Migration, 2015). Slightly over half of all Denmark's migrants come from other European countries (Statistics Denmark, 2014), whereas Copenhagen's migrant population is predominantly from non-European countries. Just as the capital's share of migrants differs sharply from the rest of the country, so, too, Copenhagen reflects far greater religious diversity. Around 60 % of Copenhagen's popula-

Box 5.4-1**Copenhagen: "The most gay-friendly place on the planet"**

Not only from the outside is Copenhagen regarded as one of the most tolerant cities towards different sexual orientations (Lonely Planet, 2015). Its local government also advertises aggressively along the lines of "Welcome to Copenhagen, where being yourself is not a crime" (Wonderful Copenhagen, 2015). This stance relates partly to Denmark's progressive approach to the topic of homosexuality, but partly also to activities that are specific to the Danish capital. In 1989, Denmark became the first country in the world to allow same-

sex couples to get married (with the world's first couple tying the knot in Copenhagen). Same-sex couples were also granted the right to adopt children in 2009 and, since 2012, have been allowed to marry in church. Copenhagen itself is home to one of the oldest gay bars in Europe (in existence since 1917 and officially recognized since the 1950s). The world's second 'National Association for Gays and Lesbians' was also founded here in 1948. The local administration supports the movement, for example by hosting the second World Out Games (Olympic Games for the lesbian, gay, bisexual and transgender community) and giving its backing to the annual Gay Pride parade. Since 2014, Rainbow Square, a public square in Copenhagen, has been officially dedicated to the LGBT movement (Wonderful Copenhagen, 2015).

tion are members of the Evangelical Lutheran Church (compared to a national figure of just under 80%). The largest Muslim and Jewish communities in Denmark are also in Copenhagen (Farmer, 2010; Micklethwait and Wooldridge, 2009; Religion-dk, undated).

As in many of the other political fields mentioned above, Copenhagen has also set itself an ambitious goal on cultural diversity. It aimed to become the 'most inclusive' city in Europe by 2015 (Andersen et al., 2014). Although, at the national level, Denmark increasingly pursued a policy of restricting immigration and advocating assimilation rather than integration or inclusion in the 1990s and 2000s, the country's capital aggressively charted a course in another direction. This became especially clear when the 'VI KBH'R' ('We are Copenhagen locals') campaign was launched in 2008. The campaign stressed that it is easier to be a Copenhagener than to become a Dane and, conversely, that you do not have to become a Dane to be a Copenhagener. The objective of inclusion has been firmly anchored in Copenhagen's political position papers and strategies since 2006.

Diversity and inclusion are aspects of urban life that are difficult to measure, however. The city has therefore developed an Inclusion Barometer to identify annual progress with regard to integration goals (Københavns Kommune, 2010). It has also set up a Diversity Board in which representatives of various institutions, companies, civil-society groups and minorities participate. This board formulated the Copenhagen Diversity Charter and drew up a plan of action to achieve the inclusion goals (Københavns Kommune, 2010).

Political discourse in the city on the subject of integration and inclusion is described as pluralist (Andersen et al., 2014). Representatives of local government see inclusion as a key condition of social cohesion. Notwithstanding, deficits have been noted regarding implementation and achievement of the city's ambitious inclusion target (Andersen et al., 2014).

An international study of intercultural openness and integration governance in 63 cities all over the world indicates that Copenhagen's policy of integration and inclusion appears to be bearing fruit. In the form of an Intercultural City Index, the study evaluated criteria such as how politics and the population deal with diversity, strategies to combat discrimination, the alignment of political strategies with diversity and cultural aspects, and how a cultural mix and cultural interaction are made possible in the urban space. In comparison with the other cities, Copenhagen ranked third in 2014, moving up two places since 2013. The city's local government scored particularly well on the promotion of diversity and a culture of welcome (Council of Europe, 2014).

Copenhagen is also regarded as exceptionally liberally minded towards minorities, one example being its openness to different sexual orientations (Box 5.4-1, Figure 5.4-6). Lastly, cosmopolitan openness is seen to characterize not only the local administration, but also the local population. 89 % of Copenhagen's residents see the presence of people of different origins as positive, putting the city second out of 79 European cities. 86 % of respondents claim that they can trust most other people in the city – a sign of strong social cohesion (EU, 2013).

5.4.5.2**Cultural Eigenart and the promotion of creativity and innovativeness**

Copenhagen is often referred to as the 'cultural hub' of Denmark and Scandinavia as a whole. The city's local government discovered the promotion of culture, creativity and the arts as an important political goal some time ago, partly to raise international awareness, attract representatives of the 'creative class', and stimulate investment (Bayliss, 2007). For reasons such as substantial investment in urban development, most of Denmark's creative and cultural workers are con-



Figure 5.4-6

A culture of diversity and tolerance: Christopher Street Day (CSD) in Copenhagen.

Source: Morten Wulff/flickr

centrated in the Danish capital (Bayliss, 2007; Andersen and Lorenzen, 2005). Strong links have also been identified between a city's openness and tolerance, the quality of its supply infrastructure, its leisure and recreation facilities, and the proportion of creative individuals in its population. Moreover, Copenhagen is well known for its large number of cultural and music festivals (such as Copenhagen Carnival, Copenhagen Distortion, Copenhell and assorted jazz festivals).

However, political strategies to promote culture that focus on economic output are also criticized as exploitative and can furthermore be detrimental to urban dwellers. Lund Hansen et al. (2001), for example, see the danger that such strategies could contribute to gentrification, creating exclusive spaces for cultural production and consumption from which less mobile, less talented and less well-off groups are excluded. In Copenhagen, cultural promotion tends to primarily target large-scale projects with an international profile, such as the development of the port area, major art museums and the opera house (HUR, 2004). The resultant creation of exclusive spaces can inhibit the development of a specific *Eigenart*.

At the same time, local government seeks to foster innovation and creativity by creating suitable open spaces. To this end, a number of former industrial zones in the inner city have been declared 'creative innovative environments', where fashion, design and cultural pioneers have been able to establish themselves with few bureaucratic obstacles and, in some cases, with government subsidies (Københavns Kommune, 2005). Overall, Copenhagen operates two strategies to promote cultural innovation: one is 'talent cultivation', i.e. the financial and strategic promotion of creative projects; the other is 'deregulation', i.e. local government's withdrawal from creative spaces (Kontrapunkt, 2004).

Alongside mostly traditional, but in some cases inno-

vative, local government activities to promote culture, Copenhagen also boasts a broad array of grass-roots activities that nourish the city's image as a creative city. Freetown Christiania undoubtedly assumes a special role in this regard (Box 5.4-3), having been a key driver of Copenhagen's cultural life since the 1970s and accommodating experiments in the arts, architecture, music and community life. One grass-roots project to promote art that deserves a mention is ARTMONEY. Designed to take the economic uncertainty out of artistic activity, but also to attract greater public attention to artists, the 'Bank of International Art Money' was founded in 1997 and developed an alternative currency. The bank provides artists with exhibition space and organizes exchange deals: artworks in exchange for art money. This alternative currency is accepted as legal tender in more than 100 Copenhagen stores. By 2013, more than 1,000 artists had taken part in the project (Banks, 2013).

5.4.5.3

Urban creative autonomy

Creating attractive, high-quality public spaces and cultivating a vibrant city life have become important criteria for Copenhagen's urban planners. The Danish capital has transformed itself from a car-friendly city into a people-friendly city (Gehl, 2010). Public spaces and recreational areas play a key part in this policy, facilitating social interaction and encounters and enabling residents to actively appropriate the environment in which they live. This section begins by outlining Copenhagen's commitment to creating and preserving green areas and recreational spaces, before discussing approaches to the inclusive design of public spaces (in order to address social issues, for example).

Creating social spaces for recreation and appropriation

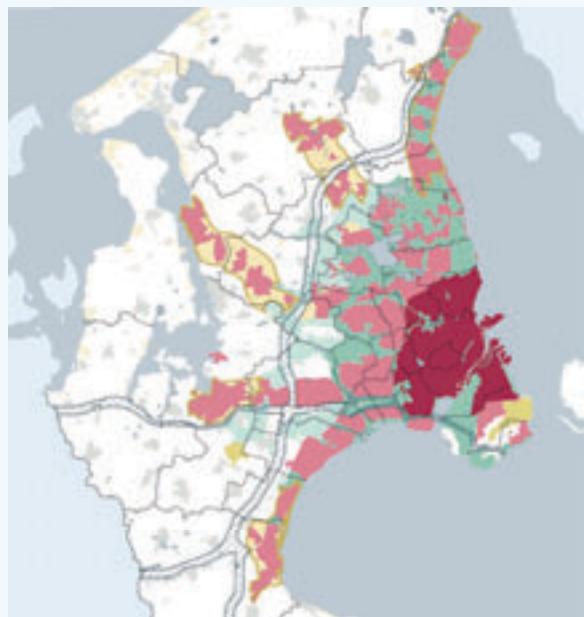
One aspect of Copenhagen's *Eigenart* is its high proportion (29 %) of green areas (OECD, 2009), very little of which is privately owned (Petersen, 2013; Box 5.4-2). Its coastal location also gives it access to plenty of water areas that likewise have a positive impact on people's health (Völker and Kistemann, 2013). In addition to spacious parks, Copenhagen also has numerous small public urban green spaces or 'pocket parks' with varying degrees of recreational potential (Peschardt and Stigsdotter, 2013). The local government does a lot to preserve and add to such spaces. It also aims to address the fact that the existing green spaces are unequally distributed across the city (Section 5.4.4.1).

The local population is very happy with its access to green areas in Copenhagen (OECD, 2009). The pocket parks in particular are popular venues for social encounters and recreational activities and are felt to

Box 5.4-2**Copenhagen's five-finger plan**

Copenhagen has a surface area of 91.3 km², including 11 city districts that have evolved along the five main traffic routes or 'fingers'. The protected space between these routes is sparsely developed and devoted to multifunctional uses. The arrangement of local recreation areas and horticultural/agricultural space creates a tightly meshed combination of urban and rural links within Copenhagen, which also crafts a landscape of considerable recreational value to local residents. Figure 5.4-7 shows the 'fingers' and the green areas between them, but also the green rings which are likewise anchored in the five-finger planning concept (Casperson and Olafsson, 2010).

The aim of the finger plan is, *inter alia*, to enable every citizen of Copenhagen to live close to a green area. Although the plan was never formally adopted, protected green areas have largely been preserved. The developed spaces are, however, longer and wider now than was originally planned (OECD, 2009).

**Figure 5.4-7**

Schematic representation of Copenhagen's finger plan, showing green areas between the fingers and four green rings. Source: Nature Agency, 2015

Box 5.4-3**Freetown Christiania – an experimental space**

Freetown Christiania has its roots in the urban social movements that have been active in Denmark since the 1960s (Thörn, 2012:155). In these social movements, various actors mix in groups, organizations and networks with the aim of achieving 'social change'. In Copenhagen, this gave rise to phenomena such as the establishment of Freetown Christiania (Thörn, 2012:155). An assortment of actors took possession of a former military site here in 1971. For

a short time, this was recognized by the Danish government as a 'social experiment'. Although its dissolution was threatened at times (Eriksen and Topping, 2011), an agreement with the Danish national government was signed in 2011 to guarantee the existence of the free town (Christiania, 2013). Legally, Christiania is treated as an independent community (Bygningsstyrelsen, 2013).

The project is often debated as a symbol of the conquering of space by 'space pioneers'. It is regarded as a place of experimentation with unconventional forms of community, approaches to the handling of drugs, organic farming and car-free urban life (Goldblatt, 2011).

enhance everyday life in the city (Peschardt et al., 2012). Furthermore, 90 % of Copenhagen's population are also satisfied with the city's cultural offerings and facilities, as well as the availability of public spaces (markets, squares and pedestrian areas). Copenhagen is thus one of the few capital cities (alongside Amsterdam, Luxembourg and Vienna) to rank among Europe's top 20 cities in terms of quality of life (EU, 2013).

Participation in shaping public spaces

Innovative urban planning and spatial development is also used as a tool to combat social problems. In addition to grassroots projects, Copenhagen has, since the

early 1990s, operated an integrated urban-renewal programme that enables the residents of selected districts to participate in the renewal of their neighbourhood in accordance with a defined procedure. The objective is to tackle challenges in city districts which face spatial, social, cultural and environmental problems (Technical and Environmental Administration Copenhagen, 2012; Section 5.4.4.1).

The former working-class district Nørrebro, for example, which housed a high proportion of migrants and was a hotspot for violent crime and fierce protests, was long seen as a social flashpoint (Milne, 2013). Following a participatory process, the urban



Figure 5.4-8

Designed on a human scale: the Superkilen park in Copenhagen's Nørrebro district.

Source: Naotake Murayama/flickr

park 'superkilen' – a collection of public spaces – was opened here in 2012 to facilitate encounters and interaction between local residents and to improve the recreational value of a district otherwise largely devoid of greenery (Figure 5.4-8). The project involved upgrading a run-down area by adding green areas, cafes, picnic areas and sports facilities. Objects and sculptures from all over the world were also installed to positively underscore the multinational flavour of this residential district. The area links districts that accommodate residents of differing origins, cultures and socio-economic backgrounds, allowing them to meet and encouraging a social mix. To date there has been no systematic evaluation of the social effects of the urban park. Small, isolated surveys highlight active usage and strong acceptance by local residents, but criticize the lack of maintenance (Milne, 2013; Bourlessas et al., 2013).

On the other hand, urban renewal in the district of Vesterbro, for example, shows that unintended side-effects – such as the gentrification of city districts – can occur despite participatory processes. Vesterbro used to rank as one of the most deprived districts of Copenhagen, with social problems in the fields of prostitution and drug abuse (Gutzon Larsen and Lund Hansen, 2008). Following the completion of a city-district renewal project, Gutzon Larsen and Lund Hansen (2008: 2440) described the district as 'radically transformed': crime and drugs disappeared from the streetscape, while cafes, ateliers, second-hand shops and restaurants revived the district and created an attractive promenade. However, this upgrade also triggered the gentrification of Vesterbro and led to effects such as sharp increases in rents (by as much as 50 % in some cases).

5.4.6

Copenhagen in the global context

In the global political context, Copenhagen participates in city networks which the WBGU believes play an important part in global governance (WBGU, 2014a; Box 2.5-6; Section 8.4.2.2). Some of these networks focus on protecting the environment and mitigating climate change, while others also address economic development and/or integration strategies. Two environmental and climate-protection networks to which Copenhagen is affiliated are C40 and the Green Growth Leaders network (co-founded by the Danish capital). In 2014, the city also won the European Green Capital Award, an accolade initiated by the European Commission (European Green Capital, 2014). Upon receiving this award, Copenhagen set itself the goal of establishing a city network whose members were restricted solely to European cities that had already won the same prize (Stockholm, Hamburg, Vitoria-Gasteiz and Nantes; European Green Capital, 2014). Another network of which Copenhagen is a member is Eurocities, which does not concern itself exclusively with sustainability topics but also applies itself to economic development and education. The Danish capital also belongs to the European 'Cities for Local Integration Policy' (CLIP) network, set up in 2006 with the aim of drafting integration and inclusion strategies for immigrants at the local level.

Overall, the city has set itself the goal of sharing information about 'green' innovations in particular – for example with the brochure 'Copenhagen: Solutions for Sustainable Cities 2014', which specifically targets other cities, and via the dedicated website www.sharingcopenhagen.dk. This approach helps other cities to learn from Copenhagen's frank and open approach, its willingness to experiment, its experience to date and its goals for sustainable development.

In the global economic context, Copenhagen is seen as a leader in the world's 'green economy' (LSE Cities, 2014). In recent years, the city's clean-technology companies in particular have been able to carve out a technological and market edge for themselves. Worldwide competition in the sector is increasing relentlessly, however. Challenges to Copenhagen's ability to maintain its competitive advantage, and to the future economic development of the city, arise especially from the shortage of qualified and skilled labour, as well as from what is only moderate innovation potential compared to other European cities such as Stockholm and Munich, measured primarily in terms of spending on research and development and the number of patents per capita (OECD, 2009: 15 f.).

To respond to these challenges, the OECD (2009)

recommends further improving Copenhagen’s quality of life, for example by enhancing its infrastructure, creating (affordable) housing options, reducing environmental pollution and strengthening a business location that is already well integrated into the global economy (OECD, 2009:16). In particular, identifying and promoting green niche products and services gives Copenhagen a chance to retain its comparative advantages even as global competition intensifies (LSE Cities, 2014).

5.4.7 Conclusions

An image as a ‘green’, pluralist and creative city is a core attribute of Copenhagen – an image that is nurtured assiduously by the local government. It is in part attributable to the city’s ambitious goals and innovative approaches to governance in all three dimensions enshrined in the WBGU’s normative compass. At the same time, top-down and bottom-up processes create a productive context that further nourishes this image.

Objectives such as the goal of reducing CO₂ emissions by 2025 are operationalized through legislation, planning and suitable instruments. Information brochures, websites and other tools are used to communicate these objectives to the outside world, establishing them as aspects of the city’s brand. Copenhagen’s desire to set an example for other cities is mirrored clearly in a plethora of brochures such as ‘Copenhagen – Solutions for Sustainable Cities’, which publicize the city’s proven and sustainable strategies. The latter relate not only to measures for mitigating climate change; other examples include a cycle-friendly transport policy (which also has a positive impact on CO₂-reduction targets) and ambitious goals in the field of inclusion and integration policy.

Ambitious targets are complemented by an approach that seeks to apply these goals to the everyday life of local residents and strives for their acceptance. Plans such as the Climate Adaptation Plan (Section 5.4.3.1) are produced in the context of public consultations and made publicly accessible in Danish and, in abridged form, in English. Every citizen or other interested party thus has the opportunity to find out what the city is doing, what its goals are, and the positive side-effects of its activities. This engenders extensive transparency and helps to cultivate an awareness of related problems and possible solutions among the people of Copenhagen. Alongside proven forms of participation, the city also experiments with innovative forms of public consultation – for example by questioning private households on the practicability of certain environment-pro-

tection measures in everyday life.

Against the background of the three dimensions embodied in the normative compass –sustaining natural life-support systems, inclusion and *Eigenart* – in Copenhagen, it is also possible to identify potential synergies. Examples include two central pillars of the city’s urban development policy: the creation and preservation of public green areas and the promotion of walking and cycling as modes of sustainable mobility that impact positively on all three aspects of the normative compass.

The openness of both Copenhagen’s local government and its population towards diversity, experiments and innovation is an element of the city’s distinctive *Eigenart*. At the same time, this openness creates equally ‘distinctive (*eigenartig*)’ places and fosters a vibrant urban lifestyle. One major positive aspect is the inclusive approach which is rooted in Copenhagen’s institutions and which, via the agency of urban development and city-district renewal in particular, is creating liveable urban spaces.

Copenhagen also clearly shows that there are two sides to this coin, however. On the one hand, the city is becoming more attractive, safer and, overall, a better place to live in the districts concerned. On the other hand, long-established structures are being edged out, in some cases giving way to the commercialization of public spaces (cafes instead of park benches) and higher rents. These unintended side-effects can be observed in many large cities. Accordingly, urban-development policy – not only in Copenhagen – should develop measures that can include all groups of the population in upgrading and renewal while, at the same time, preventing excessive commercialization and the displacement of established local people.

5.5 Guangzhou: Open Door policy, globalization and migration-driven urbanization in the ‘world’s workshop’

5.5.1 Guangzhou: rapid urbanization in the wake of China’s Open Door policy

The present-day megacity of Guangzhou, located 150 km north of Hong Kong in the Pearl River Delta, is one of the oldest and traditionally most important trading centres in China; it is the capital of Guangdong Province. Guangzhou was a centre of maritime trade relations with Arabia, India and South-east Asia as

5 Cities in the global transformation process

early as the second century CE. In 1711, the British East India Company established a trading station that was limited to Shamian Island and its small European settlement. Between 1757 and 1842, this was the only trading post with the authorization to trade with foreigners, until four additional ports (including Shanghai, Ningbo and Xiamen) had to be opened after the Treaty of Nanjing. Well-established links abroad had thus existed for centuries, and in the course of trade-borne path dependencies these links formed the bridgehead for China's Open Door policy.

Guangzhou's most recent rise came in the wake of the political and economic Open Door policy initiated under Deng Xiaoping after 1978, which was followed by a rapid development dynamic driven by industrialization and urbanization throughout the Pearl River Delta. Reform politician Deng Xiaoping's guiding principle can be loosely translated as "cross the (unknown) river by feeling the stones". It describes a policy of gathering experience with the market economy step-by-step. In accordance with this principle, the first special economic zones (SEZs) were set up in the Pearl River Delta in the 1980s, where foreign investors settled, notably Chinese companies from Hong Kong, Taiwan and overseas. The economic corridor that emerged as a result has since experienced a rapid growth in population and is today one of the most important industrial regions in the world (Wu, 2002; Lin, 2004; Enright et al., 2005; Lu and Wei, 2007; Chubarov and Brooker, 2013).

Guangzhou is situated in Guangdong Province (Figure 5.5-1), which, with more than 100 million inhabitants, is not only the most populous, but also the most economically powerful province in China. In 2006, its GDP amounted to US\$260 billion; economic growth was approx. 12 %.

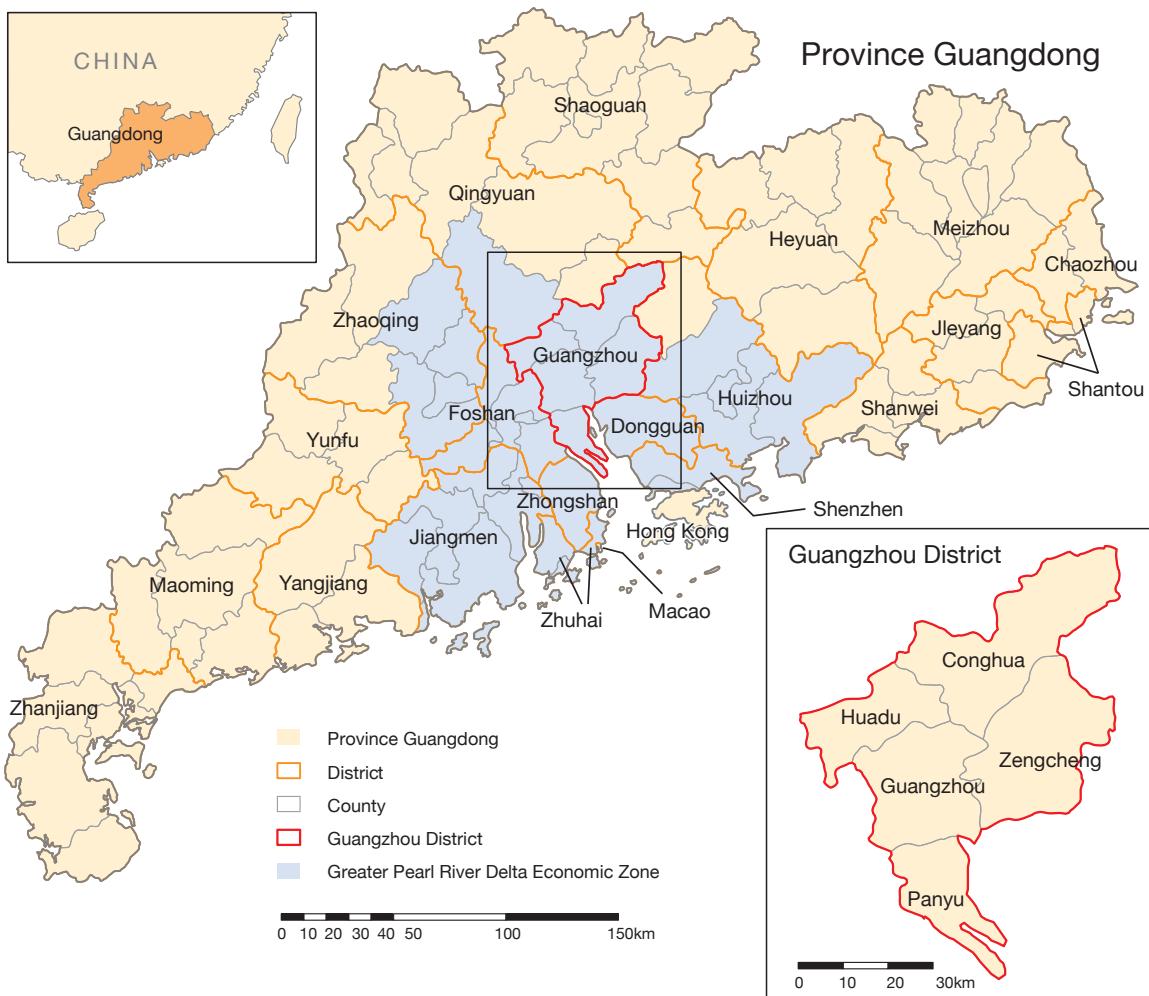
More than 80 % of Guangdong's value added is generated in the Pearl River Delta. This is the centre of Chinese light industry, which produces mainly for export and delivers consumer and household electronics, toys, furniture and print products to markets in the USA, Japan and Europe (Meyer et al., 2009, 2012). In the face of growing competition from Shanghai and its hinterland and from the new economic 'expansion fronts' west of the coastal provinces, the Pearl River Delta is increasingly having to diversify its economic structure. It is currently developing and expanding its heavy, automotive and high-tech industries (Meyer et al., 2009; Schiller, 2011).

The following section focuses on the extreme dynamics of urbanization speed, on the special challenges of centralized and decentralized control – with experimental governance and tolerated informality (Schoon and Altrock, 2014) – and on the issue of migration-driven urbanization.

Guangzhou stands for numerous Chinese megacities that are part of a huge urbanization push in China. China's urbanization level (excluding Hong Kong and Macau) rose from 11.8 % to 55.6 % between 1950 and 2015 (19.4 % in 1980, 26.4 % in 1990, 35.9 % in 2000; United Nations DESA Population Division, 2014). In 2015, just under 780 million people lived in cities and megacities in China (excluding Hong Kong and Macau); including Hong Kong and Macao increases the figure to 788 million people. This reflects the political goal of driving the development of the entire country forward by strengthening regional centres and integrating urban and rural areas. As a consistent element of this policy, urbanization processes are also desired for small and medium-sized cities with fewer than 1 million inhabitants: it is hoped that the economic impact of urbanization will radiate directly into the surrounding rural areas. The high growth rates of several coastal cities and a number of inland provincial centres stand out. Furthermore, several urban-development corridors (especially Beijing – Shanghai, Pearl River Delta, Wuhan – Changsha) have been established with the specific aim of improving the competitiveness of this rising economic nation.

Guangzhou's present-day rise is closely connected with the development of the Pearl River Delta and the former colonies of Hong Kong and Macau, which represent the traditional economic centres of the Pearl River Delta. The rise cannot be understood without the development of Hong Kong (Box 5.5-1), which is the source of decisive stimuli. In principle, the path dependencies within the Pearl River Delta were, and are, similar to those of other Chinese coastal megacities.

Ever since the Open Door policy, and even more quickly since the handover of Hong Kong and Macao, numerous new cities within the Pearl River Delta have rapidly developed into new urban and industrial centres in the space of two decades, above all Shenzhen (1995: 2.4 million inhabitants, 2015: 10.8 million inhabitants), Foshan (2015: 7 million), Zhuhai (2015: 1.5 million) and Dongguan (2015: 7.4 million; UN DESA Population Division, 2014). Almost 60 million people currently live in the Pearl River Delta including Hong Kong. Guangzhou itself has about 12.5 million inhabitants, two thirds of whom migrated there in recent decades. In 1990, the city still had just 3 million inhabitants (UN DESA Population Division, 2014); with its sudden development and rapid dynamics, it is thus both a driving force in China's transformation process and an example of many of China's urbanization challenges.

**Figure 5.5-1**

Guangzhou's location in Guangdong Province.

Source: Kraas et al., 2008 based on CIESIN, 2007; cartography: R. Spohner

5.5.2 Globalization, extreme dynamics and exogenous urban development

Between 1949 and 1978, China's foreign and economic policies focused largely on economic self-sufficiency and isolation. In terms of domestic policy, the influx of people into the cities was severely restricted by the so-called hukou registration system, which was introduced in 1958. In addition to a centrally controlled allocation of labour, industries and sectors were also assigned to cities. Many heavy-industry factories were built in and around Guangzhou in this context. Guangzhou was able to use its role as a centuries-old trading location to host China's only regular international trade fair between 1957 and the late 1970s. This isolated position on the world market changed after the Open Door economic policy was adopted under Deng Xiaoping in 1978. The first special economic zones

(SEZs) were set up near the enclaves of Hong Kong and Macao and led to a sharp increase in foreign investment. A decisive contribution was made here above all by the generations-old economic relations with the networks of so-called overseas Chinese (Cartier, 2001). In 1984, following a positive evaluation of the SEZs already in existence, 14 more cities, including Guangzhou, were declared ‘open coastal cities’ and granted economic privileges. In the years that followed, the city developed rapidly and was integrated into the world market – in a process that Sit and Yang (1997:647) call “exo(geneous) urbanisation”. Foreign direct investment increased (throughout the Pearl River Delta) from US\$0.3 billion in 1978 to US\$142.4 billion in 2006. Exports rose in the same period from US\$0.6 billion to US\$288.8 billion, the population from 16.9 million to 44.5 million (Ng, 2008).

Migration increased in leaps and bounds in the late 1990s, triggered by the rapid industrialization pro-

Box 5.5-1**Hong Kong: history and stimuli of land-use policy**

The island of Hong Kong was ceded to the British Crown in 1843 (Treaty of Nanjing), and the Kowloon Peninsula with Stonecutters Island followed in 1860 (Convention of Beijing). In 1898, China leased the so-called New Territories to Great Britain for 99 years. The 'Sino-British Joint Declaration on the Question of Hong Kong', or 'Joint Declaration' for short, signed by China and Britain in 1984, stated that the entire territory of Hong Kong, including the areas originally assigned in perpetuity, would be returned to China on 1 July 1997. Present-day China had never accepted the treaties concluded when the British colony was formed, and always regarded the entire territory as Chinese.

The decisive territorial problem for Britain was the fact that the area remaining after the expiry of the New Territories lease was too small to continue a viable economy, and that there was a lack of land for industrial, residential and recreational purposes, as well as for resource extraction (particularly water). Before the handover, approx. 40% of the population were living in the Territories, and many of the industrial areas were situated there. Some of the text in this Box 5.5-1 is quoted verbatim from Kraas (1997, translated from the German).

Land-use policy up until the 1960s: highest density and land reclamation

Up until the mid-1960s, the British colonial government took pains not to include the New Territories in Hong Kong's urban planning as spillover areas, since the land was only leased from China. The city had already expanded beyond Boundary Street, Kowloon's northern border with the New Territories. The aim was to maintain as far as possible the traditional rights and social structures of the rural population in the leased regions. New settlements were therefore limited to new land on the coast and less developed areas in the city centre. Up until the late 1960s, therefore, the New Territories were still agricultural, peripheral emigration regions with a population density of fewer than one inhabitant per km², and whose market towns had not been developed. In view of a great scarcity of suitable building land – because of the steep, uneven surface and the very narrow, level coastal strip – the planners of land use were to forced aim for the highest structural densification of buildings on flat surfaces; only squatters' settlements spread up the slopes.

Concept and construction of the 'New Towns'

In the 1950s, there were large numbers of incoming refugees from China after the 1949 revolution, most of whom found temporary accommodation in their thousands in spontaneously and illegally built squatters' huts. Under this increasing population pressure, the Hong Kong government launched extensive housing programmes. These were mainly emergency settlement measures following a number of serious fires in squatter settlements (e.g. Shek Kip Mei) and involved the relocation of the squatter population in high-rise complexes. The urban area initially expanded in areas directly adjacent to the existing city, but not in the form of self-contained, separate growth clusters. For example, the first major area of expansion, Kwun Tong, construction of which began in 1953 to the east of Kowloon, is not yet called a 'New Town', although it is within the New Territories (Buchholz, 1987:22f.). The

decision to build New Towns in the New Territories represented a turning point in housing policy. Construction of the first self-contained New Town, Tsuen Wan, began in 1959; the decisions to build Tuen Mun (Castle Peak) and, later, Sha Tin followed in 1965. The momentum behind the spatial expansion of the urban areas came from the colony's industrial development, which laid the foundations for economic growth, required geographic expansion, and made the housing programmes financially possible. Building activity slowed down following slumps in the real-estate market, the 1965 banking crisis, and unrest in 1967. The breakthrough for the idea of New Towns came in 1973 when a ten-year programme was adopted under Governor MacLehose. Its objective was to provide 1.8 million people with adequate accommodation in solid buildings, with at least 3.3 m² living space per person. The tried-and-tested principle of highly concentrated densification was retained.

To begin with, the New Towns were largely rejected by the population. Poor transport links to workplaces, low and often insecure wages, a lack of non-industrial employment opportunities needed to complement family incomes (i.e. informal work: street trading, sales from cookshops, craft and repair work, home working, transport services, etc.; Buchholz and Schöller, 1985:173ff.), a lack of basic supply and social infrastructures, and non-existent social networks – all these factors combined to force the planners to repeatedly revise downward the original targets on the number of inhabitants. In the 1980s, high economic growth and the social consolidation of many residents made it possible to significantly improve the advance provision of infrastructure services – transport links via motorways and tunnels, electrified and frequent regional and city-train services, industrial jobs, commercial centres, etc. Only then did the population figures in the New Towns increase in leaps and bounds. An increasing number of private residential settlements were added with the gradual formation of a new middle class after the mid-1980s. The proportion of the population living in Hong Kong's New Towns rose from 9.8% to 35% between 1971 and 1995 (18.8% in 1981, 28.8% in 1986).

After 1997, Hong Kong became a Special Administrative Region (SAR) with a certain degree of autonomy; the hitherto valid economic and social system and the laws currently in force were to remain for a further fifty years. Large-scale programmes started by the British were continued and new programmes initiated under Chinese leadership. The continuation of the Territorial Development Strategy ensured continuity in housing policy. The Port and Airport Strategy Plan led to the construction of the new Chek Lap Kok airport (with up to 60 million passengers and over 4 million tonnes of freight handled per year), to the transformation of the former Kai Tak airport into one of the largest cruise ship terminals in southern China, and to the implementation of numerous major motorway and bridge projects in the Pearl River Delta. Between 1978 and the 1990s, targeted strategic transformation measures turned Hong Kong from a regional industrial centre into a global service and financial centre and the southernmost transport hub of the Pearl River Delta. Many strategic land-use, area-design, housing and economic policies originally practised in Hong Kong had a stimulating, role-model impact and were continued in a modified form in the northern parts of the Pearl River Delta.

The 'one country, two systems' principle was agreed when Hong Kong, a British Crown Colony until 1997, was handed over to China. The principle stipulated that the British-influ-

enced economic, social and legal systems in Hong Kong, as well as the laws that applied before the handover, including the protection of private property, should remain unchanged in principle for 50 years. This still guarantees Hong Kong the role of the 'global gateway' from and to China today. Following massive de-industrialization processes since the 1990s –

as a result of continuous migration of labour-intensive manufacturing companies, largely to the northern delta regions between Shenzhen and Guangzhou – Hong Kong has gradually been taking on the function of the leading service centre within the Pearl River Delta.

cess and the socio-spatial reorganization of Chinese society in the 1980s and 1990s (dissolution of the people's communes, establishment of private farmer households, privatization processes, land-leasing for major enterprises, etc.). For example, the number of officially registered migrants in China rose from 40.5 million (1998) to 69.9 million (2003), while unofficial estimates speak of about twice this number (Gransow, 2007; Zhao, 2003). A basic distinction is made between *de jure* migration, i.e. migrants with an official, approved, long-term change of residence; *de facto* migration, i.e. the floating population with a temporary change of residence (who retain their original place of residence) and a temporary work permit elsewhere; and illegal migration, i.e. migrants who change their place of residence without a permit. The total number of (for the most part) permanently resident migrants in Guangzhou is estimated at more than 5 million people. They are inadequately covered by statistics, and at least half of them live in so-called urban villages or villages-in-the-city (chengzhongcun; Gransow, 2007). This term is used for simple residential areas which originally developed from rural villages.

Since people with rural hukou (the national registration system for residence control) are allowed to build their own housing, many residents of formerly rural villages in the Pearl River Delta that were caught up in the enormous geographical expansion of the cities in the 1990s and virtually 'surrounded', used this privilege to effectively 'grow' houses instead of agricultural products on their former fields. As a result, multi-storey structures were built in the narrowest of spaces without meeting building regulations (e.g. rules on distances between buildings, fire-safety precautions) and using very simple materials. These are often let by the room, primarily to migrants, and are not subject to the municipal administration. On the one hand, affordable housing in areas with high population density, questionable infrastructure and hygiene conditions, and a high proportion of informal employment enable the migrants to live in the cities; on the other hand, the original population with rural hukou also have a new, lucrative source of income by letting accommodation (Bork-Hüffer, 2012:90f.).

A comparison of cities within the Pearl River Delta reveals not only rapid overall urbanization and eco-

nomic expansion, but also significant differences. The former undisputed political and economic centre of Guangzhou now has to measure itself against even faster emerging cities like Shenzhen, Dongguan and Foshan. Despite an average economic growth rate of 14 % per year (1980–1998), the city has suffered a relative loss of influence. In 1980, almost 43 % of the Pearl River Delta's economic output was generated in Guangzhou; this figure had fallen to 22 % by 1998 (Shen, 2002). This development can be partly explained by the different starting conditions at the beginning of the reforms. Towns – or rather fishing villages – like Shenzhen had taken up hardly any space and could plan and implement their infrastructures directly on a larger scale. In Guangzhou, however, the existing (danwei) infrastructure of a city with 3 million inhabitants, where many state-owned companies were also located, had to be converted at great expense. In addition, as a provincial capital Guangzhou is subject to more monitoring and control by the central government. Smaller cities, by contrast, can more often exploit loopholes in centralized control to their own advantage.

The massive expansion of economic activity and immigration have led to extensive changes in land use and social upheavals in the Pearl River Delta as a whole, and therefore also in Guangzhou (Figure 5.5-2). Large arable and afforested areas have been converted into residential or industrial areas (Figure 5.5-3), many former town and village residents expropriated.

A study conducted in 2006 has calculated the increase in Guangzhou's ecological footprint between 1991 and 2001. The consumption of different resources such as oil, coal, water, land and steel are taken into account; converted into land used, the area consumed rose during this period from approx. 2.3 to 3.79 hectares per person. However, considering only the urban area, merely 0.29 ha would be available to each resident of Guangzhou (Du et al., 2006). Displacement processes and land-use competition are reported not only from the economically strong core areas of the city, but also from its expanding fringes (Chen, 2012). He (2012, 2013) and He et al. (2012) criticize increasing gentrification processes, and Zhu (2013) discusses the problems of trends towards uncontrolled privatization in the suburbs leading to the establishment of quasi gated communities for the new middle and upper classes. The

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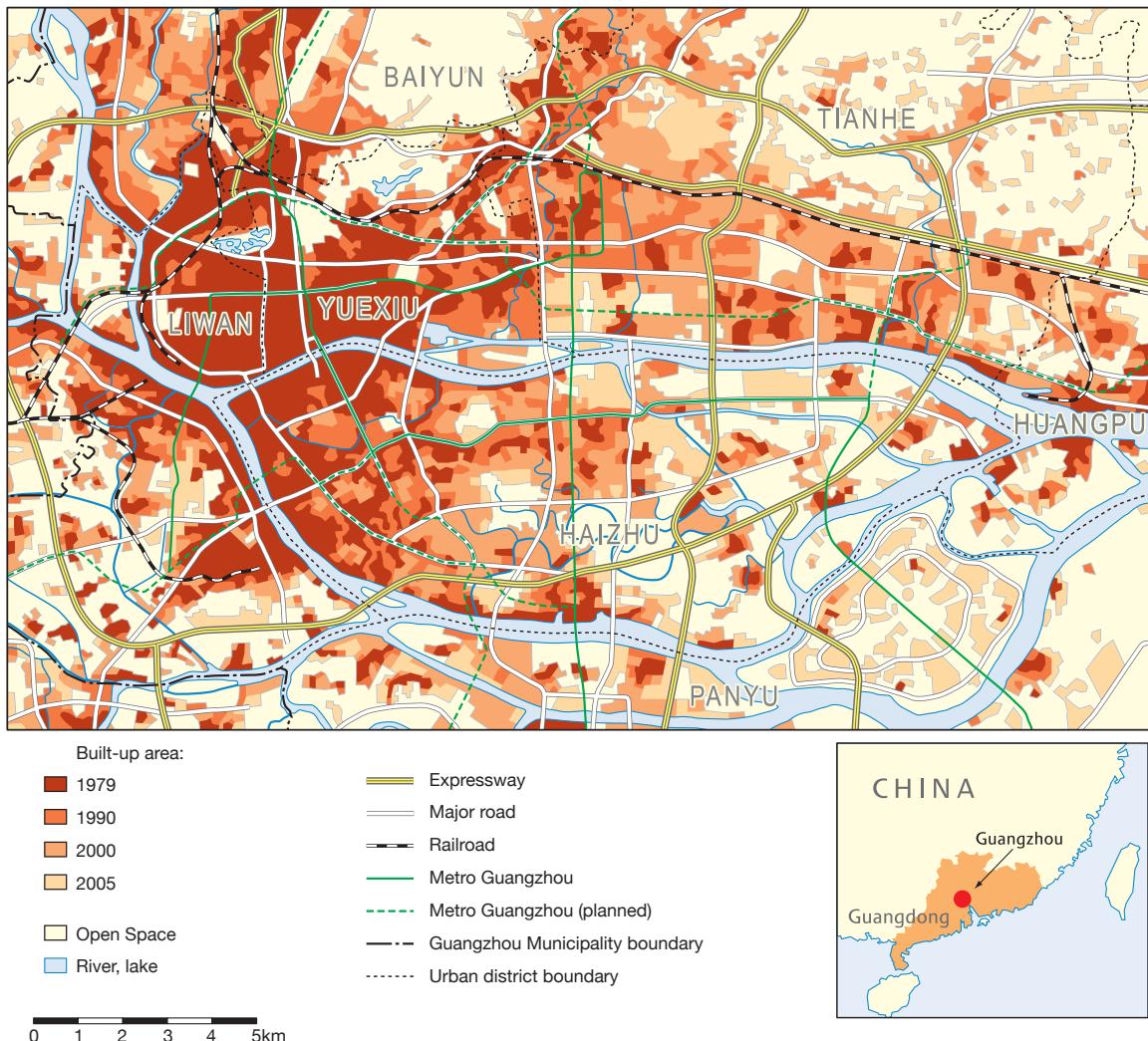


Figure 5.5-2

Phases of urban growth in Guangzhou.

Source: WBGU, altered in accordance with Bork-Hüffer, 2012

still existing hukou registration system continues to play a role in this context. Because of their 'rural hukou' status, rural migrants in the urban area (nongmingong) in particular have no access to urban infrastructure and social services such as education and healthcare facilities; they are paid lower wages, their working conditions are worse, and their housing standards are often lower (IEAS China et al., 2014). Traditional social-security systems that offer either access rights to land (and thus to supplies from agricultural production) or a right to a state-allocated (usually industrial) job, are de facto no longer in force.

In relation to local environmental quality, the dynamics of the last few decades have contributed to a high level of air pollution, caused not only by the local (heavy) industry, but also by the increase in car,

truck and shipping traffic. In particular, emissions of nitrogen oxides and sulphur dioxide have increased considerably, and the expansion of public transport – at 0.07 km per km² – is below the average of 0.17 km in comparable Asian cities, despite increased investment (Economist Intelligence Unit, 2011a:55). Zhao (2010) has shown that CO₂ intensity per business unit decreased significantly between 1992 and 2007, although absolute emissions rose. Further impacting factors include soil sealing, the loss of fertile arable land and the increased use of chemical fertilizers and pesticides, which contribute to water pollution. Water consumption in the city as a whole is very high at 527 litres per person per day (Economist Intelligence Unit, 2011a:55). As in other areas, public control and enforcement mechanisms seem to be unable to keep

**Figure 5.5-3**

Urban growth in Guangzhou's agricultural hinterland.

Source: Frauke Kraas/WBGU

pace with the rapid development. Lee et al. (2010) criticize the selective and outdated urban air-quality measurements; Francesch-Huidboro et al. (2012) point out that although the urban environment-protection authorities in Guangzhou have been expanded over decades, their capacities are still insufficient.

The literature deals with the impact of the heat-island effect due to the changes in land use in Guangzhou (Lau et al., 2011; Wen et al., 2011); further direct impacts of climate change do not yet seem to have been measured.

Infrastructure projects in Guangzhou are quickly charged with superlatives because of the high dynamics: the 600-metre television tower completed in 2010 was the highest in the world at least for a few years; the bus rapid transit system introduced in 2010 has the second highest transport quota in the world; Guangzhou South station, which was built on a ‘greenfield’ site in just a few years, was briefly the largest railway station in Asia in terms of surface area; and the bi-annual international trade fair is the largest and most important of its kind in China. Lighthouse projects like these, together with a differentiation of the hitherto rather mono-cultural economic zones, a greater variety of urban functions in the city districts, and a new form of economically driven governance (concept plans) aim to secure Guangzhou’s pioneering role for the future (Wuttke, 2012).

5.5.3

Healthcare and social cohesion

The market-economy-based Open Door policy and rapid urbanization have led to social polarization, spatial segregation and a loss of social cohesion (Gu and Shen, 2003). Furthermore, the rapid economic and social changes since the economic opening in 1978

have generated profound deficits in financing and service systems, including the Chinese healthcare system. Since that time, therefore, a large number of national, regional and local reforms and reform experiments in the health system have been initiated; their main objective is to run healthcare facilities in a way that covers costs (Liu and Yi, 2004). This Section 5.5.3 quotes verbatim from Bork et al. in parts (2009, translated from the German).

Guangzhou’s healthcare system today has a large number of unregulated and fragmented providers that vary widely in terms of quality (Figure 5.5-4; Bork et al., 2011). There is currently no stringent control or strict management. This has been caused in particular by decentralization measures, by a simultaneous lack of human resources and appropriate know-how on the lower administrative levels, and by widespread corruption. Privatizations (Lim et al., 2002) have led to the development of a wide range of providers of medical services (including numerous private and hybrid public-private forms), while at the same time an increasing number of informal and illegal providers of medical services cover the growing needs of different population groups (Bork-Hüffer, 2012; Bork-Hüffer and Kraas, 2015; Jahn et al., 2011).

National price reforms have led to an inflationary increase in prices for medicines and medical services. To remedy this situation, a dual pricing system has been introduced with fixed prices for basic services and drugs, and market prices for newly introduced services and pharmaceuticals. However, this has resulted on the one hand in an excess supply of highly technical diagnostic methods that can generate higher revenue, and on the other in a widespread over-prescription of drugs (Yang and Shi, 2006; Bork et al., 2009). This phenomenon is encountered particularly in the booming cities of the east coast due to the higher demand and income levels. The curative and preventive basic care of the majority of the population – who does not generate a profit – has been neglected since these reforms were introduced (Lee, 2004).

The mass of rural-urban migrants in particular are currently disadvantaged when it comes to access to healthcare services (Yuan et al., 2010). Their treatment costs are not covered by the existing separate financing systems for rural and urban areas, so that people often resort to informal health services, delay visits to the doctor – or do not go at all (Gao et al., 2001). Initial research findings suggest that an illness-related return migration to people’s homeland regions could exist because of the lack of access to, and the high cost of, health services in the cities. Up to now, however, traditional statistics and reporting systems have failed to document the health of the migrant popula-

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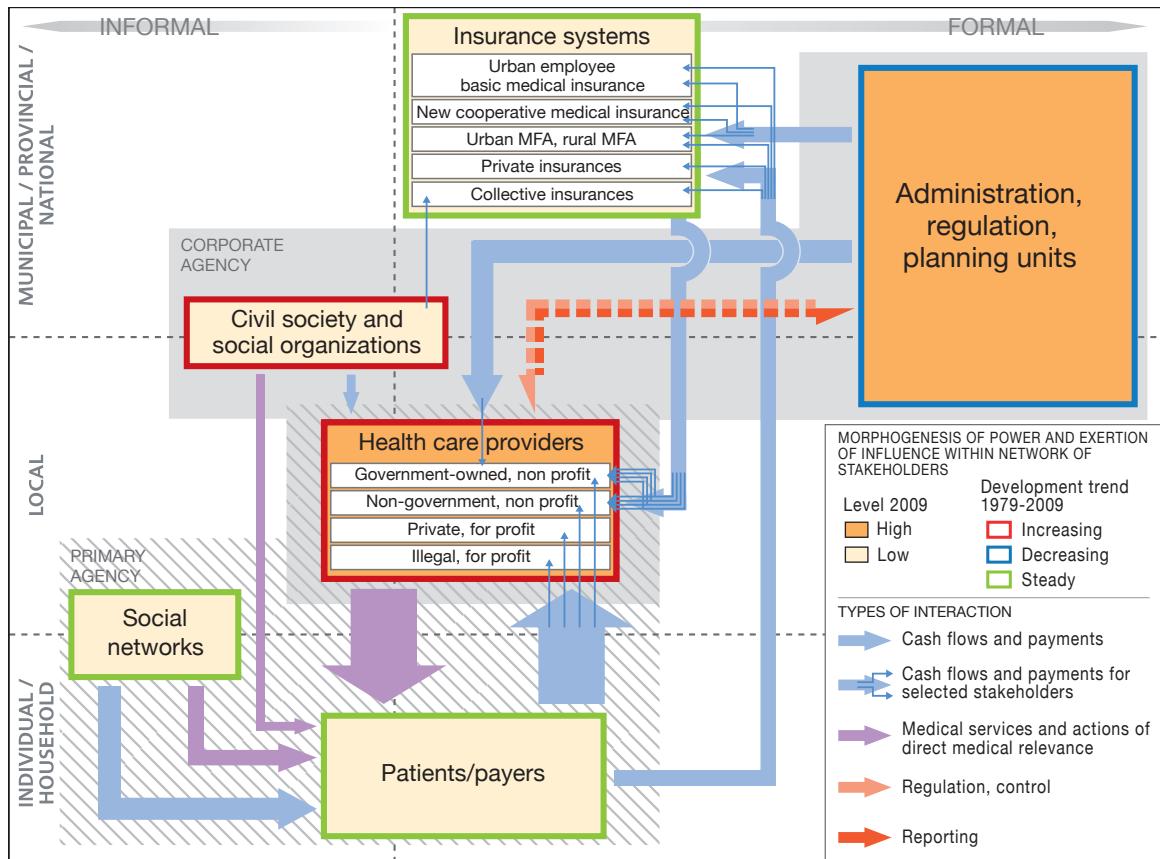


Figure 5.5-4

Morphogenesis of power and influence within the stakeholder network in Guangzhou's healthcare sector (1979–2009).
Source: Bork-Hüffer, 2012; Bork et al., 2011, altered; graphics: R. Spohner

tion (Kramer, 2006). The comprehensive national plan for a reform of the healthcare system presented in January 2009 also fails to provide healthcare services to rural-urban migrants or greater control of the private healthcare sector (Yip et al., 2012; Yang and Li, 2015).

Developments in the healthcare sector since 1978 have favoured the emergence of 'new' infectious diseases and a resurgence of 'old' ones. This phenomenon, referred to as the "double burden of disease" (Stephens, 1996:19) leads to high prevalence rates: e.g. of sexually transmitted diseases and tuberculosis in the category of 'old' diseases. At the same time there have been epidemics of 35 'new' infectious diseases in the last few years (e.g. HIV/AIDS, SARS, avian influenza; Lee, 2004; Wang et al., 2006). In addition, lifestyle diseases are becoming increasingly common due to the epidemiological transformation – caused by economic development, the accelerated ageing process of the population, and the increase in the number of people with unhealthy lifestyles (Lee, 2004; Wang et al., 2006).

Marginalized groups in particular are exposed to a double burden in Guangzhou. Health risks are more

prevalent in the former rural villages which, in the course of urban expansion, have become highly densified marginal settlements (villages-in-the-city) where a large proportion of the region's rural-urban migrants live. In addition, the above-mentioned differences in access to healthcare lead to marked disparities in the health status of poor and rich population groups (Gao et al., 2002; Bork-Hüffer and Kraas, 2015). The "world's workshop" (Sun et al., 2006 28) is suffering the consequences of hitherto incomplete reforms, a high proportion of informal and illegal medical services, and a lack of investment, particularly to improve access to healthcare for marginalized population groups.

This example is typical of the situation in many developing countries and emerging economies, where the call for 'health for all' has hardly been realized up to now. An adequate transformation of the healthcare system under state leadership has been neglected in China in favour of higher-priority economic reforms. The rapid growth of the cities has therefore resulted in unregulated informal structures in the healthcare sector. Private, in some cases informal providers are making a major contribution to bridging supply short-

falls in public healthcare. The loss of control by public administrations is reinforcing both health disparities and access barriers to public and private health services in view of a lack of social justice. This in turn leads to an increased burden of disease, especially among vulnerable population groups (the poor, the sick, women, children, the disabled). The increasing diversification of the health profiles of different population groups and the spread (or return) of old and new infectious diseases cause new health risks not only for the individual megacities. Since megacities function as hubs of global city and transport networks, the combination of vulnerable populations and poor, uncontrolled healthcare systems threatens to grow into a global threat. This threat became clear in the course of the SARS epidemic in 2003 (Bork et al., 2009; Horton, 1996).

Like many other megacities, Guangzhou needs an efficient health-reporting system geared towards the different population groups in order to identify the health problems of these population groups, and to be able to respond with sufficient resources. It is also necessary to develop adequate control instruments, which need interdisciplinary, international research collaborations and a long-term commitment on the part of the public administrations. All decision-makers – from government and the administration to the private sector and civil society – should be involved in the development of solution strategies adapted to the local context.

5.5.4 Centralistic governance versus decentralization

Interaction between national and local political decision-making and development policies has led to an unprecedented process of expansion of the existing cities (Wu et al., 2007) – above all in the so-called urban fringe areas. This has involved enormous urban extensions in and around Guangzhou which have created large special economic zones, new city districts and extensive housing estates for many millions of inhabitants on the basis of urban land reforms (Cartier, 2001, 2002; Breitung et al., 2013; Figure 5.5-5).

Governance structures are vertical in China; at the top stand the Central Committee (the central control and decision-making body) and the Politburo. Comparable hierarchical structures are to be found at the province level. Guangzhou, as the capital of Guangdong Province, has the status of a prefecture-level sub-provincial city. This special form was introduced for selected Chinese cities in 1994, increasing their legal and economic powers and responsibilities. However, the mayor of the metropolitan region is appointed by the central government (World Bank, 2015c:58). Although horizontal



Figure 5.5-5

Large-scale residential projects in Guangzhou.

Source: Frauke Kraas/WBGU

exchanges between cities are increasing, they are relatively weak compared to national policy directives.

Unlike other Chinese development zones, the provincial and local governments in the Pearl River Delta have been allowed to exercise greater influence and have more creative freedom in regional planning. This has meant that local and regional socio-political networks, as well as the private sector, have been able to develop more room for manoeuvre (Seto, 2004; Xu and Yeh, 2005). In the Pearl River Delta, inter-regional and inter-urban coordination has increased considerably over the last decade as part of the strategic development of a multi-nodal, i.e. multi-nuclear regional system of cities that specialize functionally on a division-of-labour and in some cases complementary basis. This is demonstrated by many large infrastructure projects, production and trade links, regional and (inter-) national trade fairs and regional-planning instruments. It has generated both state-managed, business-motivated and accelerated stimuli for urban development (Shen et al., 2002). Bork-Hüffer (2012:87) emphasizes: “Local governments viciously compete for contracts with foreign investors, which has resulted in redundant industrial structures as well as their acceptance of negative externalities of growth.”

In many places, however, the massive investment and enormous competition for companies and financiers in the cities of the Pearl River Delta have also overburdened cities and led to traditional urban-planning instruments and structures being circumvented. In Guangzhou, too, the development, conversion and use of areas – some already urban, some formerly rural (villages-in-the-city) and some incorporated – was soon no longer subject to the city administration’s control. “Instead, the actual urban development is more marked by spontaneous political and often speculative economic (investment) decisions, corruption and illegal land use, decentralized development projects,

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suburbanization and, more generally, rapid economic and population growth," says Wuttke (German quote translated from Wuttke, 2012:91; also Ng and Wu, 1995; Wong and Zhao, 1999).

This is illustrated by the example of central urban planning. The City Planning Act was passed at the national level in 1989. Structurally still rooted in the thought patterns of the planned economy, it introduced master-plan development for the big Chinese cities covering periods of up to 20 years. Guangzhou brought its first master plan into force in 1991. However, the highly dynamic development forced its fundamental revision shortly afterwards. The new master plan adopted in 2000 was also made obsolete just a few months later by the incorporation of two large adjacent districts into the urban area. Apart from the enormous economic dynamics and frequent administrative changes, local politicians and elites also undermine the powers of urban planning: indicators on newly developed or designated economic areas often take priority over structured and ordering planning, including sanctioning mechanisms (Wuttke, 2012: 128). Since the Open Door policy, in addition to the official urban and later master planning, administration structures of development zones have also appeared – partly in the public sector, partly in the public-private sector, and sometimes even in the unapproved sphere. Cartier (2001), for example, lists for the whole of China 422 development zones approved by the central government, compared to an estimated 6,000 to 8,700 zones actually in existence (reference year: 1995). In Guangzhou, the development zone was initially subject to a special administrative structure which had extensive economic independence in certain areas (e.g. personnel and salary decisions, investment permits, etc.) and was thus at least equal in status to urban planning (Sze, 1997:55f.). Further special zones with specific features (e.g. zones with production only for export, or strongly sectoral zones) emerged in quick succession and made the comprehensive management of economic and urban development more complicated. Several industrial zones within Guangzhou were merged to form the overarching Guangzhou Development District (GDD). Its administrative committee has extensive powers in the field of investment decisions. Investors are attracted with new services and platforms like the Multinational Corporations Club, which is integrated into the GDD (Wuttke, 2012: 139ff.). Parallel to this, instead of the legally enshrined master-planning law, a hybrid form of planning was implemented in the early 2000s, in which the city administration is intensively advised and supported by external institutes that are often part of or linked to universities. The result is a comprehensive concept plan that de facto replaces master planning, further develops a polycentric urban

structure, and focuses not so much on deceleration or monitoring powers as on an enhanced ability to adapt to dynamic developments and increased competitiveness. Wuttke (2012:134) assesses this institutional change as an "[...] expression of a new entrepreneurial urban policy, the governance form of entrepreneurship" (quote translated from the German).

5.5.5

Transformation in Guangzhou: problem areas and starting points

5.5.5.1

Sustaining the natural life-support systems

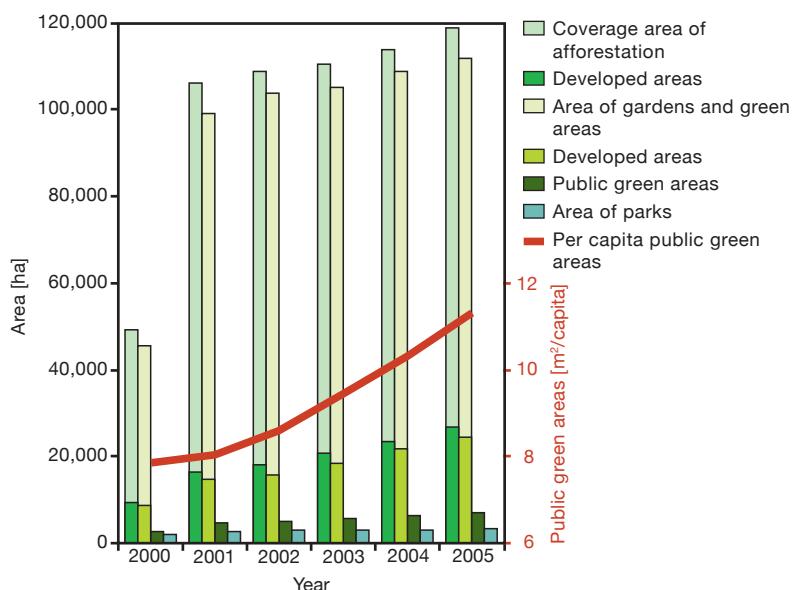
Guangzhou suffers from symptoms of considerable ecological overload. These include especially severe air, water and soil pollution (Strohschön et al., 2011), traffic congestion and degradation of natural resources, caused by high emissions, soil sealing and largely artificial environmental management. Local biodiversity has also declined sharply (Seto, 2004). The city is dependent on resources from the surrounding region, e.g. for its drinking water and food supplies; the environs also provide ecological compensation and leisure facilities (Figure 5.5-6). The Energy Strategy Research Center in Guangzhou, together with the Energy Research Institute of the University of Kyoto, published a report entitled 'Low-Carbon Society Scenario Towards 2013' in Guangzhou (Energy Strategy Research Center et al., 2013) that examines transport, 'green' buildings, the decarbonization of industries, switching fuels, and power generation with low CO₂ emissions (see Figures 5.5-7 and 5.5-8 on energy consumption and energy supply). The intensive construction activity over the last few decades has led to an enormous increase in the use of cement and steel in the fast-growing city of Guangzhou.

Stricter environmental regulations, a marked orientation towards legal guidelines with the aim of improving environmental protection, and increasing institutionalization have helped reduce environmental degradation over the last two decades (Lau et al., 2011). Civil-society actors have been included in the process to some extent; however, apart from increasing support for environmental protection, this sometimes results in implementation problems because of the intensive discussions and lengthy processes involved (van Rooji et al., 2013).

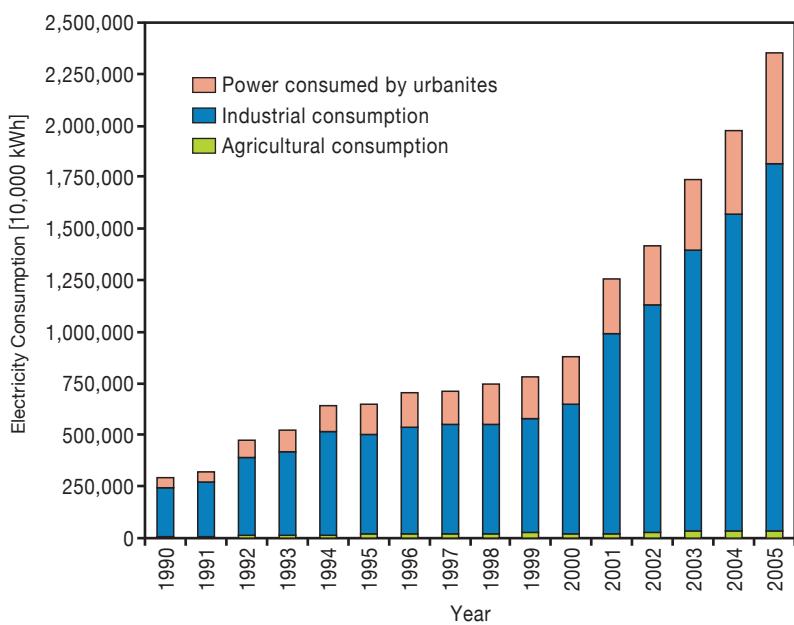
Figure 5.5-6

Surface area of parks, green and garden areas in Guangzhou.

Source: Kraas et al., 2008, based on information from Guangzhou Municipal Statistics Bureau, 2006; layout: R. Spohner

**Figure 5.5-7**

Electricity consumption in Guangzhou, 1990–2005. Source: Kraas et al., 2008, based on information from Guangzhou Municipal Statistics Bureau, 2006; layout: R. Spohner



5.5.5.2 Inclusion

Guangzhou is one of the first Chinese cities where post-reform spatial urban restructuring has been implemented by developing new forms of urban land use and polycentric organization (Wu et al., 2007). Before the Open Door policy, urban development still took place in a compact form, and the industrial state enterprises were concentrated in the north- and south-western suburbs because of the low level of infrastructure investment and the focus on local public transport (Wu et al., 2007; Bork-Hüffer, 2012:88). By contrast, the

massive post-reform reorganization on the basis of the 15th Master Plan up to 1992 involved enormous urban expansion along two development axes and three development belts in order to establish a polycentric structure. The traditional city centre in Dongshan (developed in the 1980s) was complemented by a new central business district in Tianhe (established in the 1990s; Wu et al., 2007), as well as numerous new individual development clusters. These received large-scale infrastructural development centres, e.g. the Guangzhou Economic and Technological Development Zone, the Guangzhou Convention Center, the University

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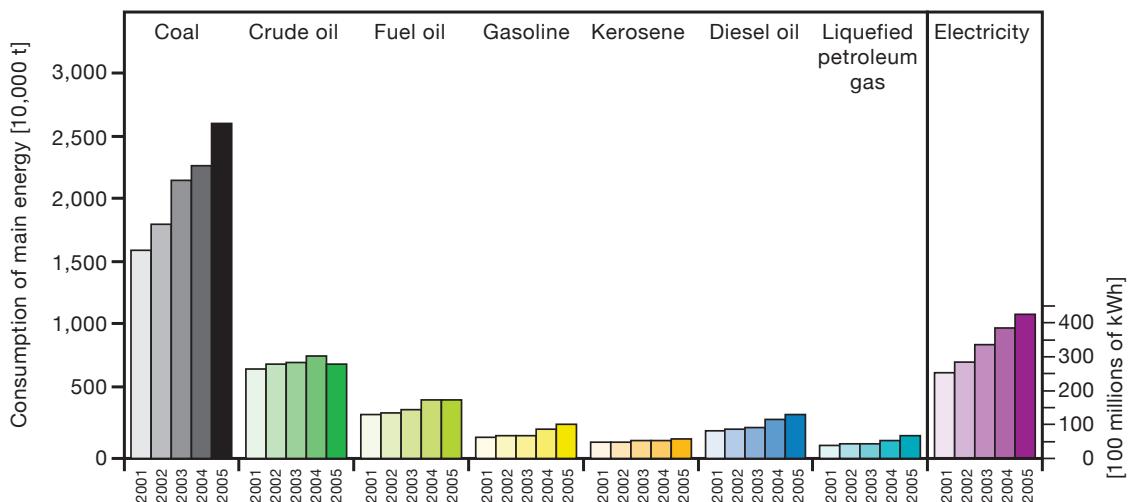


Figure 5.5-8

Sources of energy supply in Guangzhou.

Source: Kraas et al., 2008, based on information from Guangzhou Municipal Statistics Bureau, 2006; layout: R. Spohner

Town and the new international airport. In the hinterland, the decentralization strategy was continued with the incorporation of the small town of Panyu. A development corridor leading to the Nansha deep-water port was also built, involving the planning of completely new industrial zones and new towns. New, extensive residential areas based on western models were built, for example in Haizhu and Fangcun. Between 1990 and 2003, these top-down-planned development projects increased Guangzhou's functional urban area from 182 km² to 608 km² (Wu et al., 2007:388).

Against the background of Guangzhou's radical development, the question arises as to what forms of civil-society participation have been realized up to now. The main topic discussed in the literature is the social consequences of the degraded urban environment and the difficult living and working conditions of migrant workers. It highlights the enormous contributions made by migrant workers to industrial modernization, particularly the creation and development of the new industrial regions and urban extensions.

The cheap and, in principle, hitherto unlimited workforce of millions of internal migrants has made most of the economic boom possible and remains one of its essential pillars. Above all since the 1990s, major infrastructure projects – expansion of the road, metro and railway networks, the airport and the deep-sea port, the construction of the new central business district, the exhibition centre, technology parks, university campuses, etc. – have been implemented in the Pearl River Delta, and large-scale housing and leisure complexes have been built for millions of people with differing income levels. The contributions made in the

inner cities are also significant. More recent ways of upgrading traditional, historic inner-urban areas of Guangzhou can be seen in the process of increasing gentrification (e.g. in Yuexiu; Zhang et al., 2014).

Also remarkable are new forms of inclusion in the city's periphery through what is known as private governance: "While the effective state governance over rapid urbanization is absent, and public goods are inadequate in the periurban areas as a result, private governance arises spontaneously in the form of gated supercommunities in the far suburbs" (Zhu, 2013:257).

These new forms of inclusion involve new transformation problems, including growing inequality, spatial segmentation by gated communities and a lack of opportunities for participation. In addition, there are problems involving the urban residents (especially in traditional villages-in-the-city) who have been relocated in the context of new urban-development projects (Gransow, 2007; Herrle et al., 2008; Bercht, 2013).

Chen (2012) refers to increasing displacement and polarization in residential and work areas, and demonstrates that socio-spatial inequalities and disparities are on the increase at the district and neighbourhood levels, especially in the urban fringe areas close to the city. On the other hand, in the outer areas of the urban fringe, processes of displacement from the new, polycentrically emerging development centres – initiated by private companies – are causing mainly low-income population groups (former farmers, displaced city dwellers, rural migrants and foreign workers) to concentrate, and spatial conflicts are arising (Chen, 2012).

These conflicts are exacerbated by the growing expectations of the rising economic middle classes in

terms of space and resources, and by their ideas of what constitutes a liveable urban environment. Such conflicts are becoming a growing challenge for the overall urban society, because the middle classes in particular are demanding better participation opportunities (Zhu, 2013). This applies specifically in the context of resettlement and displacement measures caused by large urban-development projects: “Wholesale clearance and eviction that typify China’s urban development have often resulted in discontents among urban residents, giving rise to what critics refer to as property rights activism” (Shin, 2013:1167).

Extended political inclusion is discussed in the context of studies on different forms and causes of ‘non-participation’; for example, Chi, Xu and Xue write on the Wuhan-Guangzhou high-speed railway project (2014:1422): “While some respondents considered participation in government-owned projects unthinkable, most of them were discouraged by the absence of a sense of security and significance. Institutional barriers identified include a lack of participation channels and project information and the absence of transparent and proper processes of handling social impacts.”

Forms of environment-oriented engagement are also new: “Central in these greening initiatives has been increased attention on promoting public participation in community-based environmental activities. [...] The participatory processes [...] cannot be adequately understood without reference to earlier participatory practices and broader policy priorities guiding development in Chinese cities” (Boland and Zhu, 2012:147).

Local governance needs to be strengthened, since it is the lowest level where inclusion processes are ‘made possible’ by urban planning. New forms and experiments are conceivable in the context of a reform of the local hukou system. Possible ways of legalizing and officially recognizing and promoting a large number of informal supply networks should also be considered. These exist within the migrant workers’ communities, e.g. in relation to self-organized supply systems (examples include drinking water, education and healthcare; Kilian et al., 2010). Various forms of informal recruitment networks for participation in the labour market can also be taken into account more in the work-related transformation process (so-called flexible workforce: Hartmann, 2013). Domestic and foreign ethnic networks could also be incorporated here (Willis and Yeoh, 2002; Yeoh and Willis, 2005; Li, 2008; Li et al., 2009; Bork-Hüffer et al., 2014, 2016).

New solution forms relevant for similar urban-development processes are emerging in connection with such social innovations as new, in some cases informal negotiating processes, e.g. ‘experimental governance’ and ‘conceded informality’ (Schoon and Altrock, 2014).

5.5.3

Eigenart

In the course of the rapid urbanization of the last thirty years, Guangzhou’s form and urban organization has changed from what used to be a compact city into a strongly expanding urban landscape. The poly-nuclear organization with several centres – which include global, prestigious architecture, international production, trade and financial centres, office and residential building complexes, new cultural, leisure and sports centres – has led to radical urban modernization and urban-functional differentiation. At the same time, large sections of many traditional and historical urban areas have been demolished and replaced by modern, uniform buildings. Above all, the highly densified, new central business districts and development axes, but also the modern satellite cities, are all designed according to very similar principles – indeed, they are built mostly in a copy-and-paste-manner based on western design models. This contributes to widespread homogenization and ultimately to the architectural and socio-cultural desolation of the cityscape.

Apart from a small number of buildings and ensembles with traditional, in some cases ‘contested’ cultural heritage (Gransow, 2012a) from the colonial period (e.g. on Shamian Island), numerous old urban areas have been demolished in the course of modernization. The demolition has led to a loss of historical authenticity and thus identification potential, and to the destruction of the city’s structural originality. In the interests of a successful transformation, greater protection should be given to the small amount of historical urban cultural heritage that still exists (Figure 5.5-9).

Assessments differ on the extent to which Guangzhou has achieved a positive development in relation to cultural, ethnic, linguistic and religious diversity. Li and Liu (2011), for example, describe the development of the social integration of new immigrants as positive: although spatial and social segregation trends have continued to grow, they say, the possibilities for integration have increased significantly. On the other hand, there are the above-mentioned deficits as regards inclusion in the development and growth successes (Section 5.5.3). Although cultural differences are considerable in terms of the diversity of Chinese internal migrants, only few opportunities have hitherto been granted to enable this diversity to fully unfold; furthermore, only few foreign migrants have been living in China up to now (Box 5.5-2). For these reasons, the question of encouraging more socio-cultural *Eigenart* has played a minor role to date in Guangzhou.

There have been numerous original developments with many specific forms and collaborations in governance in the Pearl River Delta and Guangzhou. They

Box 5.5-2

Minorities: foreign migrants and religious groups

Migration processes within China increased significantly after the country's opening in 1978 and the subsequent economic upswing. In 2011, 16.5% of the Chinese population (about 221 million people) were internal migrants, predominantly migrant workers who had moved from different regions of China, mostly from the country to the cities (Gransow, 2012b). Parallel to this, an increasing number of international migrants settled in China in the course of the opening process. The country's sixth census in 2010 recorded foreigners living in China for the first time. According to this, 593,882 foreigners were living in the PR China (the overall total of

1,020,145 foreigners was higher, but 426,313 of these people were residents of Hong Kong, Taiwan and Macau). Foreigners account for just 0.1% of the country's overall population (Rafflenbeul et al., 2014). Most of them come from South Korea (120,750), the USA (71,493) and Japan (66,159) and are living in China temporarily to work (Willis and Yeoh, 2002); about one third are students.

The African, Japanese and Korean communities in Guangzhou have been closely studied (Li et al., 2009; Bork-Hüffer et al., 2014, 2016). Little research is available on the various religious groups, e.g. Christian communities (including the African migrants and traders), who are closely monitored and restricted in their freedom to practise their religion (Haugen, 2013).

include forms of experimental and tolerated informality (Schoon and Altrock, 2014), different action strategies by cooperatives operating as entrepreneurs, expatriate expertises as 'design mentors' for urban design, and special business development programmes for overseas Chinese. Guangzhou's unique business climate is a result of the high proportion of traditional, self-employed entrepreneurs, a large number of path dependencies resulting from the Pearl River Delta's co-development with international players (Cartier, 2001), the traditional trade fairs with links throughout the whole country, the long, independent traditions in education, and the traditional tea and medicine markets (the largest in China).

With reference to the question of urban creative autonomy, the main priority should be to enhance coordination between the different, in some cases competing governmental and administrative levels (national, regional, local). Furthermore, the overlap between business and politics is regarded as problematic, and there are calls for an improved involvement of civil society, international NGOs and so-called GONGOS

(Government Organized Non-Governmental Organizations; Yang, 2005).

The various forms of experimentation and negotiation processes deserve special attention; these include forms of "experimental government" and "conceded informality" (Schoon and Altrock, 2014) and are forms of social innovation in the field of local, independent methods of development and regulation. The participation of civil society in shaping cities needs to be extended, and this represents an important desideratum for a successful transformation towards sustainable urban development. More attention needs to be paid to quality of life, identity and identification by developing self-efficacy and putting a local stamp on urban spaces and infrastructures. A feeling of identity, the creation of quality of life, and being able to feel safe from land expropriation, corruption, loss of home, resettlement or crime are of key importance, especially with regard to social vulnerability and the perception and management of urban stress (Bercht, 2013).

5.5.6

Visions of future urban development

In the course of its rapid urbanization, Guangzhou has been transformed from a compact city surrounded by intensively farmed agricultural land to an expansive urban landscape with a central business district (Xu and Yeh, 2003), an international financial centre (Wilkinson, 2012b) and modern satellite cities, all characterized by globalized design. There is a functional incompatibility between the traditional, persisting structures of the villages-in-the-city as homes for millions of migrant workers and with largely informal processes on the one hand, and, on the other, the modern, high-rise complexes in the development axes and corridors, rapidly built according to different global models, as well as



Figure 5.5-9

Beijing Road in Guangzhou.

Source: Frauke Kraas/WBGU

large-scale urban expansions on the urban fringe; this ultimately leads to incoherent and only partially complementary spatial units. Higher-level urban-development planning reaches its limits when the land is subject to the collective administration of the respective village committees (Herrle et al., 2008). The transformational goal should be to find a “balance [in] the dualistic development between the city and the country, [to] make systematic infrastructure planning possible, and [to] promote a coordinated development of the region as a whole. If we do not succeed in sustainably developing the Delta’s Eigenart [sic], the caravan of investors will move on” (German quote translated from Herrle et al., 2008:46). After years of overproduction in the real-estate sector, vacancy levels in housing represent a specific and growing problem in the new urban areas (Hui et al., 2012), and this is fuelling the fear of a real-estate bubble.

Key transformation targets that seem particularly necessary include a systematic elimination of environmental pollution and a reduction of emissions, a coherent functionalization of the landscapes, improved energy efficiency, and an uncompromising promotion of the quality of life for all population groups that focuses on the real needs of the people (including internal migrants and migrant workers). In view of powerful fragmentation processes, furtherance of the following aspects seems absolutely essential: (1) ensuring the immediate protection and preservation of the little remaining urban cultural heritage and upgrading the status of local manufacturing traditions; (2) making spatial and social quality of life and identity possible for all residents; (3) promoting the integration of migrant workers; and (4) conducting a fundamental and broad-based, politically uncontrolled dialogue among all stakeholders on a future for the city that is borne by all population groups.

Numerous examples of successful approaches can help in this context. For example, the enhancement of local public transport has contributed to a (relative) reduction in emissions, and energy efficiency has been improved (Low Carbon Society Scenario: Energy Strategy Research Centre and Energy Research Institute, 2013). The way the cultural heritage of Shamian Island has been handled deserves a positive rating. There is some movement on questions such as how to deal with the villages-in-the-city and adjusting the rules on the local hukou system. Social innovations such as the handling of experimental and tolerated informality can also be of international importance if they are encouraged more freely and unconditionally. Efforts should be made to improve the handling of, and access to, information and data, particularly to make developments and decisions more transparent. This serves to improve

inclusion and ultimately enables people to identify more with the city and its development processes.

5.6

The Ruhr area: the post-industrial metropolis – polycentric and sustainable

5.6.1

From ‘region’ to polycentric metropolis?

More than five million inhabitants across an area of 4,435 km² make the Ruhr area the largest agglomeration in Germany and the fifth-largest in Europe (Schneider, 2009: 14f.). At its widest point, the region extends 116 kilometres from Sonsbeck in the west to Hamm in the east. From north to south, it stretches 67 kilometres from Haltern am See to Breckerfeld. The Rhine-Ruhr Metropolitan Region, which also includes conurbations on the Rhine, is the largest in Europe: its roughly 7,000 km² in the western part of Central Europe are home to around 11 million people with a high level of reachability (Hoppe et al., 2010: 115f., Goch, 2009: 10).

The Ruhr area today can essentially be described as a mature polycentric urban area (Hall and Pfeifer, 2000): polycentric, because it is built around multiple urban centres with varying facilities and of varied significance; and mature, because its population – which is tending to shrink – has access to a well-developed infrastructure which delivers a high standard of urban services. Yet the Ruhr area is not fully mature. It was late in emerging as an urban agglomeration, growing unplanned into a metropolis as individual towns and cities expanded in the wake of industrialization. Similar developments can be found in the north of England and northern France, for example (Tenfelde, 2008). In the 20th century, the forerunners of what is today the Ruhr Regional Association (RVR) were thus unable to establish any permanent and effective governance structure above the level of the individual city. These cities did not grow naturally out of town centres over the course of the past few centuries. Instead, they evolved from small centres, workers’ housing estates, mines, wasteland, recreational areas and elite districts.

In terms of urban typology, the Ruhr area neither matches the standard European mediaeval city model, nor does it reflect the classic industrial metropolis such as London or Berlin. The most obvious difference is the polycentric structure of the Ruhr area, which comprises numerous medium-sized cities (the biggest of which is Essen – whose population peaked at 731,220 in 1962 – followed by Dortmund, Duisburg and Bochum) and an array of small towns (Breckerfeld has just under 9,000

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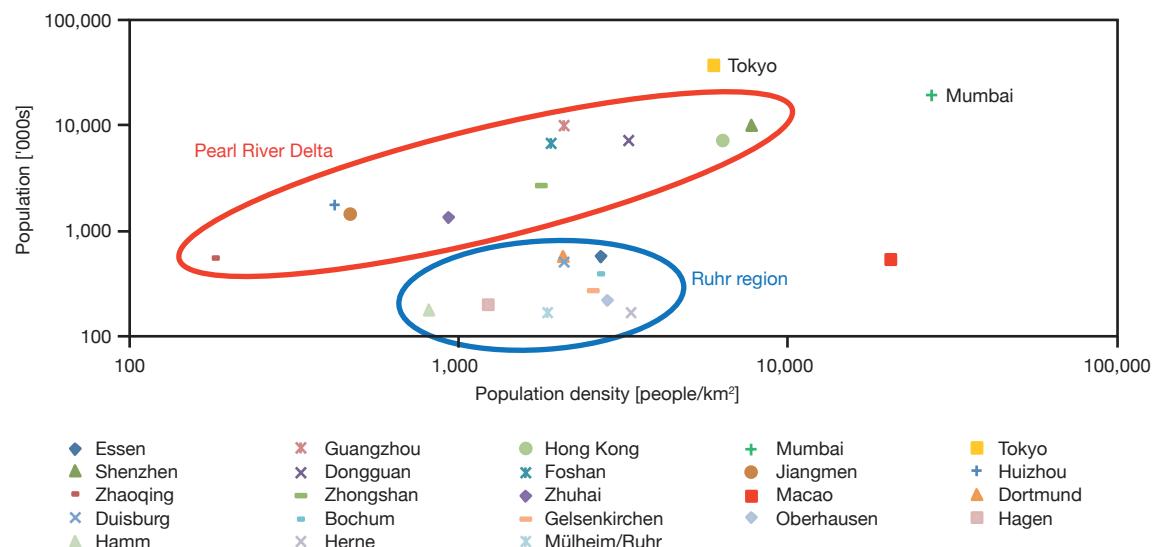


Figure 5.6-1

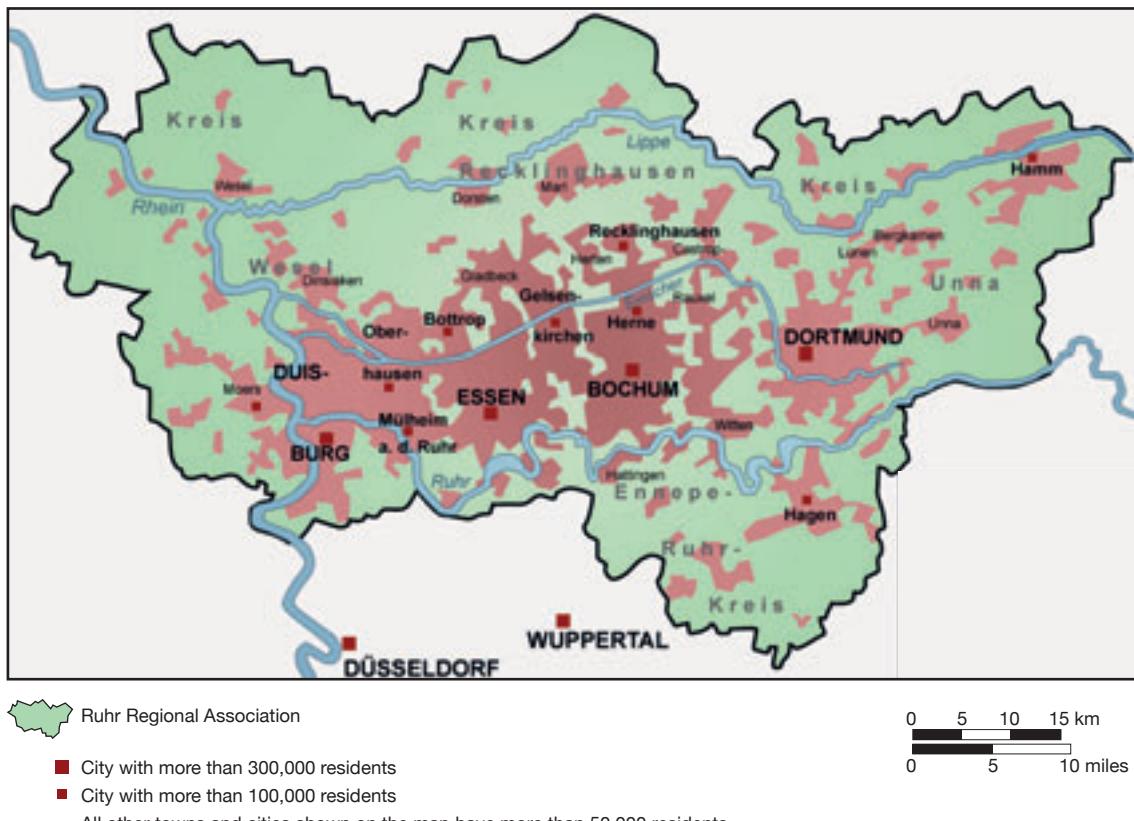
Population densities in the Ruhr area compared to other metropolitan regions.
Source: WBGU, based on the UN DESA Population Division, 2015; Eurostat, 2015

inhabitants). Polycentrism thus means a plurality of different poles with different functions, each of which fashions its urban space differently without prescribing a clear economic, cultural, social or other hierarchy (Mela, 2013:72; Burger and Meijers, 2012). In terms of surface area and population figures, the Ruhr area is on a par with other metropolises and megacities. From a planning and sociological perspective, however, the problem of the relationship between city centre and suburbs is of lesser importance here than defining "the inner boundaries between several core cities" (German quote translated from Reicher et al., 2011:18). Whereas London has a population density of nearly 11,000 people per square kilometre, the figure for the Ruhr area is only around 2,300 (Reicher et al., 2011:36; Figure 5.6-1).

Three distinct settlement belts can be seen from south to north in the Ruhr area: an originally agricultural zone along the Ruhr River, which today accommodates expensive housing; the Westphalian Hellweg route, which takes in historical cities and industrial towns; and the Emscher zone, comprising a mix of industry, transhipment points, old village centres and a landscape of artificially created hills (Köhler and Walz, 2012:116f.; Figure 5.6-5). Deconcentration (or 'decentralization') is a characteristic feature not only of the metropolis as a whole, but also of most of its municipalities, which break down either into geographically distinct city districts – some of which have village-like centres mostly separated by green areas, industrial plants and/or brownfield sites – or into planned workers' housing estates. This localized development pattern was driven by the historical establishment of mines. Huge installa-

tions for the coal and steel industry (mines, factories, workers' housing) became independent focal points for an urbanization that was dispersed over a wide area. Dispersion followed the (pre-industrial and new) traffic routes between the sub-centres. The axes of mobility created a web-like structure of traffic routes which developed at the height of the industrial era but, now that industry has receded, are not always aligned with contemporary needs (Prossék, 2009:50). An above-average volume of open spaces remained within this structure, much of which – in the form of parks, allotments, cemeteries, sports facilities, wooded areas and arable land – created ecologically useful corridors and served the recreational and other needs of the working population (Reicher et al., 2011:50; Figure 5.6-2).

Historically, this polycentric structure has had a powerful formative influence on place identity among the residents of the Ruhr area (Tenfelde, 2002); but it constitutes a significant problem with a view to governance of the current structural transition. However, it could provide a valuable resource in the process of transformation towards sustainability. Polycentrism is thus not a positive quality in itself, but becomes one if certain areas of potential arising from deconcentration are tapped: the networked autonomy of the sub-areas, a converging structure of competition, and cultural diversity. The Ruhr area can serve as an example for analysing the obstacles and opportunities which exist in urban regions whose population is stagnating or shrinking, yet which could still aim for a post-industrial – or rather neo-industrial – future by comparing developments of labour force with gross value added in the secondary and tertiary sectors (Figure 5.6-3).

**Figure 5.6-2**

Ruhr Regional Association.
Source: RVR, undated a

To tap this potential, the political fiction of the ‘Ruhr metropolis’ must become reality (Prosek, 2009:32). The question is therefore how to get from a ‘region’, i.e. an administrative/territorial unit of accounting measuring 4,500 km², to a ‘city’ in the proper meaning of the word? How can you develop ‘ruhrbanity’ (Reicher et al., 2011:232f.) that can, first, relate to a specific *Eigenart*, second, sustainably reduce its environmental footprint and, third, guarantee inclusion as a political community? In spite of unfavourable assessments and forecasts, many observers attribute precisely this kind of potential to the Ruhr area (Reicher, 2011:219). Its human capital grew up under industrialization, has experienced various structural transitions, has been rendered heterogeneous by migration, and has recently been strengthened by substantial investments in education. It has a polycentric infrastructure that is conducive to a sustainable environmental policy. And it has change agents that are driving social innovation.

What, then, is missing if the existing potential is to be further exploited? How can the region’s urban *Eigenart*, political, social and economic inclusion, and environmental sustainability be shaped and stimulated? The metropolitan perspective is what makes each

city’s *Eigenart* possible, while at the same time bundling healthy competition and specialization between the individual cities to form a shared project. So is this the ideal solution? Or would ‘bottom-up convergence’ be better? In other words, would it be better to strengthen the historical links and new functional links that underscore the autonomy of the actors creating this ‘bottom-up convergence’?

5.6.1.1

Historical genesis

Although the Ruhr area – colloquially referred to simply as the ‘Revier’ (territory) – lacks many of the traditional urban qualities (as a centre of politics, religion or science) that political power hubs and centres of culture and knowledge normally exhibit, it is of course possible to interpret the region as an urban space in which spatial determinants and temporal developments have brought forth a complex relationship.

Greater attention is now once again being focused on the pre-industrial history of the Ruhr area, as this period was also significant for the region’s later urbanization and the formation of its post-industrial identity today. Archaeological findings point to human

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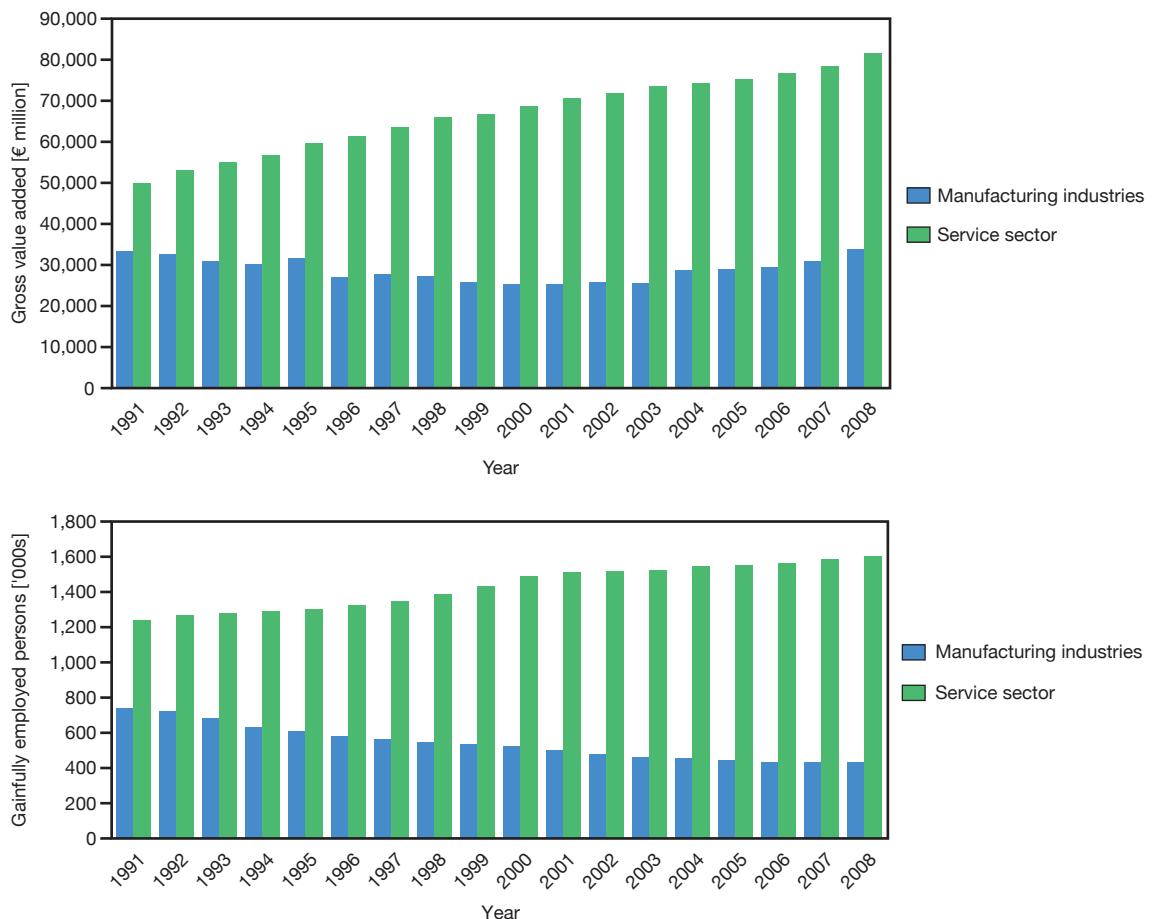


Figure 5.6-3

Structure of employment in transition, by sector.
Source: IT NRW, 2011

settlement of the area dating back more than 80,000 years. What is now the Ruhr area was already relatively densely populated as early as the 5th century. Situated in what was initially the Roman-Germanic war zone, castles and monasteries were the first centralizing factors in the Middle Ages, at which time today's core cities of Duisburg, Essen and Dortmund emerged as royal courts, trade-fair venues and religious centres. The west-east trade route traversed these cities. Their autonomy, upheld from the High Middle Ages to 1803, was threatened by territorial powers in the High and Late Middle Ages.

Situated along the Westphalian Hellweg route, the cities of Duisburg, Essen and Dortmund experienced their first economic heyday during the Hanseatic period. Dortmund possessed the status of 'Freie Reichsstadt' (Free Imperial City) from the High Middle Ages up to German mediatisation (Imperial Recess) in 1803. Essen, too, enjoyed Imperial City privileges from 1377 onwards, though its status as a Free Imperial City remained contentious owing to a dispute with

the ruling Werden Abbey (Köllmann, 1990:15).

As exemplified by the scholar Gerhard Mercator, Duisburg was a centre of European humanism – a circumstance explicitly referenced by modern-day foundations and universities. Maps of the early modern period show a number of Hanseatic cities, primarily along the Westphalian Hellweg route, alongside free cities and villages with an agricultural focus. Until as late as the early 19th century, Duisburg and Dortmund were the biggest cities, boasting only around 5,000 inhabitants each. At the time, more than 11,000 people already lived in the municipality of Mülheim an der Ruhr.

An industrial 'explosion' – accompanied by rapid urbanization – occurred in this region beginning in the second third of the 19th century. Individual ironworks formed the nuclei of proto-industrialization, examples including the St. Antony works founded in Oberhausen-Osterfeld in 1758 and the Gutehoffnungshütte ('Good Hope Ironworks') founded in Oberhausen-Sterkrade in 1782 (Boldt and Gelhar, 2008:38; Köllmann,

1990:54f.). Charcoal was still used in iron production to smelt the iron ore (Weber, 1990:256). Systematic coal mining began at the start of the 19th century in Muttental near Witten. The Ruhr area's potential thus rested on its geological raw materials: seams of coal, which occur on the surface along the Ruhr before dropping below ground to the north. The seams at Lippe reach a depth of 600 to 800 metres (Boldt and Gelhar, 2008:24). Coking plants transformed the coal into the coke needed to fuel the blast furnaces for smelting in the production of pig iron and steel. By 1850, there were already nearly 300 pits (Wehling, 2009:24); and when the deposits along the Ruhr were exhausted, new pits were opened further north, from the Ruhr to the Emscher and, ultimately, to the Lippe. In the course of industrial history, a total of roughly 3,200 mines were built in the Ruhr area.

The Industrial Revolution was accompanied by rapid urbanization. The total population of the Ruhr area grew from around 375,000 in 1852 to about 536,000 in 1871, before climbing to roughly three million in 1910 and, finally, 3.7 million in 1925. This shows that even city districts that are shrinking today experience phases of fast growth. It also shows that rapidity is not necessarily a problem in itself, as long as efficient administrative and management structures (in both local government and the corporate community) grow in line with the population influx. Cities such as Bochum grew from 2,200 in 1800 to 65,000 by the turn of the century and 117,000 in 1905 – a fifty-fold increase.

Especially from the second half of the 19th century to World War II, an economic area focused on coal mining and the production of iron and steel sprang up and was accompanied by rapidly growing housing density. A polycentric structure characterized by the absence of a city centre and by severe environmental pollution thus became established. After World War II, the Ruhr area experienced a (new) golden age as the economic powerhouse of Germany. Industrial plant and energy facilities were rebuilt in the space of a few years. However, a far-reaching structural transition set in when numerous mines were shut down. While more than 470,000 people still worked in mining in 1956, the number plunged to 17,600 in 2012 (Metropole Ruhr, undated; Figure 5.6-3). The demise of the pits as of 1957 and the collapse of the coal and steel industry in the years that followed were triggered by oversubsidization, price competition from imported coal, the growing use of oil, nuclear energy and lignite, and the relocation of the coal and steel industry to other parts of the world (Nonn, 2001). The severe environmental problems were attenuated in the 1970s by a number of government programmes (Brüggemeier and Rommel-Spacher, 1999).

To cushion the blow of the structural transition, efforts to develop the higher-education landscape were undertaken from the beginning of the 1960s. Compared to the national average, this landscape has today reached a remarkable level, with the University Alliance Ruhr (UAR) regarded as an engine of regional cooperation. Here again, the polycentric structure creates opportunities of which too little use has been made up to now (Seuberlich, 2015). Moreover, a disproportionately low volume of federal government funds has so far been channelled into the Ruhr metropolis (approx. €700 per inhabitant between 1996 and 2013, according to Zöpel, 2015:9, compared to €3,500 for Cologne-Bonn).

The Emscher Landscape Park and other projects such as the Technologiepark Dortmund and Innovation City Bottrop have also been initiated. The contribution made by economic and structural development policy and the economic policy of the federal state, primarily from the 1970s to 1990s – and above all the use of regional and structural funds from the EC and, later, the EU – was pivotal to regional development in the Ruhr area (Lackmann, 2008). The Ruhr area used these funds very aggressively for highly innovative applications, and has thus expedited the transformation of the Ruhr area from an industrial area to a cultural region that, nonetheless, still manifests deficits. In the more recent past, the choice of this region as the European Capital of Culture in 2010 was designed to inject momentum into transformative processes that would also improve the image of the Ruhr area. For example, about 10,300 self-employed persons and companies and a total of 35,300 socially insured employees were working in the cultural and creative industries in 2012 – mainly in the software and games market segment and in architecture. The PR and advertising market, the design industry and the architecture market form the backbone of the region's cultural and creative industries, especially in Dortmund, Essen and Bochum (Wirtschaftsförderung Metropole Ruhr, 2012:14f.).

5.6.1.2

The Ruhr area: a test case for the Anthropocene

One distinctive feature of the polycentric Ruhr area, of which only just over third is built up, are its expansive green areas, including agricultural land between the individual cities. Wooded areas account for about 21% (Wald und Holz NRW, 2014:56). Today's Ruhr landscape is the outcome of interlocking natural geographic and sociocultural factors which are typical of the history of industrialization. As such, it presents a case study of the Anthropocene, the period of history which is characterized essentially by human impacts on the Earth's surface and atmosphere. This is apparent

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from a bird's-eye view or from any high vantage point over the Ruhr area, whose contours are traced by the mountainous terrain in Sauerland and Bergisches Land to the south, by the Ruhr and Emscher valley in the middle, and by the artificial mountains – heaps of slag dug out of deeper layers in the course of subterranean coal mining – to the north. The highest of these rise to a height of 200 metres, with corresponding subsidence averaging 1 to 1.80 metres and reaching 24 metres in extreme cases (Harnischmacher, 2009:23). Prominent and, in some cases, iconic features that give the region its characteristic *Eigenart* (Section 3.5) include buildings like the Gasometer in Oberhausen, the television tower in Dortmund, power stations, the Zollverein Coal Mine Industrial Complex, winding towers and industrial complexes (Industrial Heritage Trail), football stadiums such as the Schalke Arena and the Signal Iduna Park, but only a few areas with a dense concentration of high-rise buildings, such as in the southern part of central Essen (Figure 5.6-4).

Urbanization, the road- and rail-based mobility axes, but also human intervention in watercourses wrought massive changes compared to the pre-industrial landscape of around 1840. From 150,000 people in 1818, the population rose to a peak of 5,667,000 in 1961. Today, the Ruhr landscape is a fragmented mosaic of enlarged city centres, “self-contained industrial plant, small miners’ housing estates, open arable land, densely replanted forests, confusing motorway intersections, functional industrial estates, towering slag heaps, bundles of railway lines and marshalling yards, canals, chimneys, cooling towers, allotments [...]” (German quote translated from Reicher et al., 2011:134). Sieverts (1997:52) referred to this environmental/industrial culture continuum as a ‘city in-between’, an urban fabric with no immediately visible city boundaries, no visible urban-rural dualism. As a result, locals have always remained close to the land. Many workers’ housing estates had vegetable gardens where goats, chickens and pigeons were kept. Many miners were ‘Kötter’ (part-time farmers) whose roots went down deep into the rural soil.

Perhaps the most striking topographic feature of the Ruhr area is the A40 motorway link along the historic Westphalian Hellweg route, flanked by parallel expressways (Figure 5.6-5).

5.6.2

Natural life-support systems, *Eigenart* and inclusion in the Ruhr area

Regarding the barriers to, and opportunities afforded by, transformation, there are three steps that the ‘special



Figure 5.6-4

The ‘U-Tower’ in Dortmund. The former Union brewery has been converted into a creative centre – and become an emblem of the city.

Source: Moellerh/Flickr

metropolis’ sketched in Section 5.6.1 can take. The dimensions to be investigated are those covered by the normative compass described in Chapter 3: a) the environmental dimension of sustaining natural life-support systems; b) the historic and cultural *Eigenart* of the Ruhr area, which fosters place attachment and underpins social cohesion; and c) the opportunities and structures for substantive, political and economic inclusion.

5.6.2.1

Sustaining natural life-support systems

The burdens inherited from 180 years of industrial history – the ‘perpetual costs’ as they are known – have left a sizeable footprint in the Ruhr area in the form of emissions (noise, pollution, greenhouse gases, particulate matter and heavy metals) and soil degradation (waste and wastewater; Briesen and Hiller, 1997:271). Both planetary guard rails and local environmental problems must be examined in light of this situation. Essen, whose relatively efficient economy nevertheless generates high prosperity-driven per-capita emissions, is a telling example. Even so, there is evidence of tangible successes, such as in air purity.

Planetary guard rails (transport and waste)

The biggest obstacle to transformation, also bearing in mind the mentality of the Ruhr area’s most influential opinion leaders to date, is probably the overdue transformation of transport policy (Danielzyk et al., 2011:48). The existing infrastructure lacks environmental sustainability, but devours huge chunks of local-government budgets due to a backlog of spending on repairs. Motorized individual transport accounts for by far the largest share of overall traffic volumes. Step by step, the aim is to reduce this share to, at most, a quarter of the total mobility volume – by widening the

**Figure 5.6-5**

Line of cities across the Ruhr area (formerly the Westphalian Hellweg route).

Source: Reicher et al., 2011:143

low-emission zone, introducing speed limits, managing parking facilities, energetically adding to the network of footpaths and cycle paths, promoting mobility and making local public transport more attractive (Beckmann, 2015). After all, these sustainable forms of mobility dovetail perfectly with the polycentric structure of the Ruhr area. In addition, traffic is today the major source of noise pollution in this region. Germany's energy transition may have got off to a good start in the Ruhr area, but the transformation of transport policy is still decidedly tentative.

Furthermore, although per-capita CO₂ emissions have declined since 1990, the CO₂ emission factor evidently remains virtually unchanged (WI et al., 2013:30), despite the fact that a decrease has been achieved nationwide (WI, 2013; WI et al., 2013:33).

The federal state of North Rhine-Westphalia (NRW) has been making concerted efforts to reduce waste volumes since the 1990s. Between 1989 and 2000, the volume of household and bulky waste was reduced by around 100 kg per inhabitant. Since 2002, volumes have remained more or less static in line with the nationwide trend (WI, 2013).

Significant steps towards an environmental transformation have already been taken in the form of measures to improve resource efficiency. Environmental impact has been reduced in recent decades. CO₂ emissions in the Ruhr metropolis were cut by 14 % between 1990 and 2010, for example (WI, 2013). The metrop-

olis is striving to develop into a low-carbon industrial region. Its shared objective is to reduce emissions in the region by 40 % by 2020, 65 % by 2035, and 80–95 % by 2050 relative to 1990 levels (WI, 2013). Innovation City Bottrop represents a model region in this context.

Local urban guard rails (clean air and water)

A multitude of legislative initiatives at the EU level (e.g. an obligation on local governments to draw up clean-air plans) and by Germany's federal government (e.g. the Federal Pollution Control Act; BImSchG) have led to major improvements in air quality in the Ruhr area since the 1970s. For example, data from the North Rhine-Westphalian Ministry for the Environment indicate that sulphur dioxide levels dropped from 206 micrograms per cubic metre of air ($\mu\text{g}/\text{m}^3$) in 1964 to 8 $\mu\text{g}/\text{m}^3$ in 2007, an improvement of 97 % (UBA, 2011).

Based on a feasibility study by the German Institute of Urban Affairs (Deutsches Institut für Urbanistik, Difu), the three responsible district governments in Arnsberg, Düsseldorf and Münster have developed three sub-plans (east, west and north) to ensure clean air in the Ruhr area. Since local air pollution control measures were seen as inadequate, recourse has now been made to regional planning (Bezirksregierung Düsseldorf, 2008:16). The RVR, police headquarters, chambers of commerce and industry, chambers of skilled crafts, and nature conservation associations

have also been involved. The public also participated (Bezirksregierung Düsseldorf, 2008). To begin with, emission-threshold overshoots in benchmark years were identified, together with the causes, in order to make a forecast about future pollution and prepare clean-air measures. Examples include road-traffic measures (such as diverting heavy goods vehicles in transit, establishing low-emission zones where pollution-intensive vehicles are banned) and industrial measures (ordinances pursuant to BImSchG).

Regarding wastewater disposal, use has been made of the NRW-specific option of organizing what are known as water-industry associations, most of which have a special legal status in the form of public corporations (Schmidt, 2013:302). Water management has always assumed a special role in the Ruhr area, and still does, partly because the choice of locations for industrial operations depended on the water supply, but partly also because industry and mining caused considerable water pollution (Schmidt, 2013:274). Furthermore, the density of industrial uses causes above-average water consumption, especially in the large autonomous cities of the Ruhr area, although consumption is now decreasing in this industrial area as the structural transition progresses (Schmidt, 2013:274). Although such heavy dependency on the water industry has encouraged cooperative water management in the Ruhr area, room for improvement remains as parochialism has evidently not yet been completely eradicated in this utility sector in particular (Schmidt, 2013).

Intensified mining activities and the advance of industrialization created huge water-management problems in the Ruhr area in the 19th century. The region is bounded to the north by the Lippe River and to the south by the Ruhr River; the Emscher River cuts across the middle. While the Ruhr was used as a source of drinking water, and the Lippe supplied various canals with service water, the factories and pits that sprang up and the growing housing estates used the Emscher as an open sewer. Regular floods then inundated the cities with the heavily polluted wastewater. Illness and the outbreak of epidemics were the result. To combat this problem, the cities and communities affected joined forces with mining and industry to form the Emschergenossenschaft (cooperative) in 1899. This organization was put in charge of wastewater management along the Emscher (Scheck et al., 2013:24f.). A water-management cooperative involving municipalities and companies was a new model which was subsequently also replicated along the Ruhr and the Lippe (Emschergenossenschaft, 2014). Use of the Emscher as an open sewer continued, while watercourses were straightened and embankments constructed to contain the problem of flooding. Unpleasant smells remained a

serious issue, but it was not possible to construct underground sewers until mining activities were discontinued and the concomitant subsidence ceased. Since the early 1990s, work has been in progress to convert the sewer system and move it underground. This project has a total volume of €4.5 billion and should be completed by 2020 (Scheck et al., 2013:25ff.).

The renaturation of the Emscher to create recreational areas and open spaces and revitalize adjacent city districts became an important aspect of the conversion project. Initial pilot projects were implemented under the aegis of the Emscher Park International Construction Exhibition (IBA, 1989–1999; Scheck et al., 2013:12).

The Emschergenossenschaft is also in charge of the Emscher conversion project. Alongside the technical challenge of moving the sewer system underground, a concept for the redesign of the Emscher itself also had to be developed. To this end, the cooperative and the Ruhr Regional Association (RVR) set up the Arbeitsgemeinschaft Neues Emschertal (New Emscher Valley Working Group) and together mapped out a master plan for the future of the Emscher. Unlike regional land-use planning, this kind of regional master plan is not legally binding. However, the informal framework facilitated uncomplicated dialogue, which in turn made it easier for the various actors to incorporate external knowledge and agree on joint goals (Scheck et al., 2013:76f.).

The origins and changing role of the Emschergenossenschaft cooperative set an example of how cities – in this case in collaboration with resident companies – can tackle environmental and development problems, and how the transformation towards a sustainable city can be managed.

Conclusions

The opportunities afforded by polycentrism are rooted above all in the existence of green areas and recreational facilities in close proximity to housing areas. Green belts must be protected, the use of open spaces contained and new green areas created on cleaned-up brownfield sites. The Emscher Landscape Park and the renaturation of the Emscher are leading projects in this regard. To realize them, close cooperation is needed on regional planning and intergenerational projects such as the RVR's regional open-space concept and the Ruhr metropolis's 2016 regional plan. Other examples include projects to protect and restore waterways as habitats and natural retention areas (e.g. the LIFE project Lippeaue and the Emscher conversion project). The transformation perspective to which the region subscribed when applying for recognition as the European Green Capital is correspondingly extensive. The goal of this intergenerational project is defined as creating a

'healthy, green and sustainable region which delivers quality of life'. The project aims to strengthen ecological functions (such as regulation of the water balance, species protection, adaptation to extremes of climate and the reduction of air pollution) and to continue land recycling (WI et al., 2013:11). One example is Essen's successful application for the status of European Green Capital in 2017.

5.6.2.2

Eigenart

Eigenart is the result of the specific ways in which space is appropriated and produced in individual urban environments, given the space and materials available and in light of each environment's socio-cultural and historic legacy. In a normative connotation, *Eigenart* is regarded as a fundamental prerequisite to urban quality of life (Section 3.5).

Cultural difference

Statements on how the right to be culturally different (Section 3.5.2) has been implemented in the Ruhr area require analysis of the various waves of immigration, if current developments are to be properly understood. This is because one crucial feature of the Ruhr area is that, since industrialization left the most powerful formative impression on it in the 19th century, it has – consistently, albeit as a function of various surges of growth – primarily attracted male immigration without ever becoming an American-style 'melting pot' (Tenfelde, 2006). Especially during the early industrial phase, inward migrants were initially German speakers (from Westphalia, the Rhineland, Hesse and Hanover), even though skilled labour from other mining regions (Upper Silesia and Harz) was also specifically recruited, followed later on by miners from other European countries (Irish, English, Dutch and Italians). Particularly after 1880, Polish immigrants, too, were, almost without exception, of Prussian origin; few of them were of Habsburg or Russian extraction (Tenfelde, 2006:10).

Looking more closely at the period after 1880 when mass immigration started, four large waves of migration can be identified (Tenfelde, 2006:10ff.). The first wave of primarily Polish immigration brought in more than 450,000 people between 1880 and 1914. However, many Polish immigrants left again during World War I and in the wake of the global economic crisis in 1932, which slashed the number of miners from 550,000 in 1922 to 240,000 in 1932. The 'Ruhr Poles', as they were known, were often perceived as outsiders. Many returned home after World War I or moved on to mining regions in northern France and Belgium. The third that remained quickly assimilated, however, above all thanks to the common ground of the Catho-

lic faith. The Catholic church indeed served as the initial social gathering place in many areas (Klessmann, 1978:187; Matwiejczyk, 2005:14). The Prussian state nevertheless opposed political activities and separatist tendencies as early as the 19th century (Matwiejczyk, 2005:24). Even in the wake of World War I, this led to the founding of Polish clubs and networks, as the Polish community remained excluded from many aspects of public life (Peters-Schildgen, 2005:71). This policy peaked in massively discriminatory measures by Nazi institutions before and during World War II (Kozlowski, 2005:167). During both world wars, prisoners of war, forced migration and forced labour all bore testimony to a contempt for the right to be culturally different.

A second wave of immigration can be identified after World War II and largely comprised expellees from the East and refugees from the German Democratic Republic (GDR). This post-War period was shaped by a huge shortage of skilled labour and attempts to attract workers throughout Germany, as many former miners had died during World War II, while most forced labourers had returned to their home regions.

The third wave of immigration followed as of about 1956. As Germany's 'economic miracle' unfolded and facilitated upward mobility, more and more people preferred to abandon what were regarded as inferior mining jobs and move into higher positions and other industries. As a consequence, southern Europeans were recruited, first from the European Economic Community (EEC) and later from beyond the Community's borders (Italians, then Greeks, Spaniards, Portuguese, Yugoslavs, Moroccans and a number of south-east Asians).

The fourth and final wave of immigration began at the start of the 1960s and essentially involved Turkish nationals, who today account for by far the largest proportion of the region's non-German population. In addition to the Turks, immigrants arrived from eastern Europe and the Middle East (Figure 5.6-6). Even so, the proportion of people with a (more recent) migration background in the cities on the Ruhr is lower, at around 30 % (Hagen: 32.5%; Essen: 24.1%), than in the Rhineland and in cities such as Frankfurt, Berlin and Munich (Zöpel, 2015). After repeated forecasts that the population of the Ruhr metropolis would shrink, the recent influx of migrants since 2013 has qualified these predictions, so that population growth between now and 2040 is believed to be possible.

Although cultural difference has been inherent to the Ruhr area from its inception, numerous examples at the city and city-district level today show that, although the right to be culturally different can indeed be lived out, initiatives across the whole of the Ruhr area are few and far between. During the region's time

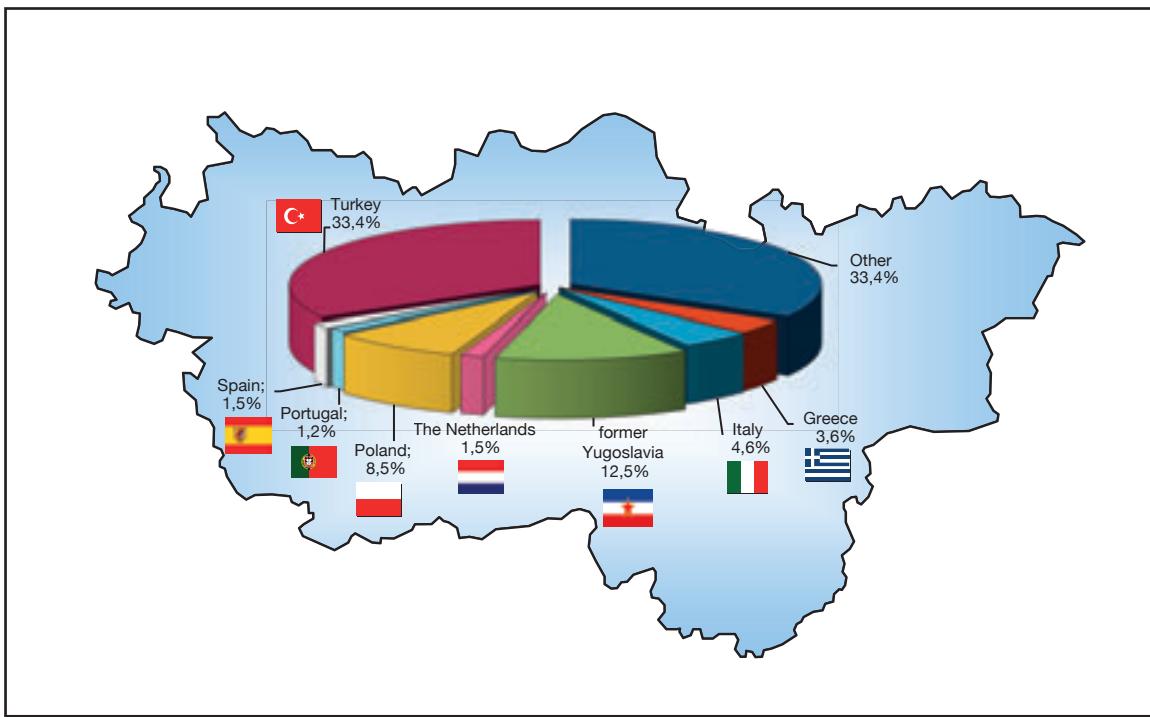


Figure 5.6-6

Foreign residents in the Ruhr Metropolis, by nationality (2014).

Source: Metropole Ruhr, undated b

as European Capital of Culture in 2010, for example, there was one showcase project which, however, was not followed up until a network meeting in 2015 – despite the fact that the Interkultur Ruhr (Interculture Ruhr) platform set up by the RVR is designed to promote the region's identity as a metropolis of diversity, based on a programme which will initially run for two years (Metropole Ruhr, undated).

The theme of the Ruhr's stint as European Capital of Culture in 2010 was 'Change through culture – Culture through change'. Its aim was to promote the region as a polycentric cultural metropolis (Prosek, 2012: 49). Today, the Industrial Heritage Trail, the Ruhrtriennale Festival of the Arts, numerous art associations (Urbane Künste Ruhr, Ringlokschuppen Ruhr, Hartware MedienKunstVerein, Invisible Playground, etc.), theatres in Bochum and Dortmund and the Initiativkreis Ruhr give the region a broad spectrum of cultural initiatives that are indeed helping to establish the right to be culturally different (Saavedra-Lara, 2015: 27).

Urban creative autonomy

The industrial legacy of the Ruhr area had serious consequences for the environment and open spaces. In recent years, however, the structural transition has also transformed the Ruhr into a region with numerous open and recreational spaces, green corridors, new green areas

on former industrial sites, and limits imposed on the loss of open spaces (WI, 2013: 85). Projects such as the Emscher Landscape Park and the renaturation of the Emscher are leading the way in this context (Section 6.3.3). These intergenerational projects are flanked by work groups such as Konzept Ruhr (Concept Ruhr) and Wandel als Chance (Change as Opportunity), which define and monitor shared goals for sustainable development (Konzept Ruhr, undated).

One precondition of urban creative autonomy is first to become aware of the spaces and conditions that could subsequently be changed. Around 1900, the contours of urban and rural spaces became increasingly blurred in the Ruhr area, giving rise to a 'city in-between'. Since then, it has always been difficult to draw clear lines between what is inside and what is outside (Ganser, 1999: 9). Accordingly, companies built housing estates for their workers that are still popular to this day, some of them along the lines of the garden-city model, in order to accommodate the rural background of the region's new arrivals. Later, some of these housing estates were preserved by either the trust agency 'Treuhandstelle für Bergmannswohnstätten' or the regional development agency 'Nordrhein-Westfälische Landesentwicklungsgesellschaft'. In some respects, the housing estates serve as a counterweight to the large housing estates set up at the time as paragons

**Figure 5.6-7**

Duisburg North Landscape Park: a decommissioned but listed industrial site, today used as a public park, for cultural events, sports and a summer cinema.

Source: Thomas Berns

**Figure 5.6-8**

Bringing public spaces back to life: the A40 motorway was opened to cyclists and pedestrians during the Still-Leben ('Still Life') cultural event.

Source: Dieter Schütz/pixelio

of contemporary building design, but which increasingly degenerated into social flashpoints (Hoppe et al., 2010:82). Together with other strictly functional post-War structures, some authors even identify a lack of pleasing aesthetics which became a habitual phenomenon, "keeping aesthetic expectations at a permanently low level" (German quote translated from Rieker and Zimmermann, 2007:46). One decisive part of space production was thus initially fashioned by entrepreneurs and later administered (in part) by government institutions. This was frequently done with the aim of creating attractive housing conditions, although the end product tended to be more functional, particularly due to the shortage of resources after World War II.

To make it easier to find one's way around in the region today, during the International Building Exhibition (IBA), slag heaps were transformed into landmarks (Ganser, 1999:76); these give orientation to the entire area and help the Ruhr area become a "landscape fashioned from graphical symbols" (German quote translated from Ganser, 1999:61). Such artistic landmarks both attract attention and create value on sites – such as slag heaps – that were previously regarded as worthless (Ganser, 1999:146). Other relicts of the industrial past are now being used in a similar manner to reinterpret the Ruhr area (Ganser, 1999:126f.). Plans drawn up by the cultural departments and urban-planning offices, especially in the context of Ruhr 2010, also added or developed creative places such as the 'U-Tower' in Dortmund, the Zollverein Coal Mine Industrial Complex and the Lohberg colliery in Dinslaken (Figures 5.6-7, 5.6-8, 5.6-4).

Alongside these quite highly institutionalized space producers and interpreters, relatively free space producers – using the spaces between old commercial or housing sites – and creative industries can also be

found in the Ruhr area (Kreativ Quartiere Ruhr; Noltemeyer, 2010). In recent years, citizens' action groups have sprung up and petered out again in many places. Examples include a freight yard in Bochum, where one group applied itself to long-term use options in consultation with local government (in the 't.a.i.b' project); the Marienkirche (Church of St. Mary) in Bochum, where the street art scene was able to play an active role; the Viktoria creative quarter (under construction) around what is known as Bochum's 'Bermuda Triangle'; and the 'Hammer Runde' (Hamme aktiv, undated). Similar developments can be seen near Dortmund's 'U-Tower', e.g. 'Die Urbanisten' (The Urbanists) in the vicinity of the 'Union Gewerbehof', an industrial estate, and in the Rheinische Strasse district. In the latter case, a consultation group for urban redevelopment representing citizens, the local administration and local government gave rise to the registered association Rheinische Strasse e.V., which publishes a regular newspaper and has organized work groups.

Notwithstanding, it would appear that a milieu of 'urban creative autonomists' in the Ruhr area is neither fully developed nor effective. This can at least be inferred from the (almost) total absence of region-wide citizens' action groups that see the Ruhr area in its entirety and/or form networks within which producers of space can pool their ideas without state involvement. What is also lacking is the external attraction effect which can trigger conversion effects by facilitating moderate gentrification to achieve a balanced social mix, and transform both neighbourhoods and whole cities into places where people want to come and live. This could make the Ruhr area both internally and externally attractive.

Government-backed exceptions include the Morgenstadt (Tomorrow's City) urban future think-

tank project, organized by the City of Essen and its climate-initiative group, for example, as well as 'Kreativ.Quartiere Ruhr' (Creative Quarters [in the] Ruhr), which seeks to promote stimuli driven by cultural and artistic open spaces (Kreativ Quartiere Ruhr, undated). Clearly, at least some cities in the Ruhr area are interested in citizens' action groups that put their urban creative autonomy to good use, although such groups first have to form, develop and take effect via the traditional corporatist structures. In this context, one recent initiative is the 'Zukunftsrat Ruhr' (Ruhr Future Council), which is taking place during the Ruhrtriennale from 2015–2017. In its capacity as a consultative body, this council encourages collaboration between the local administration, local citizens and change agents, thus acting as a vehicle for sharing ideas about the future and ways to shape it (Nanz and Leggewie, 2016).

Social cohesion

Historical recollections, a special social structure and mentality, as well as recent developments in popular culture have given the Ruhr area a social cohesion that takes the form of a distributed and therefore precarious place identity which to some extent is fed by the imagination of outside sources. 'Ruhr 2010' gave pride of place to the metropolis image, elevating it to the status of a self-fulfilling prophecy, and this is nourished by TV broadcasts (such as local instalments of the popular crime series 'Tatort'), a popstar (Herbert Grönemeyer), comedians and community theatres (such as the Mondpalast in Wanne-Eickel) – and, of course, crowd-pullers such as the Zollverein Coal Mining Industrial Complex, Essen's shopping malls and the Phoenixsee lake. The original sights and sounds encountered here, the Ruhr dialect, the kiosks, corner pubs and, not least, the proverbial football mania are more real than the long-lost insignia of the daily Ruhr-region grind, of pigeon lofts and everything to do with mining (Böll and Hargesheimer, 1958). Yet the mining-country myth of the 'Kohlenpott' (literally 'Coal Pot') and the backdrop of noise and grime lives on – and is regularly dusted off to fuel today's image advertising. In debates about the Ruhr area, the concept of the 'Pott' provides a resilient frame of reference and time horizon, which merges a perceived golden past with a defiant fighting spirit and a subliminal fear of the future (Nellen, 2014:324). In terms of the history of mentality and in ethnographic terms, it remains a moot point whether the mantra-like repetition of locals' down-to-earth nature, egalitarianism, honesty, humour and rugged spirit is sufficient to craft a collective self-image. Two indicators may provide some useful insights on this score: the language and the literature.

('regiolect') or intermediate language, a mixture of standard German and local dialects – illustrates the otherness of a polycentric metropolis with variations at its eastern and western extremities. At the same time, it is a testimony to the region's social cohesion (Ehlich, 1995:22, 27). The communicative value of Ruhr German is rooted in its links to the Ruhr area and its social relevance as the principal means of communication in the context of the Industrial Revolution around the turn of the 20th century (Becker, 2003:26). Historically, both human laziness and industrial noise effectively shortened the language. In addition, migration from within Germany and from abroad led to a mix of different language families, which explains why almost all local linguistic peculiarities can also be found in other regions (Becker, 2003:27; Ehlich, 1995:15, 19; Menge, 2003:224). Although many observers saw linguistic idiosyncrasies which would be regarded as mistakes in High German as evidence of uneducated speakers and class affiliation, Ruhr German – in part due to its use of mining terms – exemplifies a sense of solidarity and is, for active speakers, an everyday sign that they belong here (Becker, 2003:242; Brünner, 1995:123; Ehlich, 1995:10; Menge, 2003:227). Alongside the spoken word, indicators of social cohesion in the Ruhr area can also be found in the written and literary form (Box 5.6-1).

Representative surveys also reveal pointers to an actual and prevalent social cohesion in the Ruhr area. For instance, 82 % of respondents claim to enjoy living in the Ruhr area – above the national average of 75 % (Global Young Faculty, 2015). This is true above all for young people (89 % of the 18–29-year age bracket). Especially clear evidence of social cohesion is the fact that 35 % claim their strongest sense of belonging applies to the wider Ruhr area, with 38 % citing the city and 27 % the city district in which they live (Global Young Faculty, 2015). Despite its minimal administrative and political existence, the Ruhr Regional Association (RVR) aside, the Ruhr area thus assumes almost as important a position as the individual cities, and ranks higher than city districts.

5.6.2.3 Inclusion

In the context of the Ruhr area, substantive inclusion equates to a relatively egalitarian social structure which excludes neither the poor nor minorities from general social, cultural and political affairs. Nor does it enable high-income brackets to set themselves apart in exclusive residential areas. This requires well-resourced local communities which safeguard social welfare and provide healthcare, cultural and other services.

Box 5.6-1**Literature from the Ruhr area: a sign of social cohesion**

In its literary history, the Ruhr area was defined first in terms of its people, then its cultural policy, then its topography and, finally, in collective-symbolic terms. Brephohl's work 'Das Ruhrvolk' ('The People of the Ruhr'; 1920) is believed to be the first text that sees the Ruhr area as a cohesive region – demarcated on the basis of its people – in a literary context. Such isolated depictions aside, the Ruhr area nevertheless initially remained off limits to most *literati* (Delseit, 1995:147). It was thus primarily post-War literature which painted the picture of the region that prevails to this day. The main source here was proletarian literature produced by literary circles such as Dortmund's Gruppe 61 ('Group 61') and the Werkkreis Literatur der Arbeitswelt ('Proletarian Literature Work Group') in the 1960s and 70s.

Erika Runge's 'Bottroper Protokolle' ('Bottrop Protocols'; 1970) is characteristic of this type of literature. Her work brings typical Ruhr themes such as structural transition and work culture together with the political intentions of her interviews in a single text. Runge conducted interviews with 'ordinary people' from the Ruhr area: workers, miners and their family members, people from different age groups. In doing so, she gave a voice to people who – apart from their right to vote – played little part in public opinion building (Wiefarn, 2009: 234).

Jürgen Lodemann's 'Anita Drögemöller und die Ruhe an der Ruhr' ('Anita Drögemöller and the Calm on the Ruhr'; 1975) is also characteristic of the Ruhr area's literary and linguistic identity. It uses the regional hybrid dialect known as 'Ruhr German' as a theme. Given its very frequent use of Ruhr German, the work is not regarded as a social, educational or crime novel, but attains a special status as a novel showcasing the language of the Ruhr and discussing its use (Hallenberger, 2009:223).

One prominent example of contemporary literature is Frank Goosen's novel 'Pink Moon' (2005), which concerns itself with the challenges facing the Ruhr area as its structural transition nears completion. The novel is no longer set in a working-class milieu, but in the leisure society. The Ruhr area motif is not continued in the people, but is upheld by misappropriated industrial buildings that have faded into the background. The "traditional topics are missing, as is the scenery of the Ruhr area, which is now no more than a reified façade, but in no way a historical identity resource for contemporary identity building" (German quote translated from Rupp, 2009: 50). The backward-looking nature of identity building is manifestly out of line with new challenges. In Goosen's novel, values such as neighbourliness and solidarity give way to anonymity and 'single combat' (Rupp, 2009: 49). Like the motifs they use, the Ruhr area's literary genres, too, have changed, revealing a perceptible trend away from social criticism and towards popular fiction (Rupp, 2009: 39).

The collective-symbolic analysis of the Ruhr area's literature also concerns itself with the Ruhr's stereotyping as a purely industrial region. It represents a mix of mining, structural transition, wasteland, media monopoly and football motifs – as, e.g., in Florian Neuner's 'Ruhrtext' collage (2010). These examples substantiate a regional culture which developed outside the educated middle classes, takes up the traditions of the labour movement (including their Catholic traditions), and – precisely in its clichés and through the contempt in which it is held by literary high culture – carves out a distinctive *Eigenart*.

It thus becomes clear that the Ruhr area was certainly seen as a socially coherent region. However, the identity which gave rise to this social cohesion, rooted in an old-style industrial region, lives on today primarily as a memory. Yet there is also a lack of forward-looking self-understanding about what tools might be used to forge social cohesion in the future. Also in literature and its topics, therefore, the structural transition develops via the characteristics that define the Ruhr area.

Substantive inclusion

From the perspective of the 'users' of local government – i.e. local residents – each local authority is responsible for five major areas: labour and the economy; planning, construction, transport and the environment; education, culture and recreation; personnel, organization and finance; and youth, family and social affairs (Krichel, 2008:257). Although substantive inclusion essentially exists in all areas – which is no wonder, given a welfare state oriented towards the social market economy – negative trends are apparent, above all as a consequence of the structural transition and a failure to take precautionary measures such as institutionalizing a balanced budget. These trends are attributable above all to a financial crisis, and changes on the housing market are indicative of this development.

One problem debated again and again in the context of the plethora of municipal tasks is the issue of local government finance. A broad spectrum of tasks often

finds itself juxtaposed with budget deficits at local level. In North Rhine-Westphalia, the main sources of municipal revenue are charges and contributions (fees paid for public services), money from the federal and state governments (allocations) and locally levied taxes (Krichel, 2008:268; Schmidt-Eichstaedt, 2005:47f.). Loans can be another source of revenue (Schmidt-Eichstaedt, 2005: 50).

On a list of the 20 cities and municipalities in North Rhine-Westphalia with the worst financial results in 2007, twelve – Oberhausen, Hagen, Essen, Recklinghausen, Waltrop, Herten, Moers, Duisburg, Datteln, Oer-Erkenschwick, Bochum and Dortmund – belong to the Ruhr area. Evidently, the problem of precarious local government finances is particularly acute in this region (Boettcher and Junkernheinrich, 2010).

Short-term loans are often a key indicator of a fraught financial situation in local government. Normally, such loans are supposed to cover short-term financial bottle-

necks in municipal budgets (ARL, 2010:5) where there are no assets to provide security (Schmidt, 2013). However, some local government budgets now cover their running costs exclusively with such short-term loans (ARL, 2010:5).

The reasons why all Germany's cities and communities are in such a fragile financial predicament are many and varied. The list – with no claim to completeness – includes competition between locations (especially 'tax competition') arising from globalization, expenditure on social welfare, plunging tax receipts caused by the economic crisis, demographic change, and the requirement for local governments to co-finance the cost of reunification (ARL, 2010:7f.).

The right to local self-government should go hand in hand with financial resources that are dimensioned to allow cities and communities to meet the demands placed on them (ARL, 2005:15). Various solutions on the income and expenditure sides could be considered in this regard. One example would be to increase certain taxes which directly affect local government budget accounts (ARL, 2010:16). Local governments could also charge 'users' higher fees (ARL, 2010:16). Financial autonomy quite simply does not exist for local governments in Germany or in the Ruhr area. Ultimately, local governments should consistently be supplied with sufficient financial resources to enable them to properly discharge the full range of tasks guaranteed by the constitution and assigned to them by the federal and state governments.

Social disparities and segregation between city districts (the A40 motorway is commonly referred to as the 'welfare equator') have increased in recent decades. Unemployment figures, the number of recipients of transfer payments, and the volume of jobs at risk have likewise risen (Bogumil et al., 2012:25). In some cases, the financial situation of local governments is disastrous. The number of local governments working with emergency budgets has gone down since 2010, but this has not effectively improved the financial position of most cities. Nor has it created any more leeway to provide those services that would, in turn, benefit low-income households, while placing a decades-long burden on taxpayers, thus tying them down politically. Especially problematic in the context of substantive inclusion is also the fact that the proportion of subsidized housing in the Ruhr area has been in sharp decline (Figure 5.6-9).

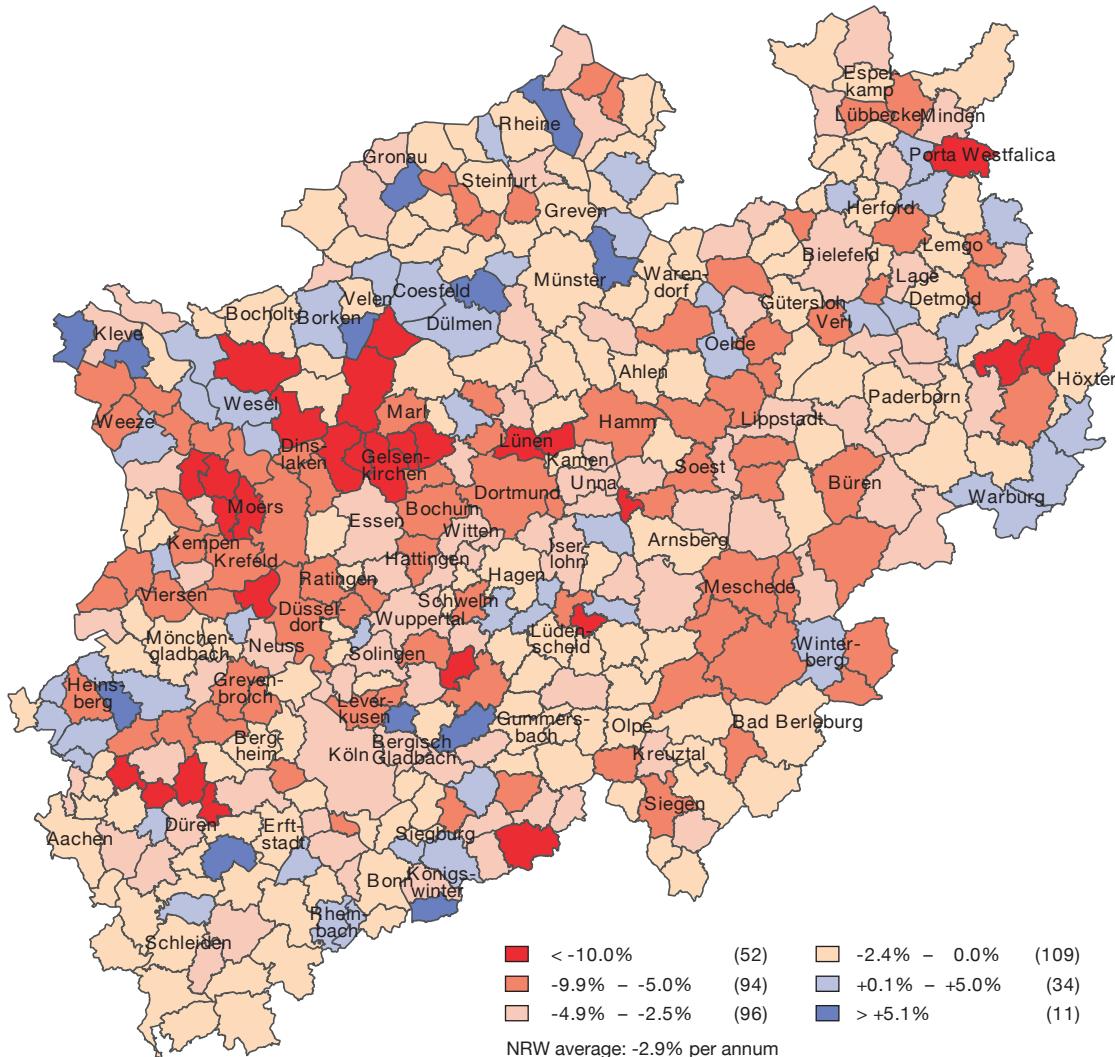
Economic inclusion

At present, opportunities for economic inclusion in the Ruhr area are being shaped by a 'second structural transition' which, despite high immigration projections, is accompanied by demographic shrinkage and sustained

de-industrialization.

The structural transition, with the coal and steel industry at its core, has been in progress since the 1950s. It will come to an end when the last coal pits are closed down in 2018. To date, the transition has been led by the remaining steel companies such as Thyssen-Krupp, power utilities, and consumer-goods retailers like Karstadt, Metro, Tengelmann, Aldi and others, all of which have employed many people (Boldt and Gelhar, 2008:81). Another aspect of economic conversion (or tertiarization) which is of relevance to urban affairs was the transformation of cities in the Ruhr area into shopping towns' with the customary array of pedestrian zones, complemented by huge greenfield shopping malls which, while not integrated into urban development, were easy to reach by motorway and had plenty of parking space. The Ruhrpark shopping centre, situated on the 'Ruhr Expressway' between Bochum and Dortmund, pioneered this development (1964) in a location where there is a lack of high-end private services and luxury offerings. Other malls on the edge of inner-city areas included the Rhine-Ruhr Centre in Mülheim, for example (Heineberg, 2013:202) and, more recently, an array of urban entertainment centres such as the CentrO in Oberhausen on the site of the former Gutehoffnung ironworks. Combining shopping, cafes and restaurants, communication and entertainment in this way had a negative impact on retail businesses in the inner cities and can be seen as an example of pseudo-urbanism: a market function with no public and no meaning to the outside world (Heineberg, 2013:201f.). Since then, attempts have been made to return to the inner cities, as on Essen's Limbecker Platz (Heineberg, 2013:202). The locations of the Ruhrtriennale sites along the Industrial Heritage Trail (IBA) stand for the conversion of manufacturing sites for cultural and creative-industry uses; here, industrial wastelands are now used as cultural venues. Landscape parks (Duisburg, Bochum's Jahrhunderthalle, Essen's Zollverein Coal Mine Industrial Complex and Carl) are likewise intended to trigger investment in the creative industries. However, the press market, the film industry, the advertising market and the music industry are all experiencing sharp declines in revenue, and only a third of them also operate outside the region. Investments in education and healthcare offer better prospects across an infrastructure of state-run and private universities (which has been growing continually since 1965), an equally considerable number of non-university research and development facilities, and all the resultant labour potential in terms of highly qualified graduates (Bogumil et al., 2012:44ff.).

Although these structural changes are taking place, the shrinking jobless rate for the Ruhr area, taken in

**Figure 5.6-9**

Average annual change in subsidized rental accommodation (2009–2012).

Source: NRW.Bank, 2013

isolation, is merely following a general nationwide trend. However, by comparison with the rest of western Germany, the Ruhr area's unemployment rate is higher than the average (Bauer and Otto, 2009: 132).

A further problem arises from the fact that unemployment reflects a clear north-south divide along the 'welfare equator' that is the A40 motorway. Recent decades have seen nascent segregation processes emerging in inner cities across former industrial areas (e.g. the northern part of Dortmund, south-eastern Gelsenkirchen and Duisburg-Hochfeld) or along the outskirts as a result of large, very dense and functionally isolated housing estates (e.g. eastern Dortmund-Scharnhorst and Castrop-Rauxel Deininghausen; Keil and Wetterau, 2013:29).

Political inclusion

Social disparities and financial cutbacks have fuelled political alienation, which is mirrored in a continual decline in electoral turnouts, above all for local government and mayoral elections (Andersen and Bovermann, 2002:23). Voluntary participation has been unable to offset this effect. Generally speaking, the tradition of civil society is underdeveloped in the Ruhr area, as a self-assured middle class was lacking for a long time and the expectation was, and still is, that (local) government would resolve problems and crises. Where civil engagement does exist, it relates to its proponents' immediate vicinity and their own city, but less to the metropolis as a whole. Citizens' action groups that have sought to establish a virtual or formalized 'Ruhr city' have met with only a muted response. Nor did the alleged existence of the 'Ruhri' (a term often used by

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the media in 2010 to designate born-and-bred locals) establish anything more than the folkloric role we have already seen.

From a legal perspective, civil inclusion in government proceedings expresses itself in the form of rights of participation and information. Rights of participation are themselves an expression of the requirement for fair, equitable and transparent administrative processes, which is anchored in basic civil rights and constitutional principles.

In Germany, rights to access government information and participate in decision-making processes are enshrined in the Administrative Procedure Acts (VwVfG) of federal and state governments, large parts of which are identical. The rights of participation (consultation, inspection of files, secrecy) granted pursuant to sections 9ff. of the VwVfG apply solely to participants in administrative procedures, i.e. citizens whose own interests are affected by the issue at hand. Parties to the proceedings can then assert these procedural rights at the local government level in cases where local government is responsible for a decision. This can involve procedures to grant planning permission, restaurant licenses or business licenses, for example. The approval of major industrial and infrastructure projects, for example, is usually the responsibility of federal-state authorities. Since such major projects regularly require public participation, citizens do not need to disclose their own interest in the proceedings in order to assert their right to voice their opinions on the matter. As a general rule, public participation is not restricted to the public in a given municipality, but is open to the whole of Germany.

Over the past 25 years, European Union law has widened citizens' rights of participation to a considerable extent. Sparked off by the Environmental Information Directive in 1990 and in the field of environmental law, and then continued and broadened by international law (Aarhus Convention), the EU's Public Participation Directive 2003/35 and the EU Transparency Regulation (Regulation 1049/2001) have injected a sizeable dose of transparency, participation and control rights into German administrative law. Rights of access to government information are no longer restricted to environmental information. Participation rights and the right to file lawsuits in particular had to be expanded to the benefit of environmental associations. However, these rights of participation are not restricted to local governments and municipal proceedings. Rather, they concern local, state and federal authorities as well as the administrative procedures at each of these levels.

Public participation in drawing up land-use plans

Planning autonomy is of special relevance to areas for which local government is responsible. Local governments (municipalities) underwrite urban land-use planning, i.e. they prepare land-use plans for the entire municipality and development plans for parts of the municipality in the form of statutes. The public must be involved in the preparation of land-use plans. Section 3(1) of the German Federal Building Code (BauGB) states that "the public is to be informed at the earliest possible stage about the general aims and purposes of planning, about significantly different solutions which are being considered for the redesign or development of an area, and of the probable impact of the scheme; the public is to be given suitable opportunity for comment and discussion. Children and young people, too, are part of the public." The public can also voice their opinions on the draft land-use plans, which must be placed on public display (section 3(2) of the BauGB). These rights of participation are flanked by general rights of access to information.

Local government regulations

North Rhine-Westphalia's Municipal Code (GO NRW) also makes allowance for special participation and information options for local residents. 'Residents' are all persons who live within the municipal territory, whereas 'citizens' are only those persons who are eligible to vote in local government elections (section 21 of the GO NRW). The local council must inform residents of all significant local government matters (section 23(1) of the GO NRW). Furthermore, every individual is entitled to address ideas and complaints to the local government (section 24 of the GO NRW). Under certain conditions, residents can also apply for the council to debate and decide on a given matter for which it is legally responsible (section 25 of the GO NRW).

Lastly, again under certain circumstances, section 26 of the GO NRW admits the option of launching a public petition to force a local referendum on a matter, in which case the citizens – and not the council – will decide. The latter instrument is thus a tool of direct democracy. However, public petitions are not permitted for "matters to be decided within the framework of a planning approval procedure or a formal administrative procedure with public participation or an approval procedure pursuant to waste regulations, emissions control law, water legislation or comparable legal matters" (section 26(5) of the GO NRW). In these cases, public participation is already regulated by relevant subject-area legislation. Examples of local referendums held in the Ruhr area include a public petition for the preservation of the Stenkhoff open-air swimming baths in Bottrop (2013) and a public petition opposing par-

Table 5.6-1

Legal basis for different planning levels in North Rhine-Westphalia.

Source: WBGU

Legal norms	Norm setter	Scope of validity	Responsible for planning
Spatial Planning Act (ROG), i.a. also laws such as the Federal Highways Act (FernstrG) and the Energy Industry Act (EnWG)/Act on Measures to Accelerate the Expansion of the Electricity Grid (NABEG, for line planning and VHVs)	Federal government	Federal territory	Federal government
State planning laws: NRW's State Development Plan and Programme (LPIG NRW)	State government	State territory	State government
Regional plans	State government	Region	RVR in the Ruhr area
Preparatory land-use plans, land-use plans pursuant to the Federal Building Code (BauGB), emissions-control law, water legislation, waste regulations, soil-conservation law, mining law, nature-conservation law, etc.	Federal government	City/municipality	Local government

tial redevelopment of the exhibition centre in Essen (2013). A total of 683 public petitions were initiated in North Rhine-Westphalia from 1994–2014, of which 251 were invalid. However, 191 of them led to referendums (Bilanz Bürgerbegehren NRW, 2015).

Planning levels that influence urban planning

Urban planning is central to the self-administration tasks of local governments. Public construction law is enacted by federal and state legislators, however (Table 5.6-1). Urban construction law is assigned to federal law, while the building code is part of state law (Battis et al., 2014). Spatial-planning law, too, is a part of federal law, while Germany's federal states enact their own state planning laws (Battis et al., 2014). Based on this legal foundation, local governments prepare land-use plans for the whole of their municipal territory and development plans for parts of the municipality in the form of statutes.

In the Ruhr area, urban planning proper takes place at the municipal level but is exposed to many different influences. At the federal-state level, the Rhine-Ruhr Metropolitan Region features in the existing state-development planning for North Rhine-Westphalia. At the regional level, the Ruhr Regional Association covers only part of this area with its own plans. Moreover, in this partial area, individual cities have joined forces to form an even smaller planning community for the regional land-use plan. The relationship between the Ruhr Regional Association and the designated Ruhr

City Region in particular raises questions about the delimitation of powers (Reimer, 2008). It should also be noted that intermunicipal cooperation is practised at the planning level in the Ruhr area, a circumstance which suggests that the region has recognized and is addressing the problem of parochial policy-making.

5.6.3

Transforming a polycentric urban region in structural transition

How can the Great Transformation – comprehensive transformation in keeping with the planetary guide rails – succeed in the Ruhr area while simultaneously advancing the causes of environmental sustainability, *Eigenart* and inclusion? The Ruhr area is a post-coal-and-steel urban settlement space where no single epicentre ever emerged. This fact can now be beneficial to the ongoing development of the region's settlement space. Polycentric structures can, for example, be an advantage when it comes to external influences and threats. They can lay a firm foundation for self-regulation and the co-production of public goods and services (such as healthcare), i.e. by distributing responsibilities and competencies in a mutually beneficial way, on condition that functioning cooperation structures are in place.

It is reasonable to assume that both change agents and effective polycentric governance constitute neces-

Box 5.6-2

Act to Strengthen the Ruhr Regional Association

What this section refers to as the Ruhr area consists of those independent cities and districts which, in accordance with Section 1(1) of the Act to Strengthen the Ruhr Regional Association (RVRG), together form this association (RVR). The Ruhr area is thus made up of 53 municipalities (Figure 5.6–10) which, on the next-highest regional level, break down into four districts and eleven independent cities.

Whereas other cities and counties in North Rhine-Westphalia are organized at the regional level as what are known as area associations (Landschaftsverbände) in order to handle certain public tasks (in social welfare and culture, for example), the geographically delimited Ruhr area has a special status due to the way the Ruhr Regional Association (Regionalverband) is organized. What used to be the Siedlungsverband Ruhrkohlenbezirk (Ruhr Coal District Housing Association; SVR, 1920–1979) became the Kommunalverband Ruhrgebiet (Ruhr Region Municipal Association) in the late 1970s (KVR, 1979–2004; Becker and Winkel, 2013). The KVR then became the Ruhr Regional Association (RVR) in 2004. This latter association comprises the independent cities of Bochum, Bottrop, Dortmund, Duisburg, Essen, Gelsenkirchen, Hagen, Hamm, Herne, Mühlheim/Ruhr and Oberhausen and the districts Ennepe-Ruhr-Kreis, Recklinghausen, Unna and Wesel (Section 1 of the RVRG).

In its capacity as a public corporation (Section 2(1) of the VRVG), the RVR is a legal entity under public law and thus the autonomous holder of rights and obligations. At least until the most recent legal amendment, it was a special-pur-

pose association with a special statutory status (Becker and Winkel, 2013). Besides promoting business and tourism, the RVR initiates projects such as the Emscher Landscape Park (RVR, undated).

The Act to Strengthen the Ruhr Regional Association was ratified by the North Rhine-Westphalian state parliament on 29 April 2015 and became law on 19 May 2015. The new law introduced a number of important changes. The RVR was given a wider range of options to assume voluntary tasks, including the initiation of and involvement in significant regional cooperation projects (Section 4(2), sentence 1, no. 1 of the RVRG); promotion of the mitigation of climate change; the use of renewable energy and the drafting of regional energy and climate-change-mitigation projects; the planning and implementation of projects to recover and use mine gas; transport development planning and local public transport planning; support for the European idea; and networking in the context of local government's European activities (Section 4(2), sentence 1, nos. 4–7 of the RVRG). The RVR's temporary oversight of local affairs for member organizations is now no longer restricted to certain areas (Section 4(6) of the RVRG).

Section 14a of the RVRG, a new provision, introduces the Municipal Council, which is made up of the chairpersons of member organizations' representative bodies. The Municipal Council serves as a link to the members and advises the institutions of the RVR. Compulsory membership was controversial and was excluded, however. Pursuant to Section 3 of the RVRG, organizations have the option of terminating their membership.

Section 2 of the Strengthening Act, which provides for direct election of the Regional Association's General Assem-



Figure 5.6-10

Municipalities in the Ruhr area

Source: Regionalverband Ruhr, undated b

bly by local citizens, came into force on 1 January 2016. Section 10(1) of the RVRG, which then also applied, sets the number of members at 91, all of whom are to be elected by general, direct, free, equal and secret ballots for a period of five years. The introduction of direct elections makes the RVR an organization for which there is no precedent in Germany. Moreover, given this aspect of direct democracy, it may no longer qualify for classification as a special-purpose association with a special statutory status (Oebbecke, 2014). Constitutional concerns regarding direct election could arise from

the RVR Assembly's function as initiator of regional planning pursuant to Section 6 of North Rhine-Westphalia's State Development Plan and Programme (LPIG NRW). If the Assembly does not consist of representatives of municipal institutions, this could violate the right of local self-government (planning authority) guaranteed by Article 28 of the German Basic Law (GG) and Section 78(1) of North Rhine-Westphalia's State Administrative Procedures Act (LVerf NRW; Oebbecke, 2014).

sary conditions in order to make environmental sustainability, *Eigenart* and inclusion fully viable for the future.

5.6.3.1

Change agents

Agents of change and social innovation exist throughout the Ruhr area. In many cases, the only thing they lack is support and self-efficacy. Especially in cultural policy, the transport sector and the mitigation of climate change, decentralized cooperation is still underdeveloped. Too little use is made of the polycentric structure which could facilitate a healthy balance between cooperation and competition. Notwithstanding, the fact that effective agents do indeed exist is evidenced by numerous examples (Chapter 6; Reicher and Leggewie, 2016).

5.6.3.2

Polycentric governance and master plans

A polycentric order is "one where many elements are capable of making mutual adjustments for ordering their relationships with one another within a general system of rules where each element acts with independence of other elements" (Ostrom, 1999:57). Up to now, however, the "general system of rules" has appeared too weak in the context of polycentrism, giving rise to excessive parochialism. It can therefore be taken as progress that, since the enactment of a new state law in April 2015 (Box 5.6-2), the territory overseen by the Ruhr Regional Association has been a single administrative district, having previously been merely a "cooperative and coordination association with no territorial sovereignty" (German quote translated from Grawert, 2012). Headquartered in Essen, the Ruhr Regional Association already played an active role as the regional planning authority for the Ruhr metropolis. Its primary mandate is to develop business and tourism and to handle public-relations work. In collaboration with municipal partners, it also operates seven district parks and leisure parks and gathers geographic and climatic data about the region, which it processes on behalf of member municipalities. For the first time,

the new RVR law now provides for direct election of the Ruhr parliament by more than two million citizens. If the region-wide governance structure created by the new law proves successful, the plan is to intensify region-building endeavours and revive the concepts of a Ruhr city which have been discussed repeatedly since the 1920s.

The transformative governance into which the Ruhr Regional Association must now breathe life is also tasked with embedding change agents into master plans that make due provision for polycentrism, to increase their self-efficacy and to lend form and coordination to the extensive process of change. One initial touchstone in this context is the new Ruhr Regional Plan, which must establish a polycentrically meaningful system of rules, while at the same time granting sufficient freedom to the agents of change and the individual cities.

Planning for the Emscher conversion, an infrastructure project with a volume of around €4.8 billion which began at the end of the 1980s and will run at least until into the 2020s, demonstrates that this kind of region-wide transformation planning can work in the long term. The new-look Emscher valley will provide opportunities for recreation, cultural dialogue, a chance to combine living and working on the waterfront, economic development, and renaturation with an increase in biodiversity (Section 6.3.3; WI et al., 2013; Emscherlandschaftspark, undated).

5.6.4

Conclusions

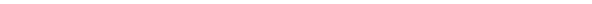
The Ruhr metropolis has three options. It can a) soldier on with business as usual, i.e. persisting with industries which are increasingly unprofitable on the global market, anachronistic from a climate and environmental perspective, and still in need of industry-policy subsidies; or b) focus on creative industries, the Internet of Things, and on expanding its service sector; or c) tread the alternative path of 'green' reindustrialization, which would help protect both the climate and

the environment while also aligning with the region's distinctive *Eigenart*.

A whole series of plans to protect the environment and mitigate climate change in individual cities provide powerful evidence and compelling scenario arguments for the latter course of action, as do region-wide initiatives. This transformation strategy implies making a neo-industrial virtue out of a heavy-industry necessity by turning the Ruhr metropolis into a workbench for a wide range of technologies for using renewable energy, by promoting superior resource and energy efficiency (i.e. highly efficient low-carbon industries), and – the most serious omission hitherto – by developing a sustainable traffic and transport structure.

If this neo-industrial core of the Ruhr metropolis were above all to deliver skilled jobs and solid income opportunities – in other words, if it ensured substantive inclusion – then the potential inherent in its polycentric structure could be realized, thereby promoting a functional division of labour between its urban segments in a better way than has been done in the past. In terms of their social structure and in socio-cultural terms, the individual cities could each retain, develop and reinvent their own *Eigenart* (and become more attractive to the outside world), especially if the economic development and industrial policy pursued by the cities and communities in the Ruhr Regional Association no longer seeks to provide all functions, but rather focuses on strengths in the fields of industrial production, the creative industries, green logistics, healthcare and other services, knowledge production, local recreation areas, and the region's standing as a bastion of sports. At the same time, region-wide projects, like the 'new Emscher' and the 100-kilometre cycle expressway, must be advanced, ideally rolling back private transport with a view to fulfilling the vision of zero emissions, and replacing it with traffic concepts aligned with the region's polycentric nature.

A fragmented and underused polycentrism could thus evolve into a post-coal-and-steel model region which is well-connected in Europe and can, in addition, demonstrate the transformation of old industrial cities and metropolises. In the production structure, polycentrism promotes a regional division of labour, and strengthens the *Eigenart* of urban segments (both culturally and in terms of their social structure) as well as the diversity of the entire metropolis. From an environmental perspective, polycentrism creates green areas, climatic cooling zones and opportunities for agricultural micro-production and small-scale production. In the political arena, it spawns opportunities for local inclusion in the political shaping of the metropolis in its regional, national and European context.



5.7

Kigali: post-conflict city in Sub-Saharan Africa

5.7.1 Introduction

The Rwandan capital of Kigali is a medium-sized, fast-growing city in Sub-Saharan Africa where some innovative and improvised solutions have been found for urban problems. Despite the 1994 genocide and significant socio-economic problems, Kigali has developed into a functional city: i.e. in many areas, structures have been designed that make the city liveable, even though it is informally organized to a large extent. Kigali is a city of contrasts. It is an economically fast-growing city with declining poverty levels, but major income disparities. It is characterized by urban sprawl and lies in one of the most densely populated countries in Africa.

Over the last two decades, Kigali has succeeded in promoting a positive economic development with limited financial resources, while simultaneously establishing ecological awareness. The plans of Kigali's local government are exemplary in demonstrating how both poverty reduction and environmental protection might be effective in a mutually complementary way. The implementation of this urban planning is still at an early stage. Although major challenges – such as the fight against absolute poverty and AIDS – still lie ahead, the city administration's goals reveal clear visions for an ecologically sustainable Kigali. The successful implementation of the first transformative steps shows that a road to sustainability is possible in urban areas despite existing adversities. In Kigali, this development has generated positive side-effects in the sphere of *Eigenart*; for example, freed-up surfaces in the newly established pedestrian precinct are used by artists. The aim is for the city to attain an identity as a sustainable city and not only to be associated with the genocide. However, urban development is controlled by the government in an authoritarian way; freedom of opinion and political pluralism are severely restricted in Rwanda.

5.7.2 Eigenart in Kigali

5.7.2.1 Post-conflict city

Rwanda had been wracked by civil war since 1990, and in 1994 this culminated in extreme violence when up to a million people were murdered within a few months. Kigali took central stage in this genocide. There were massive refugee movements. In the second half of the 1990s, the capital was still dominated by violence and insecurity (Goodfellow and Smith, 2013). Millions of refugees returned to Rwanda, especially Kigali, so that the capital grew rapidly. Despite the considerable challenges, the city did not develop into a chaotic and violent place, but established itself as one of the safest cities in the region, unlike other cities that “become sites of enduring violence after war has ended” (Goodfellow and Smith, 2013). After the return of refugees from abroad, perpetrators and survivors of the genocide often lived in the same buildings. Because the number of perpetrators was so high, and to take pressure off the national courts, public courts – so-called Gacaca Courts – were introduced from 2005 to 2012 with about 260,000 lay judges. The aim was to come to terms, in public, with what had happened and to achieve atonement and reconciliation. The Rwandan government under President Paul Kagame, who has been in office since 2000, pursues a policy of reconciliation, while at the same time fighting extremist Hutu rebels operating from Zaire. This threat, together with the experience of the genocide, is often used to explain the Rwandan government’s authoritarian style of leadership. All critical opposition to the ruling party of the Rwandan Patriotic Front (RPF) is suppressed. Still today, freedom of opinion is also severely restricted. Rwanda remains an unfree country, and Kigali is a city where political inclusion is very limited (Amnesty International, 2015a; Freedom House, 2015).

Not least as a result of the international community’s failure to stop the genocide, Kigali has received a lot of financial support for reconstruction. For example, as early as the second half of 1994, some US\$1.4 billion was donated by the international community as emergency aid (Goodfellow and Smith, 2013). From 1999 to 2009, development aid accounted for 19 % of Rwanda’s gross national income (Goodfellow and Smith, 2013). This inflow, some of which was disbursed directly as budget aid, consolidated the RPF’s political autocracy. Many infrastructure projects were funded in Kigali, which contributed to a higher level of prosperity in the city compared to the rest of the country (Goodfellow and Smith, 2013).

Kigali’s economy is dominated by the informal sector. In addition to the usual small-scale traders, even up-and-coming sectors like house-building and furniture manufacture are informally organized in the East African city. The informal businesses are growing in size (Haeflinger, 2014). In many African countries, the informal sector accounts for about half of their economic output. From a strictly economic perspective, it is considered less productive than the formal sector, since it frequently involves an exchange of services based on social relations (Haeflinger, 2014). Similarly, the relations between the informal economy and state institutions are many and varied and characterized by mutual services, loyalty and ethnicity. The number of employees in the informal sector in Africa is growing in many countries of the region.

Another peculiarity of Kigali is the switch from French to English as the dominant official and teaching language in a relatively short period of time. The national language is Kinyarwanda; the official language was French until 1994 (Rwanda was a Belgian colony). The return of English-speaking Rwandans from exile in Tanzania and Uganda has led to English being used more and more as an official language in the last few years, although both English and French have been official languages since 2003. In some cases this means, for example, that francophone Rwandans have problems at Kigali’s universities, which today teach largely in English.

5.7.2.2 Population development

Kigali has developed into a major city within a century, and it continues to grow. It is located in the middle of the ‘Land of a Thousand Hills’ (Pays des Mille Collines), in a region with the climatic characteristics of tropical savannah. The city was founded in 1907 by the German Africa explorer Richard Kandt in the former colony of German East Africa. Fewer than 500 people lived in the region at the beginning of the 20th century. The population only increased slowly in the period up to Rwanda’s independence in 1962. As late as 1974, the city’s surface area was only about 4 km²; by 2012 it had risen to 93 km², involving considerable urban sprawl. The administrative territory of Kigali City Province was extended to 730 km² in 2006, although this also includes the city’s rural periphery.

Kigali’s population increased seventeen-fold between 1970 and 2000 (Figure 5.7-1). Apart from the original colonial structures, the settlement of Kigali and its urban design was unplanned. A land register was not started until 2002; up to now approx. 10 % of all plots of land have been registered (Ilberg, 2009). The urban population has risen rapidly over the last twenty

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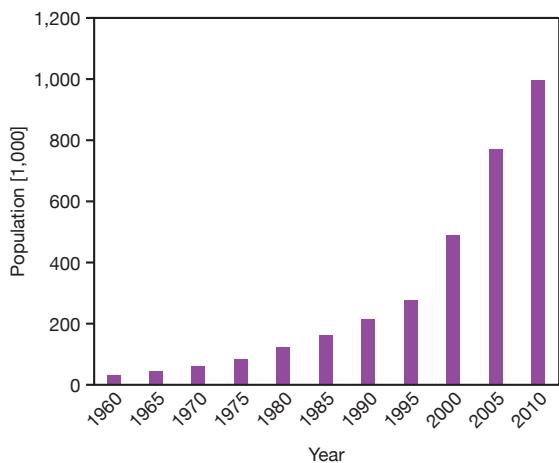


Figure 5.7-1

Population growth in Kigali (1960–2010).

Source: REMA, 2011

years. In 2002, about 600,000 people were living in the capital; in the meantime, Kigali is a million-strong city whose population is growing at a rate of around 4 % per year. With over 1.2 million inhabitants, it is the biggest city in Rwanda and home to about a tenth of the total population. By 2025, Kigali is expected to have between 2.3 and 2.9 million inhabitants; by 2040, estimates put the population at between 3.5 and 5 million inhabitants (City of Kigali, 2013a). A total of about 17 % of Rwandans currently live in cities (Republic of Rwanda, 2012a). After Mauritius, Rwanda has the highest population density in Africa; in Kigali it is 1,552 inhabitants per km² (Republic of Rwanda, 2012a). This is a relatively small figure and a result of urban sprawl. Kigali's population is young: the average age is 22 (Republic of Rwanda, 2012a). Now that many Rwandans have returned from the neighbouring countries, refugees do not play a major role for the capital at present. Only 3 % of the 74,000 refugees, most of whom come from the Democratic Republic of Congo, live in Kigali. In view of the ongoing tensions in the region, however, Rwanda could remain or become an important destination and transit country for migrants.

5.7.2.3

Challenges of urban development: population growth and urban sprawl

Kigali's rapid population growth – a result of high birth rates and migration from rural areas – represents a challenge to the urban infrastructure and to development. Since the colonial period, there has been no comprehensive plan for urban development and therefore no structured spatial growth (Kigali City Government, 2006). The lack of an urban-planning administration has led to an uncontrolled, informal urban sprawl with-

out basic infrastructure (Figures 5.7-2, 5.7-3).

If the urban-sprawl trend and growth rates continue, the city's area could expand to about 5,000 km², i.e. approx. 20 % of Rwanda's total surface area (Government of Rwanda, 2011). Such an uncontrolled urban expansion would have negative effects on the region's ecosystems. The doubling of Kigali's population between 2002 and 2010 already led to large areas being deforested by mostly informal settlements and subsistence agriculture, with negative consequences for the once abundant biodiversity. Furthermore, many informal settlements were built on landslide-prone steep slopes in the hilly landscape, which are particularly vulnerable to heavy rain. The example of drinking-water access shows that the development of infrastructure provision is not keeping pace with population growth. In Kigali it fell slightly from 84.8 % to 82.7 % between 2005 and 2012, while rising by about 4 percentage points on average nationwide (Republic of Rwanda, 2012c). Similarly, there is no centrally managed waste and sewage system. Moreover, the urban sprawl also makes it difficult to develop an efficient public transport network.

5.7.3

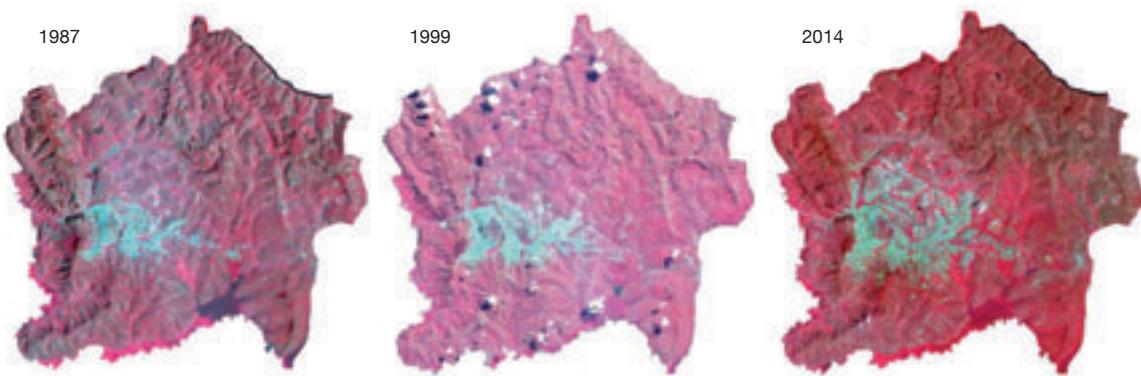
Sustaining the natural life-support systems in Kigali

Rwanda is pursuing a climate-friendly development paradigm, attempting to give renewable energy priority over fossil fuels and thereby leapfrog the carbonization of the domestic economy. For example, the Rwandan government wants to promote access to electricity primarily by using renewable energy sources. In 2008, the city of Kigali won the UN Habitat Scroll of Honour Award for these objectives and the urban implementation of the first transformative steps. The main reasons given for the award were the improved waste disposal, the zero-tolerance policy towards plastic waste, and an improvement in the security situation (UN, 2008).

5.7.3.1

Energy profile

The capital city of Kigali accounts for about 70 % of Rwanda's total demand for energy. 60 % of Kigali's electricity production is based on diesel generators, the rest is generated by hydropower. Since less than 4 % of Kigali's population (about 30,000 according to 2005 figures) is connected to the public grid, most people meet their energy requirements by burning biomass (wood, peat or charcoal) for cooking and heating. This results in respiratory diseases caused by air pollution, in some cases also indoors (Section 5.7.3.2).

**Figure 5.7-2**

Kigali's spatial expansion.

Source: Rema, 2011

Although burning wood is officially prohibited in Rwanda, overall some 85 % of primary energy consumption comes from biomass (Pigaht, 2009). Average CO₂ emissions are very low in Rwanda: 0.65 tonnes of CO₂ per capita per year nationwide. No data are available on CO₂ emissions for the city of Kigali. But since a large proportion of resource consumption can be traced back to the capital, it is likely that the per-capita figure for Kigali is somewhat higher.

At present, power generation in Rwanda falls well short of demand; at the same time, the performance of the hydropower plants has been badly affected by severe droughts in the last few years. The outdated – and in some places non-existent – power grid in Kigali leads to frequent power failures. This network instability inhibits economic growth. The supply of energy services can be expected to deteriorate under the influence of population growth. To counteract this risk, targets for improving the power supply were defined in 2000 in the 'Vision 2020': the aim was to give 35 % of the Rwandan population access to electricity by

2020 (Republic of Rwanda – Ministry of Finance and Economic Planning, 2000). At the same time, an electrification rate of 30 % was the target for rural regions. These targets were revised upwards in 2012: 70 % are to have access to electricity by 2017. Currently, though, the growth rates do not match this objective. Another aim is to reduce the proportion of energy produced by burning wood fuels to 40 %. The expansion of renewable energies is therefore a priority. The target for total installed capacity is 1,170 MW, made up of 340 MW from hydro energy, 310 MW from geothermal energy, 300 MW from natural gas and biogas, 200 MW from peat-based energy, and 20 MW from diesel power stations (African Development Bank, 2013). Reaching these goals will require investments of US\$500-700 million per year – US\$200 million per year to come from the public sector and the rest from the private sector (AfDB, 2013; Stopforth, 2013).

5.7.3.2

Local challenges and risks

Outdated or non-existent infrastructure and housing shortage

Public infrastructure development and residential construction cannot keep pace with population growth (Table 5.7-1). The land prices in Kigali have also risen sharply as a result of population growth and economic development.

In view of the growing population, 344,000 new residential units will be needed by 2022. Up to now, only about 1,000 have been built per year. The city administration itself estimates the deficit at 30,000 homes a year. Two thirds of the housing units are needed by households with an income of less than 200,000 Rwandan francs, i.e. about US\$300 per month. A two-room apartment in a planned, new residential complex currently costs at least US\$172,000 – about a hundred

**Figure 5.7-3**

Urban sprawl in Kigali.

Source: beccacantpark/flickr

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Table 5.7-1

Kigali households' access to basic infrastructures.

Source: UN-Habitat, 2013a:61

	'Improved access' to drinking water [%]	Tap water [%]	Sanitation [%]	Telephones [%]	Mobile phones [%]	Electricity connection [%]
1992	52.0	6.5	50.2	-	-	36.0
2011	93.1	34.1	94.8	2.2	87.3	65.6

times an average Rwandan's annual income (Rosen, 2015). Especially the necessity of transporting foreign materials over land makes building expensive – Rwanda is a landlocked state and is situated approx. 1,000 miles from the coast. Many materials have to be transported at high cost by truck from Kenya. One challenge for residential construction is the fact that firing bricks is prohibited. The ban was introduced to limit forest clearance for firewood. Conflicts over access to firewood had worsened ethnic tensions before the genocide.

The construction of several residential complexes is to be launched in the next few years; they are to be made affordable by subsidies. Kigali's mayor, Fidele Ndayisaba, has announced that road access, water connections, electricity supply and sewer systems are to be subsidized. A new three-room apartment should then cost approx. US\$ 30,000 (Rosen, 2015). Raising a mortgage for such an amount is de facto impossible for residents of the poor settlements.

Many slums, where the rent is only about US\$ 20 per month on average, are to be demolished or modernized. Due to the lack of alternatives, this means eviction for a large proportion of the inhabitants. Around 80 % of Kigali's population live in informal settlements without official land rights. A quarter of Kigali's population lives in extreme poverty.

Waste

Kigali is regarded as one of the cleanest cities in Africa (Mourby, 2015). Nevertheless, like many other cities that have grown unplanned, Kigali's waste management is poor. The amount of waste generated has risen about fourfold to about 2,000 tonnes a day since 2007 (REMA, 2011, 2013). Only a quarter of that is transported to a landfill. The peripheral city districts have no systematic collection scheme. The Nyanza landfill site, which has been used for the past 30 years, was not properly secured and severely overfilled. Only about 100 tonnes of waste were dumped there every day. The landfill was closed in 2012 because fire and toxic smoke were damaging the surrounding settlements and soil. According to the city's master plan, a park is to be built on the site at a later date (REMA, 2013). A new land-

fill site has been opened further from the city centre.

More than 30 % of households dispose of their waste illegally in the surrounding areas (REMA, 2013); the improper disposal of chemical industrial waste has already damaged the urban wetlands. Waste is not separated, although a large proportion of household waste would be compostable. The recycling industry is exclusively informally organized.

As the level of development rises, electronic waste – which currently only constitutes about 1.5 % of total waste – represents a growing problem. Especially the pollution caused by heavy metals when e-waste is improperly disposed of or recycled can damage human health and the environment. The introduction of a comprehensive urban waste-management system has failed up to now because of a lack of the investment necessary for transporting, recycling and recovering waste. The under-funding of the basic infrastructure is a problem for urban development in several sectors, and could also hinder the introduction of renewable energies.

Sewage

Kigali has no centralized sewage system. Only about 1 % of the sewage is treated. 60 % is collected in pit latrines: each latrine is shared by an average of about 19 people (OZ and City of Kigali, 2008). Since in Kigali these are often located on steep slopes affected by erosion, surface runoff is often contaminated. In some cases, the groundwater is also at risk from the improper installation of pit latrines. Shared use, often without facilities for disinfecting hands, creates health risks (OZ and City of Kigali, 2008). About 8 % of the sewage, including that from several state institutions such as schools, hospitals and prisons, is discharged untreated into rivers and wetlands. Industrial wastewater is not treated and contaminates surface and ground water as well as the wetlands in the city's hinterland (OZ and City of Kigali, 2008). Urban growth will further aggravate this problem. Wastewater treatment is urgently needed in order to reduce health risks and protect wetlands and rivers.

The Rwandan government issued a ban on plastic bags in 2008. The law is enforced so strictly that even visitors arriving from abroad have to hand in their plas-

tic bags at controls in the airport. Although plastic bags are sporadically sold on the black market, the ban is observed. This example shows that even in an economically difficult situation it is possible to enforce reforms for sustainable development – and even to take on a pioneering role.

Mobility and transport

The doubling of Kigali's population within about a decade has led to serious traffic congestion and a deterioration of the transport system (Republic of Rwanda – Ministry of Infrastructure, 2012). A rapid expansion of the transport network is required in order to at least partially meet the growing demand and prevent a chaotic traffic situation. Yet only about 6 % of Kigali's population own a car; more than half regularly use public transport (City of Kigali, 2013b). The number of cars and car owners as a percentage of the population is growing steadily. For example, the total number of registered vehicles, such as private cars, trucks and motorbikes, increased from 30,550 in 2005 to 80,642 in 2009 (Nsengimana et al., 2011). The rising number of private cars is not perceived by the city administration as a positive growth indicator but as a problem, because of the increased traffic congestion and air pollution (City of Kigali, 2013b). Some of the roads in Kigali are unpaved (City of Kigali, 2013b). Furthermore, power failures interrupt traffic regulation by traffic lights, which, in turn, impairs road safety and causes traffic jams and a higher level of particle pollution.

Local public transport is based partly on a formal bus system, partly on buses that operate informally. In addition to different types of buses, there are taxis and motorcycle taxis (Figure 5.7-4). The central business district was declared a car-free zone in 2015 (Tashobya, 2015). The intention of this reform is to free up further public spaces, reduce CO₂ emissions and air pollution, and create a place for artists (Tashobya, 2015).

About two thirds of the urban population have to walk quite long distances (more than 20 minutes) to reach public transport. Restricting the distance to the nearest access point to 500 metres, only 37 % of the demand for public transport is covered (Niyonsenga, 2012). This situation increases transport costs and thus the cost of living. The city administration's target in the development of the transport system is a 70:30 distribution in the use of public and private transport (City of Kigali, 2013b). The bus network in particular is to be strengthened to achieve this. Like most African cities, Kigali is a city of pedestrians, where pavements are almost completely missing. Kigali's hilly topography limits the use of bicycles (Henninger, 2013).

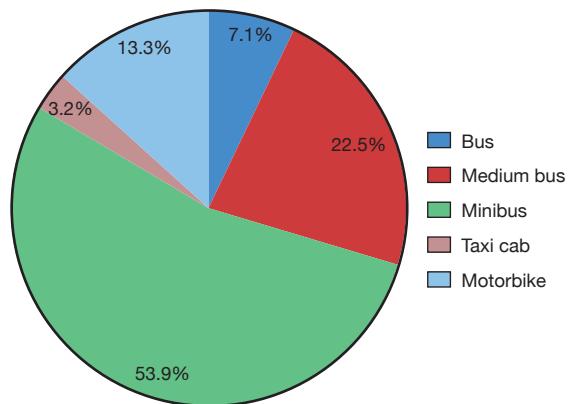


Figure 5.7-4

Local public transport in Rwanda by means of transport.
Source: Republic of Rwanda – Ministry of Infrastructure, 2012

Air pollution

In Kigali, as in many other African countries, open wood or charcoal fires used for cooking have a negative impact on the air quality, especially indoors. In addition, the increase in motorized transport and its exhaust gases from engines without catalytic converters or particulate filters generates serious pollution of the outside air (Figure 5.7-5). Residential areas on the valley floors in the hilly landscape are particularly susceptible to persistent air pollution resulting from the following anthropogenic sources: ash (25 %) and kerosene from cooking fires (13 %), as well as diesel soot from diesel engines (29 %; Henninger, 2013). Irrespective of the time of the day, particulate pollution in Kigali far exceeds the requirements of the World Health Organization, sometimes considerably (Henninger, 2013).

In addition to air pollution, there has been a significant increase in the mean temperature since the 1970s (Figure 5.7-6). In Kigali, this trend is even more pronounced than the national average rise in temperature, so that an enhanced urban heat-island effect is to be expected (Henninger, 2009). However, this effect has not yet been sufficiently studied for Kigali.

In the light of this development, the city administration has recognized that more green spaces and parks must be created (e.g. in school playgrounds; City of Kigali, 2013a).

5 Cities in the global transformation process

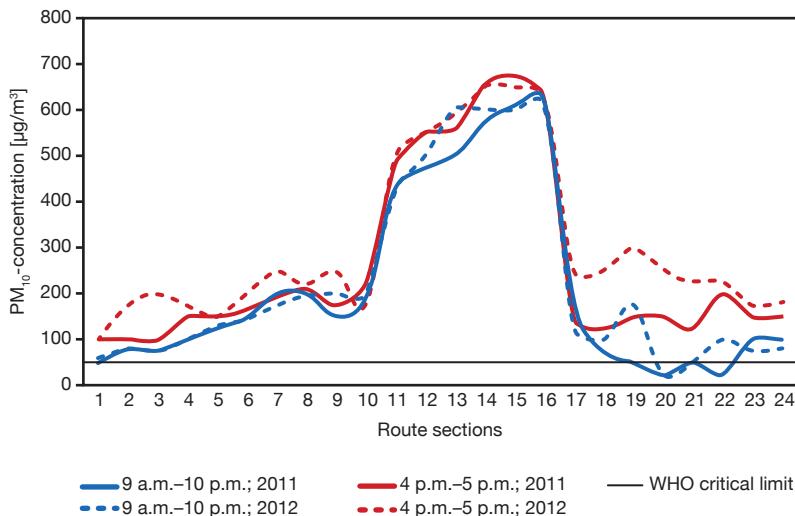


Figure 5.7-5

Pollution with fine particulate matter in Kigali. Average levels of air pollution on various stretches of road at different times. Solid black line: WHO guideline value.
Source: Henninger, 2009

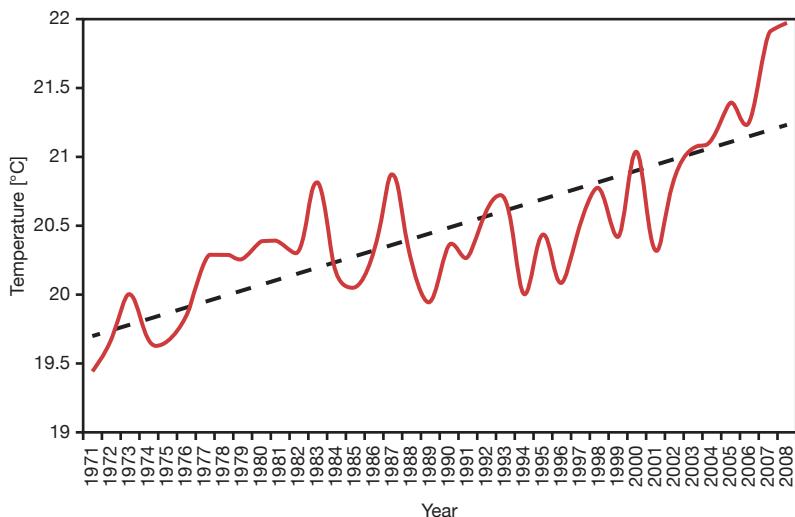


Figure 5.7-6

Temperature trend in Kigali (1971–2008).
Source: Henninger, 2009

5.7.4 Inclusion in Kigali

5.7.4.1 Political inclusion and urban governance

The Rwandan Patriotic Front under President Paul Kagame governs the country autocratically, suppresses the opposition and prosecutes people for making critical statements. State control forms a close mesh and is part of the administrative structure. Kigali is divided into three administrative districts: Gasabo, Kicukiro and Nyarugenge. They are each divided into 32 sectors and 161 cells. The cells are divided into 1,061 Imidugudu Committees, each of which comprises about 100 households. This structure also informally contains Nyumba-cumi positions, each supervising about 10 households (Goodfellow and Smith, 2013). These structures make it possible to control the population. Inclusion in urban

life and contributions to the common good are compulsory. This is achieved with the strictly monitored 'Umuganda'. On this monthly 'day of community service', citizens work for the common good under the supervision of a steering committee; participation is obligatory for all Rwandans aged between 18 and 65. The central government receives feedback about participation in and the progress of the projects. The traditional concept of the Umuganda was revived in 1998 as part of the attempt at reconciliation after the genocide and civil war between the Hutu and the Tutsi (Rwandapedia, 2014). It was institutionalized later between 2007 and 2009.

Today, Rwanda is regarded as one of the states with the lowest level of corruption in Africa. According to Transparency International's Corruption Perceptions Index, it is ranked 44 out of 167 countries in the worldwide comparison (TI, 2015b). The political system was profoundly reformed during the reconstruction phase

after the civil war, and institutions were set up to combat corruption, for example the Rwanda Public Procurement Authority. Its aim is to prevent corruption in public procurement by separating the awarding of project contracts more strictly from the political decision-makers. The comparatively low rates of corruption encourage the inflow of direct investment.

To date, Kigali's development policy has been oriented towards the Millennium Development Goals. These are to be implemented via the 'National Strategy for Climate Change and Low Carbon Development' (NSCCLCD) and the 'Economic Development and Poverty Reduction Strategy' of the Rwandan Ministry of Finance and Economic Planning (MINECOFIN). Kigali is also part of the Rockefeller Foundation's '100 Resilient Cities' programme and the UN Habitat Cities and Climate Change Initiative.

Kigali's master plan

Kigali's urban administration sees great opportunities in the densification of the city. The aim is to counter uncontrolled urban expansion and for Kigali to become a 'Centre for Urban Excellence'. A modern future for Kigali is outlined in a master plan compiled by the US-based architects' office OZ on behalf of the Rwandan President Kagame; it was passed by parliament in 2008. Ecologically and economically sustainable development is at the centre of the urban-development concept. The aim is to find a viable balance between "ecology, equity and economy" (OZ and City of Kigali, 2008). The plan incorporated inter alia the Rwandan Ministry of Economy's 2000 development draft 'Vision 2020', which also contains a critical summary of the country's problems at the time of publication. Supporters of the project predict a future for Kigali as the 'singapore of Africa' (Caryl, 2015). Kigali aims at least to become the regional financial, business and entertainment centre for the eastern part of central Africa.

In the meantime, the master plan has been complemented under the aegis of the Singapore-based firm Surbana International Consultants by adding specific district plans which further subdivide the planning of urban development. The idea is for each of Kigali's three administrative districts to fulfil specific urban functions and develop their own forms of urbanity: Nyarugenge is to become a 'Green Financial Hub and Vibrant Growth Centre', Gasabo a 'Diverse Employment Hub and Cultural Heartland', and Kicukiro the 'Knowledge Hub and Green Gateway of Kigali'. Economic development is the main focus in this categorization. Other guiding principles in the master plan set a high value on the following: solutions that take into account the natural terrain and environmental characteristics; the use of existing resources and technical possibilities; education



Figure 5.7-7

Inclusive preparation of the master plan for Kigali.

Source: Antje Kristin/UNDP/Wikipedia

and training; extensive housing construction; the modernization of transport and an environment-friendly infrastructure; incentives for foreign capital and private investment; the protection of the natural environment and ecologically sustainable urban development (ASLA, 2010). This vision of a modern Kigali aims to change the way it is perceived both by its own residents and from the outside; up to now it has mainly been associated with the genocide. In 2009, the master plan won the 'Planning Association Daniel Burnham Award for Best Comprehensive Plan' and, in 2010, the Award for Best in Planning' of the American Society of Landscape Architects (Rwanda Development Board, 2008). A new master plan was launched in 2013.

One positive aspect of the master plan is the associated detailed inventory of the current real situation in the city, including the corresponding areas where action is needed. Civil-society organizations in Kigali were consulted at various levels during the preparation phase of the master plan, which was drawn up in consultation with foreign companies, but there is no information on the extent to which this cooperation has been incorporated into spatial planning (Figure 5.7-7). Particularly the master plan's stipulations on the informal settlements are problematic. Since many of the people living in informal settlements have no secure land tenure rights, there is justified concern that their homes might be demolished when the master plan is implemented. However, its implementation raises several difficulties, because it seems hardly feasible for these projects to be financed autonomously from national sources, and the project guidelines of international donors such as the World Bank state that resettlements are not to be approved or, if so, only in exceptional cases. The master plan's visionary force can simultaneously be regarded as its weakness, because in some respects it is far removed from the reality of many urban residents, and therefore, for many of them, it offers no immediate options for action.

Box 5.7-1

Influence of mobile phones on small businesses

While the number of fixed-line telephone connections in Rwanda has been stagnating at approx. 23,000 since the turn of the millennium, mobile phones have spread rapidly, like everywhere in Africa. In Kigali, too, the proliferation of mobile phones and smartphones has promoted economic development, especially in the informal sector. Especially micro-enterprises have been able to expand their capacity, often serve more customers, and in this way increase their income (Donner, 2007). One problem for poor population groups is access to electricity for charging mobile phones. In a short time, a new business model has emerged with solar-powered mobile charging kiosks for mobile devices (Figure 5.7-8). The company African Renewable Energy Distributor (ARED) was founded in 2013 and is already active in several regions of Rwanda (ARED, 2014). Its advertising not only praises the functionality of the charging kiosks, but focuses in particular on the sustainability aspect. The company's advertising slogan also targets inter-generational justice: "We do not inherit the Earth from our ancestors, we borrow it from our children". There are also other companies

alongside ARED offering mobile charging stations. However, these are internationally operating social companies with offshoots in Kigali, e.g. Barefoot Power and Mobisol (Barefoot Power, 2015; Mobisol Prepaid Energy, 2015). These companies sell solar-powered cell-phone charging stations to small businesses.



Figure 5.7-8

Solar cell-phone recharging kiosk in Kigali.

Source: www.a-r-e-d.com

Women in politics

At 64 %, Rwanda has the highest percentage representation of women in any parliament in the world. Despite this positive development, this inclusion of women in politics must not be equated with a general social equality of men and women, or with a holistic inclusion of women in political life throughout all social levels (Burnet, 2008). After the genocide, many women were widowed and many girls had become orphans. Often, women's organizations then filled the social gaps in society (Burnet, 2008:366).

Women are also represented in Kigali's municipal government. For example, a woman, Hope Tumukunde Gastura, is the city's deputy mayor. In 2010, Kigali was one of the first five cities to begin implementing the United Nations' 'safe Cities Free of Violence Against Women and Girls Global Program'. The programme aims to make the city in general, and public spaces in particular, safer for women, and to protect them against sexual, verbal and physical harassment and attacks. Domestic violence against women is still a major problem.

At the same time, women make up a lower percentage of the urban population than men. This is attributed to the migration of men from rural regions into the city to find work, while their wives and children remain in the villages. The livelihoods of families in the villages are often financed by money transfers.

Deficits of political inclusion

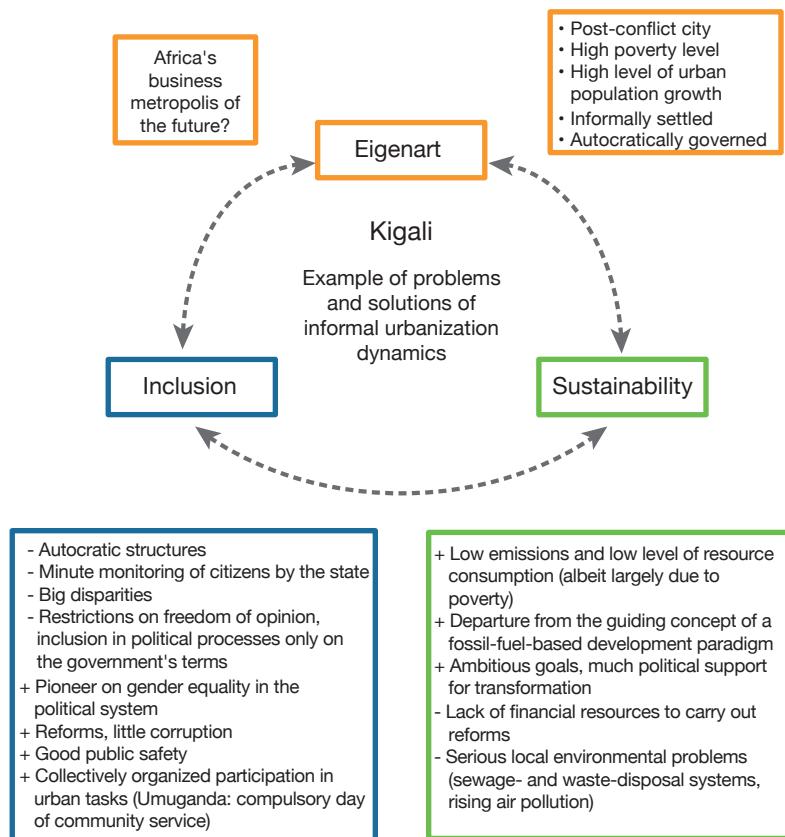
According to the Freedom House Index, Rwanda is 'not free'. The plurality of the party landscape is severely restricted; the reason given by the government is that national unity must not be jeopardized. For example, religious and ethnic parties are prohibited because of the experience of the genocide and the aspiration for reconciliation. However, this ban is used by the ruling party to suppress political opposition and critical comments about the government. 'Divisionism' is punishable by a prison sentence, and fear of being accused of divisionism dissuades many people from making critical comments. Several opposition politicians have been imprisoned for their political statements; some critics have been murdered in exile (Amnesty International, 2015a). At present, therefore, political inclusion is only realized on the terms of the ruling government elite. Moreover, at the national level, the country's president has a monopoly on power (Bertelsmann Foundation, 2014).

Free political inclusion is not possible in Kigali. The 1995 Basic Law laid the foundation stone for institutionalized political domination by the RPF, and this was reinforced by the constitution adopted in 2003. The proclamation of national unity enables the RPF to take regulatory measures against critics of the regime under the pretext of security (Reyntjens, 2011:16). This has led to the suppression of politicians who are not loyal to the government, and to the dissolution of opposition parties. Independent election observers documented election fraud in the 2003 and 2008 national

Figure 5.7-9

Urban transformation towards sustainability: framework conditions in Kigali.

Source: WBGU



elections (Reyntjens, 2011:8ff.). Not only the political sector, but also civil society has suffered repression. Here, too, this was done under the pretext of national unity. NGOs – that championed the rights of farmers, for example – were prohibited as early as 2004. Independent media have had similar experience. Publication bans were imposed on newspapers critical of the government. Journalists who resisted were arrested, expelled or murdered (Reyntjens, 2011:13 ff.).

5.7.4.2

Economic inclusion

Rwanda belongs to the group of Least Developed Countries (2013). About a quarter of Kigali's population lives in extreme poverty, according to the definition of the national statistics office. Gasabo is the poorest of the three city districts with 13.2 % of the population living in extreme poverty and 12.8 % living in poverty. The poverty thresholds were set by the city administration; a distinction is made between extreme poverty – defined as having less than € 100 (83,000 Rwandan francs) per month – and poverty, less than € 145 per month (Republic of Rwanda, 2012b). A total of about 8 % in Kicukiro and 10 % in Nyarugenge live below the poverty line. All districts of Kigali, however, are above the national average, according to which 25 % live in

extreme poverty and 40 % are in the higher category of poverty (Republic of Rwanda, 2012b). The fact that poverty rates are higher in rural areas explains the migration to the cities. Overall, a steady decline in poverty rates was recorded both in Rwanda as a whole and in the city of Kigali between 2000 and 2011 (Republic of Rwanda, 2012c). Orphans, whose share of the total population between 0-20 years is above the national average in Kigali, are an especially vulnerable group. For example, 4.2 % of Gasabo's children are orphans, while 15.9 % have only one living parent (Republic of Rwanda, 2012b).

Socio-economic disparities

Despite a positive economic development over the last few years (Box 5.7-1) and the trend towards decreasing poverty levels, Kigali is one of the cities with the largest income-inequality levels in the world (UN-Habitat, 2013a:84). Despite efforts to reduce poverty, the Gini coefficient of income distribution has hardly changed in Kigali in recent decades. In 2010, the Gini coefficient was 0.559 (high income inequality; Republic of Rwanda, 2012c). At the same time, there has been progress in the field of education; for example, the percentage of children attending a secondary school rose from 24.6 % in 2005 to 41 % in 2012 (Republic of Rwanda, 2012c).

5.7.5

Urban transformation towards sustainability

The example of Kigali illustrates the complex challenges of rapid informal urbanization (Figure 5.7-9). Despite its poor starting conditions, the city has developed peacefully and with more economic stability than comparable cities, even though some fundamental problems still exist in the field of urban development. For example, the lack of waste- and sewage-disposal structures causes environmental problems which, if no countermeasures are taken, could worsen further if urban growth continues. Economic progress has been accompanied by an extremely unequal distribution of income. The national government is currently seeking to turn Kigali into a 'Green Business Hub' by growing a knowledge-based economy that makes higher incomes possible for larger sections of the population. Because Kigali is today considered to be less prone to corruption than many other cities, it has become more attractive for foreign direct investment. In the education sector, too, good basic conditions have been created. School-enrolment rates in Rwanda are the highest in Africa. Almost all children receive a basic education, and progress has also been made in the field of higher education in recent years (UNICEF, 2015). Nevertheless, it remains unclear how the desired transformation towards a sustainable city with a vibrant economy can be achieved, and whether this corresponds to the wishes of the Rwandan population – or whether it will remain a vision of and for elites. While a repetition of ethnic violence has been prevented by authoritarian structures and state control, and economic growth has been promoted by various reforms, it is questionable whether, without stimuli from a critical civil society, there will be sufficient innovative potential in the long term to achieve a transformation towards a liveable city for all residents.

5.8

São Paulo: the fragmented metropolis

In Brazil, in addition to innovative urban-planning approaches at the local level, there is an intensive debate on urban issues and possible solutions at the national level. Parallel to this, many powers have been transferred to the municipalities to enable them to shape their development independently. With approx. 20 million inhabitants, São Paulo is the largest metropolitan region in both South America and the Southern Hemisphere, and it faces the task of mastering the typical challenges of a megacity in an emerging economy.

The text of this Section 5.8 was taken in abbreviated

form from the WBGU-commissioned expertise by Coy and Töpfer (2015) with the consent of the authors.

5.8.1

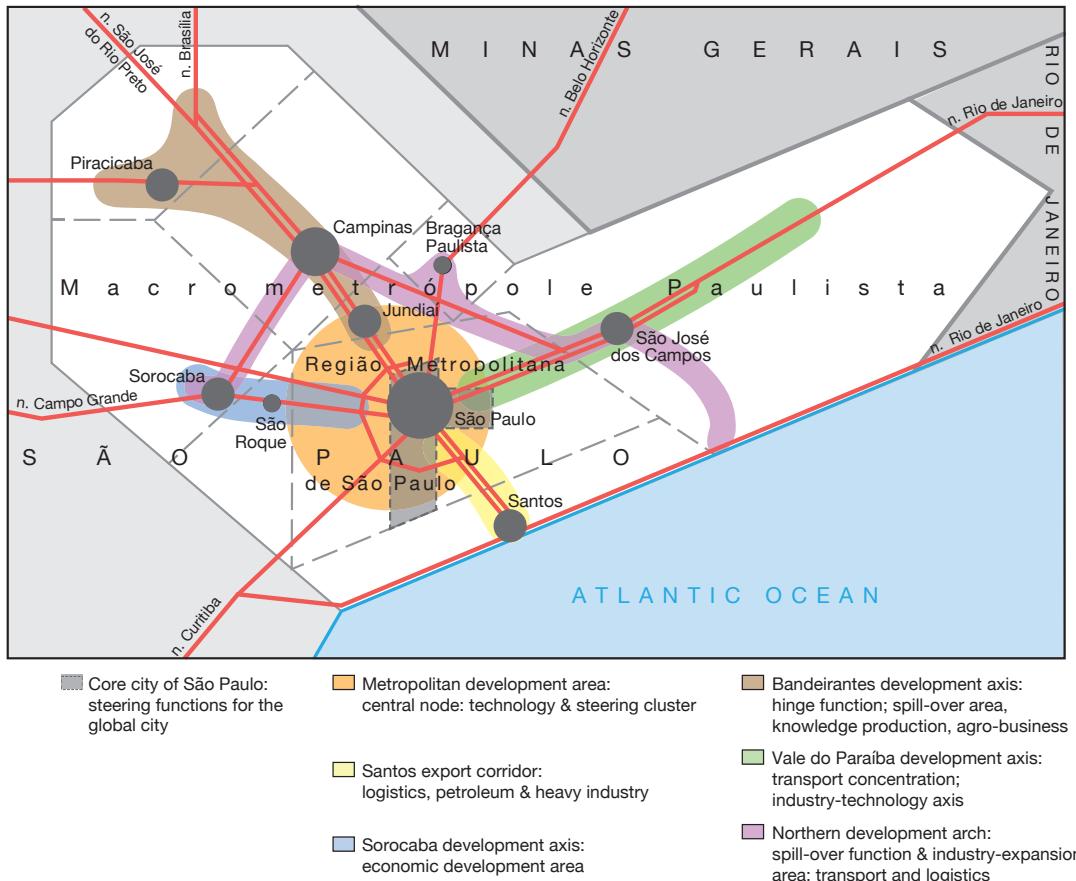
Structure and changes of a megacity

Although São Paulo was founded in the mid-16th century at the beginning of the Portuguese colonial period, the process of becoming an actual city and expanding further did not begin until the final decades of the 19th century. This was a result of the rapid increase in the importance of coffee cultivation in the region between Rio de Janeiro and São Paulo in the course of the 19th century, which started the expansion into the hinterland of today's federal state of São Paulo. Exports of coffee were to become the economic base of the city, the region and the nation for decades to come. On the threshold of the 20th century, São Paulo – which had been a small town in the hinterland just a few years earlier – became a major city. It reached its first million inhabitants in the 1930s. There was a direct connection between coffee cultivation and urban development in more ways than one. On the one hand, the owners of the coffee plantations increasingly invested the capital generated by agricultural production and exports in the city of São Paulo's industrial sector (e.g. the textile industry), which was emerging at the beginning of the 20th century (Novy, 2001). On the other hand, the coffee boom in the hinterland was connected with the expansion of the infrastructures (especially the railways) which converged in São Paulo to allow exports via the port of Santos.

5.8.1.1

Immigration

An important aspect is the influx of especially Italian immigrants, who initially worked as day labourers and tenants on the coffee plantations, but increasingly also migrated directly into the growing city. São Paulo developed rapidly into the Brazilian model of a 'melting pot', in which different immigrant groups came together and also increasingly shaped the city socio-spatially (Bernecker et al., 2000). Right up to the present day, São Paulo remains the most multicultural city in Brazil. There have also been waves of immigration in recent years, for example the Koreans, who are gradually taking over the (partly informal) textile industry in the districts near the centre, or the Bolivians and Peruvians, who immigrate into the Brazilian economic metropolis – often with unregulated status – and try to secure their livelihood with informal employment there, e.g. in the sweatshops operated mostly by Koreans (Souchaud, 2012).

**Figure 5.8-1**

São Paulo – mega-urban area: functional-spatial differentiation in the Macrometrópole Paulista.

Source: Coy and Töpfer, 2015

5.8.1.2

City, metropolitan region, macrometropole

In the meantime, the entire mega-urban area – i.e. beyond the metropolitan region – is increasingly described and discussed in planning, politics and academia as the Macrometrópole Paulista (MMP). However, it is not yet clear to what extent the MMP ‘construct’ can in future also play its due role in managing mega-urban processes (Figure 5.8-1). Several quite contrary demographic and economic structural differences are already becoming evident: the falling population density from the centre to the periphery – easily understandable in terms of urban structure – as well as the rising population dynamics from the centre to the periphery to be expected in the context of suburbanization processes or peri-urbanization processes, as well as the gradient of incomes, value added and living conditions.

São Paulo has been Brazil’s dominant economic region at the latest since the beginning of the first half of the 20th century. For example, the São Paulo federal

state generates 32.1 % of Brazil’s gross domestic product; the São Paulo metropolitan region 17.9 % and the core city 11.4 % (IBGE, 2014a, b). Greater São Paulo is the country’s industrial core region and forms a concentration of industrial locations of continental and international importance. Especially the southern suburbs of the core city, the cities of what is known as the ABC Paulista (Santo André, São Bernardo do Campo, São Caetano do Sul) are symbolic of the Brazilian Economic Miracle of the 1960s and 1970s. The industrial clusters of vehicle construction, metalworking and the chemical industry were largely financed by foreign direct investment. In the meantime, however, numerous relocations have led to a noticeable de-industrialization process as a result of negative agglomeration effects, reinforced by tax breaks offered by other federal states (Coy and Schmitt, 2007).

Focusing on São Paulo’s core city alone, the number of people in industrial employment declined from 550,000 to 450,000 in the period from 1997 to 2005. The number of employees in the service sector rose

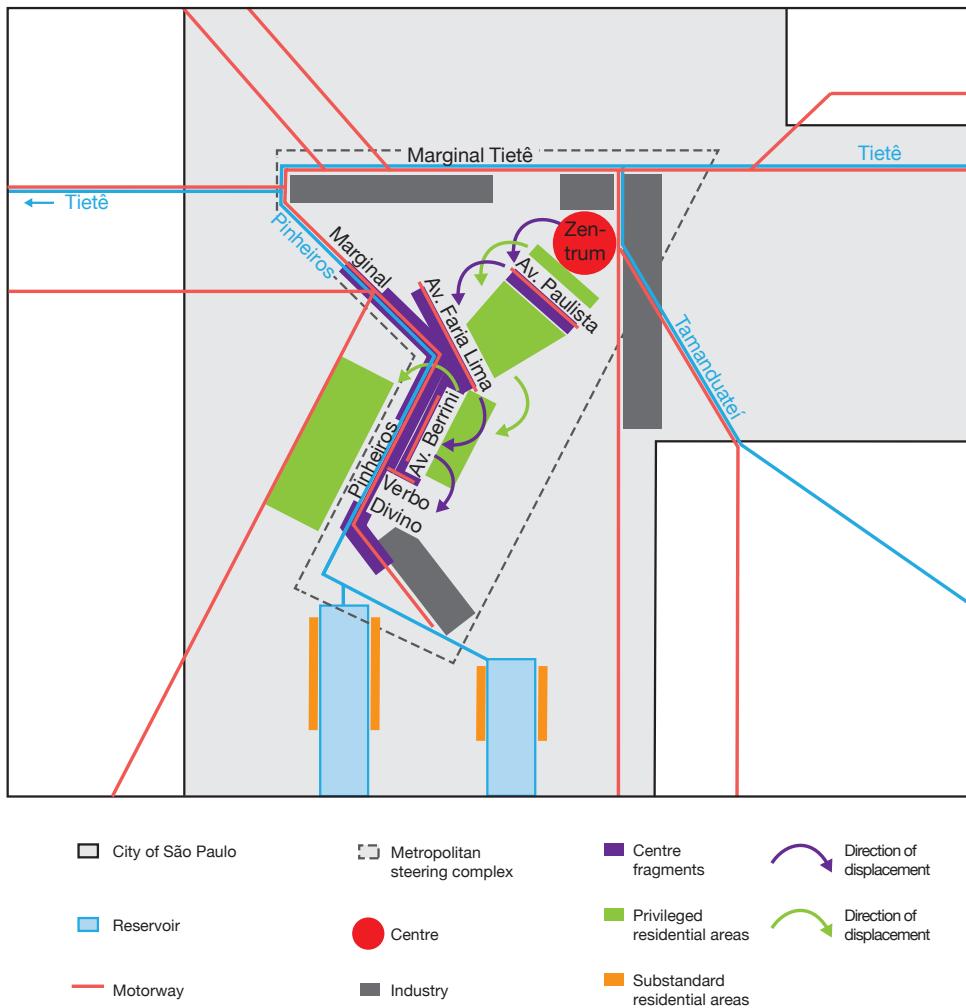


Figure 5.8-2

São Paulo: functional-spatial and socio-spatial differentiations in the core city.

Source: Coy and Töpfer, 2015

from 1,250,000 to 1,600,000 in the same period. The number of employees in all sectors together rose at the same time from 2,450,000 to 2,820,000 (Comin, 2012:7). 365 – i.e. almost a third – of Brazil's 1,124 biggest companies have their head office in São Paulo, and 32 of the 50 largest financial institutions are resident in São Paulo (core city; Comin, 2012: 14). Of the ten largest banks in Brazil, six have their headquarters in the core city of São Paulo, one other in the direct environs, and a quarter of all Brazil's banking-sector employees work in São Paulo's core city (Comin, 2012:57). These examples show not only a general tendency of tertiarization, but also in particular the importance of the control functions that radiate from São Paulo.

5.8.1.3

Winners and losers of functional-spatial changes

The economic trends of de-industrialization and increasing tertiarization described above have clear spatial consequences. The industrial areas of the core city, which were essentially to be found in or near some inner-city districts (e.g. the Brás district – textile industry, and industrial and commercial areas along the rivers Tamanduateí in the east and Tietê north of the inner city; Figure 5.8-2), today belong to the 'loser districts' with empty properties and conversion areas, social conflict fields, environmental pollution and a low quality of life. For several years now, the 'winners' among the city districts are found particularly in the south-west of the core city. These are the new development axes, which look like office cities: extremely densified and verticalized, almost citadel-like enclaves within the body of the city. These are locational concentrations of corporate headquarters of the computer-science and technol-

ogy sector and the media industry. These novel urban fragments form centralities; they emerge and grow with the successive transfer of functions from the original centre. The massive presence of national and especially foreign and transnational companies leads to the emergence of veritable control centres, whose importance, in the meantime, extends far beyond Brazil's national borders, and which are essentially the reason why São Paulo is increasingly perceived as a global city (Töpfer, 2013a).

The functional-spatial and socio-spatial differentiation processes described above are clearly reflected in the dynamics of the real-estate sector. For example, from 1992 to 2007 almost all the 4,500 newly erected high-rise apartment buildings were concentrated in five administrative units (sub-prefectures) in the western and south-western sector of the core city (Comin, 2012: 20; Figure 5.8-1).

5.8.2

Eigenart: São Paulo's centre as an identity-defining location and embryo of the urban society

São Paulo's original centre is made up of two parts: the Centro Velho (Old Centre), which lies on a hill between the rivers Tamanduateí and Anhangabaú, and the Centro Novo (New Centre), which lies directly on the other side of the river Anhangabaú. It was on this hill that the city was founded by Jesuit missionaries in 1554. It remained restricted to this area for a long time before a general economic upturn began in the wake of the coffee boom in the second half of the 19th century (Novy, 2001).

5.8.2.1

Urban form of São Paulo's centres

Today, the layout of streets in the Centro Velho still reflects the original design of the formerly village-like town. There are only a few, mainly religious buildings in the centre of São Paulo that stem from the colonial era or evoke it. Otherwise, the rapid development of the city since the end of the 19th century led to a modern silhouette, which gradually became dominated by high-rise buildings, extensively superimposing itself on the colonial, small-town structures. Some public or religious buildings with symbolic power from the turn of the century have survived up to the present, e.g. railway stations, market halls, theatres and monasteries. Many of these buildings were based on European architectural models of that time. Later, at the beginning of 20th century, verticalization began and continued up until the end of the 1950s with ever-higher tower blocks. They were built to meet the demand for homes

and, above all, office space. At the same time, their respective contemporary architectures were expressions of the aspiring, modern metropolis. The construction boom in the city centre came to an end as a result of changes in the law, so that the present-day physiognomy of the city centre largely reflects the structural situation at the end of the 1950s. Up to this time, the original centre constituted the centre of the metropolitan area and for São Paulo's upper classes. This is where the corresponding shops and boutiques, restaurants and cafés, theatres, cinemas and services were to be found (Villaça, 1998).

Alongside representative buildings (above all high-rise buildings), public squares also constituted locations meant to reflect the importance of the emerging metropolis. Prestigious parks and squares were laid out in the immediate vicinity of the centre. They played an important role for the upper classes, raising the feeling of prestige and providing recreation for them (Zola, 2007). These public areas, too, have stood the test of time, albeit often modified in appearance. After the rapid, high-rise construction activity in the city centre came to an end, laying out new public squares and redesigning existing ones remained very important.

5.8.2.2

Socio-spatial change in the centre and the 'right to the city'

The residential population of the centre declined after the 1980s, before picking up again in the first decade of the 21st century (Kara José, 2010). Most of the population growth consisted of people moving back into formerly vacant buildings; the vacancy rate fell accordingly by 50 % (Kara José, 2010). A trend is emerging here towards private renovation measures for the respective buildings (Kara José, 2013). Furthermore, new high-rise apartment blocks are also being built again for the first time since the first decade of the 21st century (Embraesp, undated); nevertheless, in the centre, too, the supply of housing is too small, above all for low-wage earners. Social movements repeatedly make this point with demonstrations and squatting (Kowarick, 2009: 153ff.). The way this issue in the city centre is handled varies depending on the political orientation of the respective city government (Teixeira et al., 2005).

Since the early nineties, there have been efforts to make the centre more attractive again. Depending on the political situation, the focus is sometimes on upgrading for the benefit of businesses and the middle classes; sometimes an attempt is also made to take account of the disadvantaged population with integrative measures. In the past two decades, the public administration, too, has moved many previously out-

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sourced agencies back into the central urban area as a measure to stimulate and upgrade the centre (Kara José, 2010). Attempts were made quite early to persuade investors – by means of an incentive system – to (also) extend their activities back to the centre with an urban-planning instrument known as Operação Urbana Centro. However, the success of this instrument did not come up to expectations (Nobre, 2009; Balbim and Campagner, 2011). Nevertheless, several renewal measures have been implemented with funds from the Operação Urbana Centro, mainly in the public sphere (Almeida, 2007; Balbim and Campagner, 2011).

Alongside construction measures, measures relating to the use of public space also play an important role. Public officials of the city administration and government, NGOs and social movements are active or involved in this field. In São Paulo, there is a wide variety of organizations and movements dealing with issues of urban development. In the city centre, there are some associations whose commitment is aimed at strengthening the economy, but also a number of others which, as social movements and NGOs, feel particularly committed to vulnerable groups and their interests. With different campaigns, both try to voice, and where possible take action on, their concerns vis-à-vis the city administration and government or, vice versa, to criticize public measures and influence them in the direction they desire.

For example, the city administration has passed two regulations on the use of public space in the centre. One is municipal regulation no. 105, which, according to its title, is devoted to the ‘protection of people in risk situations’. However, the way it is implemented serves above all to reduce the number of homeless people using public spaces in the city centre by deploying the city guard. Another ordinance bears the title ‘Operação Delegada’ (‘Delegated Activity’), in which the police support the city guard officers in the fight against irregular or illegal mobile trading – by working overtime in their free time, paid by the city administration (Töpfer, 2014b). These measures are massively criticized by social movements and NGOs and, in some cases, also by the courts. This reveals an active urban society which does not simply tolerate the measures of their respective government without contradiction, but looks at them critically and demands their right to have a say (Töpfer, 2013b; Töpfer, 2014a).

However, there are also interventions aimed at raising the immediate level of attractiveness for members of the middle class. On the one hand, there are initiatives by private individuals, for example the Caminhadas Noturnas (evening strolls), which have now been offered weekly for ten years with an average of 50 participants every week, with the aim of making the centre



Figure 5.8-3

‘Virada Esportiva’ recreational sports event to enliven public space in the centre of São Paulo.

Source: Tobias Töpfer

more lively. On the other hand, major cultural events and smaller series of events are organized by the city administration (Töpfer, 2014b; Figure 5.8-3).

Despite constant changes, the city centre has remained important for São Paulo as a whole right up to today. It plays an important role in the discourse and in the lives of São Paulo citizens and still serves as a central identity-building location. An active culture of discussion and dispute in the city centre makes it possible for many interests to be at least articulated, and for the population to get broadly involved in negotiations on the development of the centre.

5.8.3

Inclusion: housing problems, socio-spatial segregation and social housing

With the acceleration of the urbanization process in the 1960s and 1970s at the latest and the associated increase in immigration, the question of adequate housing – and the bottleneck of its affordability – became the key problem of urban growth in São Paulo, as in all Brazilian cities. New immigrants and low-income city dwellers are forced into informal, substandard forms of housing which are usually extremely ill-equipped (e.g. poor building quality, inadequate space, overcrowding and in some cases multiple occupation, precarious sanitation infrastructure, risky residential location). For many decades, typical examples for São Paulo in this context have been the so-called cortiços, mostly degraded apartment blocks or buildings that have been appropriated by squatting or informal letting or subletting. These cortiços are usually extremely overcrowded (Kowarick, 2011). Cortiços correspond to core-city slums in many respects. Favelas usually develop from the informal (and illegal) occupation of

public or private land, mostly in the peripheral areas of a city or in (core-city) risky positions (e.g. on riverbanks or steep inclines, along roads or railway lines). In São Paulo, unlike in Rio de Janeiro, they are a relatively recent phenomenon, essentially first emerging in the 1970s and 1980s. According to Saraiva and Marques (2011:106) only 70,000 people lived in favelas in 1973 – the equivalent of 1 % of the urban population at the time. The transitions between favelas and other informal ways of dividing up land are blurred; clear definitions are difficult.

5.8.3.1

Favela population in the core city and metropolitan region

Figures on the number of city residents living in sub-standard apartments are highly problematic due to a lack of clear definition criteria and fundamental difficulties with statistical surveys. Information provided by the various institutions (the Brazilian Institute of Geography and Statistics IBGE, the municipal and federal-state housing authorities, academia or civil-society organizations) only rarely cover the same ground and are often contradictory. For the whole of the São Paulo metropolitan region (Região Metropolitana de São Paulo RMSP), the IBGE speaks of approx. 3,300 favelas with 590,000 households (the equivalent of approx. 2.4 million people, assuming an average household size of four persons) in 2010, compared to just over 2,000 favelas with 416,000 households (just under 1.7 million people) in the 2000 census. Between 2000 and 2010, therefore, there was above-average annual growth both of favela households (3.7 % compared to 2 % for the total number of households) and of the favela population (2.8 % versus 1 % for the total population; Barbon et al., 2015:210). The figures for favela households as a percentage of total households, and for the favela population as a percentage of the total population, vary considerably between the municipalities of the RMSP. According to the city administration, about 30 % of substandard housing units in the core city of São Paulo were situated in the south and south-east of the urban area, one quarter in the east, and about 20 % along watercourses, i.e. in particularly risky locations. Only 3 % of the substandard housing units were in the core city; about half of these (approx. 11,000 households) were of the cortiço type (PMSP, 2010). Most of the cortiços, which used to be concentrated mainly in the city centre, i.e. approx. 69,000 households, are now distributed diffusely over the urban area (Figure 5.8-4). The housing situation in the city of São Paulo has become increasingly precarious over the last few years; the city administration calculates a housing deficit for 2010 of 872,000 units, which amounts to approx.



Figure 5.8-4

Favela paraisópolis and apartment tower blocks in the luxury residential district of Morumbi, São Paulo.
Source: Tobias Töpfer

24 % of all existing housing units. The current housing deficit is defined as the number of households living in conditions that are beneath human dignity within the meaning of national City Statute (Observasampa, undated). Overall, therefore, despite all the social and income progress that was doubtless made in Brazil during the 2000s (Calcagnotto, 2013; Zilla, 2013), it cannot be overlooked that, over the past decades, the percentage of the population living in substandard forms of housing has increased very markedly in absolute figures, and disproportionately relative to the total population (Saraiva and Marques, 2011; Barbon et al., 2015; Kowarick, 2011).

5.8.3.2

Dynamics of the formal housing market

The formal housing market, which caters for the largest segments of São Paulo's population, is developing very dynamically. Between 2000 and 2010, almost 7,000 multi-apartment construction projects with a volume of approx. 419,000 units came onto the market in the Região Metropolitana de São Paulo (RMSP; Barbon et al., 2015:220). Apartment tower blocks already account for 70 % of higher-quality housing, mostly in areas with good infrastructure and relatively high land prices. A survey of all housing units in the RMSP shows that over 70 % of the apartments or houses are owner-occupied and only just under a quarter are rented (Barbon, et al., 2015:202f.).

Gated communities are a form of housing that has been used by the upper and middle classes for several

decades. These privileged districts are excellently served by different infrastructures, sealed off by private security services, and socially largely homogeneous; in Brazil they are called *condomínios fechados*. Alongside Rio de Janeiro, São Paulo has been at the vanguard of this trend. The prototype *condomínio fechado*, a very successfully marketed large-scale project called Alphaville north-west of the core city, was launched as early as the mid-1970s. Countless similar projects followed this example both in Greater São Paulo and in other regions of the country (Coy, 2006). The favela and the *condomínio fechado* thus represent the two extremes of a growing socio-spatial segregation in the Brazilian cities over the last few years. Because of the juxtaposition of island-like enclaves of upper-class and under-class living, often in a small area and each with its own functional and networking logics, this phenomenon is better described as fragmentation. Even in the 2000s, the *condomínios fechados* made up just 0.5 %, i.e. a very small percentage of all housing in São Paulo's core city. However, the fact that they are so hermetically sealed off makes their importance for the urban space and their fragmenting effect noticeable nevertheless. In the 1980s, the gated communities were largely a greenfield phenomenon, i.e. reclusive residential projects in areas with good transport links and leisure facilities just outside the core city (Coy and Pöhler, 2002). In the 1990s, a relatively new phenomenon emerged, especially in the Greater São Paulo area: the so-called *condomínios horizontais*. These are often smaller projects that have developed in urban neighbourhoods by merging plots of land and demolishing the existing buildings, thus further increasing the small-scale fragmentation trend in the city-district neighbourhoods. According to Balturris and D'Ottaviano (2009: 142), such *condomínios horizontais* represented only 2 % of the annual supply of housing on the market for gated residential projects in 1992. By 2004 the figure had already risen to 35 %.

In recent years, it has increasingly been observed that gated communities are no longer restricted to the privileged. There is a trend towards more and more projects offering smaller, more simply equipped and therefore cheaper housing, thus targeting the middle classes. Such projects are even to be found increasingly in low-income neighbourhoods. The distribution of the gated communities in different areas of the RMSP, increasingly also in the core city of São Paulo in the form of the *condomínios horizontais*, as well as the increasing social differentiation between the target groups in this market segment, show that the formerly dominant centre-periphery contrast does not apply to the gated-community phenomenon. Rather, distribution patterns are spatially fragmented.

5.8.3.3

Social housing

Up to now, measures of state- or municipally funded social housing have not been able to find remedies for meeting people's basic right to adequate housing (Box 5.8-1). Within the group of developing countries and emerging economies, Brazil is undoubtedly one of the countries that pursued policies of state housing assistance and social housing at a relatively early stage. In fact, it already began in the wake of the Estado Novo in 1946 with the establishment of the Fundação da Casa Popular (FCP). The aim was to satisfy the social needs of the urban working classes, which were growing rapidly at the time. As so often, these first attempts at social housing ended up in the maelstrom of clientele politics controlled by vested interests. Under the military dictatorship, as part of the centralization of all strategically important concerns, social housing was restructured at the national level with the establishment of a national housing bank (Banco Nacional de Habitação – BNH) and a national umbrella authority for Housing and Urban Affairs (Serviço Federal de Habitação e Urbanismo – SERFHAU). The background was the rapidly growing industrialization and urbanization, with corresponding effects on demand, the need to satisfy a clientele that was politically important for the legitimacy of the regime, and the promotion of the construction industry in the cities. Various mechanisms were installed for financing housing via cheap loans; one basic problem was always that the only people who had access to the corresponding systems had to submit appropriate collateral, and this could only be really guaranteed by having a regular income. Those people most in need remained largely excluded. In total, approx. 5 million housing units were built throughout Brazil during the period of operation of the country-wide social housing system between 1964 and 1986 (D'Ottaviano, 2014: 257).

5.8.3.4

Crisis, paradigm shift and fresh start in social housing – *Minha Casa Minha Vida*

In the 1980s, as in many other public spheres, state social housing experienced a profound crisis, caused, among other things, by the enormous debt crisis, the cuts in the state budget prescribed by international donors, and the gradual transition to neoliberal policy principles. The central government, which in the decades before had declared the social housing sector to be its responsibility, withdrew more and more and left the initiative to the municipalities, which were also authorized by the new constitution of 1988 to take on the task in the course of decentralization. However, the municipalities were not adequately equipped financially. The

Box 5.8-1**Current housing construction programmes in São Paulo**

The present government led by Mayor Fernando Haddad has announced the following priority measures and programmes in the field of municipal housing policy for the current period of governance from 2013 to 2016 (Secretaria Municipal de Habitação, undated):

- Municipal housing construction in the narrower sense (it is unclear whether co-financed by the national MCMV programme): 55,000 new housing units.
- Favela Upgrading Programme (Programa de Urbanização de Favelas): inclusion of 70,000 families in corresponding upgrading measures; these include structural, infrastructural and ecological measures.
- Programme on the regularization of rights of ownership (Programa de Regularização Fundiária): inclusion of 200,000 families, the legality of whose living situation is to be regulated, thus ensuring that they can remain in their current place of residence (or at a new location).
- Redevelopment programme for settlements located in water-protection areas (Programa Mananciais): here, the

current government is explicitly continuing a programme of the previous government by completing the first two phases and launching a third phase, in which 70,000 families are included.

This information can doubtless only present a cursory description of all the housing-construction measures currently ongoing both in the core-city area and in the rest of the RMSP's municipalities. It should be noted that, following phases of neo-liberal laissez-faire policy in the housing field, which noticeably widened the gaps and everyday conflicts between the formal and informal city (urban production), the priorities of social and urban policy have again turned more decidedly to the increasingly urgent problem of the lack of adequate housing. In this context, housing policy is understood not only as a sectoral policy approach; it is also integrated into and embedded in a more socio-ecological way of looking both at the causes of environmental problems and at vulnerability to increasing risks. This integrative understanding is also reflected in corresponding links with municipal infrastructure and environmental policy, municipal climate-adaptation mechanisms, and, in particular, the central inclusion of the housing issue in strategic urban-development planning.

constitutional allocations are mostly dimensioned in such a way that they do not allow any further investment alongside the ongoing costs; at the same time, the tax jurisdiction of the local authorities is limited (Rolnik and Klink, 2011).

In line with the prevailing international discourses on the housing question, a paradigm shift in housing policy could also be observed in Brazil in the 1980s and 1990s. Although the classic large-scale projects of social housing have not disappeared (they are now implemented by the federal or municipal housing companies, often using the most basic standards), they have been supplemented by low-cost and self-help housing construction (sites and services, core-housing programmes), regularization of ownership rights (regularização fundiária) and slum upgrading. The implementation of the Minha Casa Minha Vida (MCMV) programme by the Dilma Rousseff government in 2009 now marked a clear new start in the social housing sector in Brazil (Amore et al., 2015; Marques and Rodrigues, 2013). The MCMV programme aimed to erect 1 million housing units in its first phase (2009–2011) – a target which was largely met – and to build another 2 million housing units in the second programme phase between 2011 and 2014 (Amore et al., 2015: 19). After a long period of stagnation, therefore, public-sector social housing has regained a clear profile. The new features seem to lie primarily in the planning, financing and implementation of the programme, all with a striking level of efficiency (Amore et al., 2015). A general problem that also affects the MCMV programme,

however, seems to be that, as a result of the funding mechanisms, the target groups that are actually needier (income groups with up to three times the minimum wage) have only been able to benefit from this major programme to a limited extent.

5.8.3.5**Municipal housing policy**

Two federal-state and municipal housing institutions in particular are responsible for the municipalities of the RMSP and the core city today: the Housing and Urban Development Company and the Metropolitan Housing Company in São Paulo (Companhia de Habitação Metropolitana de São Paulo – COHAB-SP). The political guideline behind municipal housing policy is the Plano Municipal de Habitação (PMH), the most recent of which was submitted by the Secretaria Municipal de Habitação (SEHAB) in 2009 with a fifteen-year validity up to 2024 (PMSP, 2010). The most innovative aspect of the 2009 PMH was the stronger link between housing and the environmental and vulnerability issue. Housing is thus increasingly being seen in a socio-ecological context. The background here is the problematic development that more and more informal, substandard housing estates are springing up along watercourses, particularly within the catchment areas of large drinking-water reservoirs. Many of these informal settlements house poor population groups who have been displaced by advancing urbanization tendencies from more central locations, especially in the south-western part of the city, to the high-risk periphery (Fix, 2001; Martins, 2011).

5.8.4

Sustaining the natural life-support systems: urban hygiene and local climate policy as key action areas

5.8.4.1

Water supply and sewage disposal

As in all rapidly growing urban agglomerations, the water supply is a key issue in São Paulo (Section 2.3.4.2). The city and metropolitan region of São Paulo are situated in the catchment area of the upper Rio Tietê (Alto Tietê), one of the large water systems that flow through virtually the entire federal state; it is part of the Rio Paraná system. Various water reservoirs are the sources of drinking water for the city and metropolitan region. Urban development, water supply, water quality and sewage disposal are closely related to each other. Industrial and commercial dynamics in the core city and the industrial suburbs constitute a fundamental problem for water quality. For many years, economic growth unequivocally took priority over protecting the environment and waterways. As a result, industrial wastewater was – and still is – discharged untreated into draining ditches and contaminates them. In the meantime, however, water contamination caused by industry has declined significantly as a result of strict regulations and regular emission controls (Jacobi et al., 2015:69). Most of the water pollution is now caused by private households. One contributory factor that should not be underestimated is the fact that, in the absence of alternative land, the bank areas of many waterways in the core city and metropolitan region are important expansion areas of informal urban development. The risk zones of the riverbank areas have often been (and still are) occupied by poverty groups with the aim of building informal settlements (favelas) for lack of alternatives. However, this survival strategy often makes the people affected even more vulnerable (water quality, health, flood risk). An additional connection between water pollution and urban development can be seen in the fact that, since the beginning of urban expansion and the large-scale urban-development plans in São Paulo, the system of waterways has been greatly changed by straightening, channelling and piping.

As a general observation, it must be stated that for many decades in São Paulo, as in all fast-growing cities in developing countries and emerging economies, water supplies and waterway protection on the one hand, and sewage disposal and treatment on the other were not seen as equal priorities. The water supply had priority; (at first glance) it is easier to exploit politically than campaigning for sewage disposal and water quality.

5.8.4.2

Sewage treatment: an unsolved problem

The water question was initially a matter for the local authorities in Brazil. However, the announcement of the National Sanitation Plan (Plano Nacional de Saneamento – PLANASA) in 1971 under the military dictatorship led to centralization, as in many other fields. Since that time, responsibility for the sewage question – which is decisive, especially from the point of view of urban environmental quality – has lain with the State Company for Sewage Disposal in the State of São Paulo (Companhia de Saneamento do Estado de São Paulo – SABESP). According to information provided by SABESP, 86 % of the sewage produced in the Alto Tietê river basin (i.e. the city of São Paulo and most of the metropolitan region) is currently collected via a connection with the sewage system. 65 % is treated in the eight sewage treatment plants operated in the area by SABESP (Jacobi et al., 2015:66). Over 30 % of sewage is thus still discharged untreated into the waterways. Just a few years ago, the corresponding figures were considerably worse. Since 1992, the Projeto Tietê – one of Brazil's major environmental projects in the city and metropolitan region of São Paulo – has been implemented with international financing from the World Bank, the IDB and Japanese institutions. As a result, the percentage of sewage that is collected has risen from 70 % to 85 %; the amount of sewage that is treated has jumped from 24 % to approx. 70 % (Jacobi et al., 2015:70).

5.8.4.3

Flood risk

In addition to pollution, the runoff regime in the city and region of São Paulo has been significantly changed by the almost complete channelling of the waterways and a high degree of soil sealing (37 % of the surface area) in the Alto Tietê river basin (Jacobi et al., 2015:69). In connection with the overall climatic conditions, therefore, flooding is one of the main environmental risks in many regions. In response, since the late 1990s, the flood-protection systems have been driven forward, inter alia with framework plans for river basins (e.g. with the Plano Diretor de Macrodrrenagem da Bacia Hidrográfica do Alto Tietê). The key measure to date has been the creation of retention reservoirs (piscinões). In the last few years, more attention has been given to the protection of the riverbanks and, where possible, renaturation. At the municipal level, for example, the 2002 Plano Diretor Estratégico (PDE) designated shore-protection zones as public spaces (parques lineares). The new PDE (Box 5.8-3) is pursuing this strategy further and aims to link it with participatory elements, e.g. to promote environmental educa-

tion. Overall, since the early nineties, new approaches to water governance can also be observed at the federal-state level. For example, River Basin Commissions (Comitês de Bacias Hidrográficas – CBH) were introduced as part of a first water framework law for the federal state of São Paulo. This put the nexus between water supplies, sewage disposal, water quality, urban development, quality of life and environmental quality onto a politically broader and integrative basis. However, as is so often the case, a certain amount of scepticism is warranted as regards the profile and influence of the CBHs and other measures of municipal and federal-state water governance.

5.8.4.4

Waste collection and waste disposal

The collection, storage, disposal and recycling of waste is another key problem area of urban hygiene and urban environmental quality (Section 2.3.4.3). According to Brazilian legislation, the municipalities are responsible for the collection and/or storage and disposal of household waste. Waste recycling, by contrast, is regarded as a commercial, industrial activity and left to private initiative. With the introduction of a national policy on the waste sector (Política Nacional de Resíduos Sólidos – PNRS) in 2010, separate waste collection and integrated urban waste management were declared priorities (Besen et al., 2014:259f.). Under the PNRS, waste-management plans are to be compiled at the national, federal-state and municipal or regional level. They are supposed to serve the ambitious target of reducing the quantities of waste dumped in landfills by 45 % by 2031. This can only be achieved if there are considerable efforts in the direction of separate waste collection and recycling. In this context, the corresponding plans provide in particular for greater inclusion of informal collectors of recyclable material (catadores). Surveys conducted in 2008 show that almost 1,000 municipalities in Brazil (i.e. 18 % of all municipalities at that time) already operate separate waste collection, two thirds of them involving organized recyclable-material collectors (Besen et al., 2014:260). Estimates put the number of recyclable-material collectors throughout Brazil at more than 500,000; about 10 % of them are said to be organized nationwide in more than 1,000 cooperatives or associations. About 20 % of all catadores work in the state of São Paulo (Besen et al., 2014:264). In terms of economic and societal inclusion, it is crucial that the usually informal work of waste collection and waste separation is afforded recognition. The question of formalization and organization in the waste sector is highly problematic and controversial as regards its social impact.

In 2013, 21,000 tonnes of waste were collected

daily in all municipalities of the São Paulo metropolitan region, 61 % of this in the core city, according to the Environmental Agency of the federal state of São Paulo. 30 of the 39 municipalities in the RMSP practise separate waste collection, 28 employ the services of recyclable-material collectors organized in cooperatives or associations (Besen et al., 2014:266). However, separate waste collection only comprises a very small percentage of the total amount of waste collected. In the RMSP, only 3.8 % of waste is separated; the remaining 96 % ends up on landfill sites. For the core city, the proportion of waste separated accounts for as little as 1.7 % of the total waste collected – almost 13,000 tonnes a day (Besen et al., 2014:267). Although separate waste collection and the incipient recycling value chain still play a very minor role in São Paulo's municipal waste management in terms of quantity, the now almost ubiquitous integration of the catadores, their cooperatives and associations reveals a greater awareness of waste disposal and its socio-ecological implications. For the future it will be important to see the waste problem in a more holistic context of urban hygiene, environmental quality, quality of life and economic survival strategies. More than in the past, the nexus with local climate-protection policy can be seen in view of the practice of waste incineration or emissions of landfill gases from the many landfill sites. Appropriate payments for the services of the recyclable-material collectors are under discussion both at the national level and in several federal states (Besen et al., 2014:265).

5.8.4.5

From national to municipal climate policy

A few years ago, Brazil implemented basic features of a national climate policy. In 2009, a national law on climate change was announced (Box 5.8-2) in which the principles, objectives and institutions of a national climate policy are defined. In order to specify the law in greater detail and develop implementing provisions, in 2015 the Ministry of the Environment commissioned a National Plan for Adaptation to Climate Change (Plano Nacional de Adaptação à Mudança do Clima – PNA) in which measures are to be formulated for the main topics – energy, coastal protection, water resources, natural hazards, food security, ecosystems, cities, transport and logistics, industry and healthcare – and coordinated with the already implemented sectoral programmes and packages of measures. As in other areas, the climate policy is 'declined' all the way down to the municipal level. The city of São Paulo is certainly a pioneer in this respect. Also in 2009, the city parliament and mayor enacted a Municipal Law on Climate Change (Lei 14,933/2009). On its basis, they created a Climate Change and Ecoeconomic Committee (Comitê

Box 5.8-2

Principles and objectives of São Paulo's Municipal Law on Climate Change

The principles and objectives of the São Paulo's Municipal Law on Climate Change include, inter alia:

- the promotion of renewable energies, coupled with the gradual substitution of fossil fuels;
- the application of mitigation and adjustment criteria to urban planning and building regulations;
- giving priority to local public transport over motorized individual traffic (MIT);
- the formulation and implementation of measures promoting an economical use of water resources;
- the promotion of urban green areas (especially in areas of social housing), the avoidance of soil sealing and the promotion of flood protection;
- a commitment to the guiding concept of the compact city;

➢ respect for, or the restoration of, statutory protection areas (Áreas de Preservação Permanente – APP) along waterways. As can be seen from the above list, the action fields, principles and objectives stipulated in the Law on Climate Change are the same as those formulated in the valid urban-development plans and guidelines, especially the Plano Diretor Estratégico, in the sense of the overall objective of sustainable, socially just and ecologically viable urban development. Specific elements include the reporting and documentation obligations required by Articles 24 to 27 of the Municipal Law on Climate Change, in particular an inventory, to be compiled every five years, of the anthropogenic greenhouse-gas emissions generated in São Paulo. Special command-and-control measures are derived, for example, from Article 28 of the Law. This article relates to the statutory environmental licensing of enterprises that generate significant greenhouse-gas emissions. Licensing is dependent on the submission of specific plans for the mitigation of corresponding emissions and for specific compensation measures.

de Mudança do Clima e Ecoeconomia). Under the leadership of the Municipal Environmental and Green Area Secretariat (Secretaria do Verde e do Meio Ambiente – SVMA), it is made up of representatives of different urban secretariats, other public and civil-society organizations and representatives of the private sector. Its purpose is to support the coordination, communication and implementation of a municipal climate policy. At the same time, São Paulo participates in international climate networks. Since it was founded in 2005, São Paulo has been a member of the C40 Cities Climate Leadership Group.

The municipal law on climate change provides for a regular inventory of greenhouse-gas emissions in the city of São Paulo every five years. In November 2013, a corresponding inventory for the years 2003 to 2009 was submitted, with updates in the areas of energy and waste (PMSP and SVMA, 2013). A total value of greenhouse-gas emissions in São Paulo of 15.3 million tonnes of CO₂eq was determined for the base year 2003, using the methodology updated by IPCC in 2006. According to this inventory, the corresponding total value for 2009 amounts to 15.1 million tonnes of CO₂eq (PMSP and SVMA, 2013:8). It has thus remained relatively constant in the course of the 2000s. As regards the sources of emissions, energy – in particular the combustion of fuels – dominates by far with 82 %. This is followed by the waste sector (i.e. waste treatment and landfill) with 16 %. The remaining 2 % relates to the areas of Agriculture, Forestry and Other Land Use (AFOLU) and Industrial Processes and Product Use (IPPU; PMSP and SVMA, 2013:9). The update of the emission values for 2010 and 2011 revealed higher figures than in the previous years, (16.1 and 16.4 million tonnes of CO₂eq), which can be ascribed primarily to the main emission

source: energy. The increase was explained by changes in the energy sector, in particular the commissioning of thermal power plants (PMSP and SVMA, 2013:13f.).

5.8.4.6

Impact of climate change

São Paulo can expect a rise in temperatures and, above all, an increase in the number of heavy precipitation events as a consequence of climate change (Nobre et al., 2010). An average temperature increase of 2–3 °C is predicted for the period from 2070 to 2100, which could involve a doubling of the number of days with heavy rain (about 10 mm per day) in the city of São Paulo (Nobre et al., 2010). Climate change will increase in particular the risk and the frequency of flooding and resultant landslides. Corresponding events have been recorded more and more frequently in south-east and southern Brazil in recent years; São Paulo has also repeatedly been affected. The main victims are the poor population, who, more than others, build their precarious dwellings in areas of particular risk, such as in hillside areas or next to watercourses. There have been comparatively few studies on São Paulo's complex micro-climatic conditions, e.g. the connection between urban-construction patterns and heat islands (Nobre et al., 2010:10).

5.8.5

Starting points and challenges for the transformation: urban-development planning and metropolitan governance

Brazil's 1988 constitution contains separate sections devoted to questions relating to the city for the first

time. On the one hand, this is the result of the huge increase in importance of the urbanization phenomenon in Brazil since the 1960s; in this period Brazil was transformed from a basically rural country to a largely urbanized one. On the other hand, it can simultaneously be interpreted as the success of awareness-building by the national urban-reform movement (Movimento Nacional da Reforma Urbana – MNRU) in the years of preparation for the new constitution during the re-democratization process after 1984. For, in addition to emphasizing the social obligations of urban private property, according to Article 182 of the constitution all cities with more than 20,000 inhabitants are obliged to draw up, implement and review a master plan for urban development (Plano Diretor). This also applies to São Paulo.

5.8.5.1

A new strategic master plan for urban development

Up until 2014, the Strategic Master Plan (Plano Diretor Estratégico – PDE) enacted in 2002 under the city government of Martha Suplicy, a representative of the Progressive Labour Party PT (Partido dos Trabalhadores), was in force. It had survived two conservative governments. After the inauguration at the beginning of 2013 of Mayor Fernando Haddad, also from the Progressive Labour Party PT, the process of drawing up a new strategic master plan again began on a broad participatory foundation. It was adopted in 2014 as municipal law no. 16,050 (Plano Diretor Estratégico do Município de São Paulo; PMSP, 2014). The PDE is the most important political document on the challenges, prospects and guidelines for urban development and urban policy (Box 5.8-3).

The effectiveness of the guidelines and instruments for managing and planning urban development depends crucially on the political will of the responsible decision-makers. Particularly in Brazil, it can often be observed that, when there are political changes of direction in the city government, although framework directives often still apply, the implementation of concrete measures is circumvented for reasons of political expediency, or at least their effect is watered down or realigned by specific implementation provisions. Local political continuity is an essential prerequisite for the permanence and effectiveness of principles and measures of urban-development policy that are long-term by nature. This is demonstrated by a large number of Brazilian examples of good practice: experience in the ‘Ecological Capital’ Curitiba and in Porto Alegre, the birthplace of participatory budgeting (Box 2.5-4). There has been no such continuity in São Paulo in recent years.

5.8.5.2

‘Right to the city’ and the priorities of urban-development planning

The PDE’s ten major task areas or action fields contain essential elements of a critical urban discourse on the ‘right to the city’ (Box 5.8-3). In Brazil, the National Urban Reform Movement MNRU was one of the main forces behind this discourse. Its members included several leading representatives of the academic, civil-society and political debates on urban policy and urban planning in São Paulo (e.g. Raquel Rolnik, Ermínia Maricato, Nabil Bonduki and others). The main issue is the right to the city, i.e. an urban development in which, for example, the social obligations of urban private property are taken seriously, and guaranteeing the fundamental right to housing is a priority. Other issues are an urban policy that aims to reduce socio-spatial disparities, take unequal vulnerabilities of the social actors into consideration, and enable solution mechanisms for socio-ecological problems and conflicts (Box 3.5-1). Paramount importance is thus attached to the following action areas: housing, provision with above all basic urban-hygienic infrastructures, mobility and environmental quality. In terms of urban ‘guiding concepts’, the currently valid PDE includes the compact city, density and especially the mixture of uses, as well as short distances and decentralized supply services. Special emphasis is to be placed on participatory mechanisms on different scale levels. An orientation towards basic principles of a social and sustainable city is evident. The Brazilian City Statute (Estatuto da Cidade), adopted in 2001 after years of controversial debates, provides a range of different innovative instruments for implementing these principles and carrying out the corresponding planning tasks, which the São Paulo PDE intends to use (Box 4.3-5, 5.8-3). These include the ‘socialization’ of profits from urban production, setting and implementing priority areas in social housing construction (Zonas Especiais de Interesse Social – ZEIS), improving urban mobility and city-district quality, and stricter control of urban growth along the existing local public transport axes. In addition, priority urban-renewal zones are to be created, for which urban-intervention projects are to be developed together with civil society. Furthermore, economic and socio-ecological issues and the protection of historical monuments are to be taken more fully into account in spatial design.

5.8.5.3

Planning for the metropolitan region: the new Estuado da Metrópole

Especially in the context of the planning, control and coordination of future urban development, policies that end at the borders of São Paulo’s core city soon

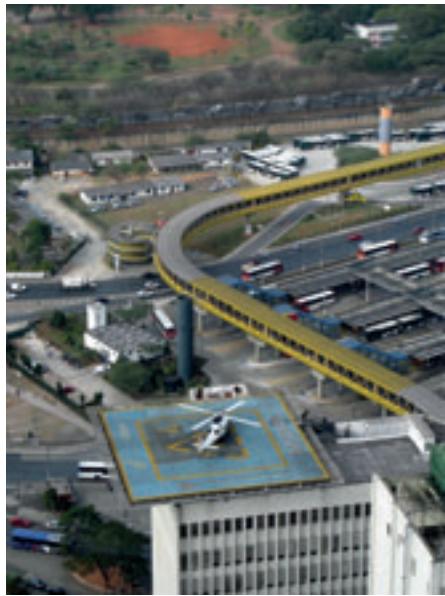
also reach the limits of their impact and usefulness. The inner cities have been merging with the peri-urban municipalities, which have been growing faster almost everywhere in the past few years. As early as the 1970s, during the military dictatorship, attempts were made in Brazil to take this fact into account by creating Regiões Metropolitanas (metropolitan regions). Furthermore, the Região Metropolitana de São Paulo (RMSP) was set up in 1973. Today, the metropolitan region comprises approx. 20 million inhabitants in 39 municipalities. The core city and peri-urban municipalities directly blend into each other – structurally, functionally and in terms of transport. However, the governance structures created for this metropolitan region have not achieved anything more than documentation and analysis, and at best relatively non-binding general planning. Accordingly, the institution responsible for the RMSP – EMPLASA (Empresa Paulista de Planejamento Metropolitano SA) – which was set up as early as 1975 on the initiative of the central government, has been regarded in the last few years as a comparatively weak institution. However, the issue of governance for the metropolitan regions has returned much more to the focus of interest in recent years. The 1988 constitution transferred the responsibility for the task of designating metropolitan regions covering several cities to the federal states. Following massive urban expansion beyond the inner cities into the surrounding countryside, many federal states have taken the opportunity to designate metropolitan regions and agglomeration areas (Aglorações Urbanas). From the nine original metropolitan regions in the 1970s, their total number in Brazil has since increased to over 60, without the effectiveness of this governance format having significantly improved. Beginning in 2004, there were consultations in Brazil on a framework law for the metropolitan regions – analogue to the City Statute, which has existed since 2001 – to implement the corresponding articles of the 1988 constitution. In January 2015, the so-called Estatuto da Metrópole was finally adopted as the national metropolis law, aiming to ultimately create framework conditions for the metropolitan regions and agglomeration areas set up by the federal states. Overall, numerous proposals for strengthening institutionalized metropolitan control and coordination were withdrawn or toned down in the course of the discussions, so that the Estatuto da Metrópole must be interpreted as a relatively ‘soft’ law. Its implementation has just begun, so it is too early to assess its possible effects. The essential basic principle of the Estatuto da Metrópole is the application of a so-called Governança Interfederativa, a joint inter-institutional form of governance, in which the community interests of the entire metropolitan region are supposed to take priority over individual

local interests and serve the overall goal of sustainable development for the metropolitan region. The main instrument of this governance format provided for by the Estatuto da Metrópole is an integrated urban-development plan (Plano de Desenvolvimento Urbano Integrado) for the metropolitan region as a whole. It also provides for coordinated sectoral plans (e.g. for transport and urban hygiene); instruments that cross municipal borders can also be derived and applied. However, it remains to be seen whether these new legal possibilities will strengthen and improve the efficiency of metropolitan governance to the extent so urgently needed to solve the problems in urban agglomerations.

5.8.5.4

Macrometrópole Paulista: the mega-urban area

For several years now, the urbanized area of São Paulo has been defined much more broadly than the RMSP because of the expansion processes and ever-greater interaction with the hinterland. The Macrometrópole Paulista (MMP) ‘construct’ is increasingly being used in scientific analyses and planning visions (Asquino, 2010). It consists of the core city of São Paulo and another 172 municipalities in the federal state of São Paulo, which are grouped together in several metropolitan regions and agglomeration areas, and now have more than 30 million inhabitants. The interlinkages in the transport and logistics field (Figure 5.8-5), on housing and commuter issues, in the economic division of labour, but also in the environmental and leisure sphere are now so large that the area must be called a true ‘city state’ of not only national, but also of international importance. The Action Plan for the Macrometrópole Paulista (Plano de Ação da Macrometrópole Paulista 2013–2040 – PAM) for the years 2013 to 2040, submitted by the EMPLASA in 2013, represents a first attempt to develop common development horizons and planning guidelines on this aggregated spatial level (EMPLASA, 2013). The PAM regards the following topics as the main areas of action: territorial connectivity and competitiveness, territorial cohesion and inclusive urbanization, and metropolitan governance (EMPLASA, 2013:11; Figure 5.8-1). However, here, too, it remains to be seen whether the PAM can really have an impact. There is no doubt that people have recognized the need for better collaboration, coordination, integration and, ultimately, pooling of the individual municipal urban policies in a policy and governance structure for the mega-urban space. However, there is no doubt that the road there will be long and difficult, mainly because of political power games and conflicts. This is a global phenomenon, however, as shown, among other things, by the fact that governance is still unsatisfactory in many European metropolitan areas.

**Figure 5.8-5**

Transport mix in São Paulo: helicopters, cars, buses and other means of transport.

Source: Tobias Töpfer

5.8.6 Conclusions

Both the described sectoral programmes devoted to questions and answers on social housing, environmental protection and climate-change mitigation, and the master plan for city-wide planning that recently came into force, have many points that can link up to an urban transformation towards sustainability and reveal evident synergies between the three dimensions of the normative compass (Chapter 3). The housing programmes are primarily devoted to social improvements for those in the population who are suffering from precarious, substandard housing conditions (substantive inclusion). Nevertheless, their objectives simultaneously also address concerns that in some cases are decidedly ecological, e.g. the protection of the water reservoirs and their headwaters in the south of the city (local natural life-support systems). Vice versa, environmental protection programmes whose primary aims are ecological improvements are inclusive in orientation. This is illustrated by the example of the collectors of recyclable material who are being actively involved in a recycling strategy, improving the possibilities of economic inclusion. What is immediately striking in the Strategic Master Plan are the references to the guiding concepts of the compact city, which are closely related to sustainable development, short distances and mixture of uses – these are recurring themes through the 2014 Master Plan. The Plan, which is valid until 2026, opens up a range of different perspectives for a development

that attempts to take environmental, social and economic aspects into account. The plans to give priority to local public transport offer both improvements in inclusion opportunities for the population groups who are dependent on these means of transport, and positive effects for clean air and climate-change mitigation. Urban land that is not yet built upon is to be protected and is to provide a wide range of environmental services. The other action fields also take into account sustainable goals in their widest sense. At the same time, all three administrative levels (national, state, local) acknowledge in different ways that there is a need for inter-municipal and inter-metropolitan steering mechanisms in order to overcome problems that do not stop at the respective administrative borders – in urban landscapes that are increasingly growing together.

Both in identifying problems and in developing planning solutions, therefore, important steps have been taken along the road to an urban transformation towards sustainability. Against the background of the normative compass, the Master Plan could integrate the perspective of *Eigenart* more closely. For instance, not-yet-built-upon urban land could provide not only environmental services, but also areas for recreation, exercise and social interaction for the population. Active participation by the population in the development of these areas could increase the level of acceptance and frequency of use.

The implementation of the transformative steps depends to a great extent on political will. If this is given, far-reaching developments are possible. Particularly in a lively democracy like São Paulo's, city governments alternate from rather progressive to rather conservative. On the one hand, this is an expression of a vibrant democracy; on the other, these repeated changes hinder continuity in the implementation of long-term planning. An active civil society, therefore, has an important role to play: even when there are frequent changes of city government, it can ensure a certain degree of continuity with its possibilities for monitoring, protesting and making demands; it can also prevent or mitigate extreme developments. The aim here must be to strengthen *Eigenart* in the sense of increasing creative autonomy and self-efficacy, and to encourage connectivity and thus the strategic cooperation between civil-society stakeholders.

Moreover, despite extensive municipal autonomy, the quality of cooperation between the three administrative levels plays an important role. Opposing governments on different sides of the political divide can hinder or block many possible developments and make the basically desirable cooperation with other municipalities in metropolitan regions and beyond enormously difficult. Vice versa, if there is a convergence of

Box 5.8-3

Action fields of São Paulo's Strategic Master Plan

The new Strategic Master Plan (Plano Diretor Estratégico – PDE) for São Paulo came into force in 2014 (PMSP, 2014). It is valid up to 2026 and contains the following action fields:

'Socialize' profits from urban production

In order to 'socialize' profits from urban production, for example, fees are levied on the real-estate sector to skim off gains from structures erected with a higher Floor Area Ratio than the stipulated basic Floor Area Ratio. The fee depends on the amount of additional space created and is paid into a municipal fund (FUNDURB). This money is to be used to finance social-housing and urban-development measures. Another aim is to prevent vacancies for speculative purposes by issuing building obligations and usage rules; enforcement instruments here include a progressive property tax and, if necessary, even expropriation. Furthermore, specific areas of the city, such as the centre and areas along strategic axes, are declared priority areas of social-housing construction (Zonas Especiais de Interesse Social – ZEIS), priority areas of urban renewal (OUCs), or priority areas as regards the social obligations of property (Box 4.3-5).

The right to adequate housing

A second field of action is devoted to the right to adequate housing. The main aim here is to designate and realize ZEIS and to build housing for the people most in need (income groups with up to three times the minimum wage), most of whom fall through the net of higher-level housing funding by the federal government. There is also a provision for a solidarity ratio, under which a value equivalent to 10% of the surface area is to be skimmed off from large-scale urban building projects and made available to municipal social housing.

Improving urban mobility

Local public transport is to be developed to improve urban mobility, for example by creating infrastructure corridors. 30% of the resources of the urban development fund (FUNDURB) is earmarked for the development of local public transport, innovative concepts relating to bicycles, and improvements in pedestrian zones (e.g. wider pavements, priority zones). Novel transport systems (e.g. multimodal systems, car sharing, river transport where possible) are to be promoted and a municipal plan for urban mobility developed.

Improving city-district quality

Improving city-district quality involves measures to conserve small units and traditional structures in the districts, to ensure a mix of uses and improved city-district management (with the participation of the residents concerned). Corresponding development plans are to be drawn up at the administrative level of the sub-prefectures and city districts in the course of a decentralization of urban-development policy.

Urban growth along existing public-transport axes

The fifth action field provides for greater control of urban growth along the existing public-transport axes. The aim here is both to consolidate existing infrastructure axes and to designate and set up new ones. The policy is to ensure that adequate public spaces are provided along these axes. Motorized individual traffic is not to be given priority. In this spirit, no

parking areas will be designated, and existing parking areas will be more efficiently managed. Along the development axes consolidated by the planned measures, minimum quotas are to be imposed for housing to maintain a mixture of uses.

Priority areas of higher-level metropolitan dynamics

Areas that should be designated as priority areas of higher-level metropolitan dynamics include the city centre, river-shore areas (e.g. along the Tietê and Pinheiros rivers), and areas along large-scale infrastructures (especially along railway lines and stations). These areas are to be conceived as priority urban-renewal zones for which urban-intervention projects are to be drawn up together with members of civil society.

Development of the economy and economic areas

The aim is to develop the economy and economic areas by designating commercial areas, assisted areas, development clusters and technology parks, and by better networking between existing infrastructures and centralities.

The environment

In the action field of environmental and socio-ecological issues, attention is focused for the first time on the 'rural areas' within the city and on their multiple functions (production, protection, recreation, ecosystem services). Mechanisms are to be introduced for the payment of environmental services (e.g. in water-protection areas or for the protection of remaining forest areas). In addition, new parks and open spaces are to be set up, especially parques lineares along streams and rivers to protect the shore zones and for flood protection; they are to be financed via a municipal open-space fund yet to be set up.

Protection of historical monuments

A further action field has to do with classic topics relating to the protection of buildings and ensembles, but also with a novel understanding of cultural values and the valorization of urban landscape in the sense of identity-generating spaces.

Participation

Participation and monitoring mechanisms are to be established at many different levels. These can range from setting up a municipal advisory council for urban policy, to a city conference to be held every three years, to advisory councils in the case of large-scale projects for urban renewal (the so-called Operações Urbanas Consorciadas – OUCs, the priority areas for social housing).

New land-development plan

The land-development plan is the decisive executing regulation for the Plano Diretor Estratégico, which can be defined more simply as the Lei do Zoneamento (zoning law), and in which more detailed rules are laid down on land valorization and usage with validity all the way down to the level of a parcel of land.

Special areas of urban renewal: OUCs

A special role in the urban renewal of São Paulo is played by extensive, long-term special areas of urban development, rehabilitation and renewal, the so-called Operações Urbanas Consorciadas (OUCs). The idea behind OUCs in current discussions is to improve transparency and the involvement opportunities of the people affected (which is already provided for

by law). This also reflects the country-wide criticism of the planning and implementation of major urban-development projects in the context of the two major sporting events: the 2014 FIFA World Cup and the 2016 Summer Olympic Games (de Carvalho and Gagliardi, 2015).

It seems that principles of the social and sustainable city

are to be given priority in the more recent OUCs (especially in Bairros do Tamanduateí), after the relatively powerful instrument of the OUCs concentrated for many years more on the field of transport and on strengthening and developing the functions of town centres, especially in the south-west with its new centre fragments.

interests between the different levels, positive developments in the direction of an urban transformation towards sustainability are possible.

5.9

Novi Beograd: 20th century socialist planned city district

Novi Beograd (New Belgrade) was built in the 1950s and is one of Belgrade's 17 city districts. Like many urban areas built in this era in socialist countries, the urban form of the socialist planned settlement contains many elements of the modern understanding of functionalism. The result here combines the architecture of communism with the separation of urban areas according to their functional characteristics. Seen from today's perspective, this district is characterized by non-sustainable structures, while simultaneously offering opportunities to realize a high quality of life and create a sustainable infrastructure.

The development of Novi Beograd is intensely interwoven with the history of the Balkan states. Its urban development can be divided into three phases. In the first, the city district's primary purpose was to serve as an administrative centre for the Federal People's Republic of Yugoslavia founded in 1945 (from 1963, the Socialist Federal Republic of Yugoslavia). Rapid population growth in the urban area led to the implementation of an increasing number of housing projects in the 1970s. During this second phase, Novi Beograd's function was that of a residential city. Up until the break-up of Yugoslavia, Novi Beograd's settlement pattern was characterized by residential complexes and extensive green areas. In the 1990s, Novi Beograd went through the third major structural change: the city district was transformed from a residential city into an economic centre. Large companies invested in the district and used the green areas as building land for office complexes, shopping malls and leisure centres. This partly uncontrolled development of Novi Beograd was facilitated by clientelism among former members of the Communist government elite. As in other cities in Europe, little importance was attached in Novi Beograd to the topic of sustainability in urban planning.

5.9.1

Eigenart in Novi Beograd

Whereas many socialist planned settlements (e.g. Nova Huta in Poland) were created as residential locations for employees working at new industrial sites, Novi Beograd was built as a political centre of power and a mirror of the new socialist Yugoslavia. Yugoslavia was a socialist country, but not an Eastern Bloc state. It was one of the founding members of the movement of Non-Aligned States: "Belgrade was the centre of the negotiation process between socialist planning and the Western way of life" (German quote translated from Münnich, 2013: 17). This is reflected in Novi Beograd's cityscape, which, on the one hand, is dominated by the socialist planning power, and, on the other, is home to places of societal development and appropriation in the city district.

5.9.1.1

History of Novi Beograd

There were already plans to build on the marshy land between the cities of Zemun and Belgrade after the First World War. After the end of the German occupation of Belgrade (1944), the Communist Party, under the political and military leadership of Josip Broz Tito, built its headquarters in the destroyed Belgrade. In 1945, the People's Republic superseded the Kingdom of Yugoslavia through elections. One of the government's main concerns was to contain ethnic conflicts. To this purpose, the Federal People's Republic divided Yugoslavia into six republics, each of which had its own capital. Belgrade was the administrative centre of the Federation and at the same time the capital of the Republic of Serbia. While the administrative centre of the Republic of Serbia was to remain in the historic city centre of Belgrade, the marshland between Zemun and Belgrade was chosen for the administrative centre of the Federal People's Republic of Yugoslavia. A 'Yugoslav Washington DC' was to emerge there (Bogdanovic, 2002).

The development of the marshland was symbolic in several respects. On the one hand, they were building on land where the German occupiers of the Nazi dictatorship had previously built a concentration camp. On the other hand, the development was seen as a sign of

Box 5.9-1

The Athens Charter

The Athens Charter was published in 1943 by the French architect Le Corbusier as a manifesto of modern, functional urban construction. It is based on the 4th CIAM Congress (Congrès International d'Architecture Moderne: International Congress of Modern Architecture) of 1933 (Mumford, 1992:392), which was devoted to the topic of the 'functional city'.

Inter alia, the Athens Charter sought physical solutions to the problems of the (inner) cities of the 19th/20th centuries, which were criticized as too dense, unhygienic, and burdened with traffic and industry; it stated that private interests must be subordinated to collective interests (Mumford, 1992:392). "The functions that a modern city must fulfil [were] defined [within a hierarchical classification]: dwelling, work, recreation and transportation" (German quote translated from Mumford, 2002:79).

The Athens Charter laid down the following points, among others, for designing the urban functions:

1. Residential districts should be centrally located. Moreover, every apartment must receive a minimum of sunlight. Residential buildings should not be constructed directly next to transport routes, but rather be built using

modern technology as high residential complexes located far apart to make room for green areas and parks.

2. Existing central and densely settled areas, such as old inner cities, should be redesigned in favour of green areas that are conducive to relaxation. Where appropriate, old structures should be partially or completely demolished for reasons of equalization.
3. Commuting distances should be reduced to a minimum. Nevertheless, industrial districts should be separated from residential districts by a buffer zone of green areas and sports facilities, and be placed close to transport routes.
4. The application of statistical methods for designing transport routes according to the speed of different means of transport should be incorporated into urban development. Again, roads should be separated from residential areas by buffers of green space (Mumford, 2002:89f.).

Overall, the Athens Charter is based on the idea of organizing and structuring the city according to the four functions of dwelling, work, mobility and recreation. Local requirements and natural limitations should be taken into consideration in the planning. Furthermore, problems of integrating recreation areas and efficient urban mobility into the city should only be resolved by extending upwards, i.e. utilizing the free space gained by higher buildings (Mumford, 2002:90).

superiority of communism over the monarchy, because attempts to cultivate the marshland under monarchial rule had failed. The colonization of the marshland was politically staged as a demonstration of power by the newly founded communist state, and Novi Beograd was celebrated as Yugoslavia's first communist 'planned city' (Kulic, 2013:37ff.).

The development of Novi Beograd was given a very high priority among the political decision-makers of that time (Jovanovic and Ratkaj, 2014:55), and this was one of the essential conditions for the implementation of this ambitious project. At the same time, a specific concentration of power made this project possible, since the state was landowner, builder and planning authority in one (Polan, 2011).

Planning of Novi Beograd and the Athens Charter

A wave of architectural modernization already began to emerge in the Balkans in the interwar period (Babic, 2013:32). A new generation of architects had close relations to the CIAM group (a movement that formed as the Congrès Internationaux d'Architecture Moderne between 1928-1959) and took its orientation from the 'international idea of modernity' (Münnich, 2013:100, 113; Box 5.9-1). In view of high urbanization rates, modern 20th-century urban development was to be made functional.

Yugoslav modernism in urban architecture was further developed after the end of the Second World

War and left its mark on reconstruction. The impact of the Athens Charter on Yugoslav urban planning was favoured by the openness of Yugoslavia's political elite towards Western societies and the break with the Soviet Union in 1948 (Bobic, 2013:66, 79; Le Normand, 2006:244).

Many Yugoslav architects who applied for the task of urban planning in Novi Beograd took their orientation from functionalist approaches to city planning (Pantic et al., 2010:663; Bobic, 2013:305). This can also be seen in the work of the architect Nikola Dobrovic, who, as senior architect, was entrusted with the planning of Novi Beograd until 1949 and was chairman of the Institute of Architecture and Urban & Spatial Planning of Serbia (Münnich, 2013:96). On the one hand, he took his orientation from Ebenezer Howard's garden city model; on the other, he integrated the ideas of the Athens Charter into modern Yugoslav architecture (Bobic, 2013:304ff.; Le Normand, 2006:246f.). His urban planning postulated a complete departure from the traditional way of building cities as developed in the 19th century.

Although Dobrovic received a lot of approval for the drafts of the buildings, his urban-planning concept for Novi Beograd was criticized. The drafts that were implemented included the main representative building of the Party Central Committee and the Federal Executive Council. Dobrovic's urban-planning concept was not directly implemented, but only used as a "basis

**Figure 5.9-1**

Public space in Novi Beograd.

Source: Nate Robert/Yomadic.com

**Figure 5.9-2**

Residential blocks and public facilities in Novi Beograd.

Source: Nate Robert/Yomadic.com

for further planning of the new city district" (German quote translated from Münnich, 2013: 123; Bobic, 2013: 306; Figure 5.9-1).

The General Urbanization Plan for Novi Beograd that was drawn up after Dobrovic's urban-planning draft was developed by planners who were more drawn to the Athens Charter. Other aspects of (early) modern urban planning, such as the idea of the garden city, receded into the background. The influence of the Athens Charter can be clearly seen, for example, in the design of the new centre of Novi Beograd (Milašinovic Maric, 2012: 3ff.).

However, the general plan for Novi Beograd was only systematically realized in parts. In particular, economic weakness and illegal housing construction prevented a development that consistently followed the master plan (Le Normand, 2006: 266; Bobic, 2013: 306). The attempt at state control through this kind of urban architecture left no room for civil-society inclusion and limited the development opportunities of urban *Eigenart*. The population had little chance to shape the urban space. Everyday life was marked by emptiness in public spaces since there was no life on the streets between the housing complexes (Figures 5.9-1, 5.9-2). Thus, there was a stark contrast between the (ideal) conceptions of urban planning according to the Athens Charter and what was actually implemented (Le Normand, 2006: 266).

5.9.1.2

Novi Beograd's building phases

Novi Beograd as an administrative centre

The first phase in the new development of the area was marked by the erection of administrative buildings which were supposed to symbolize a new communist identity (Kulic, 2013: 40). After the end of the Second World War, the plans for Novi Beograd involved about

two dozen buildings for ministries and the party headquarters; residential buildings for the civilian population were not initially planned (Blagojevic, 2004).

After the marshland had been drained, the construction of the seat of government of the Central Committee, a presidential building and a hotel for diplomats and state guests was begun in 1948. Work by young people and volunteers in the construction of Novi Beograd aimed to have an identity-generating effect and also show national solidarity and strength. However, participation in the work brigades was often not voluntary, and the working conditions were problematic (Münnich, 2013).

After the People's Republic of Yugoslavia declared itself independent of the USSR in 1951, there was a first economic crisis, which also led to a standstill in building activity in Novi Beograd (Kulic, 2013: 40ff.; Blagojevic, 2012: 242). Against the background of the potential threat from the Soviet Union, Yugoslavia began making diplomatic contacts with Western powers, which led to an economic upturn.

In 1959, the Federal People's Republic of Yugoslavia began to position itself between the USSR and the USA in such a way that peaceful diplomatic relations could be maintained with both blocs. Yugoslavia was one of the founding countries of the Non-Aligned States, whose first summit was held in Belgrade in 1961 (Kulic, 2013: 52). The policy of opening up to the West also had an impact on architectural style. The erection of modernist buildings was regarded by the USA as a break by Tito with Stalinist Russia. These developments are reflected in Novi Beograd's cityscape and were partly influenced by the Museum of Modern Art's architecture exhibition in Belgrade in 1956 (Kulic, 2013: 43ff.). For example, the Central Committee building, completed in 1959, was modelled on American high-rise buildings (Kulic, 2013: 43ff.).

Phase of housing construction projects

In the first urban-development phase, the economic upturn of the 1950s/60s led to a rapid increase in Belgrade's population. Newly built industrial plants led to the settlement of many workers in Greater Belgrade, so that a housing shortage arose despite incipient housing construction. Informal settlements developed in addition to the new buildings in Novi Beograd. Out of necessity, people appropriated the open spaces in Novi Beograd and lived e.g. in the cellars, communal rooms or lifts of new buildings (Münnich, 2013). However, this was not in line with the urban planners' ideal of creating an orderly urbanity; it also contradicted the ideas of the Socialist Party elite on a representative city for the Yugoslav republic. The city administration therefore tried to take legal action against the illegal use. This was opposed not only by the informal settlers, but also by the house councils, which did not always cooperate with the demands of the city administration (Münnich, 2013). This increase in population meant that large-scale housing projects needed to be implemented as soon as possible. This was to be carried out with the amended urban-development plans of the 1970s (Jovanovic and Ratkaj, 2014:55).

The aim was to supply the basic needs of the residents within housing complexes known as 'Blokovi', each of which offered housing for between 5,000 and 10,000 people. Shopping facilities, kindergartens, primary schools, community centres, sports facilities and repair services were therefore also integrated into the housing blocks. Extensive green areas were interspersed between the blocks. A further characteristic of these housing complexes was that pedestrians and motorized road users were separated. Cars were not allowed between the housing blocks and had to be parked in designated underground car parks (Jovanovic and Ratkaj, 2014:55; Blagojevic, 2012:232). These residential blocks aimed to represent a modernist-socialist alternative to bourgeois Old Belgrade (Jovanovic and Ratkaj, 2014:55).

At that time, Novi Beograd's housing complexes offered affordable and relatively modern homes that were popular with the citizens of Belgrade, even though the breakneck speed of construction meant that construction defects often appeared shortly after completion (Münnich, 2013).

The housing problem was largely solved by the late 1970s. However, the authorities had neglected to build cultural and recreational facilities in the city centre, which led to growing criticism of the functionalist urban planning (Blagojevic, 2012:245f.). Furthermore, there were few jobs in Novi Beograd, so that 60% of the working population had to commute to work in Old Belgrade every day.

The second urban-development phase was characterized by the breakup of the Federal People's Republic of Yugoslavia in the early 1990s. The new head of state of the Republic of Serbia, Slobodan Milosevic, tried to secure the support of the middle classes by privatizing housing (Mojovic, 2006). The aim was to suggest an economic boom and an improvement in living standards at a time of political and economic crisis marked by the Yugoslavian wars and the breakup of the Socialist Federal Republic of Yugoslavia (Mojovic, 2006). For example, state apartments could be purchased by tenants for a third of their market value. The consequence was that the percentage of homes in public ownership had fallen from the previous 90% to only two to five percent by 1993 (Waley, 2011:221; Blagojevic, 2012:232). At the same time, former party members and elites close to the party took possession of high-value houses and plots of land in Belgrade in the course of the privatization process (Doder, 1993; Ramet, 2005). The spontaneous and poorly organized privatization led to a loss of long-term state revenue from rents. Apart from the country's deteriorating economic situation, there was an increase in nationalist movements, which ultimately led to military clashes.

The third urban development phase began at the end of the war in 2000. The privatizations, which had already begun before the military conflict, were continued. During this phase, Novi Beograd was opened up to large-scale foreign investors, who increasingly saw the city district as a central location for the economic development of south-eastern Europe. Investor-friendly laws were passed at the beginning of the 2000s, aimed at reviving the economy and having a positive impact on the targeted accession to the EU. Belgrade was to become a European metropolis (Jovanovic and Ratkaj, 2014:57). The residential city was transformed into a flourishing economic centre with extensive shopping and leisure facilities. However, these were mainly built on the green areas that had originally served the residents of the housing blocks as recreation areas. Multi-national companies also built their regional offices on this open land. While in historically evolved cities such building complexes are often built along arterial roads due to lack of space, Novi Beograd offered the opportunity to erect them in the middle of residential areas (Jovanovic and Ratkaj, 2014:60). In this context, the economic interests of major investors rather than the interests of the population were taken into account (Maric et al., 2010:47). Critical urban planners believe that the remaining green areas must be preserved since they contribute to an improvement in living conditions (Maric et al., 2010:51). The number of jobs doubled between 2002 and 2011 as a result of the major investments in Novi Beograd. By contrast, the number

of jobs in Old Belgrade halved between 2002 and 2013 (Jovanovic and Ratkaj, 2014:58ff.).

Novi Beograd within the structure of the Serbian capital

Today, Novi Beograd, with almost 218,000 inhabitants, is the largest of Belgrade's 17 city districts (Statistical Office of the Republic of Serbia, 2011). With 1.16 million inhabitants, Belgrade is the metropolis of Serbia, followed a long way behind by Novi Sad, the country's second largest city with about 221,000 inhabitants. Apart from Belgrade and Novi Sad, only three other cities in Serbia have more than 100,000 inhabitants (UN-Habitat, 2013f.). This centralistic urbanization is characteristic of the south-east European countries that are developing from a socialist political regime and the related central planning towards a free market economy.

Belgrade also dominates the national economy. Almost 40% of all jobs and companies are located in the city (UN-Habitat, 2013f.), and a large number of these are now concentrated in Novi Beograd. This high concentration of population, investment and jobs in a single city is seen as problematic for the country's overall economic development (UN-Habitat 2013f.), because human capital and companies emigrate from smaller cities, and these cities therefore often stagnate or fall into decay. In the course of such a decline, the transport routes are often decimated (e.g. connection to public regional transport), which can lead to a further peripheralization of the hinterland. In addition, centralistic urbanization encourages economic disparities within the country. A polycentric development of several urban hubs, on the other hand, would facilitate integration into European and regional economic networks (UN-Habitat, 2013f.).

5.9.2 Inclusion in Novi Beograd

5.9.2.1 Political inclusion and urban corruption

The first free elections were held in Yugoslavia in 1990. The nationally 'transformed' communists managed to assert themselves in Serbia, however. This authoritarianism, legitimized by elections, was not weakened until the fall of Milosevic (2000). There followed a steady democratization of the country, although the consequences of the one-party systems are still visible. Serbia can now be described as a partitocracy, in which political parties dominate the public sector, the economy and political decision-mak-

ing. The World Wide Governance Indicator (2014) also refers to Serbia's political system as a weak democracy. As regards accountability and transparency, Serbia reached a value of 0.29 (on a scale from -2.5 to 2.5; Damnjanovic, 2015:4ff.). This means that recruiting for public posts is very prone to clientelism and patronage. According to the UNODC, the percentage of public-service employees who take bribes in Belgrade is higher than the national average (UNODC, 2011). 21% of Belgrade's population regards corruption as Serbia's main problem (UNODC, 2011). The Belgrade city administration is often perceived by the residents as an enclave. It is also characterized by a lack of accountability vis-à-vis the citizens of the city. This is shown e.g. when it comes to enforcing new major projects against the resistance of the urban population. Such projects are often connected with corrupt decision-making processes. For instance, there was resistance from the population to the 'Belgrade Waterfront' urban-development project on the opposite bank of the Sava; it was initiated by an investor from the United Arab Emirates with an investment volume of approx. €150 million (Wright, 2015). The residents of Belgrade were not included in the decision-making and planning process. In the meantime, former residents have been resettled, and the demolition of the buildings has begun, despite major protests.

Whereas Novi Beograd as a project came about under municipal direction, today it is mostly private investors who are shaping the development of Belgrade (Wright, 2015). Novi Beograd was originally developed and built with the involvement of local architects. The Belgrade Waterfront, by contrast, was designed autonomously without the inclusion of the population or of Serbian architects. Furthermore, it is feared that the concept will exclude low-income groups and that average earners will not be able to afford to live in the new area.

The inadequate transparency of Belgrade's urban politics leads to a low level of confidence on the part of the population in political decision-makers; the possibilities of political inclusion are limited. Nevertheless, there are non-governmental organizations that get involved. For example, citizens and architects campaign for the 'right to the city' in the 'Ministry of Space' collective. The aim is for the city residents to be actively included in the planning and shaping of urban spaces. The collective tries, for example, to make abandoned buildings usable again for the general public, e.g. as community centres or galleries. It is also taking part in the protest movement against the Belgrade Waterfront.

5.9.2.2

Economic and substantive inclusion: consequences of the privatization of the housing market

At the beginning of the 1990s, the Serbian housing market was privatized, whereupon 90% of the tenants purchased their homes. At the same time, the sudden privatization meant the end of the government's large-scale supply of adequate housing for urban citizens (Sekulic, 2014). At that time, no functional liberal housing market had developed; simultaneously, Belgrade was experiencing high influx and growth rates. The privatization of the housing sector thus led to a housing shortage in the city (Hirt and Petrovic, 2009:6f.). This deficiency was countered with illegal construction on open spaces. The construction of luxury real estate without authorization was also tolerated. The former Socialist Party elites in particular made the most of the opportunity, converting their political capital into economic capital by acquiring real estate (e.g. building villas on green areas). The cityscape is still characterized today by illegal constructions on open land.

At present, about 43% of Belgrade's housing consists of informal settlements (Radulovic et al., 2013:6). Decisive processes of urban development are still not transparent today. Also in the case of the new major project, the Belgrade Waterfront, it is alleged that no permit was issued when the project began, and that it does not conform to Serbian legislation (Wright, 2015).

This weak state governance, as well as the development of remaining free green areas to build shopping centres or representative corporate offices, puts urban *Eigenart* and inclusion at risk. Plans like the Belgrade Waterfront favour gentrification and the expansion of socio-economic disparities in the city.

Decaying, uninhabited buildings are another distinctive feature of the cityscape. The ownership of many of the buildings has not been clarified since the collapse of the Socialist Federal Republic of Yugoslavia. This applies, for example, to the buildings of many private companies that used to be state-owned enterprises but are now closed. There are, therefore, many vacant buildings that are gradually becoming derelict. No exact figures exist on these empty buildings with unresolved ownership issues. Despite the occupation of such buildings by squatters and their transformation into art and culture centres, as in the case of the Inex Film building, they are nevertheless often demolished in the end.

The housing market in Belgrade is currently marked by two major developments. On the one hand, gentrification processes can be observed in the city centre and the adjacent city districts (Todoric and Ratkaj, 2011:65f.). Novi Beograd's real-estate prices are now among the highest in Belgrade, partly because the spacious green areas offer a high quality of life

(Münich, 2013).

On the other hand, a significant proportion of Belgrade's population live in slums without infrastructure, water or electricity supplies. There are 29 settlements within the urban area that are referred to as slums, and 64 settlements in which the minimum requirements for hygiene standards are not met. Altogether, up to 25,000 people live in the slums of Belgrade (UNECE, 2006:60). Above all, ethnic minorities such as Sinti and Roma live in these informal settlements with precarious living conditions. As a rule, the residents are poor and have a very low level of education. They cannot attend school because they have no identity papers. At the same time, slum residents face a lot of suspicion, because large sections of Belgrade's population regard the shantytowns as centres of crime (Sabic et al., 2013:79f.). In Novi Beograd, too, evictions of informal Roma settlements are still carried out today, often forcing the people affected into homelessness. For example, in 2009 the informal dwellings of about 150 Roma in 'Blok 67', Novi Beograd, which had been built on brownfield land, were demolished with little notice because the Summer Universiade (World Student Games) was to be held nearby, and an access road was to be built on the land. The residents were not provided with adequate housing as compensation (Amnesty International, 2011b). Further slum clearances were carried out in 2012 and 2014 in Belvil, Novi Beograd, also in Blok 67; a total of about 2,000 Roma families were evicted from their settlements between 2009 and 2015 (Amnesty International, 2015b). In the few cases in which families were resettled, they were moved to the periphery of the city where there are hardly any jobs and little social infrastructure (Amnesty International, 2015b). This leads to the spatial segregation of these groups, who have no chance of economic inclusion.

5.9.3

Sustaining the natural life-support systems in Novi Beograd

The 2003 General Plan on urban development up to 2021 regards open spaces in the city mainly as ways of driving Novi Beograd's economic development forwards. Yet designs that include the preservation of the green areas regularly win tenders on the development of open spaces. Up to now, however, when projects have been implemented in practice, these ideas have not been realized, as illustrated by the example of the Usce Leisure Centre. Instead of preserving the green areas in accordance with the design specifications, a complex was built whose free spaces are limited to parking spaces (Maric et al., 2010:51ff.). Open green

areas are generally used for both formal and informal building measures; only in rare cases are industrial brownfield sites used (Zekovic and Maricic, 2008:35).

The development of formerly forested areas on Belgrade's periphery has led to an increase in soil sealing. This exacerbates the flood risk in Belgrade when there is heavy rain. Especially buildings that have been illegally built in flood-protection areas are exposed to this danger. To prevent this, the local government has initiated research projects to examine a development of green areas as flood plains. To this purpose, small river systems that are located within the city are to be connected to large green areas. In addition to recreation, flood protection and the preservation of the biosphere, these green corridors could also have a positive impact on the city's micro-climate (Ristic et al., 2013:18f.). This is also of particular importance because of the heat waves that are expected as a consequence of climate change.

5.9.3.1

Climate risks

An increase in the incidence of extreme heat events is expected in the Balkan region if the global mean temperature rises by 2°C. By 2100, unusual heat extremes (3-sigma events) could then be measured on 20–30% of days in the summer months (World Bank, 2014b). An increase in extreme temperatures has already been observed in Belgrade in the last few decades. While temperatures rose above 30°C on an average of 15.6 days per year during the period from 1949–1958, this happened on 21 days between 1998 and 2007 (Unkasevic and Totic, 2008:21). A further increase in temperatures would also increase the frequency of droughts.

Heat waves are a health risk above all for old and low-income population groups. Particularly in cities, the risk of heat waves could increase exponentially as a result of the urban heat-island effect. High-rise residential blocks prove to be unsuitable in extreme heat because there can be heat accumulation within the building (Stanojevic et al., 2014:495). Warming could also lead to a spread of malaria and dengue fever in the region (World Bank, 2014b:170f.).

The flood risk will also increase in winter and spring in the northern regions of the Balkans as a consequence of climate change (World Bank, 2014b:171). Belgrade is situated at the confluence of very water-rich rivers. Especially rivers like the Sava, which are directly influenced by the snowmelt, regularly flood in the spring months (World Bank, 2014b:188). Belgrade was last affected by flooding in 2014. A temperature increase of 2°C would have serious consequences for Serbia's rivers. It is estimated that the water flow would be reduced by 19% up to 2100 (Dakova et al., 2005, based

on World Bank, 2014b:188). A temperature rise would therefore increase the risk of flooding in Belgrade and simultaneously contribute to a reduction of the mean amounts of water flow.

5.9.3.2

Energy supply

A temperature increase of 1.5°C in the period from 2031 to 2060 would already cause a reduction in energy production by at least 90% on an average of 1.5 days a year, because there will not be enough water to operate the coal, nuclear and hydroelectric power stations (World Bank, 2014b:172). This would also affect the urban energy supply. In Serbia, the energy supply is, for the most part, based on fossil energy sources; as a rule, electricity is generated in coal-fired power plants (Jovanovic et al., 2007:532f.).

The annual per-capita emissions of a Belgrade citizen are low by European comparison: around 3.85 tonnes of CO₂ according to the Green City Index (Economist Intelligence Unit, 2009). About 30% of electricity in Serbia is generated by hydropower, and Belgrade has a natural-gas-fired district-heating network. Nevertheless, there is still considerable potential for raising efficiency; for example, households still use 60% of their electricity for heating and another 11% for hot water.

In principle, Serbia has a lot of potential for using renewable energies, particularly for generating energy from biomass and solar power (Stojadinovic, 2009:126). Serbia intends to generate 27% of its energy from renewable energy sources by 2020 (Batas Bjelic et al., 2015:374). By participating in the Energy Community, it receives support from the EU for the reorganization of the energy sector, although administrative barriers and a lack of network connections in particular hinder the development of renewable energies. Basically, regulatory measures must be strengthened to promote renewable energies.

Up to now, however, there have been few efforts to develop renewable energies in Serbia. This is mainly due to the fact that no feed-in tariff exists, despite the fact that the legal basis for such a regulation was already created in 2011 (Stojadinovic, 2009:127; IPA, 2013). Many companies have hardly any experience with renewable energies. Furthermore, many are still in a phase of building up market-economy structures, so that converting the energy supply within companies has not been a priority up to now (Stojadinovic, 2009:124ff.).

5.9.3.3

Transport

40% of Belgrade's commuters use public transport; 35% cycle or walk. Only 25% use private cars. The intensity of freight transport within the city is very high, however. 11,000 trucks enter the city daily, and often drive directly into the city centre because of the lack of ring roads. Approx. 80% of local public transport in Belgrade is operated by buses, many of which are in a poor condition (Dukic and Vukimirovic, 2011:220f.; Filipovic et al., 2009:266).

Under the 'Belgrade Public Transport and Traffic Infrastructure Improvement Project', which is being promoted by the European Bank for Reconstruction and Development (EBRD), however, a number of measures are now being undertaken to improve the situation; they include the modernization of the tram rail network and the development of rail transport and ring roads for the inner-city area. Belgrade has also expanded its network of cycle paths. In Novi Beograd in particular, the existing, extensive 'street grid' has been used to construct additional cycle paths. This has not been possible in the old town of Belgrade because of the high-density development. Thanks to the simultaneous modernization and widening of several bridges, it is now easier to go from Novi Beograd to the city centre by bicycle or on foot.

The further development of the transport infrastructure will continue to play an important role in Novi Beograd's urban planning. Above all, commuters from Old Belgrade who now work in Novi Beograd, and customers of the shopping and leisure centres who converge on the new city district in large numbers, will pose a transport challenge. There are currently too few bridges between Old Belgrade and Novi Beograd. For these reasons, the city district suffers from a heavy traffic burden (Waley, 2011:230). Open spaces and the very wide main roads offer many opportunities for sustainable development in Novi Beograd.

5.9.4

Conclusions for the transformation towards sustainability in Novi Beograd

The city district of Novi Beograd is an example of how difficult it is to plan urbanity even in places where there is a dense power structure (Münnich, 2013). The city district's *Eigenart* first emerged as a result of a political demonstration of power in urban planning, and later through appropriation by its citizens, which increased the district's quality of life. Today, Novi Beograd is a popular residential district. In contrast to many other 20th-century, modernistic, planned city districts, the

formation of a social hotspot has been successfully prevented here. Nevertheless, unregulated development by private investors and the eviction of informal, poor settlements could restrict societal plurality. The spacious green areas are also at risk from illegal building and densification. What is needed here is a greater emphasis on protecting public interests by assertive and effective urban planning.

Belgrade's urban planning today reveals a problem that is present in many cities: on the one hand, there is investment in new large-scale projects (Belgrade Waterfront); on the other, there is a lack of investment in maintaining and renewing existing buildings and in promoting culture (examples include the Belgrade Museum for Contemporary Art, the Inex Film building and social housing). In order to re-channel investment in the city, there needs to be a decentralized governance structure and more transparency in planning and contract-award processes.

Opinions differ among the resident population and experts on the extent to which the buildings from the communist-socialist period are worthy of preservation. Critics regard the large apartment blocks in particular as oversized, leading to a lack of identification by residents with their neighbourhood.

The spaciously designed areas offer potential for erecting new office buildings and shopping centres. The main issue for future urban-development policy here will be to pay more attention to sustainability aspects and to avoid the kind of unwanted path dependencies (Sections 2.2 and 2.3, Chapter 4) that make it more difficult to improve urban quality of life. Up to now, public life is still for the most part concentrated in Old Belgrade. Novi Beograd has hardly any cultural, artistic or gastronomic facilities that could give the city district more urbanity. Yet the district offers good conditions for improving urban quality of life. It is embedded in an attractive location between two rivers, and the spacious, open design offers potential for a mixture of residential, business and recreation areas (Section 4.2.3). Another important task lies in the integration of ethnic minorities, such as the Roma, and low-income groups, for example by social housing or with an improved housing structure and infrastructure in the areas that are currently informally settled.

5.10

Synopsis

The city examples show the different development paths and stages – as well as the different priorities and levels of ambition – that cities can have with regard to a possible development towards more sustainability in

the different dimensions.

Cities are very differently positioned in terms of their local resources (e.g. economic strength, financial budgets, human capital, natural resources) and powers (e.g. the local government's leeway for legislating and planning). These factors exert a key influence on the urban population's satisfaction of basic needs and their quality of life, on environmental quality and the consumption of resources and energy. For example, Copenhagen's quality of life is high, but so too is its level of resource consumption. In Kigali, Mumbai and Cairo, the satisfaction of basic needs – especially for weaker socio-economic groups – represents a great challenge.

Cities differ greatly from one another; their living conditions also vary considerably: the lifestyles of the upper-middle and upper classes in Mumbai and Cairo and the middle classes in Copenhagen are in some ways more similar than those of the upper and lower strata of urban society within the same city, even though they are, of course, marked by strong socio-cultural contexts. This applies e.g. to consumer preferences as well as to working conditions and housing. However, the living conditions of urban poverty groups in the cities vary greatly, particularly between those in industrialized countries and those in emerging economies and developing countries because the social security systems in the latter are frequently much less pronounced or even non-existent. This is shown especially clearly by the high proportion of informal settlements in Cairo, Kigali, São Paulo and Mumbai – a result of the lack of affordable housing. Yet these four cities also show how different informal settlements can be in terms of building fabric, infrastructure provision, housing security, internal organization and cooperation with the respective city administration, and that their residents cannot be equated with the poor population of a city. In view of the growing tendency of the middle and upper classes to seal themselves off in gated communities, the large, often still-growing socio-economic disparities within cities represent a major challenge (Sections 2.1 and 2.4). Disparities can also be observed to a lesser extent in the cities of the industrialized countries.

The stages and speeds of development vary hugely in different cities. Copenhagen and the Ruhr Area are now only growing very slowly. The key transformation challenges here lie in an energy-efficient transformation of the existing settlement areas and infrastructures (e.g. reorientation from motorized individual transport to local public transport), the alleviation of social inequalities, and the maintenance of creative autonomy for the population. Although the population's basic needs are largely satisfied and energy-efficiency measures are being implemented, in view of the urban residents' ecological footprint and the energy intensity of

their consumption-oriented lifestyles, these measures nevertheless do not yet represent an adequate contribution towards sustaining the natural life-support systems. Furthermore, the creative autonomy of the population is being restricted by gentrification and the privatization of public spaces, although there are many initiatives actively opposing these processes.

In the city examples of emerging economies and developing countries – as shown here in Mumbai, Guangzhou, São Paulo, Cairo and Kigali – the key transformation challenges lie, on the one hand, in catching up with the growth that has already taken place, some of which has been informal and without an adequate development of infrastructures. On the other hand, future growth must be steered in a sustainable direction in order to avoid negative path dependencies. In the WBGU's opinion, securing basic services and decent living conditions in cities is a key element of the urban transformation (Section 3.4). The problem the cities of the emerging economies and developing countries have today is that the kind of resource- and energy-intensive urban development the cities of the industrialized countries underwent in the 20th century is not a sustainable urban-development model; it cannot, therefore, be regarded as an example to be followed, since it was financed *inter alia* by capital income from industrialization processes that involve high environmental costs and the exploitation of resources in peripheral regions. In addition, improvements in the extent to which the basic needs of the urban poor are met lead to an increase in the demand for resources. This requires intelligent, efficient and socially compatible solutions.

Above all in Mumbai, Cairo and Kigali there are possibilities of leapfrogging, e.g. by developing local public transport in order to avoid a large increase in motorized individual transport. However, these options conflict with consumer preferences and the increasing consumption orientation of the growing urban middle class. They can be countered by awareness training (e.g. by NGOs and citizens' initiatives), incentive systems (e.g. tax benefits for energy-efficient buildings), or bans (e.g. on emissions-intensive vehicles).

The central role of the private sector in urban development, e.g. in large housing complexes in Guangzhou, Cairo and Mumbai, can be seen both in the cities of industrialized countries and in emerging economies and developing countries. Problems are caused by the privatization of public space, the displacement of the lower income groups and, above all, by external control of urbanization processes by the real-estate sector. This reveals the need for state control of economic processes if a system transformation is to be achieved. Although civil-society movements are also a driving and designing force, they do not have the clout needed to achieve

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a system transformation.

City administrations in the emerging economies and developing countries have less tax revenue at their disposal; this is frequently caused by the importance and scale of the informal sector as a source of income for large sections of the population (in Mumbai and Cairo, its size is estimated at more than half of the labour force), and by widespread corruption within urban-development planning and processes. Although the informal sector represents an important income opportunity, especially for urban poverty groups, the income situation and working conditions are often very unpleasant, if not dangerous. There should be a transition to more social security here.

Although the transformation towards urban sustainability should, in the future, also be oriented towards technical solutions and sectoral concepts, first and foremost it is people who must be the main focus. For example, key importance should be attached to visions of more equity in the city, and to changes in the population's consumer behaviour aimed at achieving more local and transnational equity (sufficiency, solidarity-based quality of life). As the city examples show, all cities have visions, master plans or agendas for urban development. As a rule, these include all three dimensions of urban transformation and offer promising starting points. However, in some cases, they are still geared towards incremental changes and not based on a comprehensive, long-term and profound strategy for the transformation of urban systems. It is important to examine critically whether they might just be paying lip service to the respective ideas, or are nothing but image and marketing campaigns (greenwashing). Moreover, in view of the high mobility of sections of the urban population, it is important to bear in mind that people are most likely to get involved in urban-development processes if they identify with the city. Measures to promote place attachment and social cohesion in society are therefore relevant to transformation. Overall, sustainable development in cities needs not only visions, but, above all, their implementation. Only if the targets that have been set are met, and the stakeholders are informed and involved, can the necessary transformation in cities succeed.

Local urban governments and administrations have different powers and resources with which to shape and plan, since national and regional governments, in turn, have different amounts of leverage over cities' decision-making. While the city government in Cairo, for example, has relatively few powers because of the autocratic central government, and because it is cumbersome in its actions due to local obstacles such as corruption and work organization, Denmark is regarded as a model in the implementation of the European Charter

of Local Self-Government. Copenhagen offers numerous possibilities for citizen participation, e.g. by sub-committees. In general, in accordance with the principle of subsidiarity, strengthening local governments is to be welcomed, but what can be done at what level must also be seen in the respective context. This also applies to the role of civil society. Initiatives – such as those that have been set up in Mumbai with the aim of improving the living conditions of slum dwellers – show that bottom-up approaches can make an important contribution to urban development. However, they also have their limits, particularly when it comes to persuading people to change their lifestyles in the direction of more sufficiency.

A successful urban transformation towards sustainability can only succeed if individual urban-development strategies are devised in a way that takes local socio-cultural characteristics into account. One of the biggest blockades along this road in many cities proves to be differences in the strength of governance. Few governments or other stakeholders of urban development are currently initiating and designing in-depth processes for the transformation towards sustainability. Promoting such efforts will become one of the greatest challenges of the transformation towards sustainability in cities (Chapter 8).

Urban designers: actors of the urban transformation

6

6.1 Introduction

Urbanization can be a continuous process of uncontrolled growth and the result of diverse, uncoordinated activities leading not only to the creation of housing, public and private infrastructure, landscaped open spaces and wasteland, but also, just as quickly, to their demolition or redevelopment. However, urbanization can also be dominated by state and municipal land regulation, public and private construction planning, and ordered urban and city-district design. City design ultimately develops from a dynamic mixture of planning and improvisation, organization and spontaneity, intention and laissez-faire. Accordingly, the WBGU understands urban design as the multifaceted production of cities in their spatial, cultural and societal dimensions by different actors, who coordinate their activities with each other to a greater or lesser extent.

Urban design, as understood by the community of municipal practitioners, including developers, architects and urban planners, comprises four aspects: the creation, the maintenance, the atmosphere and the beauty of urban housing. A key element is the combination of the public sphere with the private sphere, where people want to be by themselves or together with others. The interface can be imagined as a large membrane or seam. It opens up private housing to the anonymous, potentially risky, surrounding environment, while gently and respectfully allowing the public sphere to nudge into the private sphere, for example in the form of a shop, a café or a kiosk which, in turn, protrude into the city again by setting out chairs and tables. In this sense, the traditional ground-floor level has been referred to as both a real and a symbolic foundation of inclusive urbanism (Mäckler et al., 2013). Its intention is not to create a polarity between private (property) and public space, but rather to create a permeable zone in which the borders of both spheres interlace.

The Moriyama Houses in Japan are an exemplary implementation of this interface. These buildings,

which allow shared spaces to develop between smaller private units, are socially flexible, expandable, cost-effective, space- and resource-saving forms of housing for friends, single people, families, pensioners, travellers and the homeless (Maak, 2014). At best, such zones produce an urban atmosphere that links constructed objects and surfaces to form a subjective spatial experience, in which not only the metric space but also vibrations, noises, lighting moods and building materials create a specific aura. In this context, it is not the magnificent mansion, the elaborately designed square, nor the natural special feature of a location that is beautiful, but rather combined spatial figures that have developed from a city's memory and require future-oriented care, investment and cultivation.

The London-based collective Assemble, winner of the prestigious Turner Prize in 2015, implemented restoration and repair ideas in run-down, dysfunctional city districts together with the residents, and also found innovative funding for the projects. The best known of these is the Granby 4 Streets area in Liverpool's Toxteth district, which even socially oriented local politicians had been willing to surrender to a process of controlled dereliction (Assemble, 2016; Lorch, 2015). Assemble is active in the border area between design, architecture, urban development, social work and ethnology. The collective brings together architects, artists and activists, as often occurs in contemporary art.

The Chilean architect Alejandro Aravena, who won the Pritzker Prize in 2015 and is curating the 15th Venice Biennale of Architecture, pursues an analogous approach. He has revived a socially committed form of architecture that produces inexpensive housing and aims to provide flexible, modular accommodation for migrants, refugees and the victims of natural disasters.

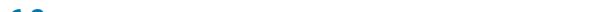
Particularly when the goal is to develop cities on the basis of their respective historical context and cultural *Eigenart* – in the sense of a transformative sustainability programme that takes local and global guard rails into account – the planning and steering intentions of design come more strongly to the fore, and individual buildings are inserted into an overall, spa-

tial system of architecture. Urban design in the sense of the people-oriented urbanization recommended by the WBGU is “the process of making better places for people than would otherwise be produced” (Carmona et al., 2003:3). Incremental and planned interventions into the landscape must be reconciled with the requirements of environmental protection and the principles of social welfare, and also take the manifestations of historical cultural identity into consideration. In urbanization practice, this can lead to conflicting goals and unintended consequences.

The following section highlights individual examples of the enormous diversity of global urbanization that illustrate interesting, good practices in transformative urban development. These examples explain patterns of action that are relevant for urban change, human/environment interactions and change agents. The latter try out different ideas and in this way help develop new leitmotifs, or visions, of urban transformation that can provide orientation for societal change. Starting from the WBGU’s concept of transformation (2011), Knieling and Klindworth (2016) have elaborated how urban planners become change agents who promote sustainable development; according to their observations, innovations largely emerge outside of formal planning processes. Communication and cooperation are important factors in this context since planners often assume the role of mediator between different actors (Knieling and Klindworth, 2016).

The examples documented here are intended to demonstrate the vast diversity of urban practices and innovations which, in the WBGU’s view, are needed to implement the goals of the normative compass (Chapter 3) and the global transformation strategies enshrined in the SDGs. It can be shown that there are approaches to a transformative strategy all over the planet that build on the respective circumstances, resources and *Eigenart* of place-making. The respective protagonists can increase the effectiveness of their activities by embedding their own actions into the universal framework. This applies all the more so if they are aware that other people in other places are also developing similar activities.

It goes without saying that the examples cited here cannot be considered representative in a statistical sense, nor do they aspire to completeness in terms of regional distribution and thematic focus. The examples range from knowledge generation and knowledge distribution for the residents of a city, to a great variety of activities in individual transformation fields, to a form of comprehensive collaborative urban design that makes it possible to think of these numerous initiatives in an integrated manner.



6.2

Transformative urban networks

Urban design initiatives can be found at different levels and with varying degrees of networking. While Sections 6.3 to 6.9 illustrate concrete examples of predominantly local initiatives, this section begins by describing various networks.

UN-Habitat’s exemplary information and networking platform ‘I’m a city changer’, which no longer exists, offered an overview of the field of urban designers. The UN’s programme responsible for urbanization attaches great importance to civil-society actors who explore new sustainable forms of living in cities. For this reason, UN-Habitat developed the ‘I’m a city changer’ platform in 2012 to initiate a network and thus improve the exchange of information among people who are trying out new forms of living together in cities, appropriating urban spaces and influencing urban design. At the same time, this platform gave actors who are, or want to become, active in the cities an awareness of their own self-efficacy. The platform was divided into six thematic areas: resilient city, green city, safe and healthy city, inclusive city, planned city and productive city.

Three further networks are examples of the diversity of ways in which change agents can join together. Impact Hub is a network of general interest for urban transformation where change agents meet. Shack/Slum Dwellers International operates primarily at the practical level. ICLEI is a platform for the cities themselves. The networks are not highlighted in all their many different facets, but serve primarily as a reference for further information on change agents. They demonstrate how local urbanization knowledge can be transformed in information networks into transferable practical knowledge.

6.2.1

Impact hubs

One specific network in the context of self-efficacy initiatives is the Impact Hub network (www.impacthub.net). Impact hubs are collectively used offices and work rooms (co-working spaces) which are mainly used by NGOs and small-scale social entrepreneurs. Impact hubs are organized in a global network and today can be found in 80 cities across all continents. The prerequisite for founding an impact hub is a critical mass of social innovators and recipients who adapt these innovations – something usually only found in urban environments.

As jointly used office and work spaces, the hubs

have an attractive interior with elements of a start-up; there is no fixed distribution of workplaces, which is intended to facilitate communication between different actors. The hubs take their inspiration from the concept of hosting: a hub member acts as a host and introduces people to each other. This leads to numerous activities such as group lunches and collectively organized further-training activities (skill sharing and business clinics).

The origins of the hub movement can be found in the anti-globalization movement, which emerged around the turn of the millennium and criticized the monotony of economic models and ways of thinking. The first hub, founded in London in 2005, was intended to give anyone who wanted to improve the world a place where they could put their ideas into practice and draw on the catalytic effects of a network.

Over the following years, the London model was widely emulated, and hubs also developed in other cities. There were no guidelines defining the criteria according to which new hubs should develop. Many hub founders appreciated this freedom as it allowed them to implement their own ideas.

However, in 2010, the network reached a turning point, as the prevailing structures no longer served the needs and interests of the individual stakeholders. The structure that had developed was completely overhauled: as integral parts of the network structure, all hubs were to equally share the responsibility and ownership of the global organization. Moreover, the name Impact Hub was chosen with the intention of creating a new brand that would simultaneously highlight the common goal of creating social innovation.

The development and history of the hub network, from its foundation and near collapse to its rebirth, are therefore exemplary and instructive as regards the difficulties faced by change-agent groups wishing to expand widely and achieve global transformation.

6.2.2 Shack/Slum Dwellers International

Examples of collaborative approaches (Section 8.3.3) can be illustrated by looking at good practices involving the urban population, local governments and other state institutions, as well as mediator organizations such as NGOs. The Shack/Slum Dwellers International (SDI) organization is a positive example of such an approach and of collaboration between change agents. SDI's roots lie in India, where women in an informal settlement (Section 7.3) founded an organization to develop strategies to combat the permanent threat of eviction and to improve their living conditions. The exchange

of information and experience with residents of informal settlements in Cape Town inspired the launch of a South African association of slum residents. More launches of similar local grass-roots organizations in other countries followed, with the aim of representing the interests of the residents of informal settlements at the local level. In 1996, the six national associations which had formed by then united under the umbrella of SDI. Today, the organization networks the residents of informal settlements in more than 30 developing countries and emerging economies, mainly in Asia and Africa. The NGOs and CBOs involved solve problems jointly and thus improve substantive and political inclusion. Major issues include protection against eviction, the development of new housing and the provision of services and infrastructure.

SDI is based on a network of local urban savings-group associations in informal settlements. The activities of these groups include not only saving money on group savings accounts, but also granting loans to group members and financing group projects. By promoting mutual learning and building negotiation and cooperation mechanisms, SDI aims to develop institutionalized structures which enable these local groups of residents to pursue their objectives vis-à-vis local and regional governments and other state agencies, and to find common solutions (Ley et al., 2014; Mitlin and Patel, 2014; Satterthwaite and Mitlin, 2014).

Our urban future will greatly depend on whether we succeed in involving and tapping the potential of the urban population and creating positive collaborations. SDI is a successful example of a collaborative approach, i.e. a form of cooperation that extends beyond participation in processes. The slum residents themselves have become active in creating new housing, networking and improving their living conditions (Ley et al., 2014). They are supported in these efforts by NGOs, which act as a bridge between the slum population and contact persons in government institutions. SDI also illustrates many of the advantages of transnational networks that can e.g. contribute towards collecting positive examples from different countries, pooling information, and generating learning effects through horizontal exchange, thus helping local groups to develop effective structures and strategies (Herrle et al., 2015a; Section 8.3.3).

6.2.3 Local Governments for Sustainability (ICLEI)

Networks also exist in which cities join forces and commit themselves to creating a sustainable future. ICLEI (Local Governments for Sustainability) is one such

established city network with a membership of over 1,000 cities (Sections 2.5.6.2, 8.4.2.2). It was founded in 1990 and is an international community of local, regional and national government organizations that have committed themselves to sustainable development. ICLEI's ambitions and reach are aimed at supporting its member cities in developing a sustainable future by becoming low-carbon, resilient, inclusive, bio-diverse, resource-efficient, productive, healthy and happy, and by building up a green economy and intelligent infrastructure (ICLEI, 2015).

6.3

Inclusive urban planning

The following section introduces master planners and planning offices from the public and private sectors that have a transdisciplinary approach to practical transformative urban development. The four examples demonstrate the diversity of private and state transformative planning offices and master planners.

6.3.1

Kunlé Adeyemi / NLÉ: shaping the architecture of developing cities

NLÉ is an architecture and design office led by Kunlé Adeyemi with headquarters in the Netherlands and Nigeria. It is active in the fields of architecture, design, urban planning, research, science, art and culture, and specializes in cities in developing countries.

Its key concern is to offer "sustainable solutions necessary for the environmental, infrastructural and human challenges posed by this megacentury" (NLÉ, 2015a). 'Megacentury' in this context refers to the dimensions of the challenges posed by the 21st century, including rapid urbanization and the emergence of megacities. Cities in developing countries are considered innovation generators where solutions to global problems can evolve. The aim is for new pathways of socially and ecologically sustainable development in cities to emerge from the potential that stems mainly from informal, in some cases improvisatory sources.

The first step is to try to use low-cost, local building materials. Some of the concepts are designed to involve non-experts in the building process. Renewable energy technologies are used in the buildings. The urban interventions are developed with the participation of the local urban population. The projects of NLÉ are initially meant as prototypes for possible further dissemination. NLÉ is consequently a characteristic example of an architecture office operating as a change agent in the

urban sphere. NLÉ is networked in the fields of science and urban design.

One project in particular demonstrates the transformative effect of the company's approaches in an exemplary manner; the Makoko Floating School (Figure 6.3-1). This school was designed and built for the Makoko slum in Lagos, Nigeria, with the participation of the residents and using local building materials. Since parts of the slum are built on stilts in the water, the rise in sea levels and frequent flooding pose existential risks for the population. The floating school, by contrast, is more adaptable to floods and offers the children a suitable place for their classes. Electricity is generated by solar panels to ensure access to a basic electricity supply that is independent of grid fluctuations and market prices.

At the same time, the floating school is a prototype project for a new type of building with which NLÉ is trying to meet the challenges faced in Makoko and similar coastal settlements. The school could serve as a model for designing floating houses which, thanks to their mobility and structural design, not only allow flexible use for different purposes but can also be combined to form a variety of settlement structures. These characteristics can be particularly advantageous in areas with changing environmental conditions, (Adeyemi and Disu, 2014). The floating school, consequently, was not a stand-alone project, but is linked to NLÉ's concept design called the Lagos Water Communities Project.

Projects like NLÉ's floating school, which develop innovative solution concepts together with the local population and are based on locally available resources and building methods, have the potential to transform settlements like Makoko and decisively improve the living conditions of the people.

Note should also be taken of the floating villages on Tonle Sap Lake in Cambodia (Floramo and Villadiego, 2014) and the works of Koen Olthuis ('the Floating Dutchman'), which, with 43 floating houses, are already a landmark in Amsterdam's new IJburg district (SZ, 2015; Waterstudio, 2015). The floating houses projects can be regarded as exemplary measures for coastal climate adaptation in regions threatened by rising sea levels.

6.3.2

Earthbag buildings and smart shacks

In recent years, several attempts have been undertaken to extend the use of technological innovations to slums. The Stellenbosch Innovation District is a project in South Africa in which Stellenbosch University cooperates with companies to find local, sustainable

**Figure 6.3-1**

Floating school in Makoko, Lagos, Nigeria.

Source: hbs-Nigeria

solutions for urban problems. The project focuses on, and supports, the development of solution strategies by the citizens themselves. For example, a 'smart shack' has been designed that is not only built of inexpensive materials but also features other sustainable technologies. The basic idea for this building method takes its origins from the earthbag building system.

Earthbag buildings are built with polypropylene sacks, in some cases especially manufactured for the purpose, which are filled with earth and used as a building material for walls (Barnes et al., 2009). The design and size of the buildings are variable; both small huts and spacious family homes can be built using this system. This has the advantage of making it possible to integrate different characteristic cultural and architectural features into the design.

The advantages of the earthbag construction method are that it is cost-efficient, conserves natural resources, uses hardly any cement, is simple and quick, and only needs a small number of qualified builders. The earth-filled polypropylene sacks also ensure a high degree of fire protection, which is especially advantageous in view of the frequent fires in slums, which are often caused by cooking fires or electrical short circuits. They also offer effective protection in floods – similar material is used to reinforce dikes in emergencies. Depending on the design, the buildings are also highly resistant to strong winds compared to buildings made of materials such as corrugated iron sheets, and can offer a correspondingly high degree of protection. This building method also offers soundproofing which, above all in densely populated areas, enhances privacy and reduces exterior noise. Earthbag buildings can be easily dismantled and the building materials reused. This simple building method also lends itself to use in disaster relief. Following the 2005 earthquake in Pakistan, for example, emergency earthbag accommodations were built that offered better protection in winter than tents,

thanks to their thermal insulation properties.

The smart shack, also known as e-Khaya, of the Stellenbosch Innovation Districts in South Africa, combines the earthbag building method with the use of solar panels for lighting, warm water, charging cell phones and rain-water supply. Daylight is used by installing water bottles in the ceilings to refract and distribute the sunlight (Western Cape Government, 2015). The dissemination of such design ideas to replace or upgrade traditional corrugated-iron huts, and the development of low-cost options for sustainable housing were initiated by the Better Living Challenge competition, organized by the Western Cape Government (Western Cape Government, 2016).

The smart shack project demonstrates how housing quality in slums can be improved quickly and cost-efficiently by simple means, innovative ideas and the wide range of inexpensive technologies that are already available.

6.3.3

IBA Emscher Park

IBA Emscher Park was conceived as a master plan for the municipalities of the old industrial, demographically stagnating communities of the Ruhr area and the federal state of North-Rhine Westphalia. The project idea for the transformative restructuring of Emscher Park was initiated within the framework of the 1989–1999 International Architecture Exhibition (IBA) and was greatly influenced by the exhibition's managing director, Karl Ganser. The scheme was embedded into a long-term, future-oriented programme with institutional and financial backing, so that it is still in operation today. The IBA's overarching goal was to improve quality of life and living conditions in the northern Ruhr area. The transformation of the region's spaces by architectural, urban-planning and ecological measures aimed to achieve economic change in the region. Its foremost ambition was to transform the region's image without neglecting its heritage of industrial culture (IBA, undated a). At the structural level, IBA Emscher Park is one of the first strategies for effectively dealing with metropolitan areas in a process of long-term shrinkage (Pinch and Adams, 2013:237).

The measures taken included the restoration of a previously fragmented landscape to form a cohesive parkland system covering a total project area of 800 km² along the Emscher river system (Pinch and Adams, 2013:231; Stemplewski et al., 2013). The leitmotif was 'change without growth', initiating the application of the principles of the circular economy in the fields of land use, energy, buildings and water manage-

ment. The IBA had thus taken on the “task of giving a new role – and thus also a face for a new future – to an urban landscape and its open spaces in the northern Ruhr area, wasted and wearied by the coal mining and steel industries” (German quote translated from Cox, 2010:56).

Housing construction concentrated on the rediscovery of the garden city, as well as on ecological models of wasteland revitalization and socially oriented urban redevelopment (Kurth, 2010:73). Settlement development was based on the motto of ‘projects, no plans’ (Pinch and Adams, 2013:234), targeting “development options of internal development in the sense of qualitative densification” (German quote translated from Cox, 2010:56). Moreover, “accompanying and controlling social management” (German quote translated from Cox, 2010:58) was required for the projects to prevent the planning errors made by the large-scale housing estates of the 1960s and 70s, and to link housing more closely to a feeling of well-being. This required factoring in not only the integration of aesthetic elements and the preservation of historic sites, but also the promotion of economic development. The outcome was that the history of the region with its (old) industrial structures did not become invisible, but rather the hallmark of a park located in the north of the industrial Ruhr area. The measures included refurbishing old miners’ housing estates, building new housing, developing cycle and hiking paths and founding commercial and technology centres. The Industrial Heritage and Architecture Routes were developed and completed in this context, exploring the region’s transformation in an exemplary way (IBA, undated a; RVR, undated c).

The IBA had set itself high scientific standards, and its expertise in terms of substance was convincing (Pinch and Adams, 2013:232). Planning and implementation were largely the responsibility of a proactive federal-state government. The IBA Emscher Park GmbH (limited liability company) was initiated and primarily financed by the federal state of North Rhine-Westphalia (Pinch and Adams, 2013:231). Through its interaction with numerous actors, the IBA represented a special type of project outside established political structures, and was consequently both “inside and outside the state” at the same time, even though it had been set up by the government (Pinch and Adams, 2013:232). This can also be attributed to the fact that the involvement of the local population in project implementation was planned and practised (Pinch and Adams, 2013:234; WI, 2013:175ff.). The ‘Emscher Future’ master plan, too, emphasizes the interconnectivity of its projects, being in a “continuous dialogue with neighbouring cities and districts, the business community, the responsible authorities and many other organizations and

institutions”, and “greatly influenced by ad-hoc and accompanying projects, such as the Berne Park or the Emscherkunst art exhibition” (German quotes translated from EGLV, undated).

The IBA’s key ecological innovation is the complete renaturalization of the Emscher river system, including all its tributaries, which is to be completed by 2020 in cooperation with Emschergenossenschaft, the Emscher river-management cooperative (Underberg, 2009). The Emschergenossenschaft is playing a decisive role in this project. It espouses the use of renewable energies and the improvement of quality of life in urban regions by converting or changing the use of (industrial) buildings (WI, 2013:116). The circular economy is thus promoted by reusing wasteland or e.g. generating energy and heating for public buildings from wastewater (WI, 2013:141).

The renewal of its industrial culture heritage can, therefore, be regarded as a success for the future prospects of the Ruhr area, since important buildings representing its industrial context have been preserved by concerted heritage conservation measures (Noell, 2010:244). The landmarks of the IBA Emscher Park function as “visual aids” and represent “places of orientation, memories and the future” (German quotes translated from RVR, undated b). With its new recreational areas and the events held there, e.g. the Extra-Schicht industrial culture night or the Ruhrtriennale, the Ruhr area has gained a new image as a location for culture and recreation; this reached a climax in the Ruhr 2010 Capital of Culture event. The slag heaps and their installations are the new landmarks of the Ruhr area (RVR, undated b).

Overall, the IBA has accordingly been the subject of positive acclaim. In Pinch and Adams’ view, the IBA projects and the creative links forged between art, landscape and recreation are pivotal to the reinvention of the region (Pinch and Adams, 2013:238). In their opinion, the IBA’s recipe for success lay in not having an overarching, comprehensive strategy or a master plan for the region (Pinch and Adams, 2013:235), allowing flexible reactions in a polycentric region but requiring comprehensive coordination.

6.3.4

Vienna’s housing policy

Vienna’s local government has been practising a policy of social housing for almost a century. Over time, maintaining a social component in housing and housing construction has become an identity-defining obligation. Despite Vienna’s outstanding attractiveness as a location and a related wave of privatization, the option of

selling housing as a means of consolidating the municipal budget has always been ruled out, even in times of budgetary constraints. Of just under a million housing units in Vienna, 26.3% are owned by the local authorities. Another 16% were funded by the city and built by non-profit property developers (WOPOKO, 2015). The income generated is reinvested in social housing projects.

Vienna's housing policy is based on three pillars: building new housing, redeveloping buildings that are more than 20 years old, and providing direct support for low-income population groups. Until the 1990s, new housing was mainly built by the city's own municipal building contractors. Today, the contracts are increasingly awarded to non-profit property developers and subsidized via a variety of funding models such as long-term municipal loans. In 2015, €325 million was made available for this purpose. Large-scale contracts are granted by means of project competitions; smaller building projects (<300 housing units) are assessed by an interdisciplinary Land Advisory Board. What is unusual about the approach of Vienna's government is that building projects are also evaluated on the basis of several social-compatibility criteria. These assessment criteria include:

- economic viability, which is verified by an analysis of the land costs, overall construction costs, usage costs and cost-relevant building facilities;
- social sustainability, including measures to strengthen the social mix, co-determination concepts, facility organization, identity-defining measures and networking with the social infrastructure;
- ecological sustainability, i.e. low-carbon and resource-saving building methods, healthy and eco-conscious forms of living with a view to the urban structure, and green, open spaces;
- architectural quality, i.e. the integrated analysis of building quality and aesthetics in relation to the cityscape, the housing unit and the surrounding environment (Groschopf and Trojan, 2013).

The housing development subsidy policy has resulted in architecturally high-quality housing, integrating a comprehensive range of community amenities into the facility complexes, such as libraries, swimming pools, childcare centres and doctors' surgeries.

The refurbishment of existing buildings was funded to the tune of €256 million in 2015. When housing is upgraded, there is always a risk of rent hikes and, consequently, of lower-income tenants being forced out. Vienna's government pursues a policy of 'gentle urban renewal', which ensures that rents remain affordable for the tenants after refurbishment is completed. Tenants with low incomes receive direct financial support. These housing allowances ('Subjektförderung')

amounted to € 109 million in 2015 (WOPOKO, 2015).

Value is also placed on socially mixed city districts. This is achieved not only by generous upper-income thresholds, allowing higher-income population groups to also move into the districts, but also by the requirement that developers finance part of the housing stock with private funding. For example, upmarket penthouse flats, which can achieve higher prices on the free housing market, are built on the upper floors.

Vienna's sustainable and socially compatible model has met with widespread international interest. However, as a model that has evolved over time, its transferability depends on a number of prerequisites – such as a local government that has the corresponding financial and administrative capacities, comprehensive planning powers and skills, and the acceptance of the population – conditions that are not met to the same extent elsewhere. Considered on an international scale, the costs are also high. The planned budget for social housing in 2015 was €689 million (WOPOKO, 2015). By way of comparison: new housing subsidies in Berlin, which has almost twice as many inhabitants, came to €64 million. However, a comparison of costs should also take into account the fact that a supply-side-oriented housing policy on the scale of Vienna's has a price-stabilizing effect on the entire housing market (Amann and Mundt, 2005), sets high minimum standards on housing quality, and induces both direct and indirect effects on employment (WOPOKO, 2015).



6.4

Social inclusion and cohesion

One of the key issues of metropolitan areas and rapidly growing cities is how affordable housing can be created – to preserve social cohesion, which is threatened in many cases by the market activities of the private real-estate industry, and to maintain the high degree of social-structural and cultural diversity that used to be typical of urban areas and should remain important.

6.4.1

Slum development: the Indian Alliance

The Indian Alliance is a network of three NGOs working in the fields of land rights, housing conditions and infrastructure of urban poverty groups: the Society for the Promotion of Area Resource Centres (SPARC), Mahila Milan, and the National Slum Dwellers Federation (NSDF). The NSDF was originally founded in 1969 under the name of Bombay Slum Dwellers Federation to defend the rights of urban poverty groups.

The NSDF emerged from this organization in 1975, and other cities followed Mumbai's example. SPARC was founded in Mumbai by Sheela Patel in 1984 and is today one of the largest NGOs in India. Following a new draft law giving cities the right to expel pavement dwellers, SPARC and NSDF joined forces in 1985 to protect the rights of the homeless and slum residents. In 1986, the two organizations founded the NGO Mahila Milan (Women Together), the first women's organization for the protection of homeless people's rights. At first, a loan programme was developed to provide the participants with economic security in crises. This was later expanded to finance housing solutions. The Indian Alliance, in which the three organizations cooperate as a federal model, was founded in the 1980s to assert the 'right to the city' for urban poverty groups, and to demonstrate to governmental and international organizations that poverty groups are capable of improving their living situation themselves (Burra, 2005).

Together, the three organizations have widely ranging fields of activity, including microfinancing and holding surveys and microcensuses in slums and among the homeless, who are frequently not counted in state censuses. They are also involved in the regional, national and international pooling of experience between slum communities on topics like capacity development and the production of knowledge among urban poverty groups. Furthermore, their agenda includes strategies for protecting land rights, projects aimed at improving housing conditions (in-situ upgrading with local workers where land rights have been secured, or relocation projects where land rights have not been recognized), and infrastructure projects such as public toilets. The projects mostly follow bottom-up approaches using low-tech solutions and involving the participation of the population concerned. By 2011, the NSDF and Mahila Milan were operating in 65 Indian cities; they involved 750,000 people in savings projects, supported some 80,000 households during relocation measures, and built 10,000 houses and over 14,000 lavatories in the form of public toilet blocks. Between 2010 and 2011, the Indian Alliance organized, among other things, 35 city-to-city exchange projects and seven international experience-pooling meetings (Chitekwe-Biti et al., 2014).

The Indian Alliance, itself the result of a network formation, is strongly networked at the national and international level. The alliance gave birth, for example, to Shack/Slum Dwellers International (SDI); Section 6.2.2). SPARC is also active in global networks of the Asian Coalition of Housing Rights (ACHR), Homeless International, and Cities Alliance, an important South-South cooperation of networks. Such wide-ranging networking has led to a high scalability of local projects

and problem solutions, and the ideas exchanged there have already found practical implementation in other Indian and additional cities in developing countries and emerging economies.

The Indian Alliance has succeeded in persuading the Indian government to recognize the special requirements of people living in informal settlements and slums and, most recently, also to support local slum-upgrading measures instead of relocations. However, the provision of adequate housing and basic services in Indian cities still remains a challenge for local governance (Satterthwaite and Mitlin, 2014).

6.4.2

Urban gardening: collective and intercultural

Food production in cities and peri-urban areas has a long tradition in many countries (Mok et al., 2014). Many ancient civilizations (e.g. pre-Columbian Maya, medieval Byzantium) relied on urban agriculture to improve the resilience of urban food security (Barthel and Isendahl, 2013). In Europe, small garden colonies were created mainly as a result of the land privatization that took place parallel to industrialization. In addition to their nutritional purpose, these colonies often fulfilled a socio-political occupational function (Stein, 2000). In the 20th century, the numerous garden allotments in Europe helped to ease the negative agricultural impacts of the war and, in Eastern Europe, the ineffectual organization of food supplies (Swain, 2002). At the end of the 20th century, garden initiatives extending beyond the idea of self-sufficiency and including social, ecological and political messages and activities sprang up in many (large) cities all over the world. Collective urban gardening projects emerged in New York (Stone, 2002), in Japanese cities (Akemine and Pestemer, 2002), in London and Berlin (Jahnke, 2007) – in some cases on special plots of land that had previously been used for other purposes or were not intended for the purpose (guerilla gardening). According to estimates of the American Community Gardening Association, there are over 18,000 collective gardening projects in the USA and Canada (Kortright and Wakefield, 2011). A well-known initiative that was important for spreading the idea of urban gardening in Germany is the Prinzessinnengarten in Berlin (Figure 6.4-1). Initially conceived as a stopgap solution, the urban kitchen garden in Berlin-Kreuzberg developed quickly into an important catalyst for addressing such topics as biodiversity, urban ecology, nutritional sovereignty, self-government, recycling, climate protection or integration and, thus, important questions about shaping the future of the city (Rosol, 2005; Rosol

and Schweizer, 2012; Clausen et al., 2012).

A special form of collective gardening is the intercultural garden, which developed in Germany. While the user structures of garden allotments in large cities have often become multicultural, in most cases incidentally, intercultural gardens are characterized by the idea of specifically supporting integration and inclusion by collectively cultivating the land. The concept became known in Germany primarily through a pioneer project in Göttingen, which was founded by refugees and refugee initiatives in 1996. The gardens created there quickly became social meeting places, with intercultural exchanges of information on plant varieties and cultivation methods. Working on the plots helps many people in the symbolic act of putting down roots in their new home; it also offers possibilities for meaningful and practical activities outside the domestic sphere, while supporting the acquisition of the local language, which acts as a common denominator in encounters between different cultures.

Collective gardens are usually run by individuals, local environmental and nature-conservation groups or migrant associations. Depending on the local situation, the municipalities support the initiatives by providing land free of charge or at low cost, and by granting subsidies or small loans. Collective gardens usually have a very limited catchment area and only rarely have a nationwide (media) impact like Göttingen's first intercultural gardens or the Prinzessinnengarten. The spread of urban gardens is encouraged by globally networked movements such as the Transition Town initiative, which considers collective gardens as an important building block in the transformation of urban society (Hopkins, 2008; Section 8.3.4).

The specific contribution of such gardens to the urban food supply remains limited, but then this is generally not the core issue. Even assuming the extensive use of wasteland and rooftops in the city, an optimistic study in Cleveland (US) was only able to claim potential self-sufficiency in the supply of fruit and vegetables. Based on the contemporary typical western style of nutrition, this corresponds to just 7.3% of total food costs (Grewal and Grewal, 2011).

Many projects deal intensively with topics such as food security, local resilience, collaborative urban design, sufficiency, applied technologies and – as in the case of the intercultural gardens – practical integration and social cohesion (Chapter 3). The feasibility of individual projects depends primarily on the amount of land available and the local mobilization potential. Costly purchases, high investments or changes in institutional structures are not necessary in many cities, which also explains the strong international prevalence (Cockrall-King, 2012). The continuance of collective



Figure 6.4-1

Prinzessinnengarten in the Kreuzberg district of Berlin: raised beds made of bakery boxes.

Source: Assenmacher/Wikimedia Commons

garden projects depends largely on local factors. Institutionalized structures such as allotment garden associations have proven to be very long lasting. The future will show whether projects with a strong social and integrative focus, which are often less formalized, will be as long-lasting.

6.4.3 Building for refugees

In recent years, the number of people who have fled from or been displaced through war and persecution has increased significantly worldwide. According to UNHCR estimates, almost 60 million people were forcibly displaced in 2014 (newer statistics were not available at the time of going to press). Of these, 38.2 million were internally displaced refugees. A total of 19.5 million people were forced to leave their home country – an increase of 2.9 million in comparison to 2013. The majority of these refugees (86%) were hosted by neighbouring developing countries (UNHCR, 2015). Due to the civil war in Syria, tens of thousands of people have embarked on the journey to Europe, which has led to a considerable increase in asylum applications compared to previous years. In 2015, a total of 476,649 people applied for asylum in Germany alone. This constitutes 273,815 more applications than in 2014 and corresponds roughly to the number of applications at the beginning of the 1990s. In 2015, the Federal Office for Migration and Refugees (BAMF) recorded 1,091,894 new applicants in the registration system EASY (Erstverteilung der Asylbegehrenden: Initial Distribution of Asylum Seekers; BAMF, 2016). In addition to double registrations and people who travelled on to other countries, many asylum seekers were unable to apply for asylum immediately due to overstrained adminis-

Table 6.4-1

Selection of modular emergency shelters.

Source: WBGU

Model	Extendable	Floor area [m ²]	Material	Energy supply	Durability [years]
Better Shelter	No	17.5	Plastic, steel frames	Photovoltaics	3
More Than Shelters	Yes	23.4	Cotton, aluminium, PVC	Not specified	10
Exo	No	6.7	Not specified	Connections provided	5–10
Extremis Technology	Yes	Not specified	Wood	Not specified	15

trations – hence the large discrepancy between the two figures (Mediendienst Integration, 2016b).

Sudden migration movements pose great challenges to societies. Whereas the direct neighbouring countries struggle to provide refugees with weather-proof accommodation and a basic supply of water, food and medical care, the discussion in Germany revolves around the building measures required to give the new arrivals a home, and the opportunities for integration that must be created.

6.4.3.1

Modular systems as emergency housing

Modular systems are suitable for the rapid, flexible and safe accommodation of people in sudden crisis situations, but can also – depending on the system – be regarded as a solution to medium-term housing problems. Several small companies are now offering alternatives to traditional refugee tents, for example Better Shelter in Sweden, More than Shelters in Germany, Exo in the USA, and Extremis Technology in England (Table 6.4-1). The housing systems are usually easy and quick to build and also simple to transport. They offer protection from the weather and a certain degree of privacy and safety. In contrast to the classical tents, some of these modular systems are made of solid, robust materials such as polypropylene or wood (Extremis Technology, 2015). The basic units offer sleeping space for four to ten people; the models reviewed have a floor space of at least 6.7 m² (Reaction Housing, 2015) and, in some cases, can be extended without limit (More Than Shelters, 2015). Efforts are made to ensure that all systems provide a basic electricity supply. Photovoltaic systems are designed to generate enough electricity to power lighting and allow mobile telephones to be charged. The housing unit can often be fitted with a shower, WC and kitchenette at a later date (Extremis Technology, 2015). This is particularly important when the modular system is intended as a medium- or long-term solution.

The optional conversion or expansion of the housing

units is significant inasmuch as they can be adapted to different purposes, geographical regions, climatic conditions and culturally specific forms of use. In addition to their flexibility, the longevity of the material plays an important role for the medium- and long-term use of a shelter. According to the manufacturers, the anticipated service life can vary considerably. Extremis Technology, for example, expects its shelters to be habitable for 15 years (Extremis Technology, 2015), while the Better Shelter model is only dimensioned for a lifespan of three years (Better Shelter, 2015). The possibility of dismantling and reassembling the shelters and also recycling their separate components is significant for the sustainable use of the housing units. In contrast to shelters whose main building material is industrially produced polypropylene, wooden constructions can be repaired quickly and without special tools.

The question of whether more durable and robust systems (e.g. Extremis Technology) are also suitable as potential housing in informal settlements needs to be explored, particularly in transitional settlements where the inhabitants only live temporarily. Weather protection, safety, privacy and flexible options for converting or expanding the systems are important properties that housing in informal settlements should have. Refugee camps are today becoming more and more permanent, such as in Dadaab, Kenya, where more than 300,000 people live in five camps, the first of which have existed since the 1990s. Upgrading the housing conditions by means of innovative design and transitional architecture could significantly improve living conditions in such refugee settlements.

6.4.3.2

Urban development as a means of integration

Although the number of refugees in Germany and other European countries is considerably lower than in Turkey, Lebanon or Jordan, the current influx of refugees is creating many challenges, particularly for cities.

The main destinations of the refugees are the major

conurbations, where (inexpensive) housing is already scarce. Furthermore, jobs are rarely available in areas with dwindling populations and high housing-vacancy rates, and migrants also tend to settle where people belonging to their own ethnic group are already concentrated.

This development puts the municipal administrations of attractive agglomeration areas under the pressure of having to provide housing practically overnight. Initially, they also fell back on provisional, often not winter-proof, collective accommodations, such as gymnasiums, factory halls, containers and tents. These provisional shelters are meant to be quickly replaced by more sustainable housing solutions, including new buildings – for which safety and environmental standards have been relaxed (Box 4.3-6). Figure 6.4-2 shows a draft by YES Architecture depicting climate-adapted modular building and settlement concepts for accommodating refugees and displaced people, planned according to the German Energy Conservation Ordinance (EnEV). The Making Heimat project, launched by the German Architecture Museum (DAM) for the 15th International Architecture Exhibition in 2016 – La Biennale di Venezia (DAM, 2016) – provides an overview of building projects for refugees and displaced persons in Germany (provisional accommodations and new buildings).

On the subject of new buildings, NRW's building minister Groschek suggested building them as high as possible and concentrating refugees in high-rise blocks – temporarily, so it was said (Klask, 2015). Wasteland and green areas that were not really intended for residential housing were approved for this purpose. Critics warn that constructing such tower blocks amounts to ghettoizing the migrants, citing the history of the French banlieues as an example (Masurel, 2011).

The alternative to new buildings is to use unoccupied buildings, even though organizing the administration is problematic. A team of Hanover-based architects headed by Jörg Friedrich has drawn up suggestions for the use of unoccupied buildings and developed them to the planning-permission stage (Friedrich et al., 2015). They include:

- ‘up-on-top building’ (e.g. on the roofs of multi-storey car parks or office buildings),
- ‘insertion building’ (implantations in unoccupied buildings, industrial facilities),
- ‘fill-in building’ (in large and small gaps between existing buildings in the city centres),
- ‘mobile building’ (in passenger trains, floating houses),
- ‘integrated building’ (in garden allotments, back yards, etc.).

Implanting these additional buildings into existing mixed city districts could prevent the development



Figure 6.4-2

Building for refugees and migrants. Exemplary settlement (basic and special modules). Design by YES Architecture.
Source: © YES Architecture

of ‘migrant ghettos’, meaning the undesired combination of income poverty with a high concentration of migrants. Socio-economic segregation develops when a poor supply of resources in a city district coincides with the stigmatizing effect of the district’s image, and possibly with the acquisition of destructive values and standards (Gans, 2014). A strong spatial concentration of migrants in a city district need not necessarily reduce the intensity of the relationships with the resident population per se. However, processes like the selective exodus of the more resource-rich, stabilizing middle classes among resident populations, as can be observed in the French banlieues and Afro-American neighbourhoods (‘projects’) in the USA, have a consistently negative impact.

What is really needed is a housing situation that allows a balanced relationship to evolve between the residents and migrants, whereby building and social measures can preserve or improve the attractiveness of the residential areas. It is important to carry out measures that improve the quality of the schools in the area, create attractive possibilities for encounters in public spaces and within the social institutions, and strengthen local inter-group relationships and the formation of social networks and groups that give the migrants social capital (Difu, 2015b).

Another suggestion for bypassing the shortage of housing in the agglomeration areas is to steer refugee “families into rural areas” (Braun and Simons, 2015), while young, unmarried refugees should preferably find accommodation in metropolitan areas. The advantage of rural areas for young refugee families is that high vacancy rates make inexpensive housing available for purchase or rent, while at the same time offering a well-developed infrastructure that is threatened by demographic shrinkage; many primary and higher-level schools are threatened by closure, as are hospitals and

other social services. Promising as this idea may sound, the question is whether enough jobs are available for refugees in rural regions (Difu, 2015b:10).

6.5

Participation in urban development

Social inclusion issues are closely connected to the integration of the urban population (Sections 3.3, 8.3). They can relate to participation projects initiated or supported by the public sector or grassroots initiatives operating without such support. The examples presented in the following section cover this range. They refer to the children-friendly design of cities, ways of dealing with urban stress factors, and the provision of city-relevant knowledge in the form of mapping.

6.5.1

Participation of children in urban development and children-friendly cities: Città dei Bambini in Italy

The ‘Città dei Bambini’ (Children’s City) project was initiated in 1991 in Fano, Italy, with the aim of promoting a new urban-planning philosophy that recognizes children not only as a target group but also as guarantors of people-oriented urban planning. The project is based on the assumption that urban development oriented to the needs of children also makes the city more liveable for the entire population (National Council of Research, undated). The project’s point of departure is that the value of the city as a living space and geographic focal point for social interaction has diminished significantly, since urban planning is increasingly oriented to the specific needs of economically productive – predominantly male – wage and salary earners. Structural and functional parameters were primarily defined according to economic criteria, which manifests itself, for example, in the form of car-friendly planning and inner-city office complexes. Those who suffer the consequences are all the other groups whose needs are largely ignored. This applies, above all, to children, e.g. in the form of a lack of space for playing and of environments polluted by noise and emissions.

By orienting urban design to children’s needs, the aim is to strengthen the emphasis on the original character of the city as a place of encounter and interaction, and to create healthy and safe spaces. The focus is on boosting autonomy, getting children involved and guaranteeing safety and children-friendly mobility.

When initiating the projects, the cities can draw on a pool of knowledge fed by two sources: for one thing,

participating cities have joined forces in an action network coordinated by the city of Rome; for another, the project is being accompanied by a research network which provides advisers for project implementation as well as feedback on the experience gathered in the projects by and with children.

While the projects vary from city to city, and specific local factors are taken into account in their implementation, a core of particularly relevant projects has become established. They include setting up ‘children’s city laboratories’ or ‘children’s councils’, which generate input on practical or general urban development topics. The ‘Going to School Alone’ project aims in particular to strengthen children’s autonomy, taking into account the relevant environmental conditions.

6.5.2

Participation in noise protection: the ‘Mach’s leiser’ project in Leipzig

Traffic and ambient noise diminish the quality of urban life in most cities around the world (Section 2.4). Since the perception of noise involves a strongly subjective component, the participation of people affected is essential in noise-reduction measures. A good example of this is the ‘Mach’s leiser’ (‘Turn it down’) project in Leipzig (2011–2012; UBA, 2013). The political and legal background was the EC directive on environmental noise passed in 2002 to “avoid, prevent or reduce [...] the harmful effects, including annoyance, due to exposure to environmental noise” (Directive 2002/49/EC of the European Parliament and of the Council; transposed into the Federal Immission Control Act of Germany (BImSchG) in 2005). This directive refers to noise protection as a “Community policy” objective aimed at ensuring a high level of good health. It thus imposes the obligation on the member countries to identify environmental noise using national noise maps and common evaluation methods, to inform the public of environmental noise and its impacts, and to develop action plans based on noise maps. The priority objective is to avoid or reduce harmful environmental noise, and to maintain environmental quality wherever it is already of a satisfactory standard. In addition to informing the public about intentions and plans, the development and implementation of the noise action plans also require the direct participation of the people affected.

Leipzig’s Department for the Environment first posted the draft of its noise action plan, together with possible measures for reducing traffic congestion, on the internet. Here, citizens could evaluate the projected measures and suggest concrete priorities for action. The project called ‘Turn it down – participating in noise-re-

duction planning in Leipzig', run by the Ökolöwen nature and environmental organization in cooperation with the CivixX and StadtLabor offices, took this consultative approach further (Section 2.5.5). As a supplement to Leipzig's municipal noise-reduction planning, the 'Mach's leiser' project is primarily based on the subjective perception of the people affected, rather than on technical data on noise levels. Concrete noise problems and quiet areas worth protecting were identified in cooperation with Leipzig citizens within the framework of a planning cell (Dienel, 2002), and solutions for a quieter Leipzig were developed. Based on a representative survey in the project area, a citizens' report was drawn up in workshops by citizens from different Leipzig districts, cataloguing a list of measures to reduce noise pollution in the city. The report was aimed at different actors, among them the local government, Leipzig's transport services, the Deutsche Bahn railway company, housing societies and house owners. A project council consisting of representatives from citizens' groups, civil society organizations, different political institutions and municipal departments, as well as public transport companies, supported the process. 27 measures listed in the report (e.g. road repairs, traffic diversions, speed limits, new space allotments for cycle paths and pedestrian zones) were identified and some of them implemented with the help of project sponsors. They cover a project area with 65,000 inhabitants. The private initiatives that emerged in the course of the project are to be continued as independently as possible when the project has ended.

The project had wide-reaching effects and can be considered an exemplary model of participation processes, from the first concept through to implementation. The planning cell conducted during the project is one of the more complex processes involving intensive participation (Dienel, 2002; Dienel et al., 2014; Nanz and Fritzsche, 2012). The participants receive comprehensive information and preparation, as well as compensation for their efforts (financial reimbursement and special leave). They are chosen at random to reduce selection effects. They can develop a common perspective largely independently, and make suggestions that are binding for the implementers.

The collaboration between the different social actors is equally exemplary, as is the binding force of commitments subsequent to the project. The project council and the sponsorship of the measures ensured that a wide range of actors were involved and encouraged to take on responsibility. Several effective publicity actions (cycling demonstrations, distribution of ear plugs on loud streets, expert-guided walks) informed the public of the results and raised expectations concerning the measures to be implemented.

6.5.3

Emancipatory cartography

In recent years, driven by digital developments, maps and their creation have changed enormously. Google's efforts with Google Maps and Google Earth along with the Open Street Map project are some of the best known examples. Today, maps are not only more easily accessible, it is also possible for much more information to be embedded and displayed in them. Moreover, it is no longer just a small group of experts – engineers and scientists in public administration, specialized companies or research institutes – who are able to create maps. Nowadays, this possibility is open to everyone who has a computer or a smartphone and fast internet access (Crampton, 2011). Maps no longer constitute only authoritative elitist knowledge, but can be used comparatively easily as an emancipatory tool, as demonstrated by many examples from cities around the world.

The Ushahidi (www.ushahidi.com) platform collects crowdsourcing information and converts it into digital maps. It is organized as an open-source software platform and run by a not-for-profit company. Participants only need a cell phone to send in observations and knowledge by text message. Ushahidi was founded in Kenya in 2008 as a project aimed at documenting and locating outbreaks of violence in the context of the presidential elections, based on eye-witness reports. The platform attracted global attention when it was used by the Occupy movement to collect and document its global activities, and in 2010, when it was used for coordinating rescue and aid measures after the Haiti earthquake; it was then developed further into Crisis-Net (www.crisis.net). Whereas Ushahidi is a thematically open platform, countless specifically local initiatives work with digital cartography instruments. These too can be transferable and scalable and distributed internationally. Leerstandmelder, for example, a website that reports housing vacancies (www.leerstandmelder.de), was launched in Hamburg but has spread to include cities throughout the German-speaking region. Supporters can report empty apartments or office and commercial premises that are then marked on a map. In many cities, networks have grown up around the platform to persuade decision-makers to take measures for the efficient use of housing in areas where it is scarce. During the discussion about refugee accommodation in Hamburg, the data collected was used to show that it would be possible to accommodate refugees and homeless people in smaller housing units in empty flats and buildings rather than in large emergency shelters (Leerstandmelder, 2015).

There are also initiatives that try to empower

civil-society groups using cartographic methods. The Argentine artist duo Iconoclasistas (www.iconoclasistas.net) and the German geographic collective Orangotango (www.orangotango.info) hold collective mapping workshops with local groups. The aim is to help them develop a common understanding of problems and present their own agendas more powerfully in their dialogue with municipal administrations or private-sector actors. The topics range from urban gardening to gentrification and the privatization of public space. The initiatives' philosophy is emancipatory in two respects: on the one hand, local grassroots groups have been enabled to present their positions more effectively in public discussions; on the other, an instrument, cartography, is now available that has historically been one of the instruments used by decision-makers (Crampton, 2011).

The transformative potential of such uses of cartography lies in the possibility of documenting decentralized developments and making them visible. The resulting transparency allows local civil-society groups to initiate political processes or consolidate their positions in dialogue with other groups of actors. The new mapping instruments can thus improve political inclusion and strengthen accountability (Section 2.5.5). As a coordination instrument, like in the case of CrisisNet, digital cartography instruments make it possible to react to disasters quickly and locally, and thus help create structures that are more flexible and resilient.

6.6

Small-scale green transformations as part of the Great Transformation

The following examples highlight the diverse facets of how individual projects can contribute to sustaining the natural life-support systems. The projects referred to, which are from the fields of recycling, sustainable consumption and mobility, not only have local benefits but also contribute to designing urban development within the framework of the planetary guard rails.

6.6.1

Waste recycling in cities

Ghana is one of the most dynamic economies in Africa. The concomitant increase in consumption and imports of new and used electrical appliances, along with the illegal import of e-waste (mostly from Europe), all contribute to the growing waste problems in the country.

The poisonous landfills in Agbogbloshie, a city district of Accra, are one example of this. An estimated

215,000 tonnes of electrical and electronic equipment (EEE) and waste electrical and electronic equipment (WEEE) were imported into Ghana in 2009, some of it illegally (Green Advocacy and Empa, 2011). About 14% of these imported appliances were in need of or beyond repair. They were largely processed and disposed of in the informal repair and recycling sector, often under highly problematic working, health and environmental conditions (Section 4.4.3). The total waste volume in Ghana is estimated at roughly 4.6 million tonnes (Miezah et al., 2015).

The Best of 2 Worlds pilot project (Bo2W; Buchert et al., 2016) for recycling e-waste is aimed at tackling this problem. The project was developed in Germany by the Öko-Institut (Eco-Institute) in cooperation with local partner City Waste Group & City Waste Recycling, and was financed by the German Federal Ministry of Education and Research (BMBF, funding period 2012–2015). The basic idea behind the project is to optimize use of the local expertise offered by the members of the Accra Scrap Dealers Association and Europe's existing e-waste recycling infrastructure, which is geared to environment- and health-friendly e-waste recycling. The members of the Accra Scrap Dealers Association work in the informal sector and collect and separate most of Ghana's domestic and imported e-waste. Old lead-acid batteries, which have severe environmental and health impacts in Ghana due to problematic recycling and disposal, are collected, packaged and shipped to Europe under a cooperation agreement between City Waste Recycling and European recycling companies. This is achieved by involving the informal scrap collectors, who form the majority of the roughly 500 members of City Waste Recycling's workforce.

The improvements in the recycling chain are reducing the long-term damage caused by improper recycling of old lead-acid batteries, while the involvement of the informal scrap collectors is improving their social situation. The City Waste Group continues to expand local recycling capacities, e.g. in the field of electric-cable recycling (burning electric cables in the Agbogbloshie district of Accra, which is notorious for these practices, is the source of considerable dioxin pollution in the region) and the professional recycling of refrigerators (greenhouse gases) and CRT monitors (lead pollution). In the medium to long term, the local recycling infrastructure in countries such as Ghana or Nigeria needs to be strengthened to such an extent that exports (or 're-imports' in the case of WEEE) to Europe are no longer necessary.

6.6.2 Sustainable consumption

6.6.2.1

The sharing city: collaborative consumption and the sharing economy

The terms ‘collaborative consumption’ and ‘sharing economy’ refer to forms of consumption that are based primarily on sharing, swapping, lending or giving away objects and resources. They also include commercial offerings (e.g. hiring out a private car for a fee) and not-for-profit activities (e.g. voluntary management of a give-away shop). The high social density and closely linked communication areas in cities make it easy to share and swap resources and commodities in daily life. Especially in industrialized countries, the reintroduction of such practices into daily life can reduce the large number of objects that people own but rarely use – from household appliances to cars – or allow them to be used more efficiently.

The idea behind the concept of the sharing city, or shareable city, is to promote community-based forms of consumption and sharing-economy activities in a city. These efforts can be initiated by the local governments themselves (as in Seoul) or by networks of grassroots initiatives supported by the state (as in Amsterdam).

Local governments can provide public resources and infrastructures to support the sharing city. They can, e.g., sponsor start-ups, give priority to consumption communities when leasing or selling real estate, or provide public areas for sharing and bartering activities. This approach is especially widespread in the USA where, in June 2013, the ‘Shareable Cities Resolution’ was passed by the mayors of fifteen major cities in the USA. In this resolution, they committed themselves to institutionalizing the promotion of community-based consumption and the sharing economy, and to reducing possible obstacles in approval and regulation procedures (such as protracted reviews of applications, stringent regulatory constraints). In 2013, Seoul’s government created a stir by launching its own initiative for the promotion of community-based consumption (Johnson, 2013). Its aim was to familiarize the city’s population with the sharing economy by giving existing providers and company set-ups financial and strategic support (granting permits, rights of use, reducing bureaucratic obstacles), and making them known to the general public in an information campaign. In the period from 2013–2015, the Seoul Innovation Bureau, which organizes the project, sponsored 57 sharing-economy organizations and companies. Another 300 are to be added by 2018. Most of the sponsored companies were able to successfully build up their activities on this basis. Today, the

two car-sharing companies founded at that time have 400,000 users who support the launch of organizations and start-ups. The concept of sharing and swapping is also to be taught and encouraged in schools through the exchange of learning materials. In addition, public spaces – museums, galleries, parks, universities, car parks – are made available for exchange activities such as clothing swaps or car sharing. An evaluation of the activities estimates that the city has saved over €1 billion, created 1,280 new jobs and reduced CO₂ emissions by 29,800 tonnes as a result of these measures (Seoul Metropolitan Government, 2015). The City of Seoul received the 2014 Metropolis Award for its activities and sharing measures.

In 2015, a network of sharing-economy actors assembled in Amsterdam to make the capital the first ‘Sharing City of Europe’ (van Sprang, 2015). The network comprises start-ups, non-profit organizations, public facilities (e.g. libraries), community centres and actors from the administration. Its mission is to strengthen social cohesion and communalities, reduce social isolation and promote sustainability and economic resilience. Activities to date have concentrated on lobbying political institutions to promote the sharing economy. An overview of the sharing economy drawn up in Amsterdam is now being used by the local government to develop strategies. Moreover, synergies and possibilities for cooperation between the local actors are being sought and public attention drawn to these activities (EUKN, 2015). The activities are coordinated by the shareNL knowledge and network platform.

The examples show how the concentrated and ambitious support of a local government, in particular, can promote activities of the sharing and exchange economy. Networks strengthen these efforts by exchanging knowledge and experience and forming strategic alliances.

6.6.2.2

Aquaponics in Dortmund

This section is a shortened version of Schmitt (2016) compiled by the author for the WBGU. The aquaponics project is based on citizen involvement and was initiated by Rolf Morgenstern in partnership with the non-profit association ‘Die Urbanisten’ in Dortmund. Aquaponics combines the simultaneous cultivation of fish and vegetables. The term refers to a specific form of food production combining the cultivation of vegetables on a mineral substrate (hydroponics) with fish farming (aquaculture) in a circulatory system. What makes this combination possible are the nutrients produced in aquaculture – the fish excretions – which are needed as fertilizer for the hydroponic system.

Combining hydroponics and aquaculture makes the

use of pesticides and chemical fertilizers superfluous, and considerably reduces land use and water consumption. It is a very efficient food-production system as a result of controlled temperature, lighting and irrigation conditions. Unlike conventional agriculture, most of the water does not seep into the soil but is retained by the mineral substrates in the grow beds, e.g. expanded clay or coconut fibres, and recirculated through the system. Moreover, it makes it possible for food to be produced in cities and thus eliminates the need for emissions-intensive transport. Seen in this light, aquaponics in the urban context is not only a specific form of urban gardening but also a "gastropolitan activity" (Lemke, 2012:148), since its goal is self-sufficiency through ecologically and sustainably produced food, and can thus be understood as the "practice of a political eating ethic" (German quotes translated from Lemke, 2012:155).

Aquaponics and various forms of hydroponics are also gaining importance in food production on a global scale. In the USA, companies such as Green Sense, which operates stacked multi-level hydroponic systems in a highly efficient way using LED lamps, sell their hydroponic goods to supermarket chains. In the summer of 2014, a vertical hydroponics farm was opened in a former Sony production hall in eastern Japan, which had been hit by the tsunami and earthquake in 2011. It is half the size of a football pitch and produces about 10,000 heads of organic lettuce every day.

The Dortmund-based project group subscribes to the vision of an aquaponics farm at the city-district level, placing its faith in local inclusion and local value-added. Ideally, it should be operated as a cooperative based on the model of community-supported agriculture (CSA), a recently devised farming concept in which a group of people collectively cultivate a piece of land and commit to purchasing the harvested goods. Seen in this light, the vision of the aquaponic 'urbanist' farmers is thus based on a business model in the form of a technology-oriented start-up for sustainable food production in the urban sphere. This start-up aims to develop the prototypes, including the related business plan, and to establish them as a cooperative model. In this model, the exit strategy that is characteristic of start-ups, i.e. the high-return exit for the investors, would have the effect of boosting local value-added and generating a public area managed by local communities. The Dortmund-based aquaponic farmers, therefore, are using aquaponics for sustainable food production, or, in more general terms, using food to produce wishes and create visions of how they imagine cities, how to plan them, build them, supply them, live in them and feel at ease or immerse themselves in them (Lemke, 2012:171).

Südwestfalen (University of Applied Sciences) in Soest with its research programmes in agriculture and rural development. In cooperation with the University of Rostock, it is currently conducting research on two aquaponics systems with a total area of 370m² to investigate questions of systems automation and microbiological safety. The development of a series of lectures on aquaponics for agricultural students is also being considered.

Aquaponics can serve as a module in an innovative form of agriculture that could be practised in the immediate vicinity of residential areas, as it is a noise- and emissions-free method of food production. The specific spatial characteristics of the Ruhr area – its heterogeneity, "the many breaches, barriers, intersections and 'impossibility spaces' between highly diverse infrastructures" (German quote translated from Haas, 2015:22) and its numerous 'inner perimeters' (Reicher et al., 2011:50), i.e. areas in which settlements and green spaces interweave – could, moreover, prove to be an advantage for aquaponic farming. In this way, a (new) type of city could (again) emerge in a densely populated metropolitan area that does not lead to the ruralization of city districts, but rather to a qualitatively different, more sustainable form of urbanization.

The aquaponics systems, which can be installed temporarily and in flexible locations, can be of great advantage in areas with difficult environmental conditions: in densely populated city states, in mountainous countries lacking cultivable land, in cities with low precipitation rates or contaminated sites. Soil that has been contaminated by heavy metals, for example, does not need to be laboriously remediated, since a system can be installed directly on site.

6.6.3 Sustainable mobility

Urban traffic systems need to be transformed to avoid dangerous climate change, reduce local environmental impacts and make cities more inclusive. A renunciation of motorized individual transport and of the idea of the car-friendly city must form the core of these necessary changes (Sections 4.2.2, 9.3.1.2). Many cities are already reacting to the far-reaching problems posed by car traffic. Just recently, Oslo decided to become the first car-free capital of Europe: cars are to be completely banned from the city centre. The following examples illustrate the different ways in which cities around the world are promoting non-motorized traffic.

6.6.3.1

Cycle Hub scheme in Manchester

The promotion of cycling is a key element in sustainable mobility strategies. The example of Copenhagen (Section 5.4) has shown how a local government is progressively pursuing this goal by, for instance, continuously dismantling car-centric infrastructures and expanding the cycling infrastructure. Many other cities have developed similar initiatives. One example is the Cycle Hub scheme in Manchester.

It was initiated by Transport for Greater Manchester (TfGM), a subsidiary of the municipal government, which is responsible for designing traffic and transport systems in the Greater Manchester region. This includes designing roads, traffic planning, local public transport, pedestrian and bicycle traffic. TfGM is also responsible for implementing political goals aimed at reducing motorized individual traffic and promoting the ecomobility alliance (local public transport, pedestrians and cyclists), particularly for the political target of increasing the percentage of daily cycling trips from 2% in 2012 to 10% by 2025. The Greater Manchester Cycling Strategy set up for this purpose is financed, inter alia, by the Local Sustainable Transport Fund and the Cycle City Ambition Grant (TfGM, 2014). Both funds serve to prioritize bicycle traffic and to embed environmental targets more firmly into transport policy. In this respect, municipal politicians are being called upon to initiate programmes that motivate individuals, families and neighbourhoods to choose a more environment- and exercise-friendly form of transport in daily life.

Cycle hubs are expanded bicycle stations, usually located at traffic hubs (such as railway stations, central car parks). They consist largely of secure bike-park shelters, sometimes offering additional facilities such as lockers for bike accessories, showers, and bike-rental and repair services. The measure is integrated into the above-mentioned Cycling Strategy and backed up by further changes in road traffic towards more frequent, safer and better cycle paths and improved opportunities for combining cycling with the use of public transport systems. A bike-rental service is also included, while recycled bikes are made available to job seekers free of charge. In addition to the (infra)structural measures, efforts are also being made to boost people's motivation to cycle and improve their practical cycling skills. For this purpose, school programmes are staged, for example, to motivate children and adolescents to cycle and to train them in the use of bikes in road traffic. Cycling tours are organized and public cycling and bike-repair courses offered. Online platforms provide information on cycling opportunities and offers (including trip planners), and enable users to interact with other cyclists.

TfGM cooperates with other municipal departments

(health, environment), cycling organizations, employers, employment agencies and companies.

Like in Copenhagen, the effect is to be regularly evaluated and published, providing information on the number of measures implemented, the increase in the percentage of people cycling, and the views of the target groups. The local transformation effect can be expected to be considerable, since the Cycling Strategy is part of a new orientation in transport policy, in which cycle traffic is embedded as an integral and priority component. An important aspect is the fact that the strategy is backed up by binding political targets and strategies, the availability of financial resources (in this case approx. £6.5 million) not only for the 'hardware' of the infrastructure measures, but also for accompanying research work (e.g. a study on the potential of cycle sharing), as well as PR measures and communication with the target groups. It is also important that routine daily mobility is considered holistically, i.e. not separately according to different means of transport, but intermodally, combining the different means of transport. In addition, routine daily travel routes and activities are taken into consideration along with the associated expectations and practical requirements (Spurling and McMeekin, 2015).

6.6.3.2

Ecocab: increasing the use of cycle rickshaws in New Delhi

Cycle rickshaws are one of the traditional ways of transporting people and things in many Indian cities. They have been increasingly forced to the edge of the roads by individual automotive traffic and are sometimes seen as an obstacle to car traffic, with the result that there have been calls for them to be banned. In the meantime, however, they are being rediscovered as an important component of sustainable, urban mobility, and there are initiatives for the encouragement and increased use of cycle rickshaws.

The first dial-a-rickshaw service, Ecocab Fazilka, was set up in 2008 in Fazilka, a small town in the Punjab (NIUA, 2015; Chopra, 2010). As the town had no public transport, motorized individual traffic (mostly motorbikes) made up a very high percentage of total traffic. Cycle rickshaws accounted for only 16% of daily journeys and were mainly available around market squares and in the town centre. Furthermore, the service was unorganized. Due to the lack of standards, the vehicles were often unsafe and the providers lacked the financial resources to improve their service. However, for poor families, cycle rickshaws not only offer a low-threshold, long-term income, but also a low-cost means of transport.

Ecocab Fazilka is a cycle rickshaw service where

rickshaws can be ordered by phone. It offers internet-based maps for locating the nearest stations. In 2015, 500 rickshaw drivers could already be booked via this service. Ecocabs Fazilka was founded by the Graduates Welfare Association Fazilka and Bharat Sanchar Nigam Ltd., which provided the technical support (NIUA, 2015).

Moreover, the quality and safety of the rickshaws was also improved. Ecocabs Fazilka has developed and produced an optimized cycle-rickshaw model, which drivers can purchase using a simultaneously developed financing system. Advertising panels on the new eco-cab rickshaws open up an additional source of funding for vehicle maintenance. Accident insurance has also been made available. The rickshaw drivers receive a membership card to show customers that they belong to Ecocabs and are insured accordingly.

The project received the National Award of Excellence from the Indian Ministry for Urban Development in 2011, and the Volvo Sustainable Mobility Award in 2013 (GIZ, 2015). The concept has been implemented in 20 cities in the Punjab region to date. As a result, 9,000 litres of petrol are saved every day and 6,000 families receive a regular income (NIUA, 2015).

6.6.3.3

Ruhr S1 cycle superhighway

The goal of the RS1 cycle superhighway, parts of which have already been built by the Regional Association Ruhr (Regionalverband Ruhr, RVR), is to create a high-speed cycle route across the entire Ruhr area from east to west that can respond to complex commuter flows and encourages the use of pedelecs and e-bikes. The idea is to make the bicycle "a real alternative", once the entire 101-kilometre track has been completed in 2020 (RVR, 2014:8). The cycle path is adapted to the typical settlements of the Ruhr area and connects important traffic hubs, such as workplace locations, recreational destinations, universities, main railway stations and city centres (RVR, 2014:325f.). It is hoped it will take some of the pressure off the public transport system and reduce car traffic and traffic jams. An important side effect is expected to be cycling's positive effect on health (RVR, 2014:8).

The involvement of the citizens in the planning of the RS1 and their active participation were key priorities of the RVR (RVR, 2014:170). This was supported by an online information platform, a moderated online dialogue, cardboard models for demonstration purposes, planning workshops, planning walks and so-called 'future conferences' (RVR, 2014:245). Citizens also participated by helping to pave short stretches of the path, cutting back hedges and bushes, and sponsoring individual sections (RVR, 2014:170f.).

Since the cycle path has not yet been fully completed, the transformative effect can only be estimated so far. The most important aim is to reduce traffic by up to 400,000 car-kilometres and, as a result, save up to 16,600 tonnes of CO₂ per year (RVR, 2014:22). Furthermore, it is expected that the health-promoting effects of cycling will save €11 million in medical expenses, and that the number of traffic accidents and fatalities will fall as a result of the reduction in the volume of traffic (RVR, 2014:22). The RS1 is also expected to encourage tourism. A study conducted by the Öko-Institut calls the RS1 Germany's most prominent example of a project to expand cycling (Zimmer et al., 2014:22).

6.7

Preventive healthcare

Urban health is one of the main transformative action fields examined by the WBGU which are still given too little political attention internationally compared to others (Section 4.5). In the following, two initiatives are introduced that deal with important aspects of healthcare.

6.7.1

Adolescent slum dwellers engaged in preventive healthcare for children

Since 2010, young people in the slums of Calcutta have been working in the field of preventive healthcare. The initiative began with the volunteering activities of two adolescent slum dwellers, Sikha Patra and Salim Sheikh (both 13 years old at the time), and is funded by UNICEF and Prayasam – an Indian non-governmental organization that focuses on empowering children through education. The work to improve children's health is backed up by health education in the slums of Calcutta, in which the two teenagers lead a group of about 75 young people: "Working as child area health minders, the duo and their friends have brought a remarkable change in health and sanitation in their slum" (Times of India, 2014). The young people work to ensure that every child in their slum receives a polio vaccination, and educate children on how to prevent malaria, dengue fever and diarrhoea. For example, the children use home-made 'shunun, shunun' (listen, listen) megaphones to tell people in their areas about the need for polio vaccinations (Bhatia, 2012). They have also sent appeals to the city administration, with the result that drinking-water pumps have been installed.

The adolescents laid the foundation for this work

in 2010 with their idea of describing the situation in their residential area on a map, thereby making it more visible. The young people were given training in mapping and an introduction to mapping technology using mobile phones (UNICEF India, 2011). Teams of four young people conducted house-to-house surveys and compiled information such as the number of inhabitants, their age, profession and health status. This was developed into a thematic map showing, for example, that there were a lot of water pumps, but none with clean drinking water. The map is used to provide evidence to the city administration of the shortcomings in the slum. The project is thus a further positive example of the use of new mapping instruments to launch emancipatory measures (Section 6.5.3).

6.7.2

World Toilet Organization

The provision of universal access to sanitation facilities was included in the Millennium Development Goals in 1990. Although the situation has improved since then for 2.1 billion people, about a third of all people worldwide (32%) still have no safe access to toilets; 13% of humanity actually have no access at all and are forced to practice open defecation (WHO, 2015a). Although the situation in urban areas is slightly better (28% without safe access to sanitation facilities), the situation nevertheless remains precarious for many people. The aim of the MDGs of securing access to toilets for 77% of humanity was not achieved (WHO, 2015a). Diseases such as diarrhoea kill approx. 280,000 people every year. Additional effects include the pollution of the soil, ground water and food, as well as the safety risk for women, girls and boys (WHO, 2015b). Women in particular wait to go to the toilet until the onset of darkness, exposing them to dangers such as sexual abuse (UNRIC, 2014). At the same time, a lack of toilets hampers access to education. For example, many young women leave school as soon as menstruation begins, because they have no privacy for their personal hygiene (WSSCC Domestos Wateraid, 2013; UN News Service, 2014).

It was against this background that the World Toilet Organization (WTO) was set up in 2001. The initiator was ex-businessman Jack Sim from Singapore. With the creation of the WTO, the large number of locally active initiatives succeeded in networking and establishing a global movement. 130 organizations are now members of the WTO umbrella association. The WTO regards access to toilets as a human right and sees the condition of the sanitation facilities in a country or a city as an indicator of societal development (World Toilet Organization, 2015).

The aim is to improve sanitation infrastructures worldwide and to offer training and education measures to raise awareness and enable the creation of clean and safe sanitation in the residential environment. Important components of the education and networking work for sanitation installations were the establishment of a World Toilet College in 2005 and the World Toilet Summit, which has been held every year since 2001. The World Toilet College provides basic and advanced training in the sanitation sphere and improves skills, professionalism, standing and payment in the sanitation sector. Furthermore, a social enterprise called SaniShop, which has developed a simple but effective toilet model, was also launched with national subsidiaries. The toilet can be built locally by franchisees after a corresponding course of training. For example, more than 11,000 toilets have been built in Cambodia by 500 local entrepreneurs. SaniShop franchisees are also operating in India and Mozambique.

In 2013 the WTO succeeded in having a UN resolution called 'Sanitation For All' adopted with the support of 122 countries, and in having 19 November established as 'World Toilet Day' at the UN (UN, 2013). On this day, activities such as flash mobs, public performances and the 'urgent run' – a kind of public fun run – are held worldwide, especially in emerging economies and developing countries, to raise awareness of the topic.

6.8

Innovative investment instruments for the urban transformation

Local populations often have innovative ideas on how the development of their neighbourhood might be advanced, but do not have the necessary finance. In many cases, entire (usually poor) population groups have no access to loans or other financial resources and are therefore greatly restricted as far as development opportunities are concerned. The following projects are examples of how actors who have previously been largely excluded obtain financing options through innovative instruments.

6.8.1

Small Medium Enterprise Fundamentals

Small Medium Enterprise Fundamentals (SMEFUNDs) is a non-profit organization with headquarters in Lagos (Nigeria). It has set itself the goal of fighting poverty by developing and promoting sustainable business models in Africa. It aims to achieve this by means of a hybrid

structure. On the one hand, SMEFUNDS acts as a platform that passes on capital flows to small and medium-sized businesses that want to make social and ethical investments. Projects to promote clean and green energy, help poor households avoid climate change, or reduce youth unemployment are among the main activities. SMEFUNDS makes loan-capital and equity investments in the order of US\$0.1 to 0.5 million. There is no sectoral preference, except that the business model must be expected to have a sustainable and social effect and be scalable. The business model must be clearly defined and open up potential for scalability, due to an attractive market environment and verifiable competitive advantages. The duration of the project must be at least one year and offer a measurable social impact.

In addition to its activity as a financing platform for small and medium-sized businesses, SMEFUNDS also generates its own projects via subsidiaries in the following business areas:

- › Go-Solar-Africa is based in Nigeria, a country with a high proportion (about 80%) of off-grid energy provision; the company offers long-term financing to enable many households to install solar energy systems, which can replace more risky or more complex forms of energy generation.
- › The 'Kike Cook Stoves' programme aims to disseminate sustainable cooking devices. These use clean fuels such as ethanol, helping to avoid emissions from fuels such as coal and thus prevent related respiratory diseases. To this purpose, SMEFUNDS builds its own plants to convert biomass, preferably waste materials, into clean ethanol.

6.8.2

Inclusive payment system: M-Pesa

Two billion people worldwide have no access to bank accounts (Demirguc-Kunt et al., 2015). The reasons include excessively high costs, too-long distances to the nearest branch, and a lack of administrative requirements, such as proof of a fixed address and identification documents. Payments are therefore handled personally and in cash. For those paying, cash payment involves the risk of theft or loss; for companies there are disadvantages due to the lack of transparency and payment efficiency. The transaction costs are very high in relation to the payment volumes, especially in the case of the small amounts that are often involved (e.g. utility services for poor population groups). It is therefore more difficult for people without a bank account to access certain services and markets.

In cooperation with Vodafone, the Kenyan com-

pany Safaricom has developed an innovative alternative to the conventional bank account. Since 2007, the company has been offering M-Pesa, an electronic payment procedure that makes it possible to pay by mobile phone. By the end of 2013, there were already 219 companies offering similar services in 84 countries (GSMA, 2014).

The texting-based system gives far more people access to a secure payment method than traditional banks. Since cell phones are widespread in cities and rural regions, and payments are made directly with cooperating mobile-phone companies or local retailers, Safaricom offers a service with a higher geographical coverage than the system of bank branches. Even in Sub-Saharan Africa the percentage of the population with access to mobile phones is already 74% and still increasing (Nique and Opala, 2014). It is an advantage for poor population groups that no costs arise either for account management or for deposits. A charge is only made for transfers; for example, 1% on a transfer of US\$ 100 (WBCSD, 2015).

M-Pesa is currently already being used by 30 million customers worldwide (WBCSD, 2015). The technology is continuously being developed further, so that today, not only simple transfers, but also loans, insurance and interest-bearing accounts are offered via mobile phone, making them available to a wider section of the population.

In addition, it lays the foundation for new, innovative business models and can thus promote local development. For example, the Kenyan company SteamaCO installs solar-cell-driven micro-networks in regions that are not connected to the electricity grid. The users register with their mobile phones; their mobile number functions as the customer ID. This information is linked with the registered user's consumption data, which are recorded by a pre-installed counter. Consumption and payment data, as well as news about faults are registered by a locally installed computer and passed on via the wireless network to the company headquarters (Baker, 2015). Such innovations promote the expansion of decentralized renewable-energy systems, thus leapfrogging the conventional supply infrastructure.

This payment technology also creates new incentives to forge ahead with the development of the infrastructure. Since the financial means of the inhabitants of informal settlements are limited, and there is often no official address system, the utility-service providers are deterred by the high cost of infrastructure development. As a result, the coverage with basic services is precarious in densely populated informal settlements. The water supply for the 89,000 inhabitants of the Kayole-Soweto informal settlement on the outskirts of Nairobi, for example, was for a long time mainly pro-

vided via boreholes and public water kiosks (World Bank and WSP, 2015). An additional 25 km of water pipes have been built in a pilot project since 2012. The costs of connecting to the water system are financed by micro-loans; the resident's mobile phone number is used for registration instead of the address. Both the invoice for water consumption and the micro-loan instalments are paid via M-Pesa or similar mobile payment systems.

In Sub-Saharan Africa, 74% of the population have access to mobile phones and adequate network coverage, compared to 32% with access to electricity and 63% with access to treated water (Nique and Opala, 2014). Companies thus have a wide range of possibilities for using the mobile payment service to help micro-funded and affordable pre-paid utility solutions for under-served population groups to make the breakthrough.

6.9 Science as a catalyst of urban development

Science is another sphere that makes important contributions to urban development. The following examples outline two project types that, in the meantime, exist in many cities and have contributed to their development.

6.9.1 Open Knowledge Foundation

The Open Knowledge Foundation was set up in the United Kingdom in 2004; today it has groups in over 40 countries and more than 20 international working groups. The Foundation aims to establish open knowledge as the standard and to create open knowledge. Free or open knowledge is understood "as an object or work [...] with which knowledge is transferred and which meets various criteria. Among other things, the work should be accessible to others in its entirety, be subject to a discrimination-free licence that allows its further distribution and re-use, without being subject to technical restrictions. [...] Furthermore, the work's licence must be distributed together with it, remain valid, and at the same time not hinder the further distribution of other works" (German quote translated from Barnickel and Klessmann, 2012:129).

The aim of this science-focused international working group is for the possibilities of digitization to be used to ensure a restriction-free and comprehensive exchange of data in science. Although a free exchange of data does not automatically improve the quality of scientific work, increased transparency, better repro-

ducibility and thus verifiability, and greater efficiency are expected to lay the foundation for better scientific work (Molloy, 2011). By calling for the free secondary use of data, the Foundation's goals go beyond those of the Open Access movement, which often tends to be oriented towards combating information scarcity and exclusivity (Herb, 2012). Mietchen (2012) identifies a number of remarkable scientific and medical research successes as a result of open collaboration and notes that, to some extent, classical science promotion with its formal incentive, review and reputation structures represents a barrier for the free exchange of knowledge in science.

Open Knowledge Labs, which have been set up in 20 German cities, are examples of open and joint research in the field of urban development. The labs "serve as meeting points for collaboration and exchange between local activists and city representatives. The goal of the project is to facilitate the development of applications and projects that use open data in order to further political participation and empowerment." (Open Knowledge Foundation Germany, undated).

6.9.2 Science shops and other actors in transdisciplinary processes

Transdisciplinary processes describe transformation processes in which the knowledge of scientific actors is related to that of non-scientific actors (Scholz, 2011). Today, intermediary institutions like science shops and community-based research centres play an important role worldwide in this knowledge integration. They originated during the 1970s from the European '68 Movement and its criticism of the academic system. Science shops carry out research in various disciplines with the participation of local civil-society actors and are geared to societal needs and problems; they therefore work in a transdisciplinary and applied manner in the narrow sense of the terms. One of the fundamental principles of science shops is to give broad sections of the population access to scientific knowledge. Some science shops are affiliated to universities, others are independent, non-profit organizations (Living Knowledge, 2015).

Because of their local connections, science shops often deal with city-relevant topics. A typical example for Europe is the Bonn Science Shop (Wissenschaftsladen Bonn), which deals with aspects of inclusion and the natural life-support systems, covering such topics as 'Civil Society and Sustainability', 'Labour Market and Vocational Training' and 'Health and Consumer Protection'. For example, it is active in projects on responsible

science, on establishing a climate-neutral science and business park, or unsealing and greening urban spaces (Wissenschaftsladen Bonn, 2015).

The South African Knowledge Co-op is an example of an initiative from developing countries. Located at the University of Cape Town, it sees itself as a platform for making development-relevant knowledge available to the local population, NGOs, municipal authorities, small businesses and other local actors. The idea is that, through cooperation, knowledge should be shared and contacts between researchers, students and local actors created. The topics are chosen by the local actors, who submit project proposals based on their needs. Together with students and professors, a project is then developed that can include research, evaluation and, as the end product, practical implementation. Since the project topics emerge in a bottom-up process, they focus on the key issues of the local population. Projects that have been embraced in this way have included ones on healthcare for infants, youth unemployment, prostitution, literacy, computer training, education science for theatre groups, and designing public walls. Other projects focus on the sustainable use of resources. The Homestead Gardens Project in Cape Town, for example, deals with urban self-sufficiency based on permaculture gardening, and with retrofitting buildings with solar-powered cookers, flow-type heaters and grey-water systems (Odendaal et al., 2013).

The activities of science shops have a good chance of having a transformative impact because of the close transdisciplinary collaboration with local actors; it is hoped that the participatory decision-making methods will lead to better implementation and permanence.

Within the science system itself, too (Chapter 10), individual scientific institutions are taking on such intermediary roles. One example is the Academy for Spatial Research and Planning (ARL) in Hanover, Germany, which, founded in 1946, is a public institution of supraregional importance and interest to the whole range of state science policy. The ARL is one of the Leibniz Association's five spatial-science institutions (5R-Network, 2013). The ARL sees itself as a "forum and competence centre for research into spatial structures and developments, their causes and effects, as well as political and planning-related ways of managing them. [...] In its research, the Academy brings together the fields of economics, social affairs, ecology and culture, and in this way gains an innovative, holistic perspective on the complex societal challenges. Its research findings form the basis for the provision of independent scientific advice to decision makers in politics, administration and society, as well as for education and training, in order to help shape the future" (German quote translated from ARL, 2015a).

6.10 Conclusions

As the American architecture critic Jane Jacobs once appropriately postulated, "Design is people". But this is far removed from the reality of today's architecture and spatial planning and therefore represents a challenge. Based on a few examples, this chapter shows that notable 'top-down' and 'bottom-up' initiatives exist that have taken action in the spirit of the principles of *Eigenart*, sustaining natural life-support systems and inclusion (Chapter 3) and have to some extent integrated them, i.e. have generated beneficial interactions. These can be pieced together to form, if not a universally applicable master plan, certainly a leitmotif for a people-oriented city.

This has to do with the nature of the city which, with urban planning's claim to omnipotence (Siebel, 2015:421ff.), stifles the productivity of the city, where differences and the unpredictable predominate, thus colliding with the claim to urbanity itself. All programmes aimed at making cities more sustainable should be written with this awareness. "Resources are almost always insufficient and in the hands of different actors pursuing different and even contradictory interests. Furthermore, the city is much too complex for any subject to have enough knowledge to control it. [...] You cannot make comprehensive provisions for a future that is fundamentally contingent" (German quote translated from Siebel, 2015:430f.).

The following hypothesis can be upheld as a conclusion from the mosaic pieced together in this chapter: "Today, urban planning necessarily proceeds incrementally, in small steps, remedying and assisting, negotiating, persuading rather than ordering, certainly more democratically" (German quote translated from Siebel, 2015:431). In addition, however, one can also conclude that parallelisms and interfaces can be involved within incrementalism that combine postulates of sustaining natural life-support systems with the dimensions of inclusion and *Eigenart*. Actors at all levels of society can and should embrace this convergence of the value dimensions and promote urban development with the general and global perspective of caring for an urban common good. Mutual observation, activation, networking, communication and participation play a decisive role here in the 'boss-less', hybrid planning process.

Grassroots initiatives need support 'from above' in this context. This support can be provided via information platforms to give the initiatives a globally based feeling of self-efficacy. Without striving for universal one-size-fits-all solutions ('best practices'), practical

networking and cooperation can be useful and valuable. An intensive international and interdisciplinary debate is taking place in the fields of architecture, spatial planning and urban design which, in urban-development processes, naturally also addresses – and learns from – the people (i.e. the space producers willing to participate) in a transdisciplinary way. Urban-governance innovations should also be located within this balance between (master) planning and grassroots initiatives.

The following Chapter 7 goes a level of abstraction higher compared to the city examples and innovation initiatives. It processes the wealth of urban experience in three dominant patterns: planned, informal and mature cities and city districts, in the knowledge that it is only referring to patterns and that their concrete manifestations can certainly be found at the same time in one and the same city.

Urban patterns

In order to steer future settlements towards sustainability, the first step must be to understand the urban present. This means in particular finding general features, patterns and structures among the great variety of objects and subjects – in other words reducing complexity in a permissible way. Having studied a number of example cities in Chapter 5 and introduced actors of the urban transformation towards sustainability ('urban designers') in Chapter 6, this chapter focuses on a phenomenology of the global settlement structure.

The need to build new cities and city districts at a time when slum areas and informal settlements are expanding and existing structures decaying, confronts humanity with existential tasks; policy-makers, civil-society actors, researchers and companies must all participate in overcoming these challenges. Related critical dynamics can be influenced by steering and shaping the urbanization processes. Due to the enormous diversity of the cities and the challenges they face (Chapter 5), there is a need for a phenomenology that accepts the complexity and simultaneously identifies patterns from which conclusions can be drawn for the design of the urban transformation. This phenomenology should be "as simple as possible, but not simpler" (Albert Einstein). Then it will not only generate knowledge gains, but also form the basis for determining policy options for decision-makers and the urban population. This is why the WBGU searches – also in direct analyses – for 'archetypes' that characterize the problem in its entirety (on the syndrome approach, see WBGU, 1996, 2000; Schellnhuber et al., 2001).

The analytical schema presented here also incorporates the systemic drivers (forces) of urbanization, as well as the resulting settlement patterns (forms). However, this is only the first step of a policy-relevant appraisal; in the second step, the basic and target values of the WBGU's normative compass (Chapter 3) – i.e. sustaining natural life-support systems, inclusion and *Eigenart* – must be projected onto the global settlement patterns in order, in the third step, to deduce generic recommendations for action and research. These can be used to generate targeted transformation pathways or to reveal adverse developments.



7.1

From phenomenology to designing cities: forces, forms, values

The processes that topographically and culturally shape cities are based on three forces: the 'master builders' of time, power and hardship. The *time* factor is founded on the assumption that temporal characteristics – such as evolutionary change, acceleration, regressions after major upheavals and asynchronicities (e.g. of natural and cultural history) – exert a strong influence on urban patterns. This is particularly evident for infrastructures that are established once and then need to be re-designed. Time is needed for every development, but it is often the scarcest 'resource' when it is a matter of complying with the planetary guard rails. For example, limiting global warming to below 2 °C requires a swift correction of existing development paradigms. This also applies to the cities, even beyond the need to sustain the natural life-support systems. For example, it is urgently necessary to give all people access to adequate housing and thus improve inclusion in urban societies (Section 3.4; SDG no. 11: Section 8.4.1.1). Accordingly, it is essential to make many fundamental choices and interventions quickly. That said, technological innovations and an accelerated exchange of information generate ways to advance this progress in parallel.

Power is in particular the political capacity to assert one's will against the will of others (Weber, 1972:28). Different means can be used to do this, e.g. money, violence, laws or persuasion. The power to shape a city culturally or architecturally can be exercised by the state, by (real-estate) businesses and/or by civil society, or else it can be restricted to individual actors and interest groups.

Hardship, in the sense of scarcity, danger or suffering, shapes urban patterns by exclusion, as in the case of poverty or oppression. Hardship is also generated by risks that develop from crises and conflicts. Hardship drives many people to migrate into the periphery of urban centres, resulting in the formation of new and

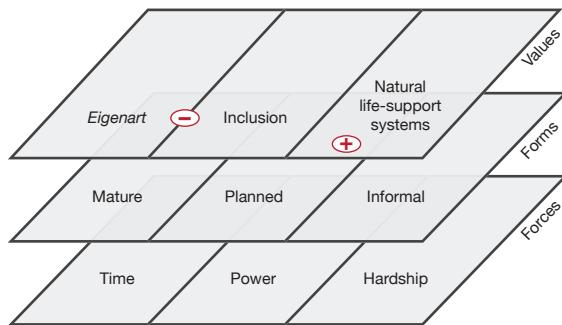


Figure 7.1-1

Basic structure of the three-level analysis: global settlement patterns (forms), their drivers (forces) and the WBGU's normative compass (values).

Source: WBGU

often improvised settlements.

The complex interaction of time, power and hardship has shaped different patterns and forms of settlement and continues to influence them: mature, informal and planned city districts. For example, thanks to the time factor certain cities and city districts have been able to grow over centuries and today have a solid building stock, established infrastructures and largely consolidated urban governance structures. Informal settlements and slums evolved in an improvised way and without prior planning or permission. Need is an essential driver and characteristic feature of this settlement pattern. By contrast, top-down planned settlements based on a master plan could only be translated into reality by exercising power. The different constellations of hardship, power and time have led to the development of a huge diversity of cities. Mature, informal and planned settlements frequently coexist in the same city or agglomeration, all at the same time and next to each other. Nevertheless, an individual city can be influenced more by one or the other of these patterns.

It is essential to shape all three patterns for the urban transformation towards sustainability. The number of people living in informal settlements is expected to rise by 1 to 2 billion, in planned settlements by up to 1.5 billion. Resource consumption and greenhouse-gas emissions in the mature settlements are still the main drivers of global environmental problems. These dynamics involve enormous challenges, while simultaneously opening an important window of opportunity for the transformation towards sustainable societies. However, there is not much time left in which to shape the urbanization process in the required way. It is the task of the urban transformation to preserve *Eigenart*, inclusion and the natural life-support systems in the development of cities. These normative values form the compass for the different pathways of the transition to

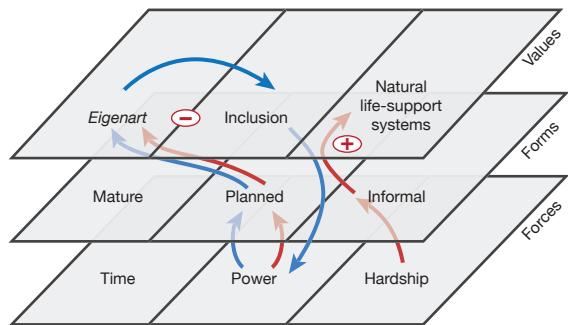


Figure 7.1-2

Possible interactions within the three-level analysis.

Source: WBGU

a 'world cities society' (Chapter 3).

A three-level analysis can thus be used as a framework to illustrate the relations between the 'master builders', the patterns and the normative compass. Figure 7.1-1 shows the levels in a highly simplified form. For example, the mature, planned and informal settlements are each shown as a separate category, while in reality there are many subcategories and mixed forms. Similarly, the target values *Eigenart*, inclusion and sustaining of the natural life-support systems could be subdivided into diverse areas (Chapter 3), but are listed here as individual terms.

A complex interdependency network can be seen between the different dynamics of a city (Figure 7.1-2). At the same time, the three-level analysis can offer possible starting points for urban interventions in relation to the potential feedback and amplifying effects of future mechanisms of action (Box 7.1-1). For example, urban actors can prevent feedback processes or lay down new pathways in this way. In the case of government actors, this could be new legislation, for example; or civil society could launch an initiative for more inclusion in informal settlements that could permanently shape the city's image over time.

In addition, different challenges for mature, informal and planned settlements and city districts can emerge from an analysis of the three layers from top to bottom, as well as from the perspectives of *Eigenart*, inclusion and sustaining the natural life-support systems. The forces of time, hardship and power also exert an influence on these challenges. Looking at these forces together reveals restrictions on the detailed design of the urban transformation towards sustainability caused by time, need and the unequal distribution of power.

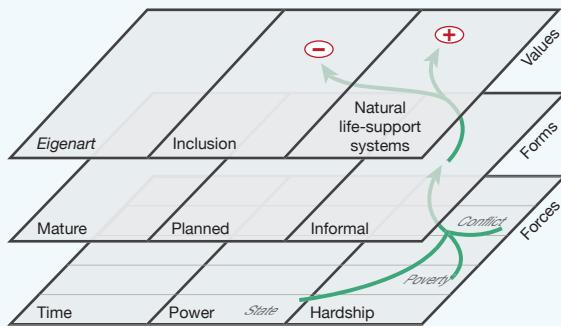
For example, the challenge for *mature* settlements that have evolved over long periods of time and, as a result, have often generated a lot of *Eigenart* and urban identities, is to make lasting changes to existing build-

Box 7.1-1**Three-level analysis: the example of Kigali**

Looking at individual city examples, the three levels can initially be read from bottom to top (Figure 7.1-3). Certain forms have developed from the interaction of the 'architects', which are in turn expressed differently in the dimensions of *Eigenart*, inclusion and sustaining the natural life-support systems.

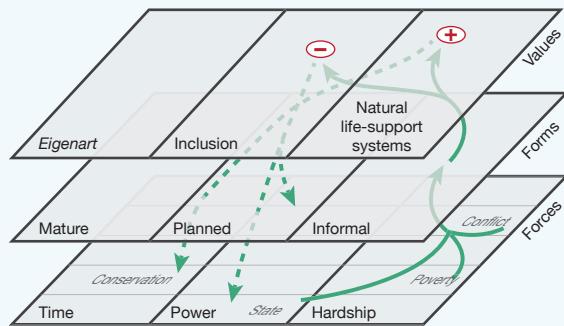
The city of Kigali, for example, has developed from an initial situation of need – marked by civil war, extreme pov-

erty and rapid population growth as a result of high birth rates and immigration – into a city marked by informal settlements and economies that is governed in an authoritarian way (Section 5.7). Political inclusion consequently is limited; so is substantive inclusion as a result of widespread extreme poverty. The government is trying to develop its city in a sustainable way and has already successfully implemented the first steps, such as a ban on plastic bags. These developments can have feedback effects on the 'architects', as well as on the settlement forms, if the three-level system has an impact from 'top to bottom' (Figure 7.1-4).

**Figure 7.1-3**

Three-level analysis: the example of Kigali.

Source: WBGU

**Figure 7.1-4**

Feedback effects: the example of Kigali.

Source: WBGU

ings. The aim must be to break consumption patterns and structures that have evolved over quite long periods of time, in order to realize a transformation towards sustainability. Planning changes to established structures means that existing infrastructures, buildings and institutions must be taken into account and the population integrated into the process (Section 7.4).

In *informal* settlements and slums, the aim must be to overcome basic hardship and make a dignified life possible for all people. Here, too, basic infrastructure must be installed in existing settlements and with the involvement of the population. Public institutions and government structures are largely absent here and do not control the urbanization dynamics. Furthermore, sustainable development and the improvement of precarious living conditions can also only succeed if there is an integrated approach to addressing both urban poverty reduction and compliance with the planetary guard rails (Section 7.3).

In *planned* settlements the aim should be to exert influence on existing plans to make sure that new buildings or city districts are built sustainably from the outset and negative path dependencies are avoided. The drawing-board planning of new settlements is often subject to great time pressure due to the rapidly growing demand for housing (population growth in the cities

and influx of people; Section 7.2).

Although every city has to develop its own 'moves' for the global transformation, analytical observations reveal possible levers for adjustments that could influence the entire system of the city.

7.2**Newly planned cities and city districts**

Publicly or privately planned new cities are currently a very important form of urbanization. Many of them are built at breakneck speed for millions of people ('speed', 'from scratch', 'scale'), especially in Asia and Africa. Above all, the new cities and settlements in China and India are particularly large and key levers for the transformation, since about half of global urban growth will take place there. China's urban population is expected to increase to more than 900 million by 2030 (OECD, 2015c). Innumerable new settlements will have to be built in China over the next few years to meet the housing needs of a population that is moving into cities. In India, the urban population is expected to grow to around 590 million people, almost twice the total population of the USA, by 2030 (McKinsey, 2010). About 500 new cities are expected to be constructed in India

by 2030, which will mean building on an area of about 700–900 million m² (McKinsey, 2010). Africa currently has the highest urbanization rates. As a percentage of the total population, the urban population there is expected to rise from 36% in 2010 to approx. 50% by 2030 (AfDB, 2012).

Given their size and the speed at which they will be built, quickly planned and erected cities and city districts can be a decisive lever for the urban transformation towards sustainability. This urbanization dynamic, which can be observed worldwide, offers an important window of opportunity for a comprehensive transformation into sustainable societies. At the same time, however, unwanted path dependencies can also quickly develop. The emerging undesirable developments of the global urbanization surge must be avoided as far as possible in the new cities and city districts. How the urbanization surge develops in China, India and other developing countries and emerging economies, and how it is organized, will have a huge impact on global environmental change and the living conditions of many people. Above all developments in big new cities over the next three decades will show whether planetary guard rails can be complied with. To be able to remain within these guard rails despite the dynamic urbanization surge, fundamental changes will have to be made to this global settlement pattern. At the same time, a transformation towards sustainable societies in cities should be designed in such a way that inclusion and *Eigenart* are secured and the urban population enabled to take an active part in the process. Furthermore, there should be room for the evolution of urban quality of life and cultural development prospects.

The urban forms of cities and city districts emerging worldwide are highly diverse. The WBGU's definition of new cities and city districts being planned includes both self-contained 'new towns' and all other urban projects that are privately or publicly planned and implemented according to traditional master planning, and in this way determine both land uses and the urban form of the city or individual districts. Cities that are planned and designed as a whole (e.g. new towns or satellite cities) are a particularly important type of newly emerging settlement for the urban transformation towards sustainability (Keeton, 2011). In addition to 'large' new towns, there are a substantial number of smaller, privately built settlements, usually planned as gated communities, in which the middle and upper classes are increasingly sealing themselves off from the 'rest of the city'. Such projects are often advertised in such a way as to appeal to a target group, emphasizing certain forms of *Eigenart* and lifestyles of a new 'urban community' (Darmstadt et al., 2010).

ies is the 'charter city', which was developed in 2009 by economist Paul Romer. The idea is to found charter cities in low-growth and structurally weak countries as extra-territorial enclaves to combat poverty; the cities would be completely controlled by a foreign (donor) government. The underlying assumption is that this could create a high level of legal security, generate above-average growth rates, and be a highly attractive destination for incoming poverty groups (Romer, 2010). The idea of charter cities is currently under discussion (Castle Miller, 2012; Cheong and Goh, 2013), although many critics have called it neo-colonialist and infeasible (Mallaby, 2010).

There is considerable scope for shaping and designing in newly planned cities or city districts; however, the challenges for the transformation are enormous, due to the scale and speed of growth. The realization of transformative goals in clearly defined action fields initially seems easier. 'Drawing-board cities' that are planned as a whole and rapidly built might theoretically offer the possibility of creating urban structures that are sustainable across the board from the outset, but successful examples are rare. There are frequently deficits with regard to the local identification and social cohesion of the population, as well as undesirable path dependencies that are difficult to change. Numerous expectations of urban planning have not been fulfilled in drawing-board cities. Many planned settlements are even regarded as failures, for example the Pruitt-Igoe social-housing project in the US state of Missouri, which was demolished only 20 years after it was built because of high levels of vacancy, vandalism and crime (Section 3.5.3.2). Building styles that are foreign to a region or local culture are also often imposed in new planned settlements. It can also happen that local construction methods and the planning organization on the spot are neglected, and that the time dimension and the difficulties of implementing plans are underestimated.

7.2.1

Interaction between the 'master builders': power, hardship, time

Newly planned cities are greatly influenced by the either conflicting or synergistic dynamics of the fundamental forces of power, hardship and time. The rapid urbanization of China, highly significant for the urban transformation towards sustainability, is an example of this.

One controversial variation on the idea of new cit-

7.2.1.1

Power – the combination of public and private interests

Power is an important determinant of large-scale urban or city-district planning. Only by exercising power can large settlements be newly planned and built. When it comes to new planning, the responsibility for decision making today lies with local or national governments. In many cases, however, multinational business groups also control the development of city districts (Provoost and Vanstiphout, 2011). For example, the Korean government financed CamDo new town in Cambodia, and Singapore invested in Tianjin Eco-city in China, among others (Provoost and Vanstiphout, 2011: 30).

One potential challenge in the planning and construction of new settlements is the often intransparent interdependence between the interests of public decision makers and private real-estate investors and its possible negative effects for the common good. In addition, the construction sector and real-estate industry are regarded as especially prone to corruption; public decision makers, too, are often affected by corruption. In China, for example, there are numerous corruption problems in the building sector; according to the Chinese State Council, commercial corruption has been most widespread in sales of land and building projects (Zhu, 2012; Song et al., 2015). Although the possibilities for participation in urban planning have improved in China (Huang et al., 2009; Kern and Bolay, 2013), there are still many problems. Especially in the context of urbanization there are few participation rights for civil society, and citizens are not adequately involved in urban-planning processes. Another problematic area is the frequent lack of coordination within and between levels of governance.

7.2.1.2

Hardship – preventing (visible) need and its limits

Because of the rapid population growth in Asia and Africa, the local governments there face the task of having to quickly cover both the existing and the future demand for housing. Many Asian governments can counter this great demand by building big settlements. At the same time, the *hukou* system in China, for example, forces parts of the rural population to commute between the city and their home villages as migrant workers. Many of the migrant workers live in temporary housing directly at the work place or in ‘urban villages’ (*chengzhongcun*: Zheng et al., 2009). These are villages that have become surrounded by the expanding city in the course of urbanization. Although they are not initially like the slums of cities such as Mumbai or Kigali, here, too, there are cramped housing conditions, a lack of infrastructure and social problems (Zheng et al., 2009; Wang et al., 2009).

7.2.1.3

Time – the challenge of acceleration

Time plays a key role in newly planned cities and city districts. Unlike in mature cities (Section 7.4), the great challenge here is to meet the growing need for housing as quickly as possible and to accelerate urban development. In the coming years, an average of 66 million people will move to urban areas every year in developing countries and emerging economies (World Bank, 2014a). Major cities like Shenzhen were built in an extremely short period of time. The city had a population of 68,000 in 1978; today that figure is almost 9 million. This rapid and large-scale urban development can create unwanted irreversibilities and path dependencies that stand in the way of an urban transformation towards sustainability. It is therefore all the more important to counteract such undesirable developments at an early stage. Furthermore, this accelerated urban development must not be allowed to take place at the expense of the inclusion of the population. It is also to be feared that the acceleration of the urbanization process will reinforce the uniformity of newly emerging settlements, leaving less space for the expression of cultural or regional *Eigenart*. Rapid urbanization processes frequently happen at the expense of the quality of buildings; for example, large quantities of emissions-intensive construction materials might be used in a short time, thus creating negative path dependencies.

7.2.2

Sustaining the natural life-support systems, inclusion and *Eigenart*: challenges for the transformation

In newly emerging cities it is particularly important to gear the planning of individual buildings, city districts and entire cities towards sustainability from the very beginning. However, the planning of entire city districts and cities is often subject to enormous time pressure, especially in countries with high rates of population growth and many migrants. Here there is a danger of numerous urban-transformation targets being neglected under the pressure of having to build housing quickly. For example, while planned cities can potentially be designed in a more resource-efficient way than city districts that have grown historically, on the other hand distinct ‘we-feelings’ and *Eigenart* are unlikely to develop in large, functional and quickly built drawing-board cities. At the same time, newly planned and built settlements offer great opportunities to leapfrog technological development stages by using opportunities that are opening up especially in the various transformative action fields (Chapter 4).

7.2.2.1

Sustaining the natural life-support systems

The detailed design of the new cities and city districts currently at the planning and construction stage worldwide (particularly in Asia) is globally significant due to its relevance to sustaining the natural life-support systems. It must be feared that the cities that are planned and will be quickly built now and in the near future will use just as many resources as in the past and cause high emissions of greenhouse gases – not least due to the high level of demand for building materials such as cement (Section 4.4.2). This is shown especially by the example of China, where more cement was used in construction between 2008 and 2010 than in the entire 20th century in the USA (Smil, 2014:91). Furthermore, the air quality in Chinese cities is very poor; it is estimated to cause about 1.6 million deaths per year (Rohde and Muller, 2015). In addition, in many regions of China urbanization is increasing the pressure on agricultural land and food production, as well as on the availability of water (Chen, 2007). Local governments decide on the designation of building land, and they also sell the plots to urban developers. Since revenue from the sale of such plots is usually the most important source of income for local governments, this leads to considerable incentives to manipulate the land market. The consequences are frequently disadvantages for the rural population, excessive residential prices in cities and inefficient urban land use (Ding, 2007). The system does not demand enough accountability from decision-makers, thus promoting inefficient and risky behaviour (Wong, 2012). In China, furthermore, strong economic and political incentives lead to new urban settlements often being characterized by an extreme functional separation of zones. This is reinforced by the construction of gigantic apartment blocks and a lack of public transport systems (OECD, 2015c), with corresponding negative effects on the sustaining of the natural life-support systems.

7.2.2.2

Inclusion

A transfer of the virtual social contract for the Great Transformation towards sustainability (WBGU, 2011) to the level of the cities will only be possible if there are enough opportunities for substantive, political and economic inclusion. The picture here is mixed in China. The very fast, industrialization-driven urbanization process has raised the standard of living of many millions of Chinese. Urbanization, for example, contributed to high wage growth and brought more than 600 million people out of poverty between 1980 and 2000 (Huang, 2015). Substantive inclusion in the residential settlements is made possible at least for the middle and upper classes.

At the same time, there are deficits in China primarily in the area of political inclusion. For example, there is no active right for every inhabitant to vote, and the urban-rural disparities are still very large. Furthermore, the Chinese population-register system (hukou system) denies substantive inclusion to millions of people. The hukou system specifies where Chinese citizens are officially registered and divides them into one group with urban hukou and one with rural hukou (Wang, 2005; Zhan, 2011). Access to most public services, e.g. pensions, health insurance and school admissions, depend on a person's hukou in China. Since hitherto it has not been possible for a person with rural hukou to officially register in a city, around 275 million Chinese with rural hukou now live in cities without having the same rights as those with urban hukou (OECD, 2015c). The hukou system is currently being reformed, albeit initially slowly and selectively. 100 million migrant workers are to be awarded the status of city residents by 2020.

7.2.2.3

Eigenart

Seen from the perspective of *Eigenart*, the current global urbanization surge involves a number of problems. In China, for example, many seek a Western ideal of the city. The planners of new Chinese drawing-board cities often take their orientation from the primacy of a car-friendly city with gigantic residential blocks, neglecting their own historical heritage. In the course of the rapid modernization of Beijing, for example, the remains of the historic city centre were gradually demolished and replaced by modern residential buildings, mostly high-rise structures with twenty and more floors, or shopping centres, thus jeopardizing local identity, networks and human capital in the process (Lui Chen, 2013; Zhao, 2016). In China there are also numerous new and, in some cases, empty planned cities and city districts; these are often new housing estates for hundreds of thousands of people on the edge of existing metropolitan regions. Many of these new cities are largely uninhabited. About 20 to 40 million homes are unoccupied in China (Shepard, 2015). One of the biggest of these ghost cities is Kangbashi (New Ordos) in northern China. The city was originally built for over a million inhabitants, but ultimately only around 2 % of it was used.

The so-called copycat phenomenon, which is common in China, is also relevant from the *Eigenart* perspective (Bosker, 2013). The reproduction of building styles, individual buildings or entire cities leads to a standardization of settlements that stands in the way of the expression of *Eigenart*. At the same time, copying sustainable solutions makes the urban transformation towards sustainability easier, especially if scope is

left for local design ideas to be implemented. At least on the level of rhetoric, the current Chinese National Urbanization Plan (2014–2020), under the motto 'people-centred urbanization', is concentrating more than before on the quality of urban growth, with a greater focus on fairness, environmental protection and quality of life.

7.2.3

Solution spaces and governance options

The globally significant (new) planning of cities and city districts, above all in Asia (and partially also in Africa), opens up great creative scope and can give the urban transformation towards a sustainable society a significant boost. At the same time, the limits to the plannability of cities must be taken into account. For example, there must be clarification on what are the most important fundamental decisions relating to solutions incorporating the three dimensions of the normative compass, which governance options offer special potential for the transformation, which instruments and processes are relevant, and what planning approaches are especially promising.

Newly planned cities and city districts require proper urban planning and suitable governance. The high speed of urbanization is leading to numerous challenges for governments, for example with regard to the provision of public services to a very quickly and strongly growing urban population, the maintenance and development of urban infrastructure, combating local environmental problems, and global resource and climate protection. In many cases the institutional structures are not equipped to meet these challenges. There is frequently not enough coordination and cooperation between actors at different levels of governance and at the same time there are too many fragmented administrative jurisdictions and overlapping institutions.

Against this background, governance is one of the most important starting points for a transformation towards urban sustainability and for better urban planning. At the same time, the limits to the plannability of cities must be taken into account. The more that cities expand, the more important it becomes that coordination mechanisms between different local jurisdictions are effective – to organize land use and transport within metropolitan regions that are growing together.

Newly emerging cities or city districts represent a comprehensive creative task for planners and all actors involved in the transformation. The aim is to provide a sustainable urban form and avoid undesirable path dependencies. In this context, it is of key importance to integrate the findings of the IPCC's last report on urban

planning. For one thing, any long-term planning must take into account climatic consequences, which can already occur with a global temperature rise of 1.5 to 2°C, in order to avoid misdirected investment (Section 4.2.4). This means, among other things, that the cities of the future must take their orientation from the available resources that can be used within the planetary guard rails.

Similarly, options for meeting the cultural needs of future generations should be kept open, so that buildings can be used differently in the course of their life spans (for housing, as work or meeting places), or be redesigned or extended, based on a modular design. Instead of costly individual buildings, there should be more investment in sustainable architecture for the population as a whole and in the holistic planning of city districts.

Furthermore, newly emerging cities and city districts also offer a chance to leapfrog, for example by integrating land-use management, urban form, transport and mobility infrastructures, resource flows and the energy system (Chapter 4). Great potential for improved efficiency can be opened up by integrating resource flows (water, waste, energy), thus allowing heat recovery, for example. Newly emerging cities offer a chance to completely decarbonize their energy and mobility systems and to plan emissions-free new cities. Emissions-intensive building materials should, whenever possible, be replaced by low-emission alternatives. Regionally sourced building materials facilitate recirculation and can also strengthen regional identity. Starting points for the transformation towards urban sustainability are also offered by commitments to make passive energy savings in the construction sector, by setting incentives for planners and investors to implement active energy-saving strategies, and by implementing an appropriate quality-assurance scheme on sustainability in urban planning and urban development.

In the planning and construction of new cities and city districts, those responsible should bear in mind that, for city residents, it is not only important to make tangible and material improvements to their living conditions, but also to be able to identify with their city. Integrating urban civil society and creating actively effective institutions that protect public interests are essential conditions for success when it comes to liveable cities. However, an urban transformation towards sustainability can only succeed if the two most powerful actors in urban development – government decision-makers and private real-estate investors – make binding commitments to this goal. In particular, the power and resources of private investors and developers should be put to use for the common good, both by legislative requirements and by such instruments as

voluntary commitments. One important starting point for strengthening the power of urban societies to shape and develop their cities is the restriction of real-estate speculation.

An important factor for good urban governance is the coordination and clear distribution of responsibilities across all levels of government (Section 2.5). In addition, it is key to strengthening the capacity of city administrations. The role of local governments and mayors should also be reconsidered. For example, they should be made more accountable for the quality of urban public infrastructures and services. Furthermore, steps should be taken to prevent and combat corruption and create longer-term incentives to achieve sustainably good urbanization results.

7.3 Informal settlements

The technological achievements of the industrial revolution and the creation of knowledge networks across great distances have brought global productivity to a peak level that has also improved the lives of many city residents worldwide. However, this positive development has not reached a large proportion of humanity; approx. every seventh person lives in an informal settlement or a slum. This means that almost one billion people today live in precarious housing conditions, in particular in the cities of the developing countries, with an additional one to two billion slum dwellers expected in the coming decades (Box 2.11; UN DESA, 2013). The lack of access to sanitary facilities, food and drinking water, and the extremely cramped conditions, pose risks to the physical and mental health of the residents and prevent them from leading a self-determined life; their living conditions very often constitute a violation of human dignity. These fundamental constraints imposed upon a large proportion of the world's population diminish humanity's development potential and reduce (solidarity-based) quality of life in the cities (Section 3.2).

In many cities, slums and gated communities of the urban (middle and) upper classes are located side-by-side in the same neighbourhood. Gated communities have been described as an 'architecture of fear' (Ellin and Blakely, 1997; Agbola, 2013). This development has intensified in recent decades and reflects the growing global socio-economic disparities within very confined areas (Section 4.2).

7.3.1 Informal settlements – a definition

Informal settlements are not defined consistently in the sphere of urban development. Many terms are (apparently) used synonymously, such as 'illegal', 'unplanned', 'spontaneous' or even 'marginal' settlements. Moreover, national designations also exist, such as *favelas* in Brazil, *barriadas* in Lima, *gecekondu*s in Turkey and *ashwa'iyyat* in Egypt. The term 'slum', frequently used, for example, by the UN, is also vague and inconsistent. What they all have in common is a negative connotation that is the opposite of the 'formal', 'planned', 'organized' – i.e. 'good' – city. This is associated with the widespread but inaccurate assumption that informality is synonymous with poverty (Davis, 2006; Box 2.1-2).

Informal settlements are defined by UN-Habitat (2015g: 1) as "residential areas where

1. inhabitants have no security of tenure vis-à-vis the land or dwellings they inhabit, with modalities ranging from squatting to informal rental housing
2. the neighbourhoods usually lack, or are cut off from, basic services and city infrastructure and
3. the housing may not comply with current planning and building regulations, and is often situated in geographically and environmentally hazardous areas."

This definition illustrates the broad spectrum within which informal settlements can appear. Informal settlements can also be the subject of real-estate speculation.

The basis for the distinction between informal and formal settlements is usually that informal settlements occupy private or public land without an explicit legal entitlement, or that they infringe applicable building and planning legislation (UN-Habitat, 2012). This, at first apparently unequivocally clear, distinction is used by many governments to distinguish formal from informal settlements and is frequently equated with a legal or illegal status. However, the academic debate draws attention to grey areas within this distinction. It is frequently emphasized that informal settlements must not necessarily be unorganized or unplanned (Bähr and Mertins, 2000; Varley, 1989, 2013). Local administrations do not always take a negative view of informal settlements either. Examples range from professionally planned settlements developed in cooperation with the local municipal administrations in Lima (Herrle and Fokdal, 2011:6) and the migrant worker settlements on the outskirts of cities in China – which, although they violate applicable law, are tolerated by the government (Kreibich, 2012:151) – to the informally erected 15-story housing estates built in Cairo by real-estate developers and tolerated by the official

authorities as ‘unplanned areas’ (Abdelhalim, 2010; Sims, 2012; Section 5.3). Various studies also refer to the fact that meanwhile there are a large number of informally developed settlements with middle-class residents (Roy, 2005: 149).

A lack of infrastructure facilities is not, therefore, an adequate criterion for defining informal settlements. Yet a distinction according to the legal situation often leads to an inconsistent or even arbitrary classification of city districts. For example, the illegal occupation of an area can form the basis of a formal residential area by later being legalized by the government (van Gelder, 2013). At the same time, competing culturally or religiously based rules or practices may exist by means of which the settlers independently obtain a ‘quasi-formal’ status. In Egypt, for example, regular payment of the electricity bill leads after some years to a permanent right of abode for the residents (Séjourné, 2012: 104). Generally, these processes are legitimized by customary-law or alternative (informal) regulations that exist outside the formal legal system.

7.3.1.1

Slums as a category of informal settlements

In view of the large-scale heterogeneity of informal settlements and the associated differences in the infrastructure facilities, the use of the term ‘slum’ as a sub-category of informal settlements (UN-Habitat, 2015g) appears to make sense, although it is also applied to a wide variety of settlement forms. The United Nations defines a slum as an area where at least one of five criteria applies: (1) poor structural quality of housing, (2) overcrowding, (3) inadequate access to safe water, (4) inadequate access to sanitation and other infrastructure, (5) insecure residential status (UN-Habitat, 2014b: 10).

While this definition targets especially the inadequate infrastructure and the informal status, other definitions also classify other settlement forms as slums, e.g. degraded formal residential areas in the city centres (Mertins, 1984; Davis, 2006; Nuissl and Heinrichs, 2013), so that the inadequate living conditions rather than the legal status constitute the overarching criterion. This also applies to some temporary settlements which, although formally developed, by no means offer adequate living conditions and exhibit a high degree of informal structures and activities; these include refugee camps (Sanyal, 2010; Herz, 2012; UNDP and UN-Habitat, 2010; Shepard, 2015) or ‘labour camps’ that can be found in large numbers, for example, in the Gulf States (Gardner, 2010; Amirth, 2011: 166; Amnesty International, 2013: 47ff.; ADHRB, 2014: 31).

However, not only the legal status, but also the adequacy of the housing conditions leads to demarca-

tion problems, since the slums undergo consolidation processes at different speeds and to different extents as a result of improvement and upgrading measures, which can attenuate these substandard conditions or even lead to their abolishment (UN-Habitat, 2014b). Slums are consequently too complex, too diverse, too changeable and too insufficiently distinguishable from their environment to be able to define them with a few parameters (UN-Habitat, 2003). The dichotomy of ‘slums of hope’ and ‘slums of despair’, which is sometimes used (Stokes, 1962: 189), attempts to undermine the convention of equating slums with poverty by also accentuating their positive development potential. Ultimately, however, these supercharged metaphors do not adequately describe the broad range of settlement patterns.

Informal settlements or slums can, therefore, differ significantly from each other in terms of the material dimension (basic infrastructure), the social dimension (socio-economic situation of the residents, conflicts, social capital) and the institutional dimension (formal and informal regulations that influence life in slums; Nuissl and Heinrichs, 2013). The terms ‘informal settlements’ and ‘slums’ are also sometimes used synonymously in the literature. For this reason, the term slum is also used below where applicable.

7.3.1.2

Measures and strategies for dealing with informal settlements

Local and national governments use different strategies to deal with informal settlements (Table 7.3-1). For a long time, these settlements were met with ignorance or (forced) eviction (UN-Habitat, 2003: 129ff.). This usually only led to the problems being postponed, shifted elsewhere, and frequently exacerbated (UN-Habitat, 2003, 2014b). According to the Centre for Housing Rights and Eviction, some 18.6 million people around the world were forcibly driven from their settlements between 1998 and 2008 (UN-Habitat, 2014b: 13). Even when the population was relocated to government-funded housing estates, these projects often failed due to the lack of jobs, social networks and connections with the rest of the greater city region (e.g. in Cairo: Section 5.3.1.2). Since the 1970s, international organizations and many governments have been mainly propagating local self-help strategies (*in-situ* upgrading). These programmes are used, among other things, to enhance urban infrastructures in settlements. In addition, the granting of land tenures and access to micro-loans is to be promoted to boost the population’s willingness to invest in their own settlement area (UN-Habitat, 2003: 131). To give the economic, social and institutional aspects of district devel-

Table 7.3-1

Conventional strategies and measures in dealing with informal settlements.

Source: WBGU, based on UN-Habitat, 2014b; Satterthwaite and Mitlin, 2014; Bahr and Mertins, 2000

Refusal of inclusion rights	
Ignorance	<ul style="list-style-type: none"> ➢ Ignorance about informal settlements; no offers of support; regarded as a temporary phenomenon
Displacement	<ul style="list-style-type: none"> ➢ Displacement of the inhabitants and destruction of the informal settlement without provision of alternatives
Relocation to the periphery	
Sites and service programmes	<ul style="list-style-type: none"> ➢ Primarily in the 1960s and 1970s ➢ Low level of acceptance among the population due to high social and economic costs ➢ Distribution of plots of land with infrastructure connections for new settlements; the residents build their own huts or houses – and in some cases make their own connections with the infrastructure ➢ Distributed to low-income families, in some cases with soft material loans ➢ Superior version: core-housing programmes: provision of a plot with building shell and sanitary cell
Low-cost housing	<ul style="list-style-type: none"> ➢ Construction of multi-storey residential blocks with simple apartments that can be rented or purchased at a low price
On-site measures (in-situ upgrading)	
Slum redevelopment	<ul style="list-style-type: none"> ➢ Demolition of the informal settlement and provision of multi-storey residential buildings by private real-estate companies; costs are amortized by the development of the newly acquired land ➢ Acceptance by the population varies greatly depending on how the measures are implemented (e.g. danger of destroying social structures)
Consolidation (upgrading)	<ul style="list-style-type: none"> ➢ Measures for improving the building fabric and the technical and social infrastructure in informal settlements by a combination of government aid and self-help ➢ Especially since the late 1970s ➢ Regarded as the economically and socially most adapted approach

opment greater consideration, since the Habitat Agenda in 1996 efforts are being increased not only to involve the local population in building infrastructures with the help of enabling policies, but also to include them in decision-making processes and integrate them into the sustainable management of the city district (UN-Habitat, 2015d: 17; Satterthwaite and Mitlin, 2014). Decentralization and deregulation of local administrations are frequently the key to these complex (governance) processes (UN-Habitat, 2003: 131).

7.3.2

Interaction between the 'master builders' of power, hardship and time

As a rule, the development of informal settlements can be attributed to several factors, such as a sudden influx of migrants or refugees, housing shortage, limited possibilities for people to find their own accommodation, or the failure of the local government to create enough affordable housing for low-income groups. Such constellations of power, hardship and time often lead to precarious urban and periurban developments.

7.3.2.1

Power – areas of limited statehood

In many informal settlements, power is not exercised by the state (UN-Habitat, 2015d). This problem can be a result of inadequate local government resources, a lack of control and management or the setting of different priorities, but it can also be caused by the misappropriation of funds intended for social housing projects. This leads the residents to take action themselves and settle on undeveloped spaces where, at first, they build improvised accommodation or houses in areas that were not intended for this purpose. Particularly in this latter case, an informal real-estate industry often develops and regulates the organization of affordable housing. Due to the lack of state control, supplementary governance structures develop in informal settlements parallel to the local administrative structures (Section 2.5.2.2.). Their orientation can vary greatly; whereas some settlements are managed by CBOs committed to the common good, other constellations are dominated by criminal networks, even by organized crime, exploiting the residents' situation for their own profit.

7.3.2.2

Hardship – improvisation driven by poverty

Income disparities between the country and the city often lead to migration into the centres, where inequality is frequently even higher than the national average (Rode et al., 2009). Furthermore, urban population growth is high in developing countries due to high birth rates, particularly in lower income groups (Skirbekk, 2008) who often have only limited access to education and birth control (Kayembe et al., 2006). Unable to access the formal housing market due to the failure of the state (power) and the population's lack of financial resources (hardship), the residents take matters into their own hands and often build up housing facilities themselves. In many cases, these housing facilities are initially provisional (e.g. tents, corrugated iron sheets). Because the residents have no resources of their own and there is no legal certainty, housing often lacks basic services such as sanitation or water-supply services. City settlements commonly expand into areas that are not intended for residential development, such as flood zones, mountain slopes or areas that have been polluted by toxic discharges from industrial plants.

7.3.2.3

Time – fast solutions, slow progress

Informal settlements can be considered a phenomenon of accelerated urbanization that is also likely to play an influential role in meeting housing needs in future urbanization processes. They are a fast, albeit initially inadequate, solution for providing housing infrastructure. This dynamic will remain effective unless measures are taken as quickly as possible to counter the spread of urban poverty. Two billion people could otherwise be living in urban slums by 2030. By the middle of the 21st century, this figure could even reach three billion (UN DESA, 2013; Box 2.1-1). Living conditions in slums substantially reduce the time people have left for productive activities, since the lack of basic infrastructure ties up a lot of time, intensifying time poverty as a result. Inadequate access to safe drinking water, for example, means that many hours have to be invested in supplying the household with water. This time poverty of the slum community entails an exclusion from other activities (such as education) that could make social advancement or improved living conditions possible.

7.3.3

Informal urbanization in the transitional century

7.3.3.1

Socio-economic disparities and urban poverty

This century's major 'challenge for humanity' – adherence to the planetary guard rails, the elimination of hunger and poverty and the creation and preservation of peace – can only be solved together, not successively or in isolation from each other. The Great Transformation cannot succeed without, let alone against, the 'bottom seventh' of humanity. A transformation of the cities should, therefore, not perpetuate, or even intensify, existing disparities, but should also seek to make a dignified life possible for all people living in cities. The WBGU, therefore, regards fighting poverty and reducing socio-economic disparities as a transformative action field (Section 4.2.5). A paradigm shift is required to achieve this goal. For example, the efforts of urban development actors, such as municipal administrations, urban planners, architects and urban research institutes, should (also) be aimed at developing and constructing housing and infrastructures for low-income groups that meet the requirements of *Eigenart*, inclusion and natural life-support systems. What is needed, for example, is an incentive system that prompts the people responsible to work towards improving living conditions in all city districts.

Whereas more justice cannot be achieved by reducing sustainability (Swilling and Annecke, 2010), the elimination of extreme inequality can be integrated into efforts towards greater sustainability. Today's wealth distribution, in which the richest 62 people own as much as the poorer half of the world's population, is highly unstable (Oxfam, 2016). For the most part, the consumption patterns of the richest billion are strongly linked to the urban way of life, which is often based on the exploitation of employees and resources in global value chains (textile industry, agricultural imports, oil production, etc.). In 2010, 388 people owned as much as the 3.5 billion poorest people (Oxfam, 2015, 2016); the trend, therefore, still shows an accumulation of wealth by the richest 0.00001%. These people live and invest in cities and therefore also often influence urban design and management. At the same time, the worsening socio-economic disparities in cities have favoured the formation of large slums. Whereas socio-economic inequality *between* countries has diminished, it has risen *within* most countries since the beginning of accelerated globalization in the 1960s (Box 2.1-6). This difference also describes to some degree the income gap between rural and urban regions, which in turn explains, at least partially, the increased migration from

rural areas (Harris and Todaro, 1970).

However, a uniform data set allowing an international comparison of the income disparities between a large number of cities does not exist as yet. The data currently available (Rode et al., 2009:3 ff.; UN-Habitat, 2008:62 ff.) show that, in many countries, income gaps in cities are higher than the respective national average (Section 4.2.5) There are, however, substantial regional differences: extremely high inequality can be found in African and Latin American cities. In Europe and Asia, the discrepancy is less marked (UN-Habitat, 2008:XII).

7.3.3.2 Migration

Alongside income inequality, other factors also influence country-to-city migration (Section 2.12). For example, access to basic infrastructure, education and healthcare in cities can play a role in migration decisions (Van, 2001), while climate risks, such as droughts, can fuel migratory movements into cities or urban peripheries (Box 2.3-6). Although migrants predominantly move into urban areas, few attempts have been made hitherto to tackle the two phenomena of urbanization and migration with an integrated approach. In the view of the International Organization for Migration, this is reflected, among other things, in the lack of references to migration in the preparations for the New Urban Agenda in the context of Habitat III (IOM, 2015).

Migration from the country to the city often ends in the periurban area, which is not urban but does not correspond to rural forms of housing and living either (Figure 7.3-1). The peripheries are places where not only migrants arrive (Singer, 2004; Schiller and Çaglar, 2009), but also city residents who are forced to move from the city centres because the costs of living there exceed the average income. In many cities, public spaces are increasingly being bought up and administered privately; buildings that are almost unoccupied, but cannot be utilized publicly either, are being used for speculation purposes (Section 4.3.1). This frequently leads to a lack of adequate housing for people with average incomes relatively close to their workplaces in the city centre. The squeezing out of city residents from the city centres thus partially explains why people with incomes that are higher than the national poverty threshold also live in informal settlements.

The influx of people into the cities can originate in the surrounding rural areas, but also from much further away. As a result, international migration, in particular, largely flows into urban areas (IOM, 2015). Furthermore, this frequently leads to qualified people migrating into the cities (brain drain). They try, among other things, to open up future prospects for themselves

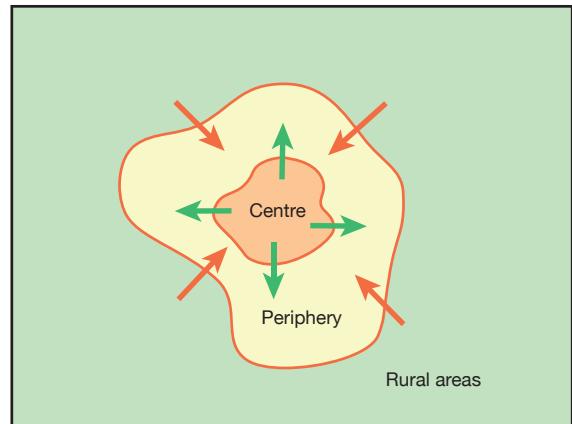


Figure 7.3-1

Migration to the urban periphery.

Source: WBGU

and to earn money for the survival of their families in their rural places of origin. They usually settle in places where the housing prices and cost of living are low. By contrast, socially weaker groups are leaving the inner-city districts. On the periphery, conflict potential can build up between these two groups if they have to compete for jobs or housing.

7.3.4

Sustaining the natural life-support systems, inclusion and Eigenart: challenges for the transformation

Although informal settlements can vary greatly in composition due to the broad definition of the term, certain potential risks that are typical of this settlement pattern can be deduced in relation to the natural life-support systems, inclusion and *Eigenart* (character) which differ from those of more mature and planned city districts.

7.3.4.1

Sustaining the natural life-support systems

Although people living in informal settlements provide the basis for many urban economies with their labour, and are actors in global value chains, this work often does not enable them to earn a dignified living. Furthermore, they are the people most affected by the negative externalities of growth, from which they hardly benefit at all (Box 3.4-2). Whereas they are particularly strongly impacted, for example, by the risks and consequences of climate change at the local level, their own contribution to the causes of that change are only very small. There is a clear correlation between greenhouse-gas

Box 7.3-1**Climate risks for informal settlements and slums**

The population living in slums and informal settlements will be disproportionately affected by the consequences and risks of climate change (Revi et al., 2014b). On the one hand, their particular vulnerability is a result of the characteristic living conditions in slums, where, for example, the densely populated spaces and flimsy buildings offer little protection from extreme weather events. On the other hand, the inhabitants are frequently not informed about climate-change-related developments, or else there are no financial resources available to adapt to a changing environment. The consequences were seen for example in 2013, when Typhoon Haiyan caused more than 6,300 deaths. In the especially hard-hit city of Tacloban, where 2,500 people died, people knew about typhoons, but not about the ensuing storm surge, which was experienced for the first time in this region on this scale

(Lagmay et al., 2015). Haiyan was also one of the strongest typhoons documented in terms of the intensity with which it hit the coastal cities. 68% of the evacuation accommodation was within the flood zone; many people died seeking shelter there. Although warnings were issued about the storm surge, survivors reported that they did not know what a storm surge was. Informal settlement areas were particularly affected by the destruction (Lagmay et al., 2015).

Despite warnings, the intensity of extreme weather events beyond the experience horizon of the population can come as a surprise for individuals. Particularly people whose work is strongly connected with the environment, but who have no formal education, can no longer apply their traditional knowledge in the event of sudden, severe environmental changes. This increases their vulnerability when there are singular, sudden extreme weather events; but the ability of the population to adapt is made even more difficult by the lack of local knowledge about future gradual changes.

emissions and income levels, as well as various other prosperity indicators. Lower income groups are usually only responsible for very low per-capita green-house gas emissions (Rao et al., 2014), but are disproportionately affected by climate risks (Box 7.3-1). Nevertheless, a look at other development indicators shows that many countries with high and medium incomes have succeeded in decoupling emissions from access to specific basic infrastructures (Rao et al., 2014).

7.3.4.2 Inclusion

The population's opportunities for inclusion vary widely in informal settlements and slums. Substantive inclusion, above all, depends in some areas on the context (i.e. it is located within the settlement itself), while economic and political inclusion does not necessarily depend on the place of residence, but strongly on national prerequisites. However, the place of residence can involve stigmatization and discrimination on the labour market, as well as fewer chances for participation (UN-Habitat, 2003). The lower socio-economic status of the residents and their frequently insecure legal situation often represent a barrier that negatively influences access to social infrastructures such as education, healthcare and social-security systems. In this respect, there are major differences between both countries and cities. Whereas in Cairo, for example (Section 5.3), informal settlement development has led to 'adequate' city districts, the infrastructure facilities in Mumbai (Section 5.2) depend strongly on the respective legal status of a slum. In the case of limited access to basic infrastructure, the lack of sanitary facilities, for example, can lead to major constraints in daily routines – particularly for women (Section 6.6.5.2). The

lack of access to education can mean that existing conditions continue unchanged, as the local population have few opportunities for socio-economic advancement (Section 3.4).

The people living in informal settlements are usually not officially registered. This can prevent their political inclusion and participation in elections (Satterthwaite et al., 2011). People who live in slums are usually also limited in terms of their economic inclusion (Box 2.1-3), as they typically belong to the lowest urban income groups; in addition, there are often extremely high income inequalities within these cities (Box 2.1-6).

7.3.4.3 Eigenart

The *Eigenart* of informal settlements varies greatly, both regionally and within cities, as it is the product of specifically local conditions (e.g. population structure, solution approaches, resource availability). Their incremental development and consolidation processes enable informal settlements to adapt continuously to existing challenges (e.g. subsequent densification, infrastructure expansion; Echanove, 2013). Against the background of a growing slum population – at least in absolute figures – scientific and political transformation paths for the development of a 'functional slum' are an urgent necessity. In this context, solutions developed by the slum residents themselves in particular must also be supported and developed further (Section 6.2.2, 6.3.2).

7.3.5

Solution spaces and governance options

There is a great and urgent need for international action to improve living conditions in slums: "Without significant improvements in the legal, regulatory and financial systems, the problem of current slums is only a glimpse of an even worse future" (UN-Habitat, 2003:xxxii). The transition from a hitherto largely rural to a predominantly urban world society often takes place in many cities in informal settlement processes. While some people manage material and social advancement, many remain in absolute poverty, often for generations.

Improving living conditions in slums as part of 'global domestic policy'

The present international migration movements, for example, show that the underlying causes – conflicts, socio-economic disparities and local environmental changes – cannot be tackled by unilateral strategies alone. Rather, what is needed to improve the living conditions of these people is a 'global domestic policy' ('Weltinnenpolitik') that helps create and maintain both stability and compliance with planetary guard rails (Section 4.2.5). This can only be done with state support. Major reforms and considerable investment will be needed to achieve the SDGs, which include ending poverty in all its forms (SDG no. 1) and providing access to adequate housing (target of SDG no. 11; Section 8.2.2). If these reforms and investments are not forthcoming, the slum population can be expected to double to 2 billion people by 2030 (UN DESA, 2013). It is particularly relevant here how informal settlements can become functional, i.e. how they can be made liveable, both socially and in terms of their urban form, and also offer their inhabitants economic prospects. The aim of replacing all informal settlements by traditional urban structures by 2030 is unlikely to be reached. Humankind has made enormous progress in the fields of technology and productivity, yet hardly any innovations have been introduced in settlements with precarious living conditions.

Informal settlements as places of transition and transformation

Locally adapted solution strategies are necessary to cope with the diversity of informal settlements. However, the decisive factor for a transformation in cities will be that not only symptoms are treated, but that the causes of their development are combated. The origin of most of the informal settlements with precarious living conditions lies in the exclusion of a large section of the population from the formal housing and labour markets and from the 'formal city areas', includ-

ing green and recreational areas. Up to now, local and national governments' response to this problem has been insufficient. In the WBGU's opinion, various different measures need to be taken on the micro-, meso- and macro-level to ensure that adequate housing can be provided for all population groups in future.

7.3.5.1

Micro-level: improving living conditions

The first thing that is needed to improve living conditions in informal settlements is to take seriously the diversity of settlement forms with their very different problems and local resources. After years of criticism of such terms as 'informal settlement' and 'slum' (UN-Habitat, 2014; Echanove, 2013; Huchzermeyer, 2014), a classification for international use should be agreed. This should primarily take due account of the need to satisfy material needs (above all housing and infrastructure), social needs (above all access to social infrastructure, safety and security) and institutional and political needs (above all legal security). This is because specifically in settlements where there has been investment, e.g. in the infrastructure, social problems (e.g. unemployment, alcoholism) can counteract material progress.

Hardly any scientifically usable, standardized data have been available up to now (UN-Habitat, 2015d). This makes it difficult to make decisions based on reliable knowledge to improve living conditions in slums. Today, with the dissemination of mobile phones and smartphones, there are better opportunities to collect and spread information – also in slums. To enable people to live a dignified life, it is necessary to guarantee basic housing. Starting points for a discussion on adequate housing could be a target of 10m² per resident, secure land tenure, and access to safe drinking water, electricity and sanitation.

Local solutions work better when the local residents are involved. The possibilities of participation vary considerably depending on national and local conditions. In particular, it is necessary to strengthen the rights of people living in informal settlements, to support their skills of articulation and help them shape and plan the city by practising collaborative governance (Section 8.3.1). Informal and formal urban structures also need to be interlinked (Section 8.3.2). To make this possible, local governments must cooperate with informally operating actors in their city. Since the articulation skills of the population living in informal settlements in many cities are mostly very weak, CBOs, NGOs (e.g. National Alliance in Mumbai: Section 6.4.1) and transnational networks (e.g. Shack/Slum Dwellers International: Section 6.2.2) offer a great opportunity to make people living in informal settlements aware of their

rights and to enable them to articulate and assert their interests (Herrle et al., 2013, 2015a). This includes, for example, improving access to educational or healthcare facilities as important resources for improving their living conditions.

There should be a special focus on the participation of women in planning processes and on their empowerment, since, on the one hand, women are particularly vulnerable and, on the other, they play a key role both in the household and in the settlements themselves (UN-Habitat, 2003; Chant and McIlwaine, 2016, Moser, 1992; Satterthwaite and Mitlin, 2014:215ff.). Positive examples include savings groups, which can make small investments possible, stabilize social cohesion, and improve the physical infrastructure in informal settlements (d'Cruz and Mudimu, 2013). Another example is 'Women's Safety Audits' in New Delhi, which improves the security situation by identifying specific risk areas for women in informal settlements (UN-Habitat, 2014b).

7.3.5.2

Meso-level: city-wide upgrading strategies and the right to adequate housing

Of the many measures aimed at improving housing conditions in informal settlements, slum-upgrading projects have primarily proved to be the most socially and economically viable (Section 7.3.1). However, upgrading projects often only improve housing conditions in a few settlements, without systematically eradicating the causes of slum development in a city (Augustinus, 2010:132). According to the UN's Special Rapporteur on adequate housing, this usually ends up as a zero-sum game: for every slum that is upgraded, another will be created (Farha, 2015: 17). What is needed to achieve large-scale settlement upgradings and to prevent the emergence of new informal settlements, are city-wide public sector strategies on land use, finance and planning as part of a comprehensive, public funded housing policy (Augustinus, 2010:132). The lessons learned from the MDG process show that above all a combination of policy reforms and the implementation of fair planning and economic policies is needed to avoid the future growth of informal settlements and slums. Useful are a range of complementary approaches including awareness raising, higher budgets for urban infrastructure, policy reforms, and the strengthening of institutions (UN, 2015:61). UN-Habitat is now also pursuing a 'Citywide Slum Upgrading' strategy, aimed at the improvement and prevention of informal settlements throughout a city (UN-Habitat, 2014b). In the WBGU's opinion, such integrative measures are worth supporting. In addition, the right to adequate housing as an integral part of the human rights agenda should

be introduced into urban legislation, so that housing conditions in existing settlements can be improved and affordable housing created for needy population groups (Farha, 2015).

Publicly funded social housing has been greatly neglected in recent decades; in most cities it has been left to the private sector (Rolnik, 2012; Farha, 2015). As a result, many of the world's cities have been unable to meet the demand for affordable housing. National and local governments should return more and more to policies aimed at creating adequate housing. In particular, social housing should (again) be at the focus of urban planning. It is important in this context to achieve a mixture of different income groups within city quarters and not to build segregated areas of social housing. Environmental and climate-protection requirements should also be taken into account in publicly funded housing. The use of natural building materials, which are often more easily available and also cheaper, and a modular and extendable design can also contribute towards adequate housing. In particular, the use of locally adapted, alternative construction materials and methods of building insulation, such as wood, bamboo, clay or stone, should be encouraged (Section 4.4.2). Furthermore, greater use should also be made of renewable energies, since they are generally not dependent on a municipal electricity network and therefore less susceptible to power outages.

In addition to structural improvements to existing slum settlements, it is also necessary to create adequate temporary accommodation for refugees and migrants. There should be a potential to erect and dismantle such accommodation quickly to prevent the creation of new informal settlements and slums (Section 6.4.3).

7.3.5.3

Macro-level: wealth redistribution and combating corruption

If cities are to develop and implement integrative strategies for upgrading and avoiding informal settlements with inadequate housing conditions, in the WBGU's opinion two key causes in particular must be eliminated at the global level: extreme wealth disparities and corruption.

Only a fair distribution of wealth, which in cities can also include a reform of urban land tenure (Section 4.3.3), allows fair access to housing for all population groups. If the question of distribution equity is not resolved globally in the next few decades, billions of people will continue to be economically marginalized and their only option will be to live in informal settlements. There is also a need for action within the framework of development cooperation (Section 9.3.1.5). In particular, the financial contribution of the OECD coun-

tries to development cooperation should amount to at least 0.7% of gross national income.

Implementing suitable strategies for improving the living conditions of urban poverty groups also requires a form of urban governance that ensures a fair distribution of goods and opportunities. In many cities this is currently prevented by widespread corruption in the public and private sectors. It is thus key for ‘good urban governance’ that corruption is successfully combated at the local, national and international levels. Above all, in the fast-growing cities of developing countries and emerging economies, the widespread corruption in politics, administration and private companies is partly responsible for the fact that money disappears or is invested in wrong or ill-conceived projects. This also undermines the population’s confidence in government, administration and society.

A fair(er) distribution of wealth and the fight against corruption at all levels of governance will lay the foundations for achieving locally successful reforms of a kind of urban development that takes the needs of the city’s entire population into account and offers equitable capabilities.

7.4

Mature cities and city districts

By the end of this ‘century of the cities’, the urbanization process will probably be largely completed. In 1950, 1 billion people were living in cities; by 2050 this figure will have risen to about 6 billion (approx. 66% of the world population), and by 2100 to around 9 billion people (about 80%: OECD, 2015a: 20). This means that an ever larger proportion of humanity will also be living in ‘mature’ urban areas. Many of these mature settlement forms are hundreds or thousands of years old; most have a well-developed infrastructure, a wide range of services and a high degree of urbanity (Section 2.2.1.3).

Urban structures in the settlements we today refer to as mature were able to develop slowly and adapt to the changing needs of the people and to technological developments. There were interruptions as a result of phases of decadence and destruction. Because of the low level of predetermination and the relative autonomy and self-powering dynamic of individual projects, this can be referred to as a liberal urbanization pattern, typical of medieval settlements and early industrial settlements (Curdes, 1997). Earlier planned parts of settlements, such as Roman military settlements, were frequently reshaped; rings with planned neighbourhoods were added to medieval settlement centres, e.g. in London, Munich, Wiesbaden and Dresden (Curdes, 1997).

The dominant urbanization patterns in the 20th century were suburbanization and the demand for central city locations (OECD, 2015a:30ff.). In the 21st century, especially in industrialized countries where mature urban patterns are most common, this is causing problems for sustaining the natural life-support systems and protecting the specific *Eigenart*; opportunities for inclusion are also tending to decline.

7.4.1

Historically evolved cities

“City has always been there in some form, developing from geographical circumstances, accumulated investments over the centuries, from technical and military requirements, economic interests, political power relationships, changing urban guiding concepts – and from the people’s stories, social relationships and hopes” (Siebel, 2015:431, quote translated from the German). The counterfactual hope of urban planning has always been that it could start with a *blank slate* and build an urban ensemble ‘from scratch’. Yet not even city districts placed in the desert, like Masdar City, are completely devoid of history; here, too, planning must relate to the specifics and determinants of topography, climate and geopolitics.

Historically evolved cities are not only found in industrialized countries. One of the oldest continuously inhabited cities is Guangzhou (Section 5.5), which was settled as early as the 9th century BCE and was the capital of the Nanyue kingdom from the 3rd century BCE. Since then, this historic city has become absorbed into a gigantic metropolitan region in the Pearl River Delta, where more than 45 million people live today. Most ‘mature cities’ are medium-sized or large cities or metropolitan areas in Europe that have a Roman-Germanic and medieval history, and cities in Europe and on other continents which developed on this model in the course of industrialization and mass migration (Section 2.2). This applies to North and South American metropolises (such as New York and Buenos Aires), and to US cities in the Rust Belt, which stretches along the Great Lakes from Chicago via Detroit, Cleveland and Pittsburgh to the east coast and the metropolitan regions of Boston and New York City. It also applies to planned new city developments built from scratch in the course of forced industrialization in industrializing regions of the Soviet Union, Manchuria and Japan (e.g. Naberezhnye Chelny, Changchun, Tsukuba Science City).

The morphology of modern cities is characterized by the permanent – sometimes slow sometimes over-hasty – reshaping of antique, medieval and colonial-settlement ground plans for factories, rental apartment com-

plexes and service buildings. This is how technological innovation and the immense increase in population since the 19th century were managed; 'city machines' were the central arenas of social change. This process can be described using the key factors power, hardship and time.

7.4.1.1

Power as control

Half of the gross world product – and with it the power of economic, political and scientific elites – is today concentrated in 380 western metropolitan regions (Seto et al., 2014:933). These elites present themselves in striking, representational buildings. However, the image of the metropolis also has other sides: the corruption and widespread economic crime encountered above all in the construction sector (e.g. the wealthy elites that formed during the US Gilded Age; Cashman, 1993; Section 4.3), and zones of uncertainty and 'no-go areas', which are countered with (today electronic) surveillance and monitoring technologies.

7.4.1.2

Hardship surrounded by wealth

Cities have thus always also been places of subversive practices. The lower classes reacted to their proletarianization with social anomie and revolts; they included hundreds of thousands of uprooted, rural migrant workers regarded by the security forces as 'dangerous classes' (Chevalier, 1958; Lenger, 2013:245ff., 514ff.). Welfare-state reforms attenuated poverty and insecurity and permitted mass social advancement. The different political and cultural forms of interaction between the bourgeoisie and the working class produced social peace and led to a relatively egalitarian distribution of resources in the cities. The bombing particular of European cities during the Second World War often resulted in the large-scale destruction of evolved structures, which was often followed by rapid reconstruction in the 1950s. The de-industrialization process that began in the 1980s frequently caused cities financial difficulties (e.g. Ruhr area), combined with emigration and demographic shrinkage processes (Section 5.6).

7.4.1.3

Suspended time

So-called 'mature' cities have a long and eventful history that can be experienced or evoked at numerous places that conjure up the past. The passage of time becomes legible and visible in the urban space; it is revealed in the changes in buildings, plots and districts. Mature cities with well developed and sophisticated infrastructures have strong path dependencies; the existing building structure determines the framework

within which these cities can continue developing. New needs can only materialize gradually within the existing infrastructure. The structure is tough and sedate, innovations must prove their worth, since they can generate high mental and material change costs – structural assets, cultural habits, spatial orientations are threatened, as, perhaps, are patterns of political order.

7.4.2

The infrastructure curse

For the historically evolved city, further development means working on existing buildings, i.e. less new construction and instead extending, demolishing, converting or incorporating. Above all, it is a matter of maintenance and repairs, and also of "converting the existing city in such a way that the interests, needs and hopes of the present inhabitants are met without destroying history and without (literally) obstructing the interests, needs and hopes that future residents will have in the city" (Siebel, 2015:433, quote translated from the German). This amounts to trying to square the circle. The postulate of sustainability, particularly the sustaining of the natural life-support systems, makes high demands on the innovative capacity of 'mature' cities. Fundamental changes involve high material costs and take a lot of time; the rates of change are slow.

An analysis of mature urban patterns based on the normative premises of *Eigenart*, sustaining the natural life-support systems and inclusion (Chapter 3) reveals a wide variety of potential, but also existential threats.

Mature cities or city districts usually have a long-standing *Eigenart* that has evolved over time; they often offer the population diverse opportunities for inclusion, which are being weakened, however, by growing socio-economic inequalities and populist campaigns. The biggest problems of mature cities lie in sustaining the natural life-support systems; the sophisticated infrastructures have developed into an 'infrastructure curse' with correspondingly high ecological footprints which can be changed only with great effort. This term has not yet become established in the literature and is used in a similar way to the 'resource curse'. The latter occurs when resource-rich countries forego modernization alternatives as a result of high ground rents and capital accumulation (Frey, 2012; Leggewie, 2013). An infrastructure curse can thus be called a path dependency which (e.g. in the middle of the first oil crisis and a global economic downturn, ignoring the Club of Rome's report on the limits to growth) places its faith in expanding a specific cost-intensive and inflexible infrastructure, such as individual car mobility and HGV traffic, and thus forces the following generations to continue along this path.

The main task is therefore to name the challenges to the natural life-support systems and to identify potential sources of assistance in the areas of *Eigenart* and inclusion. In mature urban patterns, three drivers can be identified which culminate in an infrastructure curse: economic geography, socio-demographics and urban form, including the technology built into urban structures.

1. In mature cities or city districts in industrialized countries, the proportion of goods imported from developing countries and emerging economies is usually very high, so that mature urban patterns are mostly net consumers (Seto et al., 2014:946; Chavez and Ramaswami, 2011). Depending on the energy mix and the structure of industrial production, greenhouse-gas emissions can be high here. Even if the cities' income stems mainly from services, the environmental and resource effects of an industry based elsewhere, whose products are consumed in mature cities or city districts, must be included in the balance sheet of the urban material cycles (Brownsword et al., 2005; Dhakal, 2009, 2010; Kennedy et al., 2012). There is a lot of evidence for the relationship between higher urban income, higher energy consumption and greenhouse-gas emissions (Seto et al., 2014:947).
2. Socio-demographic factors are only a secondary driver of emissions in mature cities or city districts (Seto et al., 2014:947). Growth rates are usually low and the population is stagnating or even shrinking, although this could change in some regions of the world due to the current refugee migrations.
3. The urban form of mature cities or city districts is highly relevant for greenhouse-gas emissions, because, to a large extent, it pre-determines urban energy use (Seto et al., 2014:947). The infrastructure that has evolved and the technologies that have been used over a long period of time lead to path dependencies that generate high emissions in everyday use. The extent to which new technology concepts like Smart Cities offer sustainable solutions must be investigated (Boxes 2.1-4, 2.1-5).

In the digital age, new communication networks are added to the evolved infrastructure of roads and bridges, networks and power grids, canals and rubbish dumps, while large sums are invested in repairing roads and bridges, thus prolonging the greenhouse-gas emissions into the future. Furthermore, building new energy and mobility infrastructures requires storage media for renewable energies and the construction of new power lines. This new infrastructure is created under considerable time pressure, yet at the same time even major projects can frequently only be implemented after time delays (Westphal, 2012:2). While a new network of

power lines is being built, costly repairs have to be carried out on roads, bridges and buildings, creating double financing competition. At the same time, new conflicts of objectives are emerging, e.g. over power-line construction between the interests of nature conservation and climate-change mitigation.

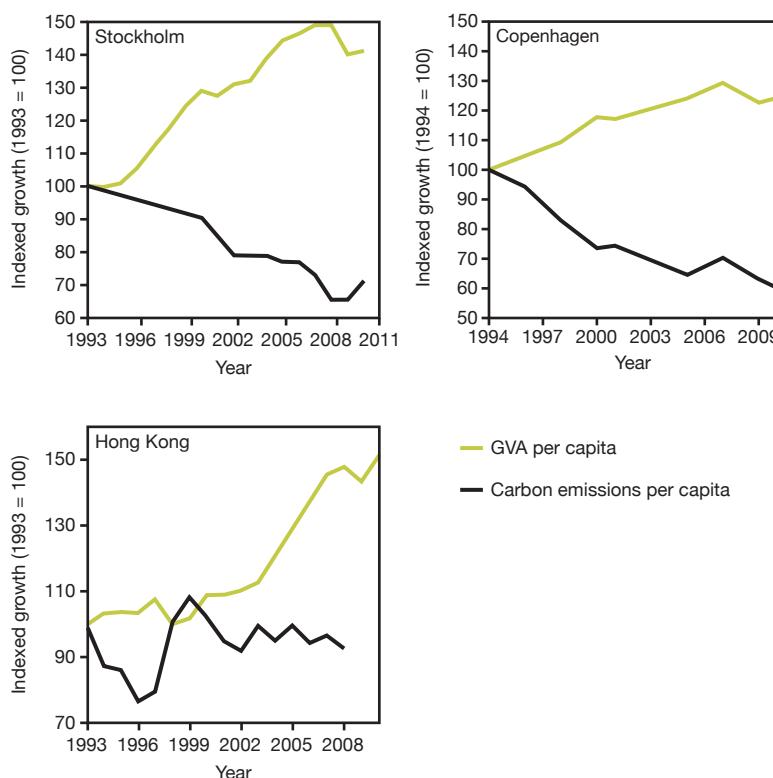
An infrastructure curse that is cemented in the long term by undesirable path dependencies with high emission patterns cannot be overcome by replacing fossil-fuels-based infrastructures by decarbonized infrastructures alone. The standard example is the car, where the petrol or diesel engine is replaced by an electric engine, while the general mobility patterns remain unchanged. Another example is energy-saving building renovation, which has little impact on the rest of electricity and energy consumption or the spatial structure. Such measures that have not been thought through holistically can lead to a local and global rebound effect (Sorrell, 2007; Sorrell and Dimitropoulos, 2008). In addition to the technical-organizational path dependency, there is thus also a mental infrastructure curse caused by habits that are difficult to identify and overcome (Welzer, 2011).

The special challenge of mature cities and city districts can be illustrated by the example of the transport infrastructure: it is largely based on indebtedness, and its maintenance and expansion claims precisely the financial resources that may then no longer be available for a climate-friendly energy and transport transformation. One example is the condition of the motorway bridges in highly indebted North Rhine-Westphalia (NRW), where the urban areas have likewise been designed especially with individual car transport in mind. Since 2012, €3.5 billion is being spent in NRW on rehabilitating, reinforcing and, in some cases, rebuilding almost 400 bridges to cope with the constantly growing heavy-load traffic (Leggewie, 2013).

The challenges can be illustrated by a look at the USA, Japan and Europe, where most mature cities or city districts are to be found. In the USA, a large proportion of greenhouse-gas emissions comes from motor-vehicle traffic; emissions must be reduced and transport made more effective at the same time, which hardly appears possible without a massive expansion of public transport (OECD, 2015a:119). Japan, on the other hand, like a number of (eastern) European cities and the former industrial centres in the USA, must adapt to an ageing society (Oswalt, 2004). This means reshaping infrastructures in such a way as to ensure that social and health services can be accessed locally, while at the same time retaining social networks and enabling the people to actively enjoy a high quality of life (IPCC, 2014c; OECD, 2015a:120). For European cities, the main challenge lies in designing the infrastructure in such a

Figure 7.4-1

Decoupling of gross value added from carbon emissions in three cities.
Source: Floater and Rode, 2014b:32



way that the cities, which are small compared to other world regions, are sustainably networked with each other (OECD, 2015a:120).

7.4.3 Solution spaces and governance options

Local governments and urban societies can mobilize great creative potential for finding solutions if they draw on their strengths in the fields of *Eigenart* and inclusion. The main priority must therefore be to identify sustainability concepts that promote inclusion and *Eigenart*. Scope for innovation has developed for change agents under very different conditions worldwide (Chapter 6). Mature cities benefit from the availability and sometimes the mobilization of large financial resources, which make it seem possible both to convert the existing transport infrastructure and to manage the transition to renewable energies and greater resource and energy efficiency. The prerequisite here, too, is inclusiveness, the socio-economic inclusion of the urban population, and functioning participation structures. When cities grow slowly, stagnate or shrink, advantages of demographic change can be exploited. However, this is only possible if a solid base of financial resources is maintained. In many de-industrialized regions this is not the case. Mature cities or city districts can also use their great potential as centres of technological knowledge, which is a pre-

requisite for the urban transformation towards sustainability (IPCC, 2014c:946ff.). Figure 7.4-1, for example, shows that it is possible to decouple economic growth from greenhouse-gas emissions. Of course, the outsourcing of high-emissions assets must be taken into account in this context. The examples do not show indirect emissions; nevertheless, they give an indication of a first possible trend. This at least shows that it is possible to decouple transport, heating and electricity from direct emissions.

7.5

Urbanization surge up to 2050 – six development risks of global change

Seen through the lens of the WBGU's compass, the sum and cumulation of urbanization dynamics in the three urban configurations lead to six global system and development risks which are of great importance, especially for decision-makers in international cooperation (Table 7.5-1). In the following list, N stands for sustaining the natural life-support systems, I for inclusion and E for *Eigenart* (character):

- N_{Earth system}: Development within the planetary guard rails

Whether the planetary guard rails can be complied with will be decided in the mature cities as well as

7 Urban patterns

in the fast-growing new city districts of Asia and Africa. Only if low-carbon cities are built there can dangerous global environmental change and an associated global threat to prosperity be prevented.

- **N_{local} : Local environmental conditions as a key condition for urban quality of life**

Good local environmental conditions (e.g. access to clean water and sanitation, adequate air quality and waste management) are prerequisites for human quality of life. In particular, the quality of life of 2-3 billion people who might be living in informal settlements by 2050 thus depends on effective local environmental policies.

- **$I_{substantive; economic}$: Substantive inclusion and socio-economic dimensions**

Socio-economic inequalities and exclusion dynamics that threaten the quality of life and stability of urban societies are on the increase in all urban configurations. This applies equally to Paris, Los Angeles, Cairo, Goma and Rio de Janeiro. The 2-3 billion people who might be living in informal settlements by 2050 are particularly threatened by these trends. These local exclusion dynamics can also set refugees in motion and pose an international security risk.

- **$I_{political}$: Political inclusion and participation as a prerequisite and goal for quality of life**

It will hardly be possible to realize political inclusion for the 2-3 billion people who might be living in precarious, informal settlements by 2050. These urban communities are dominated by need, often also by violence, sometimes by admirable self-organization as a reaction to the absence of basic public services. In the newly emerging, planned settlements, especially in Asia but also in Africa, new middle classes will demand political inclusion. Where this is not granted, there is a danger of political instability – corresponding dynamics in Turkey, Tunisia, Egypt and also China point to these interrelations.

- **$E_{dependent/inclusion}$: Eigenart as a dimension of urban quality of life and a resource of sustainability transformation – dependent on opportunities for inclusion**

The development of *Eigenart* as a condition for quality of life and a resource of sustainability transformation is dependent on the existing opportunities for inclusion. In the mature and newly planned cities and city districts, *Eigenart* is undermined by social and political inequalities, in the informal settlements by sheer need and precarious inclusion opportunities. As a result, *Eigenart* is threatened for over half of the world's population.

- **$E_{dependent/time; hardship}$: Eigenart in informal and newly planned cities – squaring the circle?**

Eigenart in the sense of creative, participatory urban development is very difficult to realize for the 1-2

billion people who will have moved into newly planned cities and city districts in Asia and Africa by 2050, because of the speed of the urban development and the usually prevailing top-down planning. *Eigenart* will hardly be able to develop in informal settlements where need – and more often than not violence – rules, where hardly any public institutions function, and where an additional 1-2 billion people might be living in precarious housing conditions by 2050.

Table 7.5-1

Urbanization surge up to 2050 – development risks of global change.

Source: WBGU

	Mature cities or city districts	Newly planned cities or city districts	Informal settlements
Natural life-support systems	N Earth system  ¹	 ¹	
	N local		 ²
Inclusion	I substantive; economic  ^{3b}		 ^{3a}
	I political	 ^{4b}	 ^{4a}
Eigenart	E dependent/inclusion  ^{5b}		 ^{5a}
	E dependent/time; hardship	 ⁶	 ⁶

- 1 Whether the planetary guard rails, especially the 2°C guard rail for climate protection, can be observed will be decided in the mature cities or city districts and in the fast-growing planned new cities and city districts of Asia and Africa.
- 2 The well-being of the 2-3 billion people who might be living in informal settlements in 2050 is threatened by often precarious local environmental conditions (access to water, air quality, sanitation).
- 3a Socio-economic disparities and exclusion dynamics threaten the quality of life of the 2-3 billion people who might be living in informal settlements in 2050. Local exclusion dynamics could also trigger flows of refugees.
- 3b Socio-economic disparities are increasing in all urban configurations.
- 4a It will hardly be possible to implement political inclusion for the 2-3 billion people who might be living in precarious, informal settlements in 2050.
- 4b In the newly emerging, planned settlements of Asia, but also in Africa, several hundred million people will be joining the global middle classes and will demand political inclusion. Political instability threatens where this is not granted.
- 5a The development of *Eigenart*, as a prerequisite of quality of life and a resource of sustainability transformations, depends on the existence of prerequisites for inclusion. For the 2-3 billion people who might be living in informal settlements in 2050, precarious inclusion opportunities would undermine their chances of developing *Eigenart*.
- 5b *Eigenart* is being undermined by social and political inequalities in many mature and newly planned cities or city districts.
- 6 *Eigenart*, in the sense of urban development shaped by citizens, will hardly be feasible for the 1-2 billion people who will have relocated to newly planned cities and city districts in Asia and Africa by 2050, due to the speed of urban construction and the prevailing top-down planning. *Eigenart* will hardly be able to find expression in informal settlements, where hardship and often violence rule, where hardly any public institutions function, and an additional 1-2 billion people could be living in precarious living conditions by 2050.

Transformative urban governance: empowering cities

8

As shown in Chapter 2, cities must become major arenas of the Great Transformation towards sustainability, not only because they contribute to global change, but also because of their transformative potential. With its newly developed normative compass (Chapter 3), the WBGU has submitted an orientation framework outlining a development space in which cities can evolve sustainably. Within this space it should be possible to permanently secure the natural life-support systems, achieve inclusion for all people, and make solidarity-based quality of life possible by applying the principles formulated in the *Eigenart* dimension: i. e. creative autonomy and recognition of the Diversity of Cultural Expressions.

The following concept of transformative urban governance contains principles, instruments and measures that are essential for shaping a search and transformation process towards sustainability. The WBGU defines urban governance as actions by state and non-state actors and institutions aimed at organizing the shared concerns of a city (Section 2.5). It is an ongoing process, by means of which conflicting interests can be reconciled and cooperative action can be promoted. Urban governance consists both of formal institutions and instruments and of informal procedures and measures. The WBGU speaks of *transformative* urban governance when referring to governance structures that are key for the successful transformation towards sustainability because they promote fundamental change and go beyond incremental changes. Furthermore, the WBGU's understanding of governance differs from views that equate governance exclusively with government action. Although the WBGU's understanding of governance includes the actions of local or national governments (Section 8.2), it also encompasses the activities of civil society (Section 8.3), the private sector as well as science, and includes the role of cities in global governance structures (Section 8.4). One of the key challenges of transformative urban governance lies in linking these different elements and levels to create a polycentric responsibility architecture which can enable the transformation towards sustainability to

succeed (Section 8.5). The question of "who rules the city?" cannot be answered solely by analysing the bearers of sovereignty that have been legitimized to government status; rather, it must always include a large number of different private actors – such as property owners and investors (Sections 2.5.1, 4.3). The great diversity of cities and the power systems within cities make it impossible to develop a universal concept of transformative urban governance. The WBGU has therefore attempted to develop principles that can be applied in many urban contexts, but are simultaneously open for development and adaptation to local conditions.

8.1

Challenges for transformative urban governance

In order to successfully manage the Great Transformation in cities, transformative urban governance has to find answers to the key challenges that are generated by the dynamics of urbanization.

To begin with, this relates to the extent of the changes. Urbanization dynamics will continue to increase, especially in Asia and Africa, with approx. 2.5 billion additional people expected to be living in cities by 2050 (UN DESA, 2015). Adequate housing, work and liveable cities must be created for all these people. With a view to the planetary guard rails, it also becomes clear how fundamentally the economic system and life styles will have to change in the course of the Great Transformation. The energy system must be decarbonized by 2070 at the latest to avoid breaching the 2°C guard rail (WBGU, 2014a). This also makes it necessary to reduce CO₂ emissions from fossil sources to zero in all cities within the next 50 years. This will involve a fundamental change in urban form and urban mobility. Leapfrogging technological development stages and avoiding unwanted path dependencies by using modular and flexible building patterns can be key design elements here. However, a number of conflicts of objectives, e.g. between fast building on the one hand and the demands of climate-change mitigation and resource

protection on the other, need to be resolved.

Another major challenge of transformative urban development lies in the expected increase in the number of people living in informal, inadequate and precarious housing. There are already more than 800 million people living in slums today. One partial solution will lie in rapidly improving the living conditions in slums (slum upgrading) and precarious informal settlements; another partial solution is, as far as possible, not to allow such city districts to develop in the first place (Section 7.3.5). Here it is particularly important that urban development pays more attention to the needs of disadvantaged population groups.

The urban transformation towards sustainability also involves the need to transform the use of resources in cities into a circular economy as extensively as possible (Section 4.4). What is needed are resource-conserving supply and disposal infrastructures that are adaptable, flexible and resilient: in particular, a reduction in the amount of waste generated, a more efficient use of resources, the re-use of materials and the recycling of organic waste, for example as a fertilizer for soil. This procedure is known as 'reduce, reuse, recycle, recover' (Figure 2.3-12). Another important aspect is the life cycle of buildings, which should be planned and built on a modular basis. This makes flexible use and easy dismantling possible during the usage and modernization phases. Moreover, the building materials remain recyclable (Section 4.4.4).

Many cities or city districts must also be prepared for new developments related to climate change (which can either be gradual or occur in the form of abrupt, extreme weather events) and respond accordingly by taking preventive measures. Around half of all cities with more than 100,000 inhabitants worldwide are located in water-scarce areas, and many cities are already overusing their groundwater resources (Section 2.3.4.2). Cities in low-lying coastal zones are particularly at risk from rising sea levels and storm surges. Such events can have grave consequences for the task of supplying a city with water, electricity and food. The challenge for cities is to improve their adaptation to climate change: they must prepare for these risks and develop forward-looking strategies to protect the population, prioritize future infrastructure investments, and integrate the mitigation of and adaptation to climate change in long-term planning. Modular construction and building systems that are easy to dismantle can be part of the solution here. It should be examined to what extent urban development can also come up with flexible interim solutions as a necessary response to major migration movements. Here, too, one answer could lie in modular building (Section 4.2.3).

Another key challenge is the time factor. The urban-

ization process is taking place at great speed. New infrastructures and city districts must be built quickly to accommodate the additional inhabitants, but without creating path dependencies that, in the long term, might prevent adherence to the planetary guard rails. Transformative urban governance structures must therefore make it possible to act quickly at short notice, while simultaneously achieving long-lasting change.

The complexity of the change processes and the resulting uncertainties are another key challenge. The long time horizon, the scope of the necessary changes, and the speed with which they must be implemented will trigger interactions and unintended, unforeseeable developments and cause problems that require an immediate response. History teaches us that there will be technological developments that can advance the transformation, but which today are difficult to anticipate and integrate into our transformation strategies (Osterhammel, 2009; Leggewie and Messner, 2012). Digitization is one of the most recent examples; it has fundamentally changed several areas of society over the past few years (Boxes 2.1-4, 2.1-5, 8.2-3, 8.3-1). In view of the problems and solution approaches, designing and shaping the transformation process will involve great uncertainty. Transformative urban governance must offer structures and processes that can deal with this uncertainty.

One of the greatest challenges for urban societies and decision makers is actually embarking on the risky venture of the Great Transformation. To do this, they must leave traditional ways of thinking behind and initiate a paradigm shift on all levels. A paradigm shift changes old, traditional patterns of thought and action not only incrementally, but usually radically (Kuhn, 1962; Messner, 2015). For the majority of those affected apart from the agents of change (Chapter 6), the shift is abrupt and worrying, overwhelming or frightening. This mental and social challenge for actors should not be underestimated, and they need assistance before they begin to see this disorientation as an opportunity for innovation (John, 2013).

In view of the developments outlined, design elements such as adaptability, flexibility, resilience and modularity, as well as leapfrogging, are becoming more and more important overall in sustainability-oriented transformative urban governance.

In its report 'World in Transition – A Social Contract for Sustainability' (WBGU, 2011:290f.), the WBGU has already outlined the basic elements that are necessary to successfully shape the Great Transformation. These are:

- scientific and technical capacities,
- new, progressive sectors of the economy with a high net investment rate enabling a rapid diffusion of innovations,

- actor constellations in which change agents can provide new impetus,
- a proactive state which promotes the transformation by actively setting priorities, and involves its citizens by offering extended opportunities for participation.

The foundation for these elements is laid by a new, virtual, social contract based on a societal understanding of the need for a transformation, thus creating legitimacy and acceptance for the Great Transformation (WBGU, 2011). This transformation concept also forms the basis for the transformation process in cities. The proactive (national) state, which the WBGU (2011) identifies as the key actor for the transformation process, will not alone be able to manage the transformation in cities. An analysis of Chapters 5 and 7 clearly shows that the high diversity of cities, the different transformation requirements resulting from the diverse urban constellations, and the plurality of possible transformation pathways make it impossible to develop top-down blueprints for transformation pathways that could be implemented in all cities.

As shown in Chapter 7, mature cities and city districts in the OECD world have fewer transformation needs in the area of inclusion, but face the challenge of transforming their existing infrastructures in such a way that their emissions and their consumption of resources do not lead to violations of the planetary guard rails. Newly planned cities and city districts in developing countries and emerging economies face the task of making *Eigenart* possible and designing their dynamic growth in such a way as to ensure that they do not follow the same resource-intensive development pathways as mature cities in industrialized countries. In informal settlements, the realization of inclusion – particularly substantive inclusion – represents the biggest challenge that needs to be resolved; such settlements often also lack political inclusion, *Eigenart* or measures to sustain the natural life-support systems.

In the WBGU's opinion, the above challenges should be confronted by empowering local governments to embark on the transformation (Section 8.2). This applies not only to decision-making powers which need to be granted to cities, but also to the provision of financial resources and the right to represent their interests at the national level. The WBGU also considers it necessary to strengthen the involvement of city residents (Section 8.3). Finally, cities should be enabled to network internationally and put their interests forward at the global level (Section 8.4). The various top-down and bottom-up processes that arise as a result should, in the WBGU's view, lead to a novel polycentric responsibility architecture for an urban transformation, which redesigns the multi-level structure in which cities have to take their decisions (Section 8.5).



8.2

Empowering local governments for the transformation

In the WBGU's opinion, it is essential for the success of the Great Transformation to enable cities to take responsibility for their own development pathways. The wide spectrum of possible starting positions means that the challenges posed by the necessary empowerment strategies vary considerably (Box 8.2-1). In general, appropriate decision-making powers need to be ceded to cities by higher regional or national levels, unless they already have these powers (Section 8.2.1). Furthermore, the provision of financial resources must be in line with the scale of the remit (Section 8.2.2). Since public funds alone will not be sufficient, and a considerable amount of private investment will be necessary, structures are needed which strengthen the authority of urban institutions and a city's inhabitants to shape and plan vis-à-vis real-estate investors (Section 8.2.3).

8.2.1

Strengthen urban decision-making powers

In the WBGU's opinion, in order to strengthen urban decision-making powers, the initial starting point is to secure the cities' existence within the constitutions of nation states by having cities formally recognized in those constitutions. In the best-case scenario, the national constitution would recognize urban areas of autonomy, for example by passing legislation on local self-administration (Section 8.2.1.1). The distribution of responsibilities and tasks within a multi-level form of governance should be based on the principle of subsidiarity, as defined in Section 8.2.1.2. Furthermore, consultation processes should be established between local, regional and national levels to ensure that cities are included in decision-making regarding all concerns that affect them (Section 8.2.1.3). The constituent elements of multi-level governance developed in the following can serve as an orientation framework. However, the challenges involved in order to achieve and implement them, vary considerably, depending on political and legal framework conditions and bearing in mind the diversity of urban transformation pathways. The characterizations in Box 8.2-1 and the patterns of urban development developed in Chapter 7 clearly show how great and how different the obstacles that stand in the way of achieving these objectives can be. While the primary challenge in informal settlements is to sustainably secure basic human needs, mature cities or city districts must break path dependencies that are

Box 8.2-1**Scenarios of the effectiveness of local governments**

If it is accepted that cities must assume responsibility for their own transformation pathways and the associated tasks, it is clear that urban institutions – especially mayors, city councillors and urban administrations – must have appropriate powers and resources at their disposal so that they can exercise this responsibility. The following scenarios illustrate the range of possible situations in which cities and urban institutions currently find themselves.

In the best-case scenario, a city has a competent local government with experts to do the tasks assigned to it. It has access to different sources of funding (including the private capital markets). It plans its revenue and expenditure over longer periods of time and on the basis of reliable financial relations with the nation state. It is linked with the surrounding region and with the national government by a dense network of sectoral institutions, and it has an established identity and a functioning citizenry, which elects and monitors the local government.

In the much more common scenario, cities have no such starting conditions. This applies especially to cities that are essentially the product of uncontrolled and rapid urban growth. Their citizenry is fragmented and only partially organized in the residential centres of the middle and upper classes. These cities are constantly confronted with the problem of a lack of authority, because the political and administrative structures cannot be adapted quickly enough to the changing conditions. They have virtually no access to the financial markets and are often in debt with the central state or their suppliers. They are not in a position to carry out medium-term budgetary or investment planning because their income sources and expenditure commitments are extremely volatile. Their infrastructures (transport, energy, drinking water, sanitation, roads) are characterized by a major modernization backlog, despite huge efforts, which can lead to a de facto privatization of many public services. Greatly simplified, it can be said that most cities in industrialized countries and a few metropolitan areas in emerging economies tend to be characterized by the first scenario, whereas most cities in developing countries and emerging economies are more likely to correspond to the second scenario, although the transitions within the entire bandwidth are blurred.

already cast in concrete. For newly planned cities and city districts, the local level that needs to be empowered may not even exist yet, and will not develop until after the infrastructures have been created. If the city has sufficient powers in the sense of the subsidiarity principle, or is able to assert its concerns in city-related legislative processes, it is also more likely to be prepared, for example, for dealing with the specific challenges in the analysed settlement patterns (Chapter 7) with regard to a comprehensive transformation towards sustainability.

8.2.1.1**Constitutional recognition and legislation on local self-administration**

The legal recognition of cities as units of government and administration is handled very differently within the legal systems of nation states (Section 2.5.3.1). The spectrum ranges from recognition by simple laws or even bylaws to constitutional recognition (Shah, 2006a:1, b:1). The recognition of cities within the national constitutions should therefore be promoted as a starting point for strengthening municipal decision-making powers. One version of constitutional recognition, for example, can be found in the South African constitution, which accepts the local level as one of the levels of governance (Lazar and Leuprecht, 2007:8; South African Constitution: Chapter 3:40).

Current research identifies a continuum of empowerment of the urban local level in which strong empowerment can be equated with complete local independence, and weak empowerment is marked by little or no deci-

sion-making powers for the city (the city as a ‘creature of the state’; Rodriguez and Shoked, 2014:146). However, there are examples that show that the local level is more effective in multi-level systems that have more local autonomy (Lazar and Leuprecht, 2007:12). Comprehensive studies in this field face the challenge that a methodology for cross-national comparisons has not yet been fully developed (Wolman, 2008; Wolman et al., 2010; Section 10.1.4). Following on from these considerations and the many tasks already carried out at the urban level (Section 2.5.3.1; UCLG, 2013), as well as the demands made on the cities by the implementation of the Great Transformation, what is needed, in the WBGU’s opinion – in addition to securing their constitutional existence – is a certain form of constitutional recognition of cities as bodies responsible for carrying out their own tasks – ideally legislation on local self-administration. In the European Charter on Local Self-Government, for example, local self-government law is defined as follows: “Local self-government denotes the right and the ability of local authorities, within the limits of the law, to regulate and manage a substantial share of public affairs under their own responsibility and in the interests of the local population” (European Charter of Local Self-Government, 1985: Article 3). In this or other variants, it assures the cities the right to self-government in certain areas such as planning, finances, personnel matters and organization (in Germany: Article 28 para. 2 of the German Basic Law). A legally enforceable right of defence – with which cities could enforce their right to autonomy vis-à-vis other levels of governance – should also be a form of constitutional recognition.

8.2.1.2

Distribution of tasks and powers, taking the subsidiarity principle into account

There are many scientific analyses and theories that deal with the question of which levels in a multi-level system are given certain powers and carry out (or should carry out) certain tasks (Lazar and Leuprecht, 2007; Shah, 2006a, b; Scharpf, 2009a; Frug, 2014b; Rodriguez and Shoked, 2014; Blank, 2010). The analyses show that local governments and administrations are already responsible for a large number of decisions and tasks in the multi-level governance system (Section 2.5.3.1) and that they are highly dependent on the framework laid down for them by the nation state (Section 2.5.3.2). Various theories deal with the definitions and core contents of federalism, decentralization, devolution, local autonomy and subsidiarity as possible concepts for the distribution of powers and tasks between different levels of governance (Blank, 2010). Although in theory these models on the allocation of powers can be distinguished quite clearly from each other (Blank, 2010:511), in practice mixed forms can frequently be found (Rodriguez and Shoked, 2014, Section 2.5.3.2). The examples listed below also stem from multi-level systems that have different degrees of federalist or decentralized organization Irrespective of the question of which level certain decisions are taken on, a clear delimitation of powers is one of the most important levers for an efficient performance of tasks (Lazar and Leuprecht, 2007:13).

Reasons for a polycentric distribution of tasks

In the WBGU's opinion, an evaluation of the above-mentioned analyses and the preceding sections also justify two further general statements: *first*, the local, urban level has certain characteristics that justify more decision-making powers compared to other levels of governance, and, *second*, tasks and powers should not be distributed either exclusively centrally or exclusively decentrally, but rather polycentrically between the different levels of governance and according to the principle of subsidiarity. Box 8.2-2 offers an overview of the WBGU's polycentric approach.

Municipal administrations and governments are initially characterized by the fact that they are closer not only to the citizens, but also to the goods that they manage and the services they provide (Blank, 2010:553; Frug, 2014b:4). This makes it easier for them than for the national level, for example, to obtain information that is relevant for decision-making (Blank, 2010:553). Furthermore, ideally cities are central places for political deliberation and for experiencing a sense of community and quality of life (Blank, 2010:553f.; Frug, 2014b:2; Section 2.4).

In addition to these urban characteristics, if tasks are carried out exclusively by the national government, the diversity of urban conditions and developments, described in Chapters 5 and 7, might not be sufficiently taken into account (Frug, 2014b:2). On the other hand, complete local independence as a (decentralized) alternative would involve the risk of undermining certain aspects that might be better regulated centrally – for example uniform, country-wide school curricula or standards on the protection of the environment (Frug, 2014a:14, b:2). In certain circumstances it can be useful for higher levels to make decisions, despite the subsidiarity principle. Because the framework conditions vary from one legal system to another, it is not possible to draw up an across-the-board list of decisions that should be transferred from a local to a regional or national level. This is an option, for example, when neighbouring cities are in close economic competition, attract new investors through constant deregulation, but in this way trigger developments that are disadvantageous to society as a whole. In such situations, it might be expedient for the regional or national level to intervene and coordinate matters by setting binding minimum standards for all cities. Interventions are also a good idea if sections of the population are excluded or disadvantaged as a result of clientele politics or even corruption at the local level (Frug, 2014a:14). The example of Copenhagen shows that it is advisable for certain tasks, such as the coordination and control of a transport system, to be carried out at the regional level (Section 5.4). In the field of regional planning, the example of the Ruhr area illustrates how regional master planning can work (Section 5.6.5).

If a certain level of standardization is desired in certain areas, it makes sense to have such standards set at the level of the nation state. For example, a state should lay down objectives relating to the common good for all the cities in its territory. However, the cities should be given a certain amount of leeway for meeting these common-good objectives. The nation state can only monitor the borderlines of this room for manoeuvre. The same can apply to the regional level in situations where it makes sense to make regulations for a wider geographic area. The transformative action field of 'materials and material flows' (Section 4.4) provides a good example here. National or even international regulations containing common objectives or control mechanisms are necessary in order to achieve optimum results. However, if such regulations and standards are negotiated and agreed at these higher levels, this must take into account the need for them to be implemented and carried out at the local level, and for corresponding capacities and financial resources to be provided (Section 8.2.2).

Box 8.2-2

The WBGU's polycentric approach

Polycentric approaches could make cities more attractive, avoid the disadvantages of excessive urban concentration and densification, and, at the same time, mobilize the advantages of decentralized settlement patterns. The conventional dichotomy between migration into and away from cities, and between the concentration and dispersion of settlement structures, is overcome by an approach which, instead of clearly separating 'city' from 'country' and 'centre' from 'periphery', systematically focuses on networking between poles of settlement and on the spaces in-between that connect small and large cities and rural areas.

Polycentric urban development is, for example, an EU policy framework and focuses on building bridges between agglomerations and de-concentrated regions, not on polarization. Strengthening small and medium-sized towns and networking them with larger cities combines the advantages of agglomeration and decentralization.

Such a hybrid settlement strategy that emphasizes polycentric approaches is relevant for a number of dimensions in urban development.

With polycentric spatial structures, better use can be made of resources if water, food and energy no longer have to be transported over long distances into a few centres. Decentralized provision of renewable energies and digital networking can support the advantages of polycentric spatial structures (Section 2.3.2).

- Polycentric settlement structures and polycentric cities promote the formation of cultural identity. They combine a diversity of urban societies with manageable settlement patterns and neighbourhoods; they can restrict trends towards segregation, and open up spaces for connectivity and innovation (Sections 2.4.2, 3.5.3).
- Polycentric urban structures increase the absorptive capacity and resilience of urban societies vis-à-vis shocks such as climate-induced extreme weather events or waves of immigration (Sections 5.4, 8.1).
- Polycentric decision-making and polycentric governance structures in cities promote the participation opportunities of local civil society and collaborative governance (Section 8.3).
- Cities should furthermore be embedded in a *polycentric responsibility architecture*. Giving cities and their civil societies more creative freedom within their nation states to shape their development pathways (vertical embedding of the cities plus local scope for shaping and planning) and enabling them to network horizontally leads to the development of a governance and responsibility architecture that is tiered locally, nationally and globally. Here, responsibilities are distributed among different, mutually (semi-) independent nodes over different levels of governance. This polycentric governance approach creates coordinating mechanisms and reflexivities that highlight the relative independence of cities (and of nations), as well as a simultaneously high level of interdependence between them (Sections 8.2, 8.5).

By contrast, in the transformative action field of 'urban health', for example (Section 4.5), although national requirements are important for guaranteeing nationwide compliance with certain standards, the local – and therefore city – level is especially important when it comes to aspects of healthcare. Polycentric governance approaches thus make it possible to combine the benefits of centralized and decentralized political structures and thus minimize their respective disadvantages and limitations in a problem- and context-specific way (Ostrom, 2010).

Implementation according to subsidiarity principle

The subsidiarity principle can serve as a guideline for choosing the best level for taking a certain decision. As a general rule, it states that a task should always be carried out by the smallest suitable unit (Blank, 2010). In European law, this principle is specified in such a way that the responsibility prerogative lies with the smaller unit depending on its capability (Calliess, 2011:124 ff.). The WBGU also subscribes to this interpretation and applies it to the distribution of powers and responsibilities in the multi-level system. According to this, the local level is not always the level at which decisions should be taken; rather, this should depend on its effectiveness. The above-mentioned right to self-

government and a strengthening of municipal financial and personnel capacities are therefore essential prerequisites for enforcing the subsidiarity principle, because without them the criterion of effectiveness is without substance. Because of the criterion of the most suitable level, the implementation of the subsidiarity principle as envisioned by the WBGU would also mean that certain tasks in a field such as environmental protection could be shared by different levels, as long as each respective level is the best-suited level for its specific part of the task. Following this approach makes it possible to simultaneously avoid both policy-integration traps and coordination blockades (Scharpf, 2009b).

The principle of taking decisions at the lowest possible level need not end at the local-government level, but means that, wherever possible, decision-making powers should be delegated to the city-district or neighbourhood level, i.e. the city's lowest possible administrative unit. This makes it easier to get the residents involved and to organize participation processes (Section 8.3.1). This application of the subsidiarity principle could support the development of a polycentric multi-level governance structure (Section 8.5).

8.2.1.3

Integration into regional and national legislative processes

If greater consideration is to be given to urban concerns, it is essential for cities to have an influence on national and regional policies and legislation relating to cities. It is not necessarily important whether a system is designed in a fundamentally centralized or decentralized way (Lazar and Leuprecht, 2007:12). However, such integration would promote the proposed implementation and enforcement of the subsidiarity principle (Section 8.2.1.2), because it could enable consultations to be held on the level of governance that is best suited to performing a certain task. The key lies in creating an institutionalized possibility of interaction between local and other levels of a nation state. This happens in Germany, for example, in the case of draft laws affecting the municipal level, according to the rules of procedure of the German parliament (Bundestag). In Mexico, the constitution explicitly regulates the involvement of municipal authorities in areas that concern them – for example in the national planning system (Lazar and Leuprecht, 2007:8). There is some doubt, however, as to whether this right is actually enforced in Mexico (Lazar and Leuprecht, 2007:9). Although there was some discussion during the federalism reform in Germany on enshrining the involvement of the municipal authorities in legislative matters that concern them as a general principle in the German Basic Law, all that remained was a provision in the Bundestag's rules of procedure (Sobbeke, 2006). Section 69(5) of the rules of procedure stipulates that, in consultations on draft legislation affecting municipal affairs, parliamentary committees must give the associations of local authorities an opportunity to comment – especially if the municipalities will have to execute them, or if their finances or administrative structures will be affected. Another example where municipalities have an opportunity to influence legislation can be found in (regional) planning law: municipalities send representatives to regional councils, which in turn prepare regional plans (e.g. sections 6ff. of the NRW Land Planning Law). In the USA, by contrast, there is no formal interaction between the local and national level; nevertheless, collaborations at the administrative levels are not excluded (Lazar and Leuprecht, 2007:8; proposal for restructuring in the USA: Frug, 2014a). In general, the following applies: if cities were given opportunities for consultation, this would ensure that their concerns could be heard and taken seriously.

8.2.2

Financing of sustainable urban development

The rapid pace of urbanization is increasing the pressure on local, national and international actors to take action and invest in order to provide adequate infrastructures for an additional 2.5 billion city residents by 2050 (UN DESA, 2014). Estimates of financial needs for the modernization, expansion and construction of the infrastructure over the next 15 years lie in the high double-digit trillion range. For example, CCFLA (2015) estimates the need for funding at US\$93,000 billion, Gouldson et al. (2015) at US\$89,000 billion, and McKinsey (2013) at US\$57,000 billion. While the costs of a climate-resilient and low-emission urban infrastructure have been quantified relatively accurately (CCFLA, 2015), there is currently little discussion on funding for socially compatible urban design or for strengthening or building (transformative) governance structures, particularly for the creation of additional jobs.

Cities must have sufficient financial capacity to manage the growing number of local tasks, make sustainable investments, create incentives to generate private funds and exert a steering effect on private investment that is in line with sustainability criteria. Especially in developing countries and emerging economies, today the authority over planning and shaping is restricted in many cities for lack of financial, institutional and personnel capacities (Sections 2.5.3, 2.5.4). However, even in cities that already have an effective administration and far-reaching financial autonomy, the local income levels are regularly too low for them to be able to finance the extensive infrastructure investments required for the transformation towards sustainability in addition to meeting their public obligations. Since public revenue alone is not sufficient to accomplish the urban transformation towards sustainability in many countries, private commitment is needed to bridge the financing gap (Merk et al., 2012).

8.2.2.1

Strengthen the municipal administration and the financial basis

Internal financing

Responsibilities and instrument portfolios in a multi-level system depend on the respective national frameworks. The powers that cities have at their disposal vary greatly in this respect. In general, it can be observed that both the administrative powers of the local level and fiscal decentralization increase with a country's level of prosperity (Ivanyna and Shah, 2012). In order to improve their financial situation, cities and municipalities should set long-term financial targets on

both the revenue and expenditure sides and, if possible, use financing instruments that steer developments in ways that are in line with the WBGU's normative compass. The first requirement is to build a professional and transparent financial-management system and to resolutely apply the cost-effectiveness principles and control mechanisms contained therein (Meyer, 2016). A professional urban financial management can not only significantly reduce urban financial needs, it is also the basis for improving creditworthiness and attracting potential investors.

At the same time, the potential of the revenue side needs to be turned into real value, because the potential of existing financing instruments has not yet been fully exploited in many cities around the world. The share of local tax revenue generated by property taxes, for example, is between 40% and 50% in industrialized countries (UN-Habitat, 2015c); in the UK and the USA local tax revenues are generated almost exclusively via property taxes (Section 2.5.4). However, land-registries and experts on assessing the value of land and buildings are needed in order to levy property taxes, and these often do not exist, especially in developing countries and emerging economies (Section 4.3.1.3). As a result, property taxes only account for an average of 3-4% of local revenues in these countries (UN-Habitat, 2015c). Property taxes can represent a dynamic and regular source of income, particularly in fast-growing cities, since sharp price increases are to be expected there. Real-estate transfer taxes are another relevant source of revenue, especially in cities that are attractive for investors and therefore have a relatively high transaction volume (UN-Habitat, 2009a). In order to achieve a steering effect in the sense of sustainability, in addition to strengthening municipal revenues, options that could be considered include progressive tax rates, individual evaluations of land and real estate at the upper end of the price scale, and linking the tax rate to the consumption of land. Establishing the appropriate personnel and institutional capacities would generate considerable revenue potential and facilitate an efficient management of revenues (von Haldenwang et al., 2015).

Furthermore, the option of charging for municipal services such as water supplies or waste disposal is largely unexploited in developing countries and emerging economies (UN-Habitat, 2009a). In addition to funding the corresponding municipal services, usage charges would also create incentives for the sustainable use of resources. For example, waste-collection fees create a financial incentive for the consumer to produce less waste or to pay more attention to recycling.

In addition to introducing new financing instruments and developing corresponding administrative facilities,

increasing the population's willingness to pay is a lever for achieving a more effective use of taxes and charges at the local level. Experience shows that even low-income population groups are willing to pay in principle if there is a noticeable improvement in services (Ikeda, 2014). There must be transparency on revenue and the use of funds to enable service recipients to assess the quality of the public administration. In addition, it is easier to assign revenue sources to the respective revenue use if charges for local public services are adjusted to approximate them as closely as possible to the costs of the public service (World Bank, 2015d). Cities and municipalities should therefore compare information on public revenue and expenditure on infrastructure and public services and make it publicly available.

The ability of cities and municipalities to generate their own revenue is tied partly to their personnel and institutional capacities and partly to the degree of municipal fragmentation. The administrative boundaries often do not correspond to the socio-economic unit of the urban area. Local labour markets, for example, are defined by commuter movements. Employees who have to commute long distances consume a proportion of the public services they require at their place of work. However, they pay their taxes and fees in their residential communities. This makes it difficult to finance local expenditure with local revenue, since the latter is spread over different municipalities.

Especially in major cities and agglomerations, governance structures are fragmented. In fast-growing cities, the spatial expansion of the urban area changes quickly and often independently of the existing administrative structures. This increases the amount of cooperation needed to provide public services extending beyond administrative borders. Studies in OECD countries show that highly fragmented governance structures impede e.g. investment in the transport infrastructure, make effective urban planning more difficult, and reduce a city's productivity (Ahrend et al., 2014a, b). Therefore, functional and administrative boundaries should be harmonized in the long term, and efforts made to improve coordination between local jurisdictions.

External financing

The decentralization of fiscal powers and the distribution key of transfer payments vary greatly worldwide. As a rule, a city's own local revenues are not sufficient to cover the costs of local public services (Faust and von Haldenwang, 2010). Furthermore, in many cities in developing countries there is no universal supply of local public services. The main objective of transfer payments by nation states to the local level should therefore be to provide municipalities with a solid

financial basis, so that they can guarantee a minimum standard of public services and thus substantive inclusion. Stable annual transfers are also necessary to make long-term budget planning possible for the municipalities. A relative stability of the transfer payments can be achieved, for example, by linking them to national revenues. For this, the level of the transfers as a percentage of national revenue should be fixed over several years (World Bank, 2015d).

In addition to providing basic financial security, transfer payments should be used to strengthen local administrative competencies. In many cities, the need to build administrative structures and develop governance competencies is the biggest obstacle to being able to act independently vis-à-vis the nation state, and to use the available financial instruments effectively. India, for example, has been successfully linking transfer payments to building up local administrative structures since 2005. Municipal authorities can apply for national funding for infrastructure projects, governance and basic services if they commit themselves to carrying out reforms. The focus is on developing efficient financial management systems, land registry offices and administrative competencies in levying charges or determining the market values of land and real estate (UN-Habitat, 2015c).

In countries where the provision of public services is already universal, the distribution keys should support existing development potential. When using tax incentives, attention should be paid to ensuring that a balance is maintained between economic efficiency and social justice and that there is no tax-undercutting competition between the municipalities and cities.

Financial markets

Greater use of financial markets in the medium to long term is important for financing the infrastructure investments required for the transformation towards sustainability (Meyer, 2016). In the cities of industrialized countries, access to credit and the financial markets has been essential for a large proportion of investment in infrastructure over the last two centuries. However, as a prerequisite for this, cities and municipalities must be able to generate sufficient revenues of their own, and a professional and transparent local financial management system must be established. These conditions are not met in many cities. The development of instruments for efficient debt management and achieving steady revenue at the local level is therefore of key importance.

Consideration should be given to granting easier access to the capital and financial markets for those cities and municipalities that generate regular and comprehensive revenues of their own, and can show that

they have a successful system of financial management. In order to exclude reckless debt financing, it must be ensured that the borrowed capital is used for investment – and not to finance current expenditure. Since to date there are hardly any standards or secondary markets for municipal loans, municipal bonds, green bonds or similar financing instruments, it is important to further develop the existing instruments and corresponding market, in order to keep the financial risks as low as possible for both investors and the local government.

Sectors with the potential to have a major transformative impact should be supported by targeted lending from national and regional banks, e.g. by priority sector lending programmes. This applies in particular for technologies that make leapfrogging possible, such as renewable energies, micro networks or public transport systems.

8.2.2.2

Mobilize private capital for urban infrastructure

The financing of sustainable urban development should be seen in the context of the debate on a globally sustainable financial and economic system. In the wake of the global financial crisis, comprehensive reforms have been initiated over the last few years (FSB, 2014) to make the global financial system more crisis-proof and to ensure financial stability. Since the agreement on the 2030 Agenda with the SDGs as uniform international development objectives (Section 8.4.1.1) and on climate targets by the Paris Agreement (Section 8.4.1.2) in 2015, there have been discussions both on the stability of the financial markets and on the contribution of the financial system to realizing these goals. Substantial financial resources will be needed to achieve the 17 SDGs by 2030 and a long-term restriction of global warming to less than 2°C, and ideally no more than 1.5°C. A connection should therefore be forged between the financial regulatory framework and the SDGs and better coordination and cooperation between the public sector and the financial sector is also required (UNEP and IEH, 2015). This target has already been enshrined in international law by the Paris Agreement. Article 2 defines “making finance flows consistent with a pathway towards low greenhouse gas emissions and climate-resilient development” as one of three objectives (UNFCCC, 2015a: Article 2(1)).

At the international and national levels, specific, legally binding or voluntary measures have already been implemented to reinforce the link between the financial system and sustainability targets; sustainable market standards have been established and disseminated. On the basis of more than 100 measures in 40 countries that strengthen the importance of sustain-

ability criteria in financing questions, the UNEP Inquiry is already speaking of a “quiet revolution” in the global financial system (UNEP and IEH, 2015). Examples include the growing cooperation between the insurance industry and the United Nations (launch of the Principles for Sustainable Insurance Initiative in June 2015) and the promotion of sustainable accounting standards and disclosure requirements by the Sustainable Stock Exchanges Initiative, in which 24 stock exchanges currently participate. In addition, there are numerous initiatives and organizations aiming to promote sustainable development via the financial markets, such as the divestment initiative (WBGU, 2014a) and religious banks, or various financing initiatives that define their own principles on avoiding investment in companies or projects with undesirable societal impacts. The finance volume of these initiatives is as yet low, but it is growing at a significant rate. For example, the bond market was worth a total of US\$100,000 billion in 2014. Although certified green bonds, valued at US\$36 billion, only account for a very small percentage of the total market, this figure represents a threefold increase on the previous year (CCST, 2015). The momentum of the divestment initiative also increased significantly last year. Two of the world’s biggest asset managers joined the movement in 2015: Axa in May and Allianz in November. In May 2015, the Norwegian State Fund made the largest divestment decision to date with its announcement that it was withdrawing US\$945 billion from the coal industry.

Since each of the initiatives develops its own definitions, and green bonds are now being launched by a very wide range of actors (development banks, governments, companies and conventional banks), there are currently a large number of criteria and standards. In the long term, uniform certification criteria and standards should be developed and voluntary guidelines, such as the Green Bond Principles developed by the International Capital Market Association (ICMA, 2015) or the Principles of Responsible Investment, which are based on a UN initiative (PRI, 2015), should be tightened and made mandatory. It is also necessary to expand existing initiatives by adding city-specific criteria to raise awareness among investors of the expectations of urban quality of life among urban societies. External and independent evaluators, e.g. the International Climate and Environmental Research University of Oslo, should play a major role in this process; their competencies and personnel and financial capacities should be extended accordingly.

The prospects for mobilizing private capital are particularly favourable in sectors with positive long-term expected returns. For example, investments in low-carbon infrastructures pay off after approx. 16 years, since

they lead to significant savings in energy consumption (Gouldson et al., 2015). However, investments involving a high up-front costs and with a long-term investment horizon involve a high risk due to regulatory, political and technological uncertainty. Especially institutional investors such as insurance companies and pension funds are legally required to invest the capital entrusted to them profitably and at low risk (UNEP and IEH, 2015).

The WBGU has already stated the key prerequisites for mobilizing private capital for sustainable investment in the (energy) infrastructure in its policy paper on Financing the Global Energy-System Transformation (WBGU, 2012). Only if there is an ambitious, long-term and binding national transformation strategy can planning certainty and legal certainty be achieved and the actions of all actors coordinated. This requires targets that remain stable and binding in the long term; the local level should be involved in defining these targets, taking successful local measures and different local contexts into account.

As, in the coming decades, many cities will be newly created and many existing cities will enter a new innovation cycle, e.g. on energy infrastructures, property and financial investors urgently need reliable statements on the kind of planning approaches and technologies that will be supported by governments and municipalities in the long term (WBGU, 2012).

Because of lower political stability, higher currency fluctuations and inflation risks, investment risks are particularly high in developing countries. The existing protection of private investment, e.g. by the International Finance Corporation and the Multilateral Investment Guarantee Agency, is not sufficient to mobilize the investment needed in the least developed countries (UNCTAD, 2015). To mobilize more capital for investment in urban infrastructure and buildings, private investors therefore need additional insurance instruments and guarantees. The certification of green bonds and agreements on uniform standards and criteria should therefore go hand in hand with the development of a global insurance and guarantee mechanism for investments in sustainable urban infrastructure.

8.2.2.3

Coordinate the international financing of climate mitigation and development

Financial support measures within the framework of international cooperation are essential for cities in developing countries, particularly for those in the group of least-developed countries.

Here, too, the financing of the transformation towards urban sustainability can only be achieved by a coordinated and coherent financing strategy. It is

therefore decisive that investment by public and private actors, also within the framework of international cooperation, is coordinated at the international, national and local levels, and that stable and binding long-term targets are laid down.

Since development-cooperation projects are generally arranged with the national governments, who have less detailed knowledge of the local needs of the city residents, direct contributions to urban planning and development by international donors have been on a relatively small scale up to now (Satterthwaite and Mitlin, 2014). In this context, the aim in international cooperation should be to focus more on urban development.

In the Addis Ababa Action Plan of July 2015, 193 countries agreed on a viable framework for the implementation of the new global development goals and a stronger link between the international development and climate agendas. This plan explicitly refers to the investment requirements in cities and to the need for more international cooperation in building and enhancing local administrative capacities (UN, 2015a: Action Area 34). More importance is thus being attached to the financing of sustainable urban development at the international level. Against the background of global urbanization dynamics, national and multilateral actors of development cooperation should coherently gear their operational strategies towards the international agreements.

In cooperation with national governments, they should ensure that direct support for cities and municipalities is also possible in the course of international cooperation. International funding (e.g. from development banks, the Green Climate Fund or Official Development Assistance) should be directed to the municipalities in an order of magnitude adequate to their problems. In addition, it should be used in particular to remove structural bottlenecks, e.g. to secure the basic urban infrastructure and basic functions, to strengthen urban management, set up municipal financing instruments and mobilize private funds directly (Meyer, 2016). However, most international development banks require a guarantee from the national government for sub-national financing. They are not willing, and in some cases – e.g. KfW Bankengruppe – not allowed, to provide project finance and assume the corresponding project risks (Canuto and Liu, 2010). Changes and risk-management instruments are needed here, so that, in the long term, more money reaches the municipalities.

The importance of climate finance in international financing has greatly increased, particularly since the 2009 climate conference in Copenhagen. At that time, industrialized countries promised to provide US\$ 100

billion per year for the international financing of climate mitigation. The central component of international climate finance is the Green Climate Fund (GCF), which is mandated to manage a considerable proportion of the funds pledged by the industrialized countries. The GCF's vision is a paradigm shift towards low-carbon and climate-resilient development; its investments aim to have a transformative impact (GCF, 2015). One of the Fund's five objectives is to design climate-compatible cities. There is thus a strong overall focus on low-carbon urban development.

So far, it has not proven possible to agree on the accounting rules for climate finance by the industrialized countries. Under the present accounting rules there are content-related and planning overlaps between the financing of climate mitigation and development, so that existing development financing already accounts for a considerable proportion of climate finance (Meyer, 2016). This double counting must be made transparent and avoided wherever possible in order to guarantee the 'additionality' of climate finance in relation to development finance.

8.2.3

Strengthen local authority over urban planning and development

As outlined in the previous Section 8.2.2, the municipal level needs to be strengthened financially to enable it to operate more independently than it has been able to do up to now vis-à-vis the nation state as well as vis-à-vis private actors. To make this possible, it is of key importance for public actors to have sufficient expertise to anticipate the long-term implications of urban-development and planning processes and to ensure that the public interest prevails over private interests. In the WBGU's opinion, the chances of achieving this are promising if institutional and personnel capacities in municipal administrations are strengthened, effective planning structures are established, and corruption is combated. It is also important to use the possibilities of digitization in administration to create structures that are better networked (Box 8.2-3).

8.2.3.1

Strengthen institutional and personnel capacities and create effective planning structures

Especially in developing countries and emerging economies, cities' authority over urban planning and development is limited in many cases by a lack of financial (Section 8.2.2.1), institutional and personnel capacities (Sections 5.3, 5.7). The initial priority in many cities is therefore to build up an active and assertive adminis-

Box 8.2-3**Smart cities: strengthening polycentric structures by means of digital technology**

Up to now, administrative structures have been mainly characterized by sectoral responsibilities, which often favours a fragmentation of processes and bureaucracy (Goldsmith and Crawford, 2014). The advance of digitization creates opportunities to break up the vertical organization of administrative structures and to rearrange it across departmental boundaries by means of digital media and the exchange of information (UN, 2014). In addition, the expansion of the digital infrastructure and the development of software-based solutions within the administration aim not only to improve the exchange of information between different sectors and authorities, but also to facilitate interaction with actors outside government and the administration (World Bank, 2016a). The possibilities of a cross-departmental reorganization of administrative structures have already been demonstrated in the field of information management. In the City of New York's DataBridge project, for example, existing data from different authorities were pooled in a data-exchange platform

(DataBridge.gov). The combination of information from different departments and authorities makes it possible to gain new insights that could not be deduced from a purely sectoral perspective (Goldsmith and Crawford, 2014). By passing on the findings to the individual departments, they can make improved decisions and use their resources more efficiently. The debate on cross-departmental cooperation is comparatively well developed in the field of emergency and disaster management. In the event of an emergency, public organizations and affected actors (such as emergency centres, fire service, the military, police, paramedics, as well as private and civil-society actors) have to take action in an unknown, rapidly changing situation and must make crucial decisions very quickly. Therefore, interdepartmental information-management projects and collaborations between and within organizations and civil society are essential in order to base the response to a crisis on as comprehensive a pool of information as possible (Kapucu et al., 2010). Building such data-exchange platforms requires IT and data analysts in particular who provide and maintain the infrastructure and collate and statistically evaluate the information. Because the data are potentially sensitive, data-protection capabilities must also be enhanced within the administration.

tration that is able to make effective use of the powers granted to it. To achieve this, governments must introduce and implement effective and appropriate forms of urban planning and urban management. It is decisive in this context to integrate building and planning rules and economic control instruments into city-wide transformation concepts.

In growing cities, transformative land use in particular should be enforced to avoid negative path dependencies in the long term (Section 4.3.3) and prevent real-estate speculation. This requires strategies of sustainable building, an ownership constitution and, above all, innovative instruments of land development (Section 4.2.3).

Active and assertive urban planning structures and strong decision-making powers at the urban level are not very helpful if urban authorities do not have the appropriate capacities at their disposal to make use of these opportunities. There are two challenges in particular here that need to be addressed.

1. Urban planners and other employees of the municipal administration involved in urban-development issues should have training in which urban development is combined with the requirements of transformation. On the one hand, they need to know about the effects of urban-planning decisions on the natural life-support systems and on ways of sustaining these systems. On the other, they should have a basic scientific knowledge of the requirements of a good quality of life in the city, as well as methodological skills in the field of participation and citizen involvement. Both – i.e. aspects of

ecological and social science – should be core elements in the training of planners and city-administration employees and be integrated worldwide into the corresponding courses of study wherever this is currently not the case.

2. In addition to making improvements to training, cities must become more independent in their personnel policy. Especially in many developing countries and emerging economies, urban authorities do not have the power to select staff and pay them a competitive salary. In such countries, regional or central governments are often responsible for hiring and firing, organization and finance in municipal administrations. Employees are appointed by higher levels of government and then assigned to urban administrations. Even where the urban administrations are able to select personnel themselves, salary levels are often determined centrally. As a rule, salary levels are lower for municipal employees than in corresponding positions in the national administration. This makes municipal administrations less attractive as employers and makes it harder for them to find good administrative staff (Sud and Yilmaz, 2013:120f.). All efforts to strengthen personnel autonomy should always go hand in hand with corruption prevention to forestall the emergence of clientelism.

8.2.3.2

Ensure the compatibility of private investment with the common good and restrict real-estate speculation

The importance of the investment market for real estate has been increasing since the 1990s. Real-estate development is increasingly run by international institutional investors such as open-ended property funds, private equity companies, real-estate corporations and real-estate investment trusts that are not rooted in the cities where they invest. In order to ensure that the development of a city is not influenced by the profit aspirations of these investors, let alone speculative real-estate investments, urban administrations must be in a position to guarantee that aspects of the public good are taken into account in private real-estate projects.

Real-estate speculation can be reduced by taxation measures (e.g. property acquisition tax or property tax) and the control of real-estate vacancy levels (Box 4.3-5; Section 5.8). Welfare in society as a whole can also be secured in private real-estate projects by imposing conditions in planning and approval procedures, e.g. requiring the creation of publicly accessible open spaces or social housing. It is also necessary to integrate binding participation mechanisms into planning procedures (Section 8.3.1). In addition, private actors should be obliged to meet sustainable standards to ensure that public interests are taken into account. Alongside the debate on sustainable standards in the financial sector (Section 8.2.2.2), this topic is also increasingly being discussed in the real economy. The United Nations Global Compact promotes sustainable business practices which must comply with ten general principles in the fields of human rights, working and environmental standards, and the fight against corruption. Sector-specific recommendations on the implementation of the principles for the construction and real-estate sector are already available (KIT, 2015). Up to now, compliance with these principles has been voluntary; in the long term it should be made compulsory.

A diversified housing and real-estate policy is desirable to promote public-good-oriented housing development (Section 4.3.3). In addition to the regulation of the private housing market outlined above, municipal and state actors should promote social housing and support alternative forms of ownership such as cooperatives. Since the key purpose of housing cooperatives is to provide affordable housing, these forms of housing are particularly relevant for low-income population groups. Furthermore, their democratic structures ensure that the residents can influence the development and design of their homes.

Ultimately, the experience of the recent financial cri-

sis shows that countries where there is a comparably high proportion of tenants have not been as susceptible to speculation bubbles in the field of residential properties. Rental markets should therefore be supported and tenant protection strengthened.

8.2.3.3

Corruption prevention

Corruption, defined as the abuse of entrusted power for private gain (TI, 2015a), can be found in all societal, political and economic fields of urban development and is thus one of the main obstacles to the urban transformation. In particular, bribing and taking bribes by officials or politicians (UN-Habitat and TI, 2004), as well as the large-scale willingness of companies to engage in corruption – particularly in the building industry (TI, 2005; Kenny, 2007; Wells, 2014; WEF, 2015) – not only cause immense material damage, but also undermine confidence and, with it, the very foundation of every urban society. This danger can be higher when cities are in situations of upheaval. Often there is a lack of clear rules and responsibilities, so that corrupt actions can be covered up fairly easily. Simultaneously, the low risk of being exposed can greatly increase the proclivity for corruption (Klitgaard et al., 1996: 12).

The WBGU therefore sees the prevention of corruption as a key point of transformative urban governance. Since almost all areas of urban governance offer structural loopholes for corruption, preventive measures must also target many levels. Here it is primarily a question of effectively containing corruption both at the government level (grand corruption), at the interface between the state and citizens (petty corruption), and in the context of obtaining political influence (political corruption). To this purpose, all urban stakeholders should be involved in anti-corruption strategies. In corruption prevention in cities, the focus should initially be on anti-corruption strategies in the public sector and – because of the intense growth dynamics of cities – in the corruption-prone construction sector. Worldwide, these two fields are highly prone to corruption (TI, 2005) and often tightly intertwined with each other, especially in developing countries and emerging economies (Kenny, 2007). Particularly in autocratic government structures, where the political and economic sectors are closely interlinked, susceptibility to corruption is very high (e.g. Cairo: Section 5.3.2.4). Furthermore, the most rapidly growing cities are in countries (such as China, India, Nigeria) where the public sector is regarded by Transparency International as very corrupt according to TI's Corruption Perceptions Index (CPI; TI, 2015b). The victims of corruption in cities tend to be disadvantaged population groups, who often have to spend an above-average share of their income on

bribes (Kenny, 2007; TI, 2013). In land and real-estate markets, structures of organized crime are sometimes involved (Box 4.3-3).

The public sector should commit itself to the principles of integrity, transparency and accountability (TI, 2015a; Section 2.5). Furthermore, the performance principle, adequate remuneration for public servants, the development of codes of conduct and further instruments of corruption prevention should be introduced within the framework of transformative urban governance (UN-Habitat and TI, 2004). The principle of transparency is a particularly effective means of combating corruption (UN-Habitat and TI, 2004), for example if civil society has virtually unrestricted access to information about the decisions and responsibilities of the public authorities. Parallel to this, civil society must be supported in its efforts to publicize corruption and actively demand measures to combat corruption by strengthening free media and creating transparency measures. NGOs, too, should be closely involved in the fight against corruption. NGO engagement can, for example, increase public awareness of the harmful consequences of corruption in cities, identify corruption-promoting structures and strengthen urban integrity systems. Furthermore, NGOs like Transparency International try to bring the different actors in the fields of politics, business and civil society together in an integrative approach to the fight against corruption (TI, 2015a). In addition, creating transparency in administration can be used as a strategic approach to reforming local governance, because corruption has a bigger impact at the local level, and further reforms – e.g. at the national level – can be catalysed in this way (UN-Habitat and TI, 2004:2).

In order to combat corruption in the construction sector, in addition to creating transparency in public procurement procedures, also engineering offices and corporations should be integrated into the fight against corruption, e.g. by means of internal corporate anticorruption obligations.

8.3

Strengthen civil society: involve residents, act collaboratively

Even urban administrations that have been empowered for the transformation and have the corresponding decision-making autonomy and financial resources will not be able to implement the Great Transformation in their city on their own. Resources and acceptance among the population are essential. As explained in Section 2.5.5, the general public, participation, transparency and shared responsibility are therefore important components of good urban governance. Section

2.5.5 describes different participation formats, including the degree of participation; this can range from informing to consulting, to participatory (involvement in) decision-making, to allowing people to take action autonomously. In order to realize this, formal participation structures must be strengthened (Section 8.3.2.1), and arenas for public discourse and experimentation created and integrated (Section 8.3.2.2). This applies in particular to planned and mature urban structures and to cities with a high – possibly even over-regulated – degree of formalization. Treating residents in informal settlements as equals means dealing constructively with the structures that exist there, and recognizing them wherever possible as long as they are not criminal (Section 8.3.3). Strengthening civil-society actors is an important element of collaborative governance both for highly formalized and for informal urban structures (Section 8.3.4).

8.3.1

Opportunities and limits of collaborative governance

Drawing on Herrle et al. (2015a), the WBGU uses the concept of collaborative governance. It is more narrowly defined than the concept of participation, which also contains weaker participation instruments, such as the simple provision of information. Collaborative governance is based on strong participation structures (Section 2.5.5), promotes and recognizes independent civil-society initiative, and includes the inhabitants of a city in governance processes as equal actors (see Section 6.5 for good examples of participatory urban development). There are a number of arguments for the basic endorsement of collaborative elements in urban governance. They are divided into moral-democratic, functional and social reasons. Horelli (2002) points out that involving the people affected is a democratic right and a duty. Matthies and Blöbaum (2008:815) and also Hülsmann (1998) point out that participation possibilities also support democratic and political qualification and thus the maintenance of democracy itself. The dimension of political inclusion described by the WBGU (Section 3.4.3) also encompasses this element. Furthermore, in the transition area from democratic to functional arguments, participation makes decisions (more) legitimate. In order to make possible the innovativeness, flexibility and adaptability that are needed to shape the transformation at the local level despite all uncertainties, a city's economic, civil-society and scientific actors should be included in the planning and decision-making processes. Such co-management makes it easier to detect dangers and challenges at an early stage and to

integrate local knowledge, as has already been shown in research on the resilience of ecosystems (Wilkinson, 2012a; Boyd and Juhola, 2014). From a social perspective, collaborative governance enables a broad dialogue to take place and thus makes it easier to assess potential, unintended consequences of measures. In the same way that diversity in ecosystems increases resilience, a pluralistic perspective – to some extent with inter- and transdisciplinary components – helps prepare a social system for unforeseen events. Having recourse to a wide range of different perspectives increases the chances of developing innovative solution approaches. The greater initial effort needed for extensive participation procedures regularly pays off, because the involvement of a diversity of perspectives leads to more viable results. In addition, the risk of protests and legal interventions is reduced and thus frequently results in an acceleration of the processes over the entire project cycle (Messner, 1997; Abelson and Gauvin, 2006; Dietz and Stern, 2008; Ostrom, 2010).

Furthermore, psychological research draws attention to the positive effects with regard to the human need for autonomy and self-fulfilment (Matthies and Blöbaum, 2008:815). Accordingly, there is more frequent and more promising collaboration and acceptance when residents can track and comprehend the course of planning, when a feeling of self-efficacy develops in the process, when personal benefit is recognizable, and when people can identify with a measure (Energy Trans, 2014). This is also in line with the WBGU's demands for political inclusion (Section 3.4.3) and creative autonomy (Section 3.5.2).

In addition to all the positive aspects of participation, however, the restrictions and limits must also be mentioned. On the one hand, participation is often inadequately and untransparently implemented, even by structurally empowered municipalities. Citizens expect their participation to give them creative scope. They then experience, under certain circumstances, that there is no legal provision for this scope and that it cannot be provided in practice, either because the procedures do not allow for participation, or because there is a lack of will, knowledge or resources to take participation results into account in the long term. In these cases, Selle (2011) speaks of 'particitainment', because the aim is often not outcome-open participation, but simply a way of gaining acceptance for potentially unpopular measures. Similarly, participation is important in most phases of a measure's process of development and implementation – from its initiation to its implementation, evaluation and maintenance – and not only at individual points in time (Nanz and Leggewie, 2016). Participation procedures must not be misunderstood as a superweapon, either. Although, as described

above, there are indications that participation procedures can have functionally positive effects, transparent and fair procedures are no guarantee for the acceptance of projects or plans (Energy Trans, 2014:5f.). A distinction must be made here between the quality of the process and the quality of the results. An assessment of participation must focus primarily on the quality of the opportunity to participate and on the fairness of the process, not on achieving a specific result which, in the worst case scenario, might already have been fixed beforehand. Another possibility is that more citizens reject and criticize plans and measures, particularly in cases where a population experiences an expansion of participation opportunities as something new. This is possibly related to an (actually highly desirable) increase in perceived self-efficacy, but it illustrates the fact that even formally fair participation structures do not automatically reduce friction between sovereign and societal actors (Energy Trans, 2014:2f.).

8.3.2

Use potential for collaboration and create arenas for discourse and experimentation

The struggle of societal groups to find the best solutions for sustainable development benefits from the general conditions being known, transparent processes, the skills needed to deal with the processes available, as well as clearly defined and accepted responsibilities. In the sense of the WBGU's compass, and as described at the beginning of this Section 8.3, arenas of discourse and experimentation must be created, different societal groups involved in urban development as equals, and free spaces for personal involvement opened up. The case studies in Chapter 6 show how, for example, children can be actively integrated into the planning of people-friendly urban environments (Section 6.5.1), or how local residents can successfully contribute their own ideas in the development of noise-reduction strategies (Section 6.5.2). Competencies in shaping collaborative processes often first have to be created in municipal administrations and among town planners. Mature or planned cities and city districts often have a high level of functioning political and administrative structures, and in many cities collaborative processes already exist in the form of written principles or a repertoire of instruments. Here, conditions are favourable for a structural expansion and better implementation of collaborative governance practices; these conditions should be used (Section 8.3.2.1). At the same time, physical, administrative and decision-making structures have become established over a long period of time in some of the mature cities and city districts.

In such places, therefore, establishing spaces for experimentation and arenas for public discourse in highly formalized structures is a particular challenge (Section 8.3.2.2). For cities with weak administrations and a high degree of informality, the challenge tends to lie in first laying the formal foundations for collaborative governance, and in identifying and formally involving the necessary societal actors. Regardless of the context, within the framework of planning processes, procedures and methods of collaborative governance must become part of the worldwide training of urban planners as well as necessary social-scientific principles. To date, however, this is only the case in a few universities.

8.3.2.1

Extension of existing collaboration structures

For decades, a lot of experience and good basic knowledge has been gathered on useful possibilities for participation and collaboration. The WBGU recommends a collaborative governance approach and advocates the use of strong participation instruments wherever these can be meaningfully implemented. In addition, weaker participation instruments such as information provision or population surveys also fulfil an important function. For one thing, strong participatory instruments cannot be used for all topics or at all levels. For another, fundamental change processes can also be set in motion by weaker instruments (Cornwall, 2008: 274).

Attention should be consistently paid to quality when selecting and implementing participation formats (Table 2.5-3). This includes the transparency and clarity of procedures, the long-term integration of citizens, a practised culture of proactive participation, and choosing participating societal groups and instruments according to the challenges that need to be met. Citizens can be invited to events either openly, individually or at random. In the case of open participation structures, however, there is a risk that these might be used by individual groups who already have a privileged status to strengthen their own position. This may result in unequal participation, e.g. in relation to ethnic differences or different income brackets. Gender equality is also an important aspect: while women in particular do many of the day-to-day family tasks in cities, in traditional and patriarchal structures it is primarily men who make use of participation structures and thus the opportunities to influence urban development (Lama-Rewal, 2011; Kemitraan, 2014). The challenge is to create inclusive structures in which marginalized population groups also participate equally. It is necessary in this context to empower the people in such a way that everyone has the same capabilities to get involved in participation processes.

The more extensive the participation, the broader

the spectrum of methods that are available (Horelli, 2002). The methods should be adapted to the subject of the decision and to the target groups; e.g. age, level of education, prior knowledge or time availability should be taken into account. The available range of established formats has grown continuously in recent decades and comprises, among other things, future workshops, round tables, planning cells, focus groups, world cafés, scenario workshops, surveys, civil forums, open-space or bar-camp events, citizen households or councils, and a range of mediation procedures (Nanz and Fritzsche, 2012; Energy Trans, 2014: 7). It is important that formats aimed at improving urban quality of life should be closely oriented towards spatial appropriation procedures and spatial everyday settings, and promote social cohesion and local identification. In this context, Kusenbach (2003) and Kuopa (in Horelli et al., 2013), for example, use the day-to-day practice of walking through one's own environment to trace significant places that are relevant to everyday life and take these into account in urban development. It is also helpful to direct the spatial focus onto small and manageable urban units such as city districts or blocks. Paying attention to these small-scale spatial structures creates more opportunities for promoting identification and activating the population. Barcelona, for example, forms so-called 'superblocks' out of several combined residential blocks to make it possible to organize car-free streets, meeting places and open spaces within the superblock (BCN, 2007: 14ff.). Thus, local coordination centres – similar to city-district management – can be created for planning and implementing measures and for informing, activating and involving the residents.

In cities with a stable digital infrastructure that is available to all citizens, digital and internet-based instruments can and should also be used for urban planning and urban development (Box 8.3-1). They can enable the public in general – and children and adolescents in particular – to participate to a greater extent (Horelli and Kaaja, 2002). The potential already became clear in Chapter 6 with the example of civil-society initiatives that have formed around digital cartography instruments and the development of publicly accessible information and participation platforms (Section 6.5.3). However, various practical examples show that municipal administrations tend to be reluctant to adapt new technologies (Horelli and Kaaja, 2002). To provide the basis for digitally supported, participative urban planning initially requires developing the appropriate skills and integrating the technologies and their results into the institutional processes. The aim should be to take into account content developed via participation in the decision-making and planning processes, and not to treat it simply as an unimportant adjunct.

Box 8.3-1**Smart cities: digital participation**

Digitization is changing the relationships between citizens and administrations and fuelling demands for new and additional opportunities in the field of digital participation (UN, 2014). Goldsmith and Crawford (2014) use the term 'responsive city' to describe the increasingly digitized forms of data and information exchange between citizens and (city) administrations, which are realized using digital spaces of cooperation and techniques. According to Kubicek et al. (2011), the participation formats include participatory budgets, consultations on guiding concepts and planning projects, and consultations within legislative processes (Table 2.5-3).

What these approaches have in common is that the citizens, particularly the recipients of specific services, become more actively involved in their design instead of just passively consuming public services. In this context, digitization helps activate the citizenry – on the one hand by reducing information asymmetry and increasing transparency, thus improving the decision-making basis outside the administration, and on the other hand by means of process optimization, which reduces the amount of organization, time and effort required for participation (Goldsmith and Crawford, 2014). Traditionally, citizens have had to be physically present at participation events on a specific date in a specific place in order to place their vote or voice their opinion. Electronic formats make much of the time and transport effort superfluous, significantly simplifying procedures. For example, in Belo Horizonte, Brazil, participation in the local participatory budget model rose on

average from 1.5% to 10% after the introduction of digital tools (Peixoto, 2009). Further possibilities for cooperation or the co-production of solutions include inviting citizens to test digital services (e.g. apps or websites) or to tender for projects to develop service-oriented programs.

At the same time, new participation formats create opportunities to direct attention to neglected issues or to provide the government with information on issues where it is poorly or wrongly informed. For example, the German website www.Leerstandsmelder.de (Section 6.5.3) draws attention to the vacant apartments that exist in Germany despite the shortage of housing by enabling users to report empty apartments and buildings on a map. In developing countries, it is hoped that the participatory mapping of informal settlements will help assert rights and claims vis-à-vis public supply structures in neglected neighbourhoods (Lemma et al., 2005). According to the United Nations, the range of digital administration services has increased in almost all countries in recent years, although the digital divide between countries, regions and individuals is still large (UN, 2014). In view of the possibilities of digital participation, the need for an inclusive internet policy is therefore especially evident. Digital political inclusion is based on affordable network access for all citizens (including disadvantaged and vulnerable groups), offerings in the people's own language, and easy-to-use portals. In addition, it is important to promote a more active use of the internet – e.g. commenting on and sharing content, or even writing new programs and applications, instead of only using the internet receptively. Therefore, training in digital media and data skills is needed not only for public administrations, but also for all citizens.

It is also important for the participants – e.g. children and adolescents – to be able to see the effects of their participation as quickly as possible (Horelli and Kaaja, 2002). Online and offline formats have their respective strengths and weaknesses and can also be meaningfully combined with each other. For example, a personal, face-to-face exchange can be created in parallel with addressing and including people in different locations (Energy Trans, 2014:9).

8.3.2.2**Create and use urban open spaces for citizen engagement and creativity**

The participation of the population is not limited to their integration in formal processes organized by authorities. It is also important to create spaces for experimentation within the city. The cities of the future need convincing citizen-designed model projects and urban spaces for experimentation on good, sustainable city life which can be held up as examples to be emulated and where lessons can be drawn from their success or failure. There are countless such small-scale, original examples worldwide from the fields of art, culture and political self-administration, which contrast greatly with strictly planned city districts and projects.

The Transition Town movement represents an interesting, supra-regional example. This open concept for the bottom-up transformation of a city towards future viability and resilience was originally drafted only for the small English town of Totnes (Hopkins, 2008). However, within a few years, inspired by guidelines, workshops and films, thousands of similar initiatives have been launched in over 43 countries on all continents; more than 1,100 have been formally registered (Transition Network, undated). Like few others, the Transition Town movement stands for a positive way of dealing with challenges and for motivating the local population with liveable visions of their personal environment (Maschkowski and Wanner, 2014).

The strength of such local and often small-scale and independent initiatives lies in the fact that they propose locally adapted and unusual alternatives, that they find niches and start their own experiments there. They are thus pioneers and possible models for stronger public or private actors, and are becoming more professional as time passes. The stimuli that emanate from such initiatives are relatively rarely found in the technical field. Social, environmental or economic topics are more common. Problematic social practices are identified and named, and people who are themselves

affected generate an impetus for change. In urban areas there are many such bottom-up processes whose aims are in line with those of sustainable urban development. For example, transition initiatives develop and operate urban gardens, repair cafés or local markets in collaboration with other actors (Hopkins, 2013). They draw up energy-transformation plans for their own city on their own initiative or together with other groups, or they engage in local efforts to mitigate climate change. In the 'Transition Streets' project, for example, small neighbourhood groups are formed which prepare guidelines to help each other save resources and energy, strengthen social networks and jointly put resource-conserving mobility and consumption patterns to the test (Ward et al., 2011). The global network is spreading the project, and the idea is being applied in a modified form in other cities. Other examples tell of the conversion of a municipal waste dump into an action and learning park in South Africa, of numerous local currencies in the UK, or of places for meeting and exchanging ideas in crisis-hit Spain, where people constructively discuss their own future viability (Transition Network, 2015).

Transformative urban governance can and should link up with such projects. The challenge lies in finding the right moment and the most suitable form of providing targeted support or assistance without disturbing the creative and self-organized processes, or weakening the projects by paying them too little attention. The implementation and scaling up of niche innovations require different interfaces with the spheres of politics, administration and business, as well as mutual interest and mutual support. Political decision-makers and administrations should develop a sensitivity for the value of creative niches.

In highly controlled and planned cities, promoting innovation and creativity can imply deliberately scaling down public regulation in spaces for experimentation. The example of Copenhagen (Section 5.4) shows an administration trying to promote innovation and creativity by setting up open spaces in the city. Inner-urban districts that were once used for industrial purposes are declared 'creative innovative environments' in which pioneers in the fields of fashion, design and culture can settle with few bureaucratic hurdles and, in some cases, with public support. Two strategies are pursued: talent cultivation, i.e. financial and strategic support for creative projects, and deregulation, i.e. the withdrawal of the administration from creative spaces. The Transition Town movement and other grassroots initiatives often seek out these open spaces themselves or demand them from local authorities. There is also the special situation of cities which, due to shrinkage or structural-transformation processes, produce open spaces unintentionally

and thus prepare the ground for unexpected creative processes that are difficult to predict. The best-known examples of this are Detroit, Manchester and Liverpool, the Ruhr area or former industrial centres such as Halle and Leipzig (Oswalt and Rieniets, 2005). There, creative interim-use concepts can offer space for new ideas and revival processes.

A further building block for creating opportunities for innovativeness and creativity is the targeted promotion of diversity. A cosmopolitan image aggressively communicated to the outside world, a high level of urban quality of life and a liberal attitude towards different life concepts, can attract the creative class and generate a productive mix of different cultures in the urban space, as the example of Copenhagen shows. However, making cultural diversity possible also means promoting inclusion. The approach pursued by Copenhagen, a metropolis with a high proportion of migrants, is an example of good governance. It was launched by a Diversity Board made up of representatives of various institutions, companies, civil-society groups and minorities. This body developed the Copenhagen Charter for Diversity and a plan of action for achieving the objectives of inclusion. An inclusion barometer for continuous self-monitoring was developed to annually measure the progress made towards eight integration targets. Similar strategies have also helped Manchester and Liverpool to become more attractive.

Overall, the WBGU advocates governance structures made up of both vertical governance structures, marked by formal participation, and horizontal governance structures which imply the broadly based collaborative involvement of the population and specifically create and enlarge open spaces. On the horizontal level, this leads to numerous opportunities for intervention and for incorporating societal ideas and initiatives of change. In this way – by interaction, collaboration and also constructive conflict – laboratories for the Great Transformation emerge. The prerequisites for this interaction, however, are functioning sovereign structures and a civil society that is sufficiently well-organized and equipped with the necessary rights.

8.3.3

Integrate informal structures

In many cities and city districts, urban development progresses largely independently of public control in informal urbanization processes. These processes relate primarily to informal land and real-estate markets, but, as a rule, affect all areas of urban life (Box 2.1-3; Section 7.3). While informal processes in the OECD world mostly relate to complementary urban-develop-

ment processes that complement formal processes, in developing countries and emerging economies informal processes can be found that develop parallel to the (mostly inadequate) formal processes of urban development and largely replace them. These supplementary informal urbanization processes frequently dominate large parts of urban development in cities in emerging economies and developing countries (Section 2.5.2.2). While this used to be regarded as a problem in most cases, today a considerable solution potential is seen in such processes – for example self-organized urban development. This applies both to the creation of housing and employment opportunities, and to self-administration by the residents. For poor population groups, many of whom are excluded from the formal housing and labour markets, the self-organized informal settlements are often the only way to live – indeed to survive – in cities.

Living conditions in informal settlements vary greatly. While some constellations of informal settlements can lead to adequate city districts, as is sometimes the case in Cairo (Section 5.3), the conditions in other cities or city districts are mostly precarious, as, for example, in Mumbai (Section 5.2). Informal governance structures also vary. Whereas in some settlements, CBOs working for the common good manage the administration of the city districts, other constellations are dominated by criminal slumlords exploiting the situation of the residents for their own interests. Since the Great Transformation towards sustainability has to be initiated in cities, in informal settlements it is necessary to build constructively on the governance structures that exist there. Non-conformist activities and customary-law methods of obtaining land and developing it for housing should be integrated in a collaborative way; criminal practices, however, should be curtailed. In slum-upgrading projects, many cities have already gained experience with decentralizing and deregulating responsibility architectures by means of enabling processes (UN-Habitat, 2003:131). There are examples of the integration of the informal economic sector in cities (Box 5.3-2). Furthermore, the expertise of the local population is used to collect local data, develop locally adapted upgrading strategies, and organize the sustainable management of informal districts (UN-Habitat, 2014b). In South America in particular, there are numerous examples of the successful integration of informal structures in urban upgrading programmes (Section 5.8).

Herrle et al. (2015a) describe successful examples of collaborative governance with reference to transnational civil-society networks in developing countries and emerging economies. Local initiatives from disadvantaged sections of the urban population have taken

part – via transnational networks – so constructively and successfully in the debate, as well as in the promotion of upgrading projects, that municipal administrations – at least those that approach them open-mindedly – are now cooperating with them (Herrle et al., 2015a; Section 6.2.2). Another decisive factor in the future will be whether the public sector develops city-wide strategies – e.g. on land use, financing, planning or management within a comprehensive, publicly funded housing policy – which constructively use and promote the informal processes (Section 7.3.5).

Since the transformation towards sustainability is more difficult to realize without state structures, informal structures will have to be supplemented by formal ones in the medium and long term. Informal structures that do not stand in the way of sustainable development should be legalized wherever possible. The recognition of informal settlements is often key in this context. The extent to which these processes require, for example, the formalization of property titles, must be decided at the local level and within the specific context (Box 4.3-2).

The aspects outlined above relate primarily to the handling of existing informal settlements or governance structures. However, fast advancing urbanization will lead to the growth or emergence of further informal structures in the foreseeable future, because informal settlements or informal governance structures continue to develop where the formal mechanisms fail and where, for example, not enough affordable housing is made available. However, in many cases this cannot be achieved in the short term. Therefore, existing informal structures must also be strategically used and, wherever possible, incentives generated that take into account the requirements of inclusion, *Eigenart* and sustaining the natural life-support systems. Also needed are more efficient urban planning and governance structures – i.e. a significant strengthening of a municipality's planning and administrative capacities. Here, too, the aim should not be to assign to the state the primary role of the planner and implementer of urban development, but rather to see the public sector as a partner, accelerator or moderator. This means, for example, that the state must try to strategically formulate and implement future development corridors of cities, and to shape their development together with local actors in the informal urban development processes. This also means that the state must not cede control of the city quarters to the private markets – whether informal or formal. Rather, it should prevent disadvantaged population groups from being driven out by land or real-estate transactions (Section 8.2.3; Box 4.3-2).

Overall, it is necessary to strengthen the population's rights, also those of people living in informal set-

tlements, to support their skills of articulation and help them shape and plan the city by practising collaborative governance, and to interlink the existing informal and formal urban structures. To achieve this, local governments must negotiate directly with the informal actors in their cities. Since the role of the informal settlers is often very weak in many cities, transnational networks such as Shack/Slum Dwellers International (Section 6.2.2) offer a great opportunity to strengthen local civil-society groups.

8.3.4

Civil-society networks and their importance for urban development

Regardless of whether they are active in mature cities or city districts, or develop in fast-growing planned neighbourhoods or informal settlements, local civil-society groups often face similar challenges: they must develop structures and strategies of their own in order to represent their concerns and assert their objectives. They are regularly confronted with actors that are more powerful and better equipped with resources. Both, regional and transnational networking with other groups can help them deal with these challenges more effectively.

Organizational and networking structures for and between local initiatives advance the potential and visibility of local groups. Examples like the Transition Network (Section 8.3.2.2) or Shack/Slum Dwellers International (Section 6.2.2) show that the reach of actions can be increased by an organization that is not hierarchically superior, but supportive and inspiring. For example, in December 2015 the Transition Network was in frequent contact with 479 official Transition Town initiatives from over 43 countries. Shack/Slum Dwellers International is active in 33 countries and connects many local groups in informal settlements (SDI, 2015). Via the networks, information is collected and collated, financing solutions are enabled through savings groups, and publications and training courses are distributed, thus generating learning effects that help the local groups to build up effective structures and develop forceful strategies (Fokdal et al., 2015:76). Moreover, local groups receive support by belonging to a transnational movement, and the network as a whole becomes lively, vibrant and convincing through the many examples. Networks can help launch cross-initiative projects and concentrate public-relations activities, thus raising the profile of local groups and their concerns. Furthermore, being a member of a network provides access to international political circles and sources of finance, such as major foundations, which would remain closed to smaller local groups operating alone (Fokdal et al., 2015:81).

At the same time, these networks also bring new challenges. On the one hand, the balancing act must be mastered between local concerns and transnational challenges, without losing contact with the grass roots. On the other hand, such transnational network structures are non-transparent and difficult to fully understand – especially if they connect groups that are not very formalized or institutionalized. For one thing, this can cause legitimacy problems; for another, it makes it more difficult for such networks to access funding (Fokdal et al., 2015:81).

Herrle et al. (2015a) describe the role that transnational networks can play together with local groups, especially in developing countries and emerging economies, focusing on various socio-economically disadvantaged urban groups that are campaigning for adequate housing. Municipalities are taking these groups increasingly seriously as a result of their success. They cooperate with them, involve them in a collaborative way, and in this way try to make progress in this area (Herrle et al., 2006, 2015a).

To be able to promote transnational networks and make better use of their potential, governments and major foundations should create more and better financial funding options. Easy accessible, low-threshold forms of funding are required, so that not only large, well established civil-society actors have access to funds. In addition, there should also be investment in capacity development to create the know-how and skills the networks need to apply for funds.

8.4

Shape global governance structures in a way that meets present-day needs

Although cities have been unable to play a formal role in international governance structures up to now, due to their lack of international legal personality, the results of international negotiations are nevertheless relevant for their transformation efforts. The 2030 Agenda adopted in September 2015, including a stand-alone SDG on cities, and the Paris Agreement have both direct and indirect implications for the Great Transformation towards sustainability in cities.

Although they are not formally involved in international environmental negotiations, the significance of cities is continuously increasing due to the resources they consume and the large and growing number of people who live there. Not only their contribution to the underlying causes of global environmental changes, but also their potential for providing solutions make them relevant actors of the transformation. Working together in city networks, cities have taken on a pio-

neering role in the last few years and achieved remarkable successes, especially in the field of climate-change mitigation, despite the fact that intergovernmental negotiations and efforts were at a standstill at the time (WBGU, 2014a:83f., 91ff.). Against the background of these positive developments, there have been suggestions that the role of cities in the international governance system should be upgraded (Aust, 2015b). The discussion about a Global Parliament of Mayors (Barber, 2013) shows that the current global governance structures are no longer up to date when it comes to the role of cities (Section 8.4.2). Cities do not even have a permanently guaranteed voice at the Habitat conferences on urbanization and urban development. Improving the integration of cities in global governance structures is not only necessary to do justice to their growing role; it would also advance the Great Transformation (WBGU, 2011).

8.4.1

Importance of international negotiations for the transformation in cities

8.4.1.1

2030 Agenda for sustainable development

The 2030 Agenda with its 17 Sustainable Development Goals (SDGs), which was adopted by the UN General Assembly in September 2015, has significant implications for cities and urban development (Box 8.4-1). Although local governments and local governance are addressed in particular in SDG no. 11 – “Make cities and human settlements inclusive, safe, resilient and sustainable” – all the goals are of relevance to cities either directly or indirectly. Other SDGs also refer to local governments and local governance. However, the latter are not mentioned explicitly by them, although SDG no. 10 (inequality) and SDG no. 17 (global partnerships) at least mention the importance of governance “at all levels”. By contrast, the concept of decentralization – an important element in strengthening the local level and enhancing its ability to act – is not mentioned in the 2030 Agenda.

The integration into the 2030 Agenda of a dedicated urban goal as SDG no. 11 was a major success, particularly against the background of the great importance of cities and urbanization for global development, even though it has yet to be operationalized (Brandi, 2015). At the same time, the local level is addressed at least indirectly by all the other 2030 Agenda goals as a cross-sectional area. To this extent, the local level, local governments and local governance should be taken into account and integrated in the formulation of indicators

for the 17 SDGs.

In this context, the New Urban Agenda to be formulated at Habitat III – which is expected to have the status of a non-binding declaration under international law – could also have an important role to play. It can provide important ideas on how local governments can contribute to the successful implementation of the SDGs (Parnell, 2016; Misselwitz and Villa Nueva, 2015). Furthermore, cities should also contribute to monitoring and reviewing the corresponding progress made in the implementation of the SDGs. The New Urban Agenda should be seen as a useful supplement to the 2030 Agenda, and as its continuation with a view to the important role of local governments for the future of local and global development.

8.4.1.2

International climate policy: implications of the Paris Agreement for cities

The Framework Convention on Climate Change (UNFCCC) is directed first and foremost at its member states as actors in mitigating climate change. In the last few years – not least through the commitment of networks such as ICLEI and C40 (Box 2.5-6) – the spotlight has also increasingly been on contributions to climate-change mitigation made by non-governmental and subnational actors such as cities, and on their role in adapting to climate change. First analyses show that the climate activities of these actors make substantial contributions (Chan et al., 2015a, b). The decision of the 21st session of the Conference of the Parties to the UNFCCC (COP21), which accompanies the Paris Agreement adopted on 12 December 2015, expressly welcomes the efforts of cities and other non-governmental actors on climate change and invites them to continue their efforts to reduce emissions and further develop their resilience to the impact of climate change (UNFCCC, 2015a). The Lima-Paris Action Agenda (LPAA), which was initiated as early as 2014 and was again highlighted in the final document of the COP21, summarizes these activities. During the COP21 in Paris, a Five-Year Vision was also formulated to mobilize all the actors concerned. It is made up of four objectives (UNFCCC, 2015b):

- “Increasing the number of cities and regions deciding to implement an Action Plan and climate objectives;
- Building resilience in the greatest number of cities and regions, with particular attention to vulnerable populations;
- Improving project preparation and climate planning to ensure increased financial flows to the territories, whilst accelerating the deployment of innovative economic and financial tools;

Box 8.4-1**2030 Agenda for sustainable development**

On 25 September 2015, the United Nations summit in New York adopted the 2030 Agenda for Sustainable Development (UNGA, 2015). The 2030 Agenda is a non-binding declaration under international law and thus categorized as soft law; its target system is universal. This new development agenda with its 17 SDGs supersedes the Millennium Development Goals (MDGs). The MDGs were eight development goals to which the international community committed itself and whose core purpose was to overcome poverty (UN, 2015d). Unlike the MDGs, the 2030 Agenda applies not only to developing countries and emerging economies, but also to industrialized countries and thus serves as a basis for a changed global partnership. The 17 SDGs link the principle of sustainability with economic, ecological and social development (Loewe and Rippin, 2015). The SDGs are as follows (UNGA, 2015):

1. End poverty in all its forms everywhere.
2. End hunger, achieve food security and improved nutrition and promote sustainable agriculture.
3. Ensure healthy lives and promote well-being for all at all ages.
4. Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all.
5. Achieve gender equality and empower all women and girls.
6. Ensure availability and sustainable management of water and sanitation for all.
7. Ensure access to affordable, reliable, sustainable and modern energy for all.
8. Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all.
9. Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation.

10. Reduce inequality within and among countries.
11. Make cities and human settlements inclusive, safe, resilient and sustainable.
12. Ensure sustainable consumption and production patterns.
13. Take urgent action to combat climate change and its impacts.
14. Conserve and sustainably use the oceans, seas and marine resources for sustainable development.
15. Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss.
16. Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels.
17. Strengthen the means of implementation and revitalize the global partnership for sustainable development.

At the Rio+20 Conference of the United Nations in 2012, the member states decided to draw up goals for sustainable development (UNCSD, 2012). The aim was to realign the processes that had been running since the 1992 United Nations Conference on Environment and Development in Rio de Janeiro according to the target system of SDGs. The 2030 Agenda lays the foundations for the environmental and development policies of the coming decades. The SDGs are political objectives of the international community, and as such they are of key, orienting importance for future global, sustainable development. In the run-up to the negotiations on 2030 Agenda, the WBGU called on the international community not to reduce the SDGs to the fight against poverty, but to cover all dimensions of sustainable development. In particular, global environmental changes must be incorporated and the planetary guard rails taken seriously, because otherwise poverty eradication will become impossible (WBGU, 2014b).

- › Supporting multi-partnership initiatives between different levels of governance (State-local governments, decentralized cooperation, etc.)."

The LPAA brings together many different kinds of initiatives, e.g.:

- › *Compact of Mayors*: launched in 2014 by Michael Bloomberg, the UN Special Envoy for Cities and Climate Change, together with UN-Habitat and the city networks C40, ICLEI and UCLG. It is the largest urban initiative worldwide committed to reducing greenhouse gases and adapting to climate change.
- › *Covenant of Mayors*: initiated in 2008 by the EU to promote the implementation of the EU's climate-change-mitigation targets at the local level. The mayors of 6,664 EU municipalities, representing approx. 42% of the EU's population, had joined the Covenant by the end of 2015 (Covenant of Mayors, 2015).
- › *C40 Clean Bus Declaration*: an initiative of the C40 network, which 23 of its members have joined, aim-

ing to lower emissions from local public transport by introducing buses with electric, hydrogen or hybrid drives (C40, 2015a).

- › *Carbon Neutral Cities Alliance*: a city network founded in 2014 by (to date) 17 major cities, setting themselves the target of reducing their emissions by 80% and developing carbon-neutral planning standards, among other goals, by 2050 (CNCA, 2015).
- › *Municipal Solid Waste Initiative*: supports cities in minimizing emissions in the field of waste disposal and promoting this objective by creating bilateral city partnerships (LPAA, 2015a).
- › *Global Alliance for Buildings and Construction*: launched during COP21 with the aim of leveraging the great reduction potential of the construction industry (LPAA, 2015b).

Information on the projects of these and other initiatives is available, classified by initiatives or cities, on NAZCA (Non-State Zone for Climate Action), an internet portal run by the UNFCCC Secretariat (UNFCCC, 2016).

The growing recognition of cities as actors in international climate-change mitigation is also reflected in the Green Climate Fund, which now allows cities (in addition to nation states) as donors; the opportunity has so far been taken up by Brussels and Paris.

8.4.2 Cities and the international system: transformation potential?

The rising number of transnational city networks and the positive ideas coming out of initiatives like C40 or ICLEI in the field of climate-change mitigation have triggered a debate on the role of cities and city networks in global governance (Acuto, 2013c; Boutelier, 2013; Barber, 2013; Curtis, 2014; Aust, 2015b). The legal discussion on such transnational urban activities (Section 2.5.6) regularly brings to light the limitations of national legal systems and the international legal system in relation to these activities. When they pursue ‘foreign policy’ measures – e.g. with commitments to cut emissions of CO₂ – cities, as part of a nation state, come up against domestic limitations if national law prohibits them from taking such action in the field of ‘foreign policy’. Calls like those from Benjamin Barber to create a Global Parliament of Mayors as a supplement or even replacement for what he regards as an outdated international system of states (Barber, 2013:357) have hitherto been regarded critically by experts in international law (Aust, 2015b:266f.). They would violate fundamental principles of international law, such as the principle of sovereignty, if they were to replace the system of nation states, which has been established since the Peace of Westphalia in 1648. Although cities or their networks could be equipped with rights by international agreements – in which case they would obtain a partial international legal personality – they can nevertheless not be endowed with full international legal personality and thus put on an equal footing with nation states. In the WBGU’s opinion, it is questionable whether making cities or their networks equal to nation states under international law would be beneficial for a transformation towards sustainability fleshed out by the normative compass – with its dimensions of sustaining the natural life-support systems, inclusion and *Eigenart*.

Cities are acknowledged to have great potential when it comes to solving both local and global environmental problems. This internationally visible potential is a result of the formation of city networks and many cities pursuing far more ambitious paths than nation states, particularly with regard to climate change. However, it is questionable whether the climate-change

commitments voluntarily self-imposed by cities and their alliances will be further encouraged and even extended if they, like nation states, are able to negotiate and agree binding obligations, e.g. on the protection of the climate, as legal entities under international law. It is to be feared that negotiations between cities would become as lengthy and cumbersome as those between nation states, and that the much larger number of actors involved would further increase the complexity of the negotiations. Transferring to the cities a negotiation process that already reveals its limits when nearly 200 countries worldwide are involved, could have the opposite effect to what is intended with the recognition of the international legal personality of cities (e.g. Aust, 2015b:275).

Yet benefits could come from the fact that, if agreements between cities are more ambitious than state or international efforts to mitigate climate change, this could exert pressure on nation states and persuade them to take more ambitious action. However, there would be the risk that the nation state forbids its cities to exert such pressure and the cities then withdraw from their ambitious role. To this extent, the call for a transformation towards sustainability, which is becoming ever more urgent, could even be stalled if cities and their alliances were recognized as having international legal personality.

In the case of initiatives like the Global Parliament of Mayors (Barber, 2013), which would initially bring together existing city networks as a ‘network of networks’ (Barber, 2013:339), another question to be addressed is the legitimacy of such a parliament. It is uncertain who could take part in this parliament, and what forms the elections would take. Where would the democratic legitimacy of this parliament come from? Barber’s repeated comments on the dysfunctionality of nation states (Barber, 2013:338ff.) in particular raises the question of what the future role of such a parliament might be. Should it later also be allowed to take decisions to the detriment of cities not represented in the parliament? Even if a rotation procedure were used, the 300 representatives targeted by Barber would only represent a certain percentage of cities, but not the rural population, so that a large part of the population would be unrepresented (Aust, 2015b). It is also completely unclear what kind of solution could be found if cities were prevented from fulfilling obligations resulting from potential parliamentary decisions by restrictions imposed on them by their nation state. What legal consequences do these decisions by the parliament have concerning international treaties? The problems and questions that arise when taking a closer look at the implications of giving cities international legal personality, or setting up a Global Parliament of Mayors,

which might at some time be able to take binding decisions, have led the WBGU to refrain from supporting such far-reaching demands. Moreover, it is questionable whether this is even necessary to strengthen the transformative potential of cities and city networks.

In the WBGU's opinion, the roles played by intergovernmental negotiations – e.g. the negotiations under the UNFCCC – and urban activities are different. The former are needed for a global goal, which is necessary to solve certain problems – such as climate change. Cities, however, are the level of realization on which many such goals must be implemented. In the case of cities, therefore, the focus of international exchanges should be on mutual learning, in order to accelerate such implementation processes. The needs of cities should be taken into account in international negotiations – and the results of the latter implemented at the urban level – through exchanges between the goal-setting and implementation levels. To achieve this, it is necessary, in the WBGU's opinion, to integrate cities and city networks more closely into formal structures of global governance, without giving them international legal personality. It is enough to allow urban 'foreign policy' (Section 8.4.2.1), strengthen city networks, and involve them better at the UN level (Section 8.4.2.2). In the field of international climate policy, the Paris Agreement is a first step in this direction.

Scientific discussions of more radical ideas – like Barber's Parliament of Mayors – are nevertheless useful. It is advisable to bear in mind the possibility of opening up the international legal system to cities, since its declared goal is to solve global problems, and these problems have an impact not only between nation states, but also at the local, urban level. If strategies are developed at the urban level that can help solve global problems, not only should they not be impeded, they should be recognized, rewarded and promoted by incentive mechanisms. Further research which reveals the framework conditions required is therefore needed to find an appropriate way of integrating local solution strategies at the level of international law (Section 10.1.4; Box 10.1-10).

8.4.2.1

Enabling urban 'foreign policy'

It is a fundamentally positive development that cities are making a contribution to tackling global problems such as climate change or child labour with their own climate targets or by enforcing international labour standards. Urban, local competencies can help curtail child labour. One example was a ban on the use of gravestones produced by child labour – to be found in the statutes of a German municipal cemetery (Section 2.5.6.2). This example shows very clearly the extent to

which international standards can have an impact right down to the local level. In its special report 'Climate Protection as a World Citizen Movement', the WBGU has already advocated promoting the activities of cities in the fight against climate change (WBGU, 2014a). The WBGU is convinced that offering this support is the task of the nation states. It can be provided, for example, by removing legal barriers or making financial resources available. Research also needs to be complemented and extended (Aust, 2015b: 267 with reference to comparable research in Canada, South Africa and the USA) in order to identify ways of promoting positive city initiatives by the nation states within their legal sphere. Further research of this kind should be encouraged in international exchange, as should a political debate on this question within the nation states (Section 10.1.4; Box 10.1-10).

8.4.2.2

Strengthening city networks

In addition to allowing and encouraging the participation of cities, measures are needed that strengthen the city networks themselves and their integration into global governance structures.

The first measure is one that should be carried out by the city networks themselves: activities could be better coordinated and greater visibility attained by combining existing initiatives. In order to maintain the significant advantages of networks for the cities and, simultaneously, to take up relevant ideas on their role in global governance, a bundling of network activities should be advocated, e.g. through an umbrella association. The association could function as a voice for existing sustainability networks run by cities, and take on tasks such as harmonizing internal interests and activities, and conducting external public relations and lobbying for the networks. A positive example from the field of climate-change mitigation is the Compact of Mayors, a climate initiative in which three city networks – ICLEI, United Cities and Local Government (UCLG) and C40 – have joined forces (Section 8.4.1.2).

Secondly, city networks should be given more recognition as actors in the current sphere of international politics. The pioneering role of city networks should be rewarded, for example, by a political voice in the context of UN processes. The negotiations under the auspices of the Framework Convention on Climate Change (Section 8.4.1.2) are an area that illustrates the inclusion of city networks and their initiatives. In its special report on climate-change mitigation, the WBGU has already proposed recognizing city networks and equipping them, like NGOs, with rights, but not with obligations (WBGU, 2014a). Their interests should be taken into account, and they should be granted par-

ticipation and monitoring rights. In addition, there is a need for further thought on how, for example, the climate-change-mitigation efforts of the cities can be made transparent and visible, especially in cases where the ambitions of the nation state in this matter lag far behind those of one or several cities from that country. These requirements are reflected to some extent by the participation structures finally agreed on for Habitat III by a UN General Assembly resolution after tough negotiations. They allow cities and civil-society representatives to take part in all official meetings and to intervene in writing and orally. In addition, cities may submit recommendations and organize side events and round tables. Furthermore, the resolution also guarantees them access to all official documents (UN, 2015c). However, the arrangements that applied in 1996 for Habitat II went further. At that time, representatives of cities and civil-society organizations had access to all – not just the official – rounds of negotiation. After Habitat III, experience should be evaluated and compared. The UN should then ensure that an appropriate system becomes standard for all negotiations relevant for cities, so that constant arguments over whether and how cities and NGOs should have access are no longer necessary.

Thirdly, it is conceivable that cities also receive financial support as a further incentive. International funds and financing mechanisms could provide collective urban pioneers (and other associations of actors) with additional resources, if they play an active role in global governance.

The measures mentioned here must be carefully thought through and developed, since the problems of legitimacy and representation, which would also exist in a Global Parliament of Mayors, are also evident among more informal city networks. In order to counteract this, care should be taken to ensure that cities are represented in all their regional diversity and different sizes. A situation should be avoided in which the big metropolitan areas, with their personnel resources and economic power, use city networks to cement their supremacy.

8.4.3 UN-Habitat: the need for and potential of a reform

UN-Habitat, the United Nations Human Settlements Programme, was set up in 2000 on the basis of the United Nations Centre for Human Settlements, which had been founded in 1977, and the United Nations Commission on Human Settlements. Although it is closely linked to the Habitat conferences (Section 8.4.4) – its

mandate is based, among other things, on the results of the conferences, and it is also very much involved in the preparation of the conferences – UN-Habitat, as a UN programme, must be distinguished from these intergovernmental negotiations. As a programme of the UN system, UN-Habitat is highly dependent on fluctuating, voluntary contributions. UN-Habitat's budget totalled US\$ 186.3 million in 2012 (the latest available figure). US\$ 10.7 million of this amount came from the UN as core funding. A further US\$ 175.6 million was made up of voluntary contributions made by member states, nearly 94% of which was earmarked (UN-Habitat, 2013e:45). By way of comparison, UNEP, the United Nations Environment Programme, had a budget of US\$ 237 million in 2012 (UNEP, 2013c), i.e. about a third larger; it also had a significantly higher profile and exerted a more effective influence on international policy processes than UN-Habitat did.

The work of UN-Habitat essentially comprises two components: one aspect is content-related, normative policy work, such as compiling studies and reports on challenges or solution approaches, and organizing workshops; the other is technical cooperation, which accounts for most (69%) of the budget. Originally set up as a general programme for settlements, sustainable urbanization has become UN-Habitat's key concern in recent years. It is the only UN programme that deals with this issue. The work of the programme, which is based in Nairobi, Kenya, is supported by five regional offices and, following a realignment in 2011, focuses on seven thematic fields (UN-Habitat, 2013d): urban governance, planning and urban design, urban economy, basic urban services, housing and slum upgrading, risk avoidance and reconstruction, and research and capacity development.

The work of UN-Habitat was evaluated in 2011 by the British government (DFID, 2011), in 2015 by the UN (2015b), and during the creation of the Strategic Plan for 2014–2019 also by UN-Habitat (2013d) itself. These evaluations revealed great weaknesses. The British government cancelled its financial contributions to UN-Habitat's core budget in response to its evaluation (DFID, 2013:12). The main criticisms were poor financial management, a lack of transparency, and poor knowledge management (DFID, 2011; UN, 2015b). UN-Habitat acknowledges (2013d:5) that the strategy plans first emerged independently of UN-Habitat's work programme and budget, leading to ineffective management and monitoring structures. The causes include delayed reform processes which were partly due to the change of leadership – Joan Clos took over from Anna Tibaijuka as executive director of UN-Habitat in 2010 – and were only implemented hesitantly and inconsistently. The external evaluations also crit-

icized the fact that there had hitherto been no consistent, programme-wide climate mainstreaming (UN, 2015b:24), and some of the regional offices still worked mainly in rural areas, although sustainable urbanization is UN-Habitat's main concern (UN, 2015b: 1).

In view of the challenges of rapid urbanization, the WBGU believes that UN-Habitat is much too weak an actor within the UN architecture and is not in a position to meet the expectations placed in it. The management problems revealed by the evaluations must be urgently addressed. Transparent and effective management structures are required if UN-Habitat is to be active as a relevant and reliable partner in the field of urbanization. The management reforms envisioned in the strategy plan for 2014-2019 (introduction of a flatter, less hierarchical organization structure and better project-management structures) and internal monitoring mechanisms can make a contribution in this direction. In addition, it needs faster and more flexible decision-making structures. UN-Habitat has a governing council that only meets every two years; unlike UNICEF or UNDP, it does not have an executive board with a small number of actors that meet several times a year. Decisions (e.g. passing a work programme or a budget) thus need more than three years of preparation. This makes it difficult to respond flexibly to new challenges. But as urgently needed as management reforms are, they alone will not be enough to make UN-Habitat a sufficiently effective programme.

In the WBGU's opinion, UN-Habitat, should be put in a position (1) to generate relevant knowledge on urbanization and sustainable urban development, and to coordinate the collection of urban data. Since, as part of the UN system, it is regarded as politically neutral, UN-Habitat is particularly well-suited (2) to playing a supporting role in formulating targets and policies, especially in developing countries. UN-Habitat should (3) function as a multiplier in the exchange of knowledge and experience for the implementation of the Great Transformation in cities, promote sustainable urbanization, and initiate international negotiation and exchange processes. In addition, UN-Habitat should (4) give cities a stronger voice within the UN system.

There are various options for strengthening the role of UN-Habitat within the UN architecture and embedding the topic of urbanization better. In view of the challenges that urbanization poses for humanity, it would be appropriate to turn UN-Habitat into a UN organization for urbanization and urban development. Compared to the current programme status, this would have the advantage of being better financed and having greater autonomy and independence. UN organizations can determine their own procedural rules, like for example the International Labour Organization, which

has representatives of both employers and employees as members. This would make it much easier to integrate cities and city networks.

It would also be conceivable to merge UN-Habitat with UNEP, and then to upgrade them to an independent organization. Both programmes are struggling with financial and organizational limitations because of their programme status. A merger and closer dovetailing between urbanization and environmental issues could generate valuable synergies. Since both programmes are located in Nairobi, the logistical challenges of such a merger would also be relatively straightforward. However, there is the risk that urbanization and urban-development concerns might be weakened by a merger. UN-Habitat, as a smaller and much lower-profile partner, would run the risk of being absorbed by UNEP and might hardly be visible any more in a merged structure. Furthermore, experience shows – particularly the attempts to upgrade UNEP to an environmental organization of the United Nations (WBGU, 2001; Biermann, 2000; Meyer-Ohlendorf and Knigge, 2007) – that creating a new UN organization is not an undertaking that is bound to be successful or could be implemented quickly. In view of the time pressure, none of these options should be pursued alone.

A third approach would be to make urbanization a fixed part of all UN institutions as a cross-cutting theme, and to turn UN-Habitat into an Interagency Task Force – like UN-Energy in the field of energy. This would have the advantage that all UN institutions would have to grapple with the topic. However, there is the risk that ultimately, when attention shifts to other topics, there would be no institution left that deals with urbanization and sustainable urban development in earnest if there were no dedicated programme.

The fourth variant would maintain UN-Habitat's programme status, but restructure and expand it – at least to begin with and as a precursor to a possible upgrading of UN-Habitat to a UN organization. The aim should be to make UN-Habitat a strong programme whose influence and efficacy are at least on a par with such programmes as UNEP. In addition, the topic of urbanization should be made a central, cross-cutting theme within the United Nations across the institutions. The appointment of a Special Envoy of the Secretary-General for Urbanization would underline the importance of the topic and encourage debate about it – both within the UN and within the member states.

To enable UN-Habitat to adequately fulfil what the WBGU regards as its key roles as knowledge generator, consultative institution and multiplier, it should concentrate much more on its policy work. In this area it needs to fill a large gap, while, in the field of technical cooperation, UN-Habitat is competing not only with

other UN organizations, but also with bilateral development actors. With a view to the content of the work, the focus should be not only on urban planning and urban design, but in particular also on the global challenges engendered by urbanization. It is necessary to improve the quality of the policy work to make UN-Habitat an innovative and relevant cooperation partner for national governments and urban administrations once again. It would be helpful in this context to significantly boost the number of staff in the programme departments and to strengthen the capabilities of the regional offices to carry out advisory work.

In the WBGU's opinion, a scientific department and a chief scientist would be needed to strengthen UN-Habitat's policy work and put it on a more solid scientific basis. Such a department should be able to generate new knowledge, and to pool existing data on urbanization and make it available. A scientific department could further develop, in close cooperation with relevant research institutions, the collection of sufficiently detailed urbanization data, which should also take small and medium-sized cities into account as far as possible. In this way, UN-Habitat could also play an important role in the development of indicators and in monitoring (e.g. on SDG no. 11). A science strategy, yet to be drawn up for UN-Habitat, could serve as a basis for the development of scientific capacity, in a similar way to UNEP (UNEP, 2011a). In addition to this work by UN-Habitat, an international scientific panel on urbanization should be set up. In a similar way to the IPCC and the IPBES, the panel should regularly draw up progress reports on important urbanization trends. Only in this way can effective and scientifically well founded policies be developed.

UNACLA (United Nations Advisory Committee of Local Authorities), UN-Habitat's urban council, should be strengthened to enable it to better meet the needs of cities and to give them a stronger voice within the UN. To intensify the exchange with and between national governments, it would also be a good idea to hold regular regional ministerial meetings at which the national ministers of building and urban development can discuss common challenges. This could be an extension of the regional meetings of ministers, which were last held to prepare Habitat III.

In order to carry out the tasks mentioned, the international community of states should not only initiate a rapid reform of UN-Habitat, but also improve UN-Habitat's financing. After deducting the funds earmarked for technical cooperation and the positions related to this, all that remains is a tiny budget and a small staff of fewer than 400 people. That is not enough to do justice to the role of a knowledge generator, stimulator or multiplier. It is understandable that countries such as the United

Kingdom and the Netherlands have stopped making payments to UN-Habitat's core budget in view of ineffective management structures, a dearth of innovation in policy work, and lacking monitorability of its successes. But to be able to do justice to the tasks at hand and make progress with the proposed changes, it is necessary to resume such payments quickly and to raise the budget for content-related, normative policy work and capacity development to a similar level to that of UNEP.

In the WBGU's opinion, UN-Habitat's future role in the sustainable shaping of urbanization should be discussed at Habitat III. The mandate for UN-Habitat should be modified in a way that enables the programme to effectively carry out the above-mentioned tasks.

8.4.4

New Urban Agenda: use Habitat III for the Great Transformation

Habitat III is the first major UN conference after 2015, which saw the third international Conference on Financing for Development, the adoption of the 2030 Agenda and the COP21 in Paris. The WBGU suggests that Habitat III should aim to produce the following results in order to make the processes initiated at these summits locally relevant and to strengthen the Great Transformation at the urban level worldwide:

- Procedural renewal:* In view of the great speed of urbanization and the path dependencies that are created when building new infrastructures, the WBGU believes that a 20-year rhythm of Habitat conferences is not appropriate. The conference should take place every four years. Cities and city networks have been granted the right to speak and participate in Habitat III. To strengthen their role and avoid the kind of delays in negotiations experienced in the run-up to Habitat III, these rights should be made permanent and not redefined for every conference. In this way, the new Habitat conferences can become pioneers in the participation of cities and city networks, making it possible to try out and determine the best role for cities and city networks within UN negotiations (Section 8.4.2.2).
- Advancing the urban transformation:* With the New Urban Agenda, Habitat III should give a decisive impulse for the Great Transformation in cities. In the WBGU's opinion, a charter for the urban transformation, which could be negotiated in the post-Habitat III process up to 2020, could serve as a vehicle and focal point (Sections 8.5, 9.2).
- Create a bridge to 2030 Agenda and the Paris Agreement:* The New Urban Agenda should try to

- build a bridge between the cities and both 2030 Agenda and the results of the UNFCCC negotiations. Both are global governance processes whose relevance to cities is occasionally explicitly stated. However, by and large this connection is missing and should be created by Habitat III, the first implementation conference after the 2015 summit year: it should translate the results of 2030 Agenda and the Paris Agreement to the local level and, for example, supplement the SDGs that have urban relevance but have not yet been specifically formulated, by adding city-specific sub-targets (Adelphi and Urban Catalyst, 2015:13ff.). The creation of uncoupled parallel structures should be avoided; instead, a close relationship with the other negotiations should be established (Schreiber et al., 2016).
4. *Create structures for implementation and monitoring:* Habitat III should initiate effective implementation and monitoring processes to ensure that the New Urban Agenda does not just remain a promise, but leads to concrete transformation processes. Here, it is worth taking a critical look back to Habitat II, where the structures set up for this purpose were inadequate.

A monitoring process for the New Urban Agenda should take its orientation from the 2030 Agenda monitoring process and try to take advantage of as many synergies as possible. This means first and foremost making use of the SDG indicators and supplementing them where they are not city-specific (Adelphi and Urban Catalyst, 2015:13ff.). The results of such a monitoring process should be regularly discussed at the Habitat conferences and the World Urban Forum, which is highly valued by stakeholders as an important global exchange forum (UN, 2015b:13) and should continue to take place, alternating with the Habitat conferences.

8.5

Build a polycentric responsibility architecture

The outlined challenges for cities – some resulting from the current and future urbanization dynamics, others from the necessary transformation towards sustainability – make it necessary for cities to be active not only at the local level, but also nationally and globally.

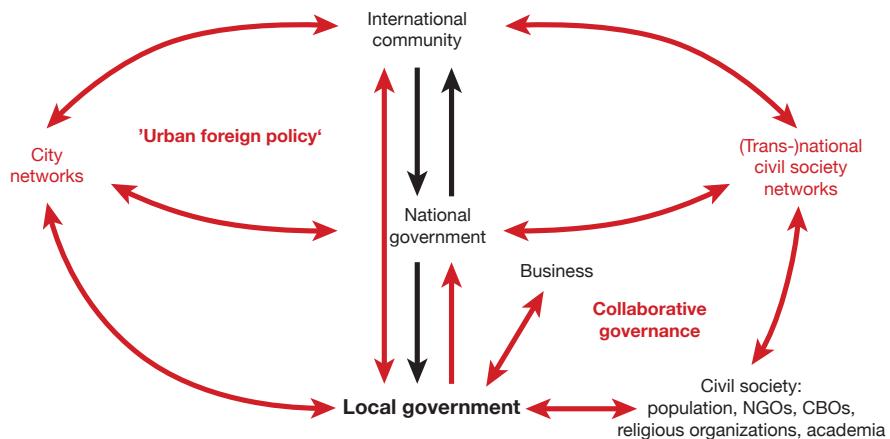
At the local level – as shown – it is necessary not only to recognize the responsibility of the cities for their own transformation pathways, but also to empower them to take responsibility. Responsibility for their own local affairs should be transferred to cities. Top-down structures should be avoided in which nation states lay down rules for their cities and leave them little or no room for manoeuvre. Overall, the WBGU advocates a

mix: vertical, top-down governance structures should be complemented by bottom-up approaches. In particular, the authority of cities over shaping and planning should be strengthened, facilitating the organization of their own affairs (Section 8.2). In many cities in developing countries and emerging economies, this decision-making power would first have to be transferred to the cities, while cities in many industrialized countries will need to correct decisions made in recent decades that took away a considerable proportion of their control and financial resources.

Furthermore, vertical governance structures should be extended horizontally. This can be done at the local level by incorporating urban societies into collaborative decision-making processes. A horizontal extension of responsibility also takes place when cities link up in national and international city networks. In order to promote and reinforce this development, it must be a concern of nation states in particular to empower cities and their local governments to shape the transformation process. Cities must be equipped with the appropriate decision-making powers and resources.

On the other hand, the challenges are so big that even well-resourced local governments would fail if they wanted to organize and enforce the transformation process in their cities by themselves. Their powers to shape and control are limited, and a city's transformation will only be permanently successful if that city is backed by the entire urban society, and if the latter assumes responsibility. To achieve this, especially the principles formulated in the inclusion and *Eigenart* dimensions of the normative compass must be taken into account during the transformation process. There is a need for a functioning public sphere (Box 2.5-3) with open arenas for discourse in which all actors are involved. They form the framework for a joint search process leading to the development of the vision for the Great Transformation of a city. Only in this way do legitimacy and support evolve, securing the successes of this transformation process in the long term (Section 8.3). At the national level, the focus is on strengthening the autonomy of cities and urban administrations and on their ability to shape their development. Whereas, at the local level, it is essential to involve the residents of a city and to enable them to help shape the transformation process, at the national level cities must articulate and promote their interests to ensure that they are equipped with the necessary decision-making powers and financial resources.

Interlinking vertical and horizontal governance structures across different levels of governance results in a polycentric responsibility architecture. Long-term environmental economics research on public goods and joint action has shown that such polycentric struc-

**Figure 8.5-1**

Elements of a polycentric responsibility architecture. The diagram indicates the different elements. The original governance structures in most countries – essentially vertical and top-down – in which cities have little autonomy, are symbolized by the black arrows. Civil-society engagement exists, e.g. via non-governmental organizations (NGOs) or community-based organizations (CBOs). But for the most part it is poorly integrated. The creation and strengthening of transformative urban governance structures (shown in red), such as collaborative governance and 'urban foreign policy', leads to a horizontal extension of the vertical structures and the addition of bottom-up processes.

Source: WBGU

tures as a rule achieve better results and ensure that processes can still be continued even when individual levels or institutions are blocked (Messner, 1997; Stichweh, 2004; Ostrom, 2010, 2014, 2015; Messner and Weinlich, 2016).

This second dimension of polycentrism alongside the spatial idea of polycentric regional development – the polycentric architecture of governance and responsibility outlined here by the WBGU – forms the basis for solutions to the challenges of transformative urban governance (Chapter 8.1). The essential demands on this polycentric responsibility architecture are as follows:

- If they are to be able to achieve the required *scale of changes* in the time frame available, it quickly becomes clear that cities – especially in developing countries and emerging economies – cannot follow the traditional development pathways, but must leapfrog non-sustainable development stages.
- To do justice to the *time factor* and to be able to act quickly and implement long-term objectives simultaneously, it is necessary to see cities as transitory spaces. Structures created to meet current needs must be flexible and modifiable. Dismantling options are required that make it possible for cities to develop sustainably within the framework of the normative compass, and to avoid unwanted path dependencies. In this context, it helps to think modular when it comes to cities.
- A high degree of flexibility and adaptability is necessary to be able to control the transformation pro-

cess despite great *uncertainty*. Only by collaboratively involving different actors and establishing co-management structures do pluralistic perspectives develop and, with them, the broad knowledge base needed to be able to behave in an adaptable way and to respond flexibly to unexpected challenges and events (Folke, 2006; Wilkinson, 2012a; Boyd and Juhola, 2014). For this purpose, it is important to strengthen arenas for discourse and to create open spaces and spaces for experimentation (Section 8.3), where there is room for creativity (Section 3.5.3.3), new intersectoral and interdisciplinary approaches can be tried out, and acceptance for them can be created. This makes it possible to simultaneously reduce the fears and irritations that develop as a result of the *paradigm shift* in the course of the Great Transformation.

A polycentric responsibility architecture also requires that cities should be granted rights at the global level – e.g. rights to speak and participate in international discourses and conventions. In this way, nation states would extend the responsibility architecture horizontally. Moreover, cities should be encouraged and supported to network nationally and internationally in city networks to likewise strengthen horizontal governance structures.

In the WBGU's opinion, the polycentric responsibility architecture outlined in this section is one of the key elements of a social contract for the urban transformation. Charters for the urban transformation based on these elements should be created at all levels

8 Transformative urban governance: empowering cities

of governance (Section 9.2). The New Urban Agenda should – as previously outlined – lay the foundation enabling the states to prepare a global charter by 2020. In a similar way, there should be such charters at the regional (e.g. EU) and national levels. But also every individual urban society itself should specify in concrete terms, in a charter, its inner-city social contract for an urban transformation.

Recommendations for action

9.1 Challenges

More than half of humanity already lives in cities. This proportion is expected to rise to about two thirds by the middle of the century, so that approx. 6.5 billion people will then be living in cities. The current situation and dynamics differ fundamentally in the various regions of the world. In Europe and North America, the biggest urbanization surge already took place in the last century, and a little later in Latin America. Today, more than three quarters of the people in these regions live in cities, whereas this applies to significantly less than half of the population in Asia and Africa. The main momentum of the current urbanization dynamic is thus concentrated primarily in Asia and Africa (Section 2.1). The effects are so massive that we must face up to this trend. There are likely to be an additional 2.5 billion people living in cities by the middle of this century (UN DESA, 2014). In view of the existing cognitive, technical, economic and institutional path dependencies, a policy of 'business as usual' – i.e. unstructured, quasi-automatic urbanization – would lead to a non-sustainable 'world cities society'. More than 850 million people today are already living in inadequate housing without access to basic supplies and services (UN DESA, 2015). In sub-Saharan Africa, more than 60 % of the urban population are currently living in slums; in Asia the figure is around 30% (UN DESA, 2015). By 2050, the number of people living in inadequate housing could rise by 1-2 billion, unless effective action is taken (UN DESA, 2013). In this case, the other up to approx. 1.5 billion people making up the expected total of approx. 2.5 billion additional city-dwellers would therefore not move into slums, but into new city districts erected very quickly. This relocation of humanity could become the most consequential process of social change in the 21st century.

It involves immense challenges for providing adequate housing and living conditions both in existing and in the many newly emerging cities or city districts.

In addition, many cities are confronted with the challenges of climate change. For example, answers must be found to the threat to many coastal cities posed by the rise in sea levels and by the risks of storm events and flooding (Revi et al., 2014a). The growth dynamic of the urbanization process is particularly strong in medium-sized cities (1-5 million inhabitants).

Another challenge lies in offering a growing urban population adequate, long-term access to infrastructures, income sources and a good quality of life, in encouraging and empowering them to get involved, while at the same time managing the urbanization surge in a resource- and climate-friendly way, so that planetary guard rails are complied with. This requires fundamental changes in urban development, which the WBGU has described as the Great Transformation towards sustainability (WBGU, 2011; Section 3.1).

9.1.1 Realign and reshape urban development

The way we live in the cities can be shaped and managed; it is not the result of some inescapable urbanization dynamic. Cities and urban societies can influence whether housing is affordable, whether cities fragment into wealthy and precarious city districts, whether road noise and air pollution are tolerated, whether the cities are dissected by through roads, and whether urban mobility is subordinated to the primacy of private car traffic. Here, improving living conditions in the cities goes hand in hand with their contribution to the global transformation towards sustainability. Cities are an integral part of a hierarchy of levels of government and responsibilities; they are frequently subject to financial constraints and uncontrolled dynamics that limit their ability to control their destiny. Nevertheless, in the WBGU's opinion there are many ways in which urban development can be influenced in a positive direction.

Cities are also not isolated actors. Large cities in particular have organized themselves into city networks with their own voice, where experience and know-

9 Recommendations for action

ledge are exchanged and interests are bundled. Given the growing importance of cities in global sustainability policy, their ability to act as global players and contributors to the Global Transformation towards sustainability should be strengthened accordingly.

Essential elements of this Global Transformation towards sustainability involve major changes to current urban development dynamics:

- *First*, the physical development of cities, their urban form, their connectedness, their infrastructure and buildings. In this context the next two decades will offer an historic opportunity, since a considerable proportion of the urban areas will be newly built, re-built or expanded. Never before in the history of humanity has such a comprehensive urban infrastructure, consisting of buildings and systems for mobility and energy, been constructed in such a short period of time. It will largely depend on how this development is shaped and managed whether the natural life-support systems can be sustained and all people given the opportunity of substantive inclusion. Humankind can either create new path dependencies that obstruct the road to a sustainable future, or it can successfully and quickly change course, leapfrogging technological development stages and making it possible to pursue a sustainable urbanization pathway.
- *Second*, the strengthening and mobilization of the urban societies themselves. They must be empowered to assert their interests effectively. In this context, a special challenge – but also an opportunity – is the fact that new urban societies are forming worldwide (Section 2.4).

As its overarching goal, the WBGU is aiming for moderate densification, resource conservation, and conversion to a circular economy, for cities that are energy-efficient and emissions-neutral in the long term, and marked by socially mixed districts in which the urban societies are substantively involved in urban development. In addition, more polycentric spatial-development concepts and decentralized settlement structures should be promoted in order to avoid spatial socio-economic disparities, and to counteract potential agglomeration disadvantages in growth regions.

In such cities, housing is affordable, the entire urban population has access to basic infrastructure, there are sufficient green and recreation areas, private car traffic has been greatly reduced in favour of public and non-motorized mobility systems, travel distances, e.g. from home to work, are short, children are not at risk in public spaces, and public squares are hubs of exchange and communication.

On the other hand, these are also cities where responsibilities are regulated in such a way that rights

of ownership or use are exercised in the spirit of the common good, political inclusion is made possible, innovation is stimulated and co-determination processes are established that place the urban population at the centre of the urban development – and not only rhetorically.

Cities and urban societies are key arenas of the transformation towards sustainability and have great transformative power. The aim must be to mobilize and use this power. At the same time, every city is different, each has its unique character (*Eigenart*) that has grown historically. Strategies for the transformation towards sustainability must take this *Eigenart* into account and use it as a resource for change.

9.1.2

Use the transformative power of cities and urban societies

The present recommendations are geared towards integrating urbanization dynamics into global change, and in particular towards a long-term urban transformation strategy. The aim was to identify key action approaches for a future-oriented, transformative urban-development policy. The choice was made with a view to the scale, time horizons, specific acceleration requirements and time frames needed to prevent undesirable path dependencies. With this, the WBGU aims to contribute to the international urbanization debate, which, despite a high level of convergence in perceptions of the problems, lacks a superordinate, long-term transformation concept in which to embed the recommendations (Section 2.6). This concept is geared towards the normative compass proposed by the WBGU, comprising the elements ‘sustaining the natural life-support systems’, ‘inclusion’ and ‘*Eigenart*’ (Chapter 3).

When formulating its recommendations, the WBGU was also guided by the insight that, given the cultural, geographical and structural diversity of cities, their very different levels of development, and the diversity of the problems facing them, there can be no such thing as a blueprint for sustainable urban development.

The recommendations are primarily addressed to Germany’s federal government, primarily in its capacity as a player on the international stage. However, many of the recommendations also directly target local governments and urban societies and appeal to their transformative power.

9.2

Elements of a social contract for the urban transformation

The Great Transformation towards a sustainable society requires a cross-generational orientation framework to ensure harmonious coexistence for nearly 9 billion people. The WBGU speaks in this context of a ‘new global social contract for a low-carbon and sustainable global economic system’ (WBGU, 2011). In such an imagined agreement, individuals and civil-society groups, governments and the international community, businesses and academia pledge to take on shared responsibility for sustaining natural life-support systems. Such a social contract is a prerequisite for securing societal inclusion and the legitimacy of the urban transformation.

The worldwide urbanization dynamic is at the centre of this report, and here, too, the WBGU considers it necessary to agree on a global consensus on urban quality of life, while simultaneously sustaining humanity’s natural life-support systems. Elements of such a consensus have already been developed on the international stage. The course has been largely set with the adoption of the Sustainable Development Goals (SDGs) and the Paris Agreement of 2015 on climate change. The United Nations Conference on Housing and Sustainable Urban Development (Habitat III) offers an opportunity to make further progress with this global consensus.

Against this background, it is possible to define the idea of a global social contract more precisely, and to formulate it in detail as a ‘social contract for the urban transformation’. It could be mirrored worldwide and at all levels of governance in the form of written charters. Habitat III offers a chance to launch the negotiation process for a charter at the global level. The states should integrate and flesh out the perspective of urban transformation into such a document as a guiding concept. They should also articulate how corresponding transformation processes can be supported at other levels of governance, particularly at the local level.

Urban societies, too, should take the opportunity to write their own individual charter formulating their city’s vision and pathway for a transformation. Common ideas about the direction of future urban-development policies should be negotiated in a participatory manner and laid down as an official document. Because of the diversity of the cities and urban societies, these agreements will vary; however, they could take their orientation from the normative compass for urban transformation proposed by the WBGU. Similar charters can also be useful at the regional (e.g. in the EU) and national levels. Such a process would be spear-

headed by pioneers of urban development and contribute to the emergence of a transnational and polycentric responsibility architecture for shaping and managing urbanization in the 21st century (Chapter 8).

The idea of such charters takes up a series of existing political statements and agendas that have been adopted at different levels over the last few decades by governmental and city alliances, mayors and non-governmental organizations, and already contain important aspects that are needed for an urban transformation. One of the most prominent is the 2007 Leipzig Charter on Sustainable European Cities, a landmark declaration for Europe (Section 2.2.2.6). The Leipzig Charter focuses on integrated urban-development policy as well as disadvantaged city districts and contains many elements that are also supported by the WBGU. The Leipzig Charter would have to be further developed in a global perspective and extended to include the fundamental challenge of global environmental change.

In addition, under the term of ‘Right to the City’ (Box 3.5-1) a global discourse has developed out of social protest movements and city networks, in which a wide variety of actors champion the cause of more equitable cities and better opportunities for inclusion. Examples include the World Charter on the Right to the City (2001) and the Global Charter – Agenda for Human Rights in the City (2005), which formulate key principles for the inclusive city. To initiate a discussion in preparation for Habitat III, the civil-society and private-sector partners of the World Urban Campaign issued a statement called The Future We Want – The City We Need (WUC, 2014), a revised version of which is being published in 2016 (WUC, 2016). In this statement they formulate principles of a new urban paradigm and a corresponding political road map for the next 20 years. These examples show that there is experience with negotiating such charters and that networks exist that can help further the formulation of such charters for urban transformation. However, the existing declarations do not sufficiently address the challenges of the kind of comprehensive urban transformation towards sustainability that the WBGU recommends.

The social contract itself would be virtual in character in the sense of a societal agreement on the urban transformation. However, it should be mirrored worldwide and at different levels of governance in the form of fully formulated charters. The three key elements (Table 9.2-1) of such a contract are:

- a polycentric responsibility architecture (Section 9.2.3);
- a transformation towards sustainability of the urban action fields prioritized by the WBGU (Section 9.3);
- consideration of the WBGU’s normative compass (Section 9.2.1).

9 Recommendations for action

Table 9.2-1

Three key elements of a social contract for the urban transformation towards sustainability.

Source: WBGU

Key elements of a social contract for the urban transformation

Polycentric responsibility architecture

- Recognize cities in the constitution
- Grant the right to self-government in shaping local affairs
- Distribute decision-making powers according to the subsidiarity principle
- Secure funding
- Strengthen institutional and personnel capacity, establish effective planning structures
- Consult cities in national decision-making processes and in international negotiations
- Enable urban societies to influence the transformation process
- Agree charters for the urban transformation at the local, national, regional and global level

Transformative action fields in cities

Internationally discussed fields

- Decarbonization, energy and mitigation of climate change
- Mobility and transport
- Urban form
- Adaptation to climate change
- Poverty reduction and socio-economic disparities

Focal points: fields that are given too little attention internationally

- Urban land use
- Materials and material flows
- Urban health

Normative compass

- Sustaining natural life-support systems
- Ensuring inclusion
- Promoting *Eigenart*

9.2.1

Normative compass

The WBGU has developed a normative compass with which to shape and manage the fundamental upheavals in the century of urbanization. It is made up of three dimensions (Chapter 3):

- *Sustaining the natural life-support systems*: All cities and urban societies should pursue development pathways that take the planetary guard rails into account and solve local environmental problems.
- *Inclusion*: Universal minimum standards for substantive, political and economic inclusion should be met in all urban societies.
- *Eigenart*: With the dimension of '*Eigenart*', the WBGU on the one hand recognizes the sociocultural and spatial diversity of cities and urban societies (descriptive *Eigenart*). On the other hand, *Eigenart* is a target or orientation dimension of urban transformations (normative *Eigenart*); as such it emphasizes that conditions should be created in urban living environments which ensure that (a) people can develop self-efficacy in the spatial structures and can feel and create urban quality of life for themselves; (b) local identity and social cohesion can develop; and (c) there is a strengthening of the potential for social and economic creativity and

innovation that is generated via local interactions (connectivity) between actors from different spheres of society.

9.2.2

Transformative action fields as part of the social contract

The term 'transformative action fields' in cities is applied to those areas of urban development where the WBGU sees the biggest potential leverage effects for the urban transformation towards sustainability (Sections 4.1, 9.3). On the one hand, these key action fields represent solution options which are particularly likely to trigger system swings towards sustainability, because of their considerable co-benefits and their potential for preventing path dependencies. On the other hand, transformative action fields also represent major challenges which, due to their urgency and scale, are also of elementary importance for the transformation towards urban sustainability. See Section 9.3 for the recommendations on the transformative action fields.

Table 9.2-2

Prerequisites for the transformation capability of urban societies.

Source: WBGU

1. Recognize and strengthen cities as key arenas of the transformation
2. Re-establish public authority over shaping and planning urban areas
3. Cities should assume responsibility for their own transformation pathways
4. Create arenas for public discourse and experimentation; allow and encourage the inclusion of the urban population
5. Use the normative compass to find integrative solutions to conflicts of objectives
6. Inclusive growth: reduce socio-economic disparities
7. Improve cities' adaptability to rapid changes
8. Regional planning should promote polycentric urbanization
9. Strengthen the role of science and education in the urban transformation

9.2.3

Polycentric responsibility architecture

In order to be able to implement the Great Transformation in the cities and to benefit from their transformation potential, the WBGU recommends strengthening the role of cities and urban societies and giving them more autonomy vis-à-vis the power of the nation states. Nation states should create the necessary conditions to enable cities to take responsibility for their own transformation pathways and to cooperate with other cities. This requires more than recognizing the right to self-government and organization in local affairs. Cities should also be given the right to represent their interests in national legislative processes, and to participate in, and speak at, negotiations at the international level.

In addition to an extension of the rights and areas of influence of cities in the vertical responsibility structure, there is also a need for a horizontal extension of the responsibility architecture (Chapter 8). Cities should be enabled to network and develop common strategies and concepts for transformation pathways at the international level. At the local level, cities should strengthen civil society and enable it to contribute to decision-making processes. A polycentric responsibility architecture emerges through the networking of vertical and horizontal structures across the various levels. The basis for this can be provided by charters on urban transformation, which WBGU believes should be created at the local, national, regional and international levels.

9.2.4

Further elements to be considered

Alongside the key elements of the social contract listed in Table 9.2-1, additional elements that need to be taken into account in negotiations on the social contract for

the urban transformation towards sustainability, and its operationalization in the form of charters, include the development risks of global change (Section 7.5; Table 7.5-1) and the prerequisites for the transformation of the cities (Section 9.2.4.2; Table 9.2-2).

9.2.4.1

Urbanization surge up to 2050 – six development risks of global change

Seen from the perspective of the WBGU's compass, the sum and cumulation of urbanization dynamics in the three urban configurations (Chapter 7) lead to six global system and development risks which are of great importance, especially for decision-makers in international cooperation. In Sections 7.5 and Table 7.5-1, these development risks are presented in detail.

9.2.4.2

Prerequisites for the transformation capability of urban societies

The progress and success of the Great Transformation (WBGU, 2011) essentially depend on the decisions that will be taken in cities over the next few years. A paradigm shift must take place – away from incremental approaches and towards transformative changes – in order to sustain humanity's natural life-support systems and people's quality of life in the long term. The perspective used here is to look back to today from a desirable future. How can each urban society find a transformation pathway for itself that makes this sustainable future possible? To achieve this, the diversity of the cities and the potential of their actors must be taken seriously and used. Against this background, the WBGU identifies the following prerequisites for the transformation capability of urban societies.

9 Recommendations for action

1. Recognize and strengthen cities as key arenas of the transformation

Key elements of the transformation are decided in cities. One example is infrastructure development (energy, water and sanitation, waste management, mobility). Integrative solutions can be found in many transformation fields at the city level, e.g. urban land use, how materials and material flows are managed, and urban health. Cities also offer important solution potential in other transformative action fields, such as energy and mitigation of climate change, mobility and transport, urban form, adaptation to climate change, or poverty reduction and socio-economic disparities (Chapter 4, Section 9.3). Synergies between local development and global challenges should be used here, e.g. by implementing new mobility concepts and agreeing inclusion (access to mobility) and sustaining the natural life-support systems (e.g. avoiding greenhouse-gas emissions). However, cities can only make use of this potential if they have sufficient decision-making powers and can ward off interference and encroachment by the nation state when necessary. One prerequisite for the above-mentioned polycentric responsibility architecture is that, in the age of global urbanization, cities gain the right to run their local affairs. This also applies to the role of the cities as players in international cooperation. There is much to be said for recognizing cities as players at the international level and for enabling them to take decisions promoting transformative urbanization.

2. Re-establish public authority over shaping and planning urban areas

As stated in many global reports on urbanization (Section 2.6), the public sector should regain authority over planning and shaping in the cities. This authority is often undermined by lack of financial, institutional and personnel capacity. Weak governance makes cities susceptible to corruption; it also increasingly leaves urban design to private actors, e.g. property investors or even violent organizations. Local governments and administrations should assume (more) responsibility for urban development and for necessary investment in the infrastructure. Often, however, the necessary financial resources are not or not sufficiently available. To enable cities to also take action financially, the size of municipal budgets should be increased, so as to intensify investment and boost the use of their own sources of funding (e.g. local taxes and fees). Moreover, there is often a lack of adequate institutional and personnel capacity, including suitable training. As a result, legal provisions are not enforced (enforcement deficiencies). The fight against corruption in the cities is a key precondition for strengthening their authority over shap-

ing and planning. The WBGU therefore proposes that the cities should be strengthened financially, institutionally and politically, so that they can take on more responsibility for urban development and infrastructure.

3. Cities should assume responsibility for their own transformation pathways

The WBGU has identified patterns of urban development (planning cities and city districts from scratch, informal settlement construction, mature cities and districts) which reveal immense challenges and opportunities for a transformation towards sustainability (Chapter 7). Irrespective of the respective patterns, cities must increasingly take on responsibility both locally and globally for the Great Transformation towards sustainability. In this way cities become symbolic ‘real-world laboratories’ for transformative solutions, for there are no blueprints for sustainable urban development. Developing a wide range of transformation pathways is an important joint search process involving local stakeholders. The WBGU offers a normative compass for this process. The diversity of the pathways offers opportunities for developing innovations and for initiating learning processes between the cities. Alliances like Local Governments for Sustainability (ICLEI), City Alliance – Cities Without Slums, Right to the City Alliance, C40 Cities and the Compact of Mayors are suitable forums in this context.

4. Create arenas for public discourse and experimentation; allow and encourage the inclusion of the urban population

Transformation requires dialogue, joint learning processes and conflict management. Urban societies must agree on the objectives of the transformation and their long-term future, for example in the form of city-specific charters for the urban transformation. The prerequisite is the establishment of urban arenas for public discourse in which civil-society stakeholders, non-governmental organizations, the private sector and academia can discuss and negotiate with the urban administration – in public, transparently and on an equal footing. Firstly, this enables the urban population to take individual responsibility; secondly, it strengthens a city’s *Eigenart*. A special role is played here by incorporating and strengthening groups that are especially dependent on a people-oriented design of public spaces.

In newly emerging city districts and in ‘catching-up’ development, the required change can already be initiated by making fundamental changes, for example, in the urban form, building standards and the materials used (leapfrogging); in existing cities, however,

the focus is on overcoming path dependencies, e.g. by creating arenas for experimentation. Here, the detailed designing of the transformation is a joint search process in which many solutions have yet to be found with the involvement of local stakeholders. Freedom and arenas for experimenting with innovations in urban design are essential here. This form of citizen inclusion simultaneously boosts the legitimacy of the local government. Urban societies should therefore create suitable framework conditions (e.g. funding structures) and promote the skills needed to take action. Civil-society stakeholders, businesspeople and scientists with the appropriate skills can use these structures to produce a wealth of ideas and innovative solution approaches which can contribute to the development of sustainable development pathways. These results should be used and, where appropriate, incorporated into institutional, legitimized and binding structures.

5. Use the normative compass to find integrative solutions to conflicts of objectives

In the search for solutions to conflicts of objectives, an integrative approach based on the normative compass (Chapter 3) should be pursued when designing urban-development processes. Synergies should be exploited in this context. For example, an improvement in urban air quality is not only good for people's health, it can also make a contribution to the mitigation of climate change and is ultimately good for well-being and quality of life in the city. A sectoral approach or a sequential way of tackling individual objectives can trigger considerable conflicts of objectives, for example, where there are differences in short-term interests between the real-estate industry, the design interests of public actors and the quality of life of the urban population. These conflicts of objectives must be detected and taken into account as early as possible. For example, it is not a solution to initially focus on solving socio-economic problems by boosting growth at the expense of resources and the climate, and leaving the job of 'repairing' environmental damage until later. If e.g. a majority of the fast-growing cities in the emerging economies were to follow such an approach, this would initially mean that the new global middle classes would grow. However, at the same time, the planetary guard rails would be breached in the coming decades, thus jeopardizing the livelihoods of many future generations. Furthermore, the aspect of *Eigenart* must not be neglected. This is a reference to the loss of urban cultural heritage, identity-generating landmarks or parks that are open to the entire community; it might also include missed opportunities to strengthen social cohesion and therefore important resilience factors in such a process. In view of the complex challenges and time

pressure for the transformation, integrated, holistic and systemic solutions are required from the outset.

6. Inclusive growth – reduce socio-economic disparities

Income and wealth disparities, which are rising particularly in cities, have a negative impact on the social cohesion of urban societies, on urban economic development, and on the governability and security of cities (Section 3.4.2). Reducing socio-economic disparities is therefore a key condition for the transformation capability of cities. The debate on inclusive growth and the adoption of SDG no. 10 – "Reduce inequality within and among countries", which includes ensuring above-average income growth rates for the lowest 40% of the income groups (one of the targets of SDG no. 10) – has established a framework for national policy-making which cities can refer and contribute to. Cities can help reduce socio-spatial disparities, for example by ensuring an adequate and affordable supply of housing for all, by overcoming access barriers to education and health services, by prioritizing non-motorized mobility and local public transport, or by building basic infrastructures such as water and sanitation facilities. Furthermore, participation structures should be designed in such a way that the entire urban population can help shape the development of a city, regardless of income and on an equal footing. These goals should be prominently embedded into urban-development strategies; they are just as essential for the transformation capability of a city as, for example, ensuring healthy finances and good administration. In view of the challenges involved for many cities and urban societies in having to cope with the large number of refugees (e.g. in the Middle East and Europe), it is all the more important to counteract polarization tendencies. It is essential to quickly find cost-effective, liveable, human and ecologically sustainable solutions for refugee accommodation and settlements, and thus to strengthen cities in their role as key sites of cultural human development.

7. Improve cities' adaptability to rapid changes

The transformation of cities towards sustainability is a long-term process in which fundamental changes are made in the direction taken by urban development. At the same time, the challenges and problems that confront cities and urban societies today vary considerably. Accordingly, solution approaches are many and varied and depend on local conditions. The diversity of the challenges is illustrated with city examples (Chapter 5). Using three settlement patterns (newly planned, informal and mature settlements), Chapter 7 explains the fundamental differences in the transformation requirements and solution approaches.

9 Recommendations for action

In newly emerging cities and city districts, one of the main priorities is to avoid non-sustainable development pathways and their related path dependencies by leapfrogging stages of technological and institutional development, and by encouraging economic and social innovation and participation. Due to the strong urbanization dynamics, infrastructure development is currently not keeping pace with population development in many cities of the world. Furthermore, cities and city districts can be exposed to new dynamics which force them to act under great time pressure and uncertainty. Examples of such challenges include the need to adapt to climate change and shock events such as large movements of refugees from crisis regions or following natural disasters. Cities and city districts should therefore also be understood as transitory spaces in which structures that are needed quickly today can be created, but must be flexible and modifiable over the long term. Thus, in future, architecture, urban development and urban governance must offer a framework that can tolerate and promote changes, additions and extensions. Leapfrogging, modularity, flexibility, adaptability and resilience can therefore be regarded as design features of ‘urban development in transition’ (Section 8.1).

8. Regional planning should promote polycentric urbanization

If spatial development concentrates on a small number of central locations, this usually exacerbates both social disparities and disparities between economic areas. National and regional planning should encourage the emergence of polycentric spatial structures, so that the area is dominated not by one, but by several central locations. The guiding concept of ‘decentralized concentration’ is based on this principle; it pursues the goal of avoiding disparities between social and economic areas by promoting decentralized settlement structures and infrastructures and counteracting potential agglomeration disadvantages in growth regions.

9. Strengthen the role of science and education in the urban transformation

Science and education contribute towards a broader understanding of the urban transformation; they make this knowledge accessible and help identify and implement suitable transformation pathways for the respective city (Chapter 10). Inter- and trans-disciplinary research is especially suitable for this, because the inclusion of urban stakeholders significantly improves the chances of implementation. In ‘real-world laboratories’, scientists and stakeholders can jointly acquire knowledge and problem solutions for the urban transformation by trying things out and experimenting. In

order to make this knowledge about transformation also accessible to broad strata of society, transformation education is also necessary.

9.3

Transformative action fields in cities

This section begins with recommendations on the fundamental choices that need to be made in selected transformative action fields that are already being discussed internationally (Section 2.6), but which the WBGU places into a new context in relation to time horizons and scale against the background of transformation (Section 9.3.1). These are five action fields: (1) decarbonization, energy and mitigation of climate change, (2) mobility and transport, (3) urban form, (4) adaptation to climate change, and (5) poverty reduction and socio-economic disparities. Furthermore, it makes recommendations on three transformative action fields that are examined in detail in this report and which, in the WBGU’s view, are given too little political attention internationally (Section 9.3.2). These are (1) urban land use, (2) materials and material flows, and (3) urban health (Table 9.3-1).

9.3.1

Transformative action fields that are in the focus of international attention

9.3.1.1

Decarbonization, energy and mitigation of climate change: improve urban decision-making skills and strive for zero emissions

Cities are responsible for approx. 70% of global demand for energy and global energy-related greenhouse-gas emissions (Seto et al., 2014; Section 4.2.1).

Challenges

There are two main issues involved in the urban transformation towards climate compatibility: direct CO₂ emissions in the cities must be cut to zero, and the demand for energy must be contained in order to make the global energy transformation towards CO₂-emissions-free energy systems possible. So-called ‘grey energy’ must also be taken into account, i.e. the energy that is expended directly and indirectly in the construction of buildings and infrastructure. At the same time, access to energy and infrastructure is yet to be provided for hundreds of millions of present-day – and billions of future – city dwellers. Distributed combustion devices, such as stoves, heaters and vehicles, should

be phased out and replaced by emissions-free alternatives. This largely also applies to the distributed combustion of bio-based materials (*inter alia* for health reasons). The decarbonization of energy-generation systems is essential, although this can only partly be influenced directly in cities. The main starting point in the energy sector is the demand side, above all by reducing the amount of energy consumed by buildings. In 2010, buildings were responsible for 32% of global energy demand and 19% of energy-related greenhouse-gas emissions (direct and indirect), or 6.4% of direct emissions (Lucon et al., 2014). Overall, it would be possible to reduce the global energy demand of buildings by 46% by 2050 (Ürge-Vorsatz et al., 2012). One approach to improving efficiency is to focus not on energy, but instead on the provision of corresponding energy services. Transport is another important lever; it is discussed in the following section. Approaches here include land-use planning to reduce demand, public local transport, electrification, and freight logistics and efficiency (Gouldson et al., 2015). Direct and indirect cuts in emissions can also be achieved in waste management, for example by recycling, and by an integrative planning of infrastructures (e.g. energy, water, waste). Grübler et al. (2012:1311) come to the conclusion that systemic characteristics generally have a bigger effect on future energy demand in cities than those of individual consumers or of technological artefacts. For example, the percentage of traffic covered by local public transport and unmotorized traffic has a greater impact on transport-related energy demand than the efficiency of vehicle fleets. Because people in detached-house areas with passive house standards and hybrid cars tend to commute a long way to work, the demand for energy there can be higher overall than in more densely populated and compact cities with a high proportion of local public transport, pedestrians and cyclists, even if the buildings there are poorly insulated. Especially in industrialized countries, many cities have already developed climate action plans; however, this is much more rarely the case in developing countries and emerging economies with high urbanization rates. So far, however, there is little evidence of these action plans being successful, and the development of emissions reduction in these cities largely follows the development in the respective country as a whole (Seto et al., 2014).

Goals

All cities should strive to cut their total CO₂ emissions from fossil energy sources to zero by 2070 at the latest. This goal of zero emissions is much more ambitious than that of 'climate neutrality', because climate neutrality often describes a condition in which, for exam-

ple, a city's transport system still generates emissions, but these are 'compensated' by reductions in emissions outside the city limits (Section 3.3.1; Table 9.3-1). In addition, cities should seek to cut their indirect CO₂ emissions and shape their urban development in such a way that the demand for energy is contained or reduced. In view of the Paris Agreement's aim not only to hold the increase in global average temperature to well below 2 °C compared to pre-industrial levels, but also to take action to limit the increase to 1.5 °C, the WBGU recommends already reducing emissions to zero by 2050, at least in the electricity sector. SDG no. 7 ("Ensure access to affordable, reliable, sustainable and modern energy for all") should be at the centre of the development of energy infrastructures.

Core recommendations

Due to the great differences between the cities – e.g. in relation to the level of development, access to energy, the urbanization dynamic and national legislation on the mitigation of climate change – no blanket recommendations can be made on the prioritization of measures, investments or policies at the city level. Cities have to develop the skills they need to react systematically to these challenges. The WBGU recommends that every city should develop a scientific basis for shaping a coherent, low-carbon urbanization policy and integrate research results into the decision-making process based on an exchange between scientists, decision-makers and the urban population. In addition, valid and comparable data are needed as a basis for urban-planning decisions, as well as improved monitoring and evaluation systems, particularly in developing countries.

- *Compile decarbonization roadmaps for all cities:* All cities should draw up long-term strategies for reducing to zero their direct and indirect CO₂ emissions from fossil sources and cement production. In this context, they should strive to decarbonize the electricity sector by approx. 2050 and achieve zero emissions in all sectors by 2070. Climate neutrality based on compensation measures can only be an interim target (Section 3.3.1).
- *Integrate air-pollution control and the mitigation of climate change:* Air pollution in cities is closely linked to energy consumption. There are considerable synergies between air-pollution policies in cities and strategies to mitigate climate change (Box 4.5-4). These synergies should be exploited.
- *Informal settlements – make use of opportunities offered by renewable systems:* High priority should be given to providing all people with access to electricity as well as to clean fuels and modern devices for cooking. In informal settlements it is often a question of removing obstacles to formal access to

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Table 9.3-1

Core recommendations for transformative action fields.

Source: WBGU

Goals	Important measures and approaches
Internationally discussed fields	
Decarbonization, energy, and mitigation of climate-change	
<ul style="list-style-type: none"> ➢ Replace all fossil CO₂ emission sources in cities with emissions-free alternatives by 2070 at the latest ➢ Ensure access to affordable, reliable, sustainable and modern energy for all by 2030 (SDG 7) ➢ Gear urban development towards limiting the demand for energy 	<ul style="list-style-type: none"> ➢ Compile decarbonization roadmaps for all cities ➢ Integrate air-pollution control and mitigation of climate change ➢ Informal settlements: take advantage of the opportunities of renewable systems ➢ In the long term, plan new cities exclusively emissions-free and ensure sustainable management of materials and material flows
Mobility and transport	
<ul style="list-style-type: none"> ➢ Achieve complete decarbonization of transport systems by 2070 ➢ Implement inclusive urban mobility by 2030 (SDG 11, target 11.2 'Provide ... accessible and sustainable transport systems for all') ➢ In the long term, allow only emissions-free mobility in inner cities 	<ul style="list-style-type: none"> ➢ Build and develop mixed residential and working city districts, and always within walking distance of public transport (transit-oriented development) ➢ Make public transport accessible to everyone and roads safer for non-motorized transport (pro-poor transport policies) ➢ Gradually reduce motorized individual transport in inner cities
Urban form	
<ul style="list-style-type: none"> ➢ Combine sustainability and adaptability in urban development ➢ Create inclusive city districts (people-oriented, climate-compatible) ➢ Provide buildings and spatial structures to create urban quality of life, e.g. easily accessible, safe spaces with niches for different user groups to allow interaction and relaxation 	<ul style="list-style-type: none"> ➢ Develop concepts for flexible and adaptable city districts ➢ Decelerate urbanization surges; polycentric spatial design instead of conventional rural-urban migration ➢ Seek a balance between densification and green/open spaces ➢ Increase incentives for passive energy-saving in city-district development and construction ➢ In new urban areas, implement planning strategies for sustainable city districts
Adaptation to climate change	
<ul style="list-style-type: none"> ➢ Reduce climate-change risks for urban societies ➢ Adapt urban development to climate change 	<ul style="list-style-type: none"> ➢ Integrate adaptation into urban planning as an iterative learning process: e.g. include scientific findings ➢ Integrate mitigation and adaptation when making long-term infrastructure decisions ➢ Improve skills of vulnerable groups to cope with climate change ➢ Improve local data availability
Poverty reduction and socio-economic disparities	
<ul style="list-style-type: none"> ➢ Inclusive growth: ensure above-average growth for lower income groups ➢ Reduce poverty and socio-economic disparities in cities ➢ Improve quality of life in informal settlements ➢ Implement the right to adequate housing and secure political inclusion rights ➢ Initiate a paradigm shift: strengthen initiatives for the poorest 40% of the world's urban societies 	<ul style="list-style-type: none"> ➢ Establish global initiative of UN-Habitat, UNDP, UNEP and World Bank for the additional 1-2 billion people expected to be in inadequate housing ➢ Counteract the growing concentration of property and land ownership ➢ Win over relevant urban actors (e.g. local governments, architects, planners) for efforts to improve the quality of life of urban poverty groups; mobilize comprehensive public and private financial resources ➢ Make the right to adequate housing a core element of bilateral and multilateral development cooperation ➢ Prioritize the poorest 40% instead of the richest 5% of the population in urban investment and architectural competitions

Goals	Important measures and approaches
	<ul style="list-style-type: none"> ➤ Upgrade urbanization to a priority area in the OECD's Development Assistance Committee (OECD-DAC) ➤ Initiate a priority programme 'Adequate Housing for All' at the World Bank, focusing on regional and medium-sized cities ➤ Secure access to basic infrastructure, education and health facilities for all
Focal points: fields that are given too little attention internationally	
Urban land use	
<ul style="list-style-type: none"> ➤ Ensure that land use is oriented towards the common good ➤ Use land more flexibly (i.a. risk adjustment and precaution) ➤ Minimize land degradation 	<ul style="list-style-type: none"> ➤ Introduce or strengthen social-impact analyses for land-use management ➤ Ensure a transparency and documentation requirement for land ownership and use (reform land law if necessary) ➤ Keep enough urban spaces in public or community hands ➤ Secure right of first refusal or veto right for municipalities for plots of land ➤ Establish locally adapted planning systems ➤ Fight corruption and stem land grabbing ➤ Stem land and property speculation ➤ Consider flexible management models (interim use, shared space, urban commons, etc.)
Materials and material flows	
<ul style="list-style-type: none"> ➤ Establish as complete a circular economy as possible in this century ➤ Substitute toxic or pollutant substances ➤ Ensure recovery of non-renewable resources <p>Examples:</p> <ul style="list-style-type: none"> ➤ Replace CO₂-emissions-intensive building materials (e.g. reinforced concrete) with low-carbon alternatives ➤ Stop the loss of phosphorus ➤ Organize sustainable recycling systems for electronic waste 	<ul style="list-style-type: none"> ➤ Promote product durability and reparability (e.g. resource taxation) ➤ Promote responsible management of waste and recycling and stem illegal waste trade (Basel Convention) ➤ Promote modular building and design methods, including making structures easy to dismantle or recycle, above all low-carbon building materials (building regulations) ➤ Manage materials and material flows sustainably in public procurement and works contracts
Urban health	
<ul style="list-style-type: none"> ➤ Target a global paradigm shift from fighting disease to promoting health by boosting resources and potential for a healthy life in cities ➤ Stabilize health promotion by means of cross-sectoral city planning and development, and by strengthening municipal responsibility for planning ➤ Promote the urban population's health competence and behaviour 	<ul style="list-style-type: none"> ➤ Secure substantive inclusion, improve food security ➤ Design cities in a way that promotes health, focusing on spaces for encounters and activities ➤ Strengthen the self-organization of urban residents; support small-scale health-promoting measures in city districts ➤ Stem urban epidemics and new infectious diseases by promoting the resilience of the population, health education and improved health reporting ➤ Promote health by means of cross-sectoral urban planning (synergies with mitigation of climate change and decarbonization)

9 Recommendations for action

- mains electricity. Off-grid renewable energy sources offer a lot of potential for a quick expansion of the electricity supply for urban poverty groups in informal city districts (GNESD, 2014; Singh et al., 2014).
- In the long term, plan new cities exclusively emissions-free: Newly emerging cities and city districts offer a chance of integrated planning of urban form, transport infrastructures and energy systems. There is considerable efficiency potential that can be used, for example, in the integration of resource flows (water, waste, energy) that allow energy cascades or heat recovery (Grübler et al., 2012).

9.3.1.2

Mobility and transport: overcome the dominance of motorized, individual traffic

Limiting global warming requires the complete decarbonization of energy and transport systems (Section 2.3.3.1). The transformation of urban transport systems is furthermore a core element of inclusive urban development (Section 4.2.2; Table 9.3-1).

Challenges

The biggest challenge in the urban mobility and transport sector is the dominance of motorized, individual traffic. This model has been a major contributory factor in a self-reinforcing crisis. Efforts to reduce congestion caused by increasing road-vehicle traffic have usually concentrated on expanding the road network, leading to even heavier traffic and more traffic jams, air pollution and noise. A departure from the long-valid model of the car-oriented city is not only necessary to reduce urban environmental pollution and greenhouse-gas emissions; it is simultaneously an opportunity to transform the entire transport system both in the cities and beyond. Due to the high population density, cities are the easiest place to develop transport structures that can function without or with reduced motorized, individual traffic. City dwellers who do not own a car will then also be prepared to use buses and trains beyond the city limits. The larger the percentage of the urban population who no longer use a car of their own, the greater the demand for local public transport outside the urban centres. Cities can therefore serve as an important lever for transforming the transport system beyond their own borders.

The consequences of the current car-centred development model are extremely high costs generated by air-pollution-related diseases, productivity losses and wasted fuel (Section 4.2.2). The negative effects on urban poverty groups are disproportionately large. They suffer the most from the consequences of motorized individual traffic, as they often live alongside loud, exhaust-polluted arterial roads, and benefit least from

its advantages. Moreover, since few of them own a car, they are the most dependent on efficient local public transport systems and non-motorized mobility – i.e. the very systems that have been put on the back-burner in many places in favour of motorized, individual traffic.

Hardly any element of urban mobility is as inefficient as motorized, individual traffic. Cars are only moved for approx. 4 % of their lifespan, and drivers spend a significant part of that time in traffic jams or looking for a parking space (New Climate Economy, 2014:14). Nevertheless, there is a global trend towards increasing motorization; the number of private vehicles is expected to double from currently 1 billion to 2 billion by 2030 (New Climate Economy, 2014:14). At the same time, however, mobility is in the midst of a profound transformation in many cities, especially in industrialized countries: the continuously increasing motorized traffic has reached its limits in many cases. Instead, in a growing number of cities there is an increase in bicycle use and in the number of pedestrians; the importance of car sharing and bicycle rentals is growing, as is multimodal travel using smartphones (Section 4.2.2; Figure 4.2-1). These are key elements for a transformative change in urban mobility in the direction of sustainability. Although electromobility will help to significantly reduce air pollution in cities, it will not solve the immense use of resources and space by the car-based transport system, including the problems of congestion, parking and noise pollution caused by rolling noise.

Goals

The internationally agreed goal for sustainable development – (SDG no. 11) “Make cities and human settlements inclusive, safe, resilient and sustainable” – lays down a framework for all relevant actors. One of the targets is to provide access to affordable and sustainable transport systems for all by 2030; notably by expanding public transport (Table 9.3-1), paying special attention to the needs of vulnerable groups (“women, children, persons with disabilities and older persons”). Moreover, recent studies show that the 724 largest cities in the world could reduce global GHG emissions by up to 1.5 billion tonnes of CO₂eq per year by 2030, mainly through transformative changes in the transport sector (New Climate Economy, 2014:3).

Core recommendations

Planners and decision-makers in many places are still clinging too firmly to the paradigm of a car-oriented city, so that the expansion of sustainable urban transport systems is subordinated to the needs of motorized, individual traffic. A shift toward public transport, cycling and walking is required here (Table 9.3-1).

- Integrate transport planning and urban land-use planning: The integration of urban transport planning with urban land-use planning, although hitherto neglected in many parts of the world, is an internationally recognized, universal and key condition for successful sustainable urban development (Section 4.2.2). Such integration involves a paradigm shift in which the planners' understanding is extended from that of mere infrastructure developers to promoters of urban mobility. In the WBGU's view, it is important to see traffic and transport as a means of facilitating urban mobility, and not as an objective per se. In other words, accessibility should be prioritized, not the transport itself. In accessible cities, not only certain locations (workplace, homes, etc.) are close together; these cities are also pedestrian-friendly with safe cycle routes and affordable, high-quality public transport options that are low-carbon and accessible to all social groups. These are cities where the entire urban population benefits from good accessibility. Urban planning that fulfils the right to basic mobility, especially for the economically disadvantaged urban population, is key to socially inclusive urban development. In this context, transport planning must not be regarded in isolation, but must focus sustainable urban-planning considerations on the promotion of local public transport, cycling and walking (transit-oriented development) in the interests of sustainable urban development. Development cooperation should support socially inclusive urban development on the basis of integrated urban and transport planning.
- Promote cities with socially inclusive and environment-friendly accessibility: In practice, the focus should be on the expansion of local public transport, the creation of separate areas for non-motorized mobility (dense cycle-track networks, pedestrian precincts) and measures to improve road safety (Table 9.3-1). Other requirements include a stricter regulation of motorized, individual traffic by parking-space management, city tolls and 30 km/h zones, as well as a reduction in traffic that generates a high level of air pollution by improving technical vehicle standards and using economic instruments (taxes, charges; Section 4.2.2). In addition to these approaches, the WBGU recommends the creation of arenas for experimentation in city districts where non-motorized, individual mobility and local public transport systems are given unrestricted priority (in inner city areas, e.g. within Berlin's circular train line, the *S-Bahn-Ring*). The aim should be to firmly embed the vision of a city with easy, socially inclusive and environment-friendly accessibility into urban-development policy. When creating public

transport systems, developing countries and emerging economies have the option of avoiding the errors made by industrialized countries by leapfrogging technological development stages, so as not to trigger negative spirals with ever larger traffic jams. Overall, to achieve sustainable mobility there will still have to be enormous investment in infrastructure in the coming years, especially in medium-sized cities.

9.3.1.3

Link urban form with sustainability and adaptability

Urban form has a considerable influence on many aspects of the transformation towards sustainability, e.g. on the mitigation of and adaptation to climate change, transport and mobility, and access to adequate housing and public spaces; it also shapes the local identification and identity of the urban population (Section 4.2.3; Table 9.3-1).

Challenges

In the coming decades, the challenge when building newly emerging cities and city districts will be to secure a sustainable urban form *a priori* and in this way avoid undesirable path dependencies. The urban form of cities currently has a high level of persistence, because capital-intensive buildings and infrastructures are, as a rule, designed to have a lifespan of many decades. Because a significant proportion of the global urbanization process is characterized by newly emerging cities or city districts (Section 7.2), the WBGU sees this as one of the key design tasks for planners and all the actors involved in the urban transformation towards sustainability.

Changing the structure of existing cities or districts is much more complex, expensive and limited in terms of the possible depth of intervention. However, their urban form can also be reshaped in such a way that it comes closer to meeting the requirements of sustainable urban development. The main options here are densification and energy-efficient urban renewal. Appropriate adaptation strategies must be developed for mono- and polycentric urban structures respectively.

Cities are in a constant state of flux, but there are development dynamics which cities should keep their eyes on for precautionary reasons. On the one hand, these include creeping changes like climate change or shrinkage processes. On the other hand, cities can be exposed to sudden dynamics, such as natural disasters or crisis-related major refugee movements, which they are inadequately prepared to deal with.

9 Recommendations for action

Goals

The urban form of cities determines their energy consumption and CO₂ emissions, as well as the quality of life and health of the urban population. But there can be conflicts of objectives here, for example between a high level of densification and a lack of green and open spaces. Furthermore, the city districts should offer local sources of income, enable the urban population to participate in public life, be bicycle- and pedestrian-friendly and affordable for all income groups. The five principles of a New Strategy of Sustainable Neighbourhood Planning (2015a) and the International Guidelines on Urban and Territorial Planning (2015b), published by UN-Habitat, offer initial ideas on developing more compact city districts.

Synergies with other transformative action fields should be exploited in the course of planning (Section 4.6). Urban form is especially connected to the urban infrastructure; for example, there are close links between the urban form of cities, the mobility infrastructure, the demand for transport, and the number of kilometres driven. The prerequisite for planning compact districts and cities is transformative land-use management. Cities should provide public, semi-public and community facilities for 'possibility spaces' and arenas for experimentation and to encourage the political inclusion of the urban population. To make sure that this is possible, sufficient urban spaces should be publicly or community owned (Section 4.3.3).

Core recommendations

The WBGU supports the calls for locally adapted, appropriate design strategies for low-carbon urban and city-district planning. Here it is important to take into account not only the respective geographical and cultural context, but also technical possibilities for implementation and maintenance. This also requires suitable governance structures and financing mechanisms (Chapter 8). For example, regulations should be passed making it mandatory to use strategies of passive energy saving in the construction sector, as well as incentive systems to encourage planners and investors to implement active energy-saving strategies. In addition, a locally adapted, appropriate quality-assurance system on sustainability in urban development should be promoted. On the one hand, this could increase the energy efficiency of city districts; on the other, if outdoor spaces, for example, are designed in such a way that meets the inhabitants' needs (for security, recreation, etc.) and on the right scale, this can promote social interaction and improve the quality of life in the city districts.

In order to be able to respond better to unpredictable dynamics, such as large refugee movements, nat-

ural disasters or climate change, more attention should be paid to the integration of flexible or transitory concepts into architecture and urban development. This applies particularly to cities in locations exposed to specific risks (e.g. storm events and flooding) or close to political crises or war zones. Furthermore, greater flexibility makes it easier to integrate new knowledge and technical innovations into the urban infrastructure.

9.3.1.4

Integrate adaptation to climate change into urban development

Climate change will have a profound impact on a wide range of urban functions, infrastructures and services, and may also exacerbate existing problems (Sections 2.3.4.4, 4.2.4). The impacts of climate change in cities will vary depending on their geographical location, the robustness of their infrastructure, the vulnerability of the population, successful adaptation strategies and disaster preparedness.

Challenges

Climate change will increasingly impact on the urban population's living conditions. This can involve direct effects, such as temperature extremes, droughts or floods, or indirect effects like climate-related changes in food availability in the cities, or effects on the water-supply or electricity systems. Global climate change also interacts with a city's climatic peculiarities (Rosenzweig et al., 2011). The urban heat-island effect is an example of this. Concrete and other building materials absorb heat; evaporation and its cooling effects decline as vegetation is removed and surfaces are sealed.

It is estimated that a sea-level rise of as little as half a metre could already more than triple the number of people at risk and increase the amount of endangered assets more than tenfold (e.g. port cities or industrial installations; Hanson et al. 2011; Revi et al., 2014a: 19). According to these studies, Mumbai, Guangzhou, Shanghai, Miami, Ho Chi Minh City, Calcutta, New York, Osaka-Kobe, Alexandria, Tokyo, Tianjin, Bangkok, Dhaka and Hai Phong are among the most vulnerable cities in terms of their people and assets.

Goals

The risks of global warming for urban societies should be reduced, adaptation to climate change boosted and resilience to climate risks improved. Local governments and urban societies should develop disaster-preparedness strategies, take climate change into account when investing in the infrastructure, and work out strategies for integrating the mitigation of and adaptation to climate change into their long-term planning. The

costs involved can be considerable; for example, the cost of adjusting urban water-supply and sanitation systems in Sub-Saharan Africa alone are estimated at US\$2.7 billion per year (without the cost of overhauling today's infrastructure; Revi et al., 2014a). Adaptation to climate change is an iterative learning process that should be incorporated into urban planning as a cross-cutting subject through both incremental and drastic measures (e.g. relocations, withdrawal from formerly populated areas).

Core recommendations

- Build resilient infrastructures: Municipalities must be at the centre of a successful urban adaptation policy, because the adaptation of cities depends largely on their integration into local investments, policies and the legislative framework. Depending on the geographical location, cities should adapt their infrastructures to expected climate risks. If extreme precipitation looks likely to increase, this could mean, for example, upgrading surface-water drainage capacity, banning settlement in areas susceptible to flooding, or giving preference to redundant infrastructure systems.
- Improve skills of vulnerable groups to cope with climate change: A key building block for adaptation to climate change is strengthening the capabilities of, above all, vulnerable groups in developing countries and emerging economies to overcome crises and new challenges posed by climate change. In essence, this means urban poverty reduction, securing access to basic services, strengthening self-organization, inclusion in decision-making processes, and improving food security.
- Strengthen disaster preparedness: The ability of cities to deal with climate risks can be significantly improved by urban risk governance and disaster preparedness. Concrete action fields include the protection of vulnerable population groups by building housing in more sheltered locations, improved integrated land-use planning, and changes in building regulations to make structures flood-proof (Revi et al., 2014a). Further building blocks for strengthening crisis-management capacity include offering training courses for the population and boosting the capacity of the emergency services in case of disaster.
- Integrate scientific findings into decision-making processes: Taking scientific expertise into account in decision-making processes is another decisive aspect of urban climate-risk management and dealing with creeping climate change in cities, whereby scientists, decision-makers and vulnerable population groups should all participate (Revi et al., 2014a). Adaptation

measures should not only react to past experience, but must also anticipate future events and changes. Knowledge of these future, climate-change-related adjustments is limited and involves inherent uncertainties.

- Improve planning and data availability: There is also a need to reform university curricula, especially for city planners, with the aim of placing more emphasis on mitigation of and adaptation to climate change in cities (Revi et al., 2014a:585). The lack of valid and comparable data as a basis for urban-planning decisions (e.g. about local climate changes), and the lack of monitoring and evaluation systems, especially in developing countries, are another frequently criticized shortcoming (UKAID and DFID, 2012; Section 2.6).

9.3.1.5

Reduce poverty and socio-economic disparities in cities

Overcoming extreme poverty and major socio-economic disparities in cities is one of the key challenges of sustainable, inclusive urbanization (Section 4.2.5; Revi and Rosenzweig, 2013; UNEP, 2012; UKAID and DFID, 2012; LSE Cities, 2009). Socio-economic disparities are often particularly marked in big cities and are usually expressed in clear-cut socio-spatial fragmentation between rich and poor city districts (OECD, 2015a:94).

Challenges

Today about a quarter of the world's population lives in informal settlements (without formal rental agreements or property rights), where housing conditions are totally inadequate. International development institutions define slums mainly in terms of inadequate housing conditions and informality (UN-Habitat, 2003). 60% of the urban population in Sub-Saharan Africa currently live in slums; in Asia the figure is approx. 30%. In China (180 million) and India (104 million) alone, more than 280 million people are living in slums (UN-Habitat, 2013a). Although the slum population in cities has fallen as a percentage (from 39% in 2000 to 32% in 2010), their absolute number rose by over 100 million people from 760 million in 2000 to 863 million in 2010 (UN-Habitat, 2013a). About 750 million city dwellers (2012) have no access to adequate sanitation, and 150 million (2012) no access to supplies of improved drinking water (WHO and UNICEF, 2014).

Solving these problems is made more difficult by the growing socio-economic disparities (Box 2.1-6) in many cities of the world. Growing income disparities are even being observed in the large agglomerations of OECD countries (OECD, 2015a:93), as well as in countries where there have been successes in the

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implementation of the MDGs. The notion of economic growth automatically also reaching the poorer urban groups through ‘trickle-down’ effects has proved to be empirically untrue. Despite strong growth dynamics, socio-economic polarization (i.e. drastic differences in incomes, employment opportunities, access to public goods and services) is rising and the opportunities for urban prosperity and stability are declining (UN-Habitat, 2013a:87f.). Against this background, the issue of justice and the concept of inclusive growth have taken on greater importance in the international development debate. In this context, reducing poverty and socio-economic disparities is regarded as a key element of an economically successful urban development: “more equal cities are more prosperous cities” (UN-Habitat, 2013a:86).

Goals

Reducing poverty and socio-economic disparities in cities should become a key objective of urban policy. This challenge is usually met by welfare-state programmes, e.g. improved social-security systems. However, it has become increasingly clear that, in addition to dysfunctions in distribution, there are structural barriers that perpetuate discrimination and exclusion (UN-Habitat, 2013a:89). Social inclusion therefore also means eliminating barriers that obstruct access to goods and services, and to opportunities for development and empowerment. In practical terms, above-average increases in income should be secured specifically for lower income groups; quality of life should be improved in informal settlements (Table 9.3-1). Especially in such areas, active and assertive governments that can, for example, enforce the right to adequate housing are needed at the local and national level (Table 9.4-1).

In the fight against inequality in the fields of income and wealth, the responsibility for action lies primarily with nation states: by pursuing a fair, distribution-oriented fiscal and economic policy, they must ensure that especially the socially weaker sections of the population benefit from economic growth. Inclusive growth is one of the fundamentals when it comes to limiting and reducing inequality (Table 9.4-1). Although the cities cannot escape the socio-economic structures that are laid down by the national economic and political system, they can use their skills and resources to develop in a direction in which public services and infrastructures become crystallization points for better living conditions (LSE Cities et al., 2013).

Core recommendations

In the WBGU’s view, local governments should ensure that not only the existing key actors (national governments, private investors, international implementing

organizations and NGOs), but also less well organized, civil-society stakeholders have enough opportunities to help shape urban development and the improvement of their living conditions. All too often, it is primarily large and established non-governmental organizations that are actively involved in urban-development processes; however, as a rule they tend to represent better-off and better educated groups (Huchzermeyer, 2009), whereas residents of informal settlements or migrants, for example, are rarely involved. Local governments should also make sure that urban poverty groups receive access to basic infrastructure and services. Overall, economic development can only have a positive impact on the living conditions of urban poverty groups if the importance of the informal economy is recognized and its development potential adequately taken into account (e.g. in informal training, small entrepreneurship). What is also needed is investment in strategies for improving resilience to natural disasters, weather extremes and other climate risks which affect poverty groups particularly frequently (Revi und Rosenzweig, 2013). Several cities and national governments have already begun putting the justice issue on the agenda of their urban-development policy, since they see it as a fundamental element of prosperity (UN-Habitat, 2013a:92).

In the WBGU’s view, a paradigm shift is needed across the board to anchor the topic of urbanization as an integral element of international cooperation, with the specific aim of improving the living conditions of slum populations today and in the future. This requires a bundling, acceleration and a major scaling-up of all political, economic, social, planning and scientific activities that are concerned with sustainable urban development. The WBGU advocates launching a global initiative by UN-Habitat, UNDP, UNEP and the World Bank for the 1-2 billion additional people expected to be living in inadequate housing by 2050.

To prevent the number of people in inadequate housing from doubling or tripling, a fundamental change of perspective is necessary – one that does not combat the symptoms, but focuses on the reasons why informal settlements with inadequate housing develop. A growing concentration of wealth and land ownership is inconsistent with fair development opportunities. The question of equitable access to income sources and development opportunities for all people is also crucial for the development of the cities. Conventional urbanization has directed financial, personnel and creative resources largely into developing residential areas for the upper 1-20% of the world population. New priorities need to be set here if a situation is to be prevented in which 3 billion people will be living in unacceptable, inhospitable, informal city districts in 2050. Particular pri-

orities include winning over the relevant urban actors – such as local governments, architects, city planners, investors, development banks and civil-society stakeholders – for the tasks of strengthening and developing informal, often precarious city districts, mobilizing extensive public and private financial resources, gearing planners and architects to the needs of transformation, reforming training systems in this direction, and also strengthening the necessary scientific resources in order to improve the quality of life for urban poverty groups. Informal organization forms should also be taken into account in this context. Urban societies should take this on as a key task for the future and create the corresponding conditions locally.

Within the framework of international cooperation, Germany, in addition to promoting inclusive growth strategies, can make an important contribution to improving the living conditions specifically of the poor populations in cities in developing countries and emerging economies. This is already a priority in the sector strategy on sustainable urban development of the BMZ (German Federal Ministry for Economic Cooperation and Development). Key fields of activity include strengthening municipal economic development, improving local adaptation to climate change, and forging stronger links between cities and their surrounding areas. In addition, the BMZ also supports local administrations and decision-makers in the participatory planning and implementation of investments – for example in urban basic infrastructure aimed at improving the living conditions of the poor population (e.g. Cities Development Initiative for Asia). With regard to the growing demographic and economic dynamics in small and medium-sized towns and cities, and in order to achieve transformative planning, it would, above all, be important in the future to focus on counselling and training local governmental and non-governmental actors in participatory development planning in those cities.

Implementing the right to adequate housing in developing countries and emerging economies should become a key component of bilateral and multilateral development cooperation (e.g. at the UN, the World Bank and in bilateral government cooperation). Adequate housing and access to educational opportunities are basic prerequisites and the starting point for the creation of development and inclusion opportunities for the poor urban population (Table 9.3-1). To this purpose, the World Bank should launch a priority programme called 'Adequate Housing for All', focusing on the fastest-growing regional and medium-sized cities (1-5 million inhabitants). New cities, city districts and urban societies will be emerging in Asia and Africa in the coming decades, so there is a window of opportunity for preventing undesirable path dependencies.

9.3.2

Transformative action fields that are given too little attention internationally

9.3.2.1

Ensure that urban land use is oriented towards the common good

The use of urban land is influenced by various factors and mutually interacting claims on space. Urban plots of land compete for different uses (e.g. housing, business, green spaces) in a confined space, often embedded in a highly dynamic land and real-estate market. The forms of use are often subject to long-term path dependencies and influence the protection of environmental resources, the emission intensity of infrastructures, access to technical and social infrastructure, and the identity and diversity of cities (Section 4.3).

Challenges

Although cities only cover a small part of the Earth's surface, the current urbanization process is causing a high rate of land consumption which also extends to the urban hinterland. The rapid urbanization processes, which in some cases are unregulated, especially in Asia and Africa, lead to an expansion of urban areas and infrastructures, establishing path dependencies for the next decades. Particularly in the fast-growing cities, however, the rapid growth of urban areas often encounters structures that are the result of inadequate land-use planning, as well as weak urban governance. Informal use structures and negotiation processes, as well as a lack of legal security (e.g. in the case of informal land tenure), make sustainable urban development difficult, specifically in developing countries and emerging economies. The challenge in already built city districts is how existing land-use structures can be made more energy-efficient and more liveable, e.g. by means of urban-renewal projects.

Goals

The distribution and management of urban land uses and the planning of new and re-designated land are a vital lever for the Great Transformation, since they represent the fundamental, key decisions that determine both the entire urban development and the functionality and quality of life of a city over a long period of time. The current process of urbanization offers numerous opportunities to actively shape long-term land use. In order to avoid negative path dependencies, transformative land use should concentrate as far as possible on key principles; in the WBGU's view, these are minimizing land degradation by means of decentralized concentration and revitalization; a low-carbon, envi-

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ronment-friendly and socially compatible densification; orientation towards the common good; and flexibility and adaptability in land use. In order to implement these principles, the cities' land tenure systems and their design features must be structured in such a way that land use can be steered in the direction of a transformation towards sustainability.

Core recommendations

There are already many instruments available for controlling land use and strengthening urban land governance. Due to the great diversity of cities and their different (national) legal, cultural and socio-economic conditions, every local government must carefully examine which levers can be implemented locally. The prerequisite for these considerations must be an ownership constitution that is committed to the common good.

- › *Gearing land use to the common good:* Urban areas should be recognized as common property; zoning should be geared to the common good. The regulation and/or assignment of urban plots of land should be not left exclusively to private owners or administrative decision-makers, but be (largely) reserved for a general or community form of use that is oriented towards the common good, while simultaneously allowing both public and private ownership. Diversity of ownership models should be the order of the day; community ownership should be promoted alongside the private and public ownership of land. Furthermore, forms of private land use that are non-sustainable, non-public and do not protect the commons should be strictly regulated. Community rights should be encouraged, and social urban projects should be given protective and defensive rights vis-à-vis appropriation by the private sector. In addition, local governments should create control mechanisms allowing public spaces and urban community areas to be designated and protected, thus removing them from a market-based exploitation logic. Profits from (private-sector) urban development should also flow into common-good-oriented urban-development projects (e.g. via a solidarity tax).
- › *Corruption prevention:* The allocation and use of land offer numerous loopholes for corruption, both in politics and the municipal administration and among companies and private individuals. Although the United Nations Convention against Corruption has been ratified by 178 nation states (as of December 2015), it has had little effect in urban practice up to now. In order to effectively stem corruption in land use, all urban actors must be brought into the fight against corruption. This could be achieved by a form

of integrity management for land use covering the entire city. For example, the implementation and enforcement of land allocation and design should be placed into the hands of impartial bodies, e.g. non-partisan committees of experts, that observe both community and individual interests. In addition, speculation and corruption in the urban land and real-estate market should be stemmed. In particular, transactions in these areas should be made transparent and accessible to the public. Ownership of land and real estate by anonymous offshore companies should be prohibited.

- › *Urban land documentation and steering tools in land-use management:* Improving the quality of the information base by setting up land registers, registering ownership and rights of use, and preparing information and evaluations relating to plots of land – these are important prerequisites for sustainable land management. They make it possible to coordinate processes in planning, information, organization and cooperation, budget, marketing and enforcement. The choice of specific instruments for registration should be geared to the respective city's possibilities. Particularly in developing countries and emerging economies, forms should be chosen that are commensurate with the available capacities and urban governance. In addition, local and regional (planning) skills and resources should be strengthened in line with the principle of subsidiarity. To this purpose, cities must have the corresponding powers, as well as the personnel and financial resources, to implement and enforce decisions, so that a form of land use that is in line with the normative compass can be established. If short-term solution strategies are created to deal with current problems, these should not be developed independently of (existing) building and environmental standards in order to prevent long-term, negative path dependencies. Forms of information and interaction (e.g. dialogue, mediation, city-district management) should be embedded in land-use conflict management.
- › *Urban land markets should be more strictly regulated;* for example, the assessment base for land markets should be oriented not only to economic aspects but also to the urban common good. Furthermore, fair tax models should be created that allow local governments to levy a real-estate transfer tax; tax loopholes, e.g. using 'share deals', should be closed.
- › *Diversification of tenure systems – making adequate housing possible:* Especially in developing countries and emerging economies there are a variety of customary and informal tenure systems alongside private ownership. It is often difficult to formalize these, because in some cases they are subject to local

rules and traditions, and in others the resources for formalization are not available. It is often difficult to formalize these because in some cases they are subject to local rules and traditions, and in others the resources for conversion are not available. Security and legitimacy in housing for poorer sections of the population can be achieved in many cities even without (private-sector) formalization, for example by integrating customary and informal tenure. The prerequisite here is that these models are also committed to the common good and do not, for example, serve the (criminal) enrichment of a few private individuals (ranging from slum lords to real-estate speculators). The decisive factor for implementation will be how government decision-makers come to an understanding with informal actors in the future (Section 8.3).

The WBGU considers the following management principles to be important; they should be taken into account in sustainable land-use planning:

- *Densification*: Depending on the availability of land, cities should minimize their land consumption by means of moderate, socially compatible densification. Densification in urban development offers a range of potential synergies by minimizing land consumption, adapting to and mitigating climate change, and improving liveable urban spaces. Furthermore, 'compact' cities can keep transport routes short by designing with pedestrians in mind and minimizing necessary travel distances. Regionally this densification should be organized in a decentralized way (decentralized concentration), in order to avoid one-sided concentration phenomena and to develop balanced, polycentric spatial and settlement structures.
- *Flexibility/adaptability*: Since urban plots of land are frequently used one-sidedly as a result of sectoral claims (e.g. traffic zones), a sustainable form of use should aim to make areas as adaptable as possible vis-à-vis current and future claims to their use and protection, and to facilitate multi-sectoral forms of use. Possible design models include interim uses, shared space concepts, urban commons, but also community-based types of housing.
- *Public open space*: Different kinds of urban spaces of encounter are important for harmonious coexistence, the social cohesion of a society and urban quality of life. Public open spaces offer room for social, cultural or sporting activities, the development of social networks, for civil-society engagement and cooperation – e.g. between citizens, the local government and politicians. Thus, they are also a key aspect for the formation of local identity. Regarding public open spaces as areas for development and experimentation requires new forms of

planning involving all relevant actors (participation procedures), during which possible conflicts of interest (e.g. between different age or user groups) can also be solved.

- *Context*: To achieve sustainable land-use management, the following local context-specific requirements must be taken into account. The instruments available for land-use management (e.g. instruments of conflict management) should be adapted to the respective societal, cultural and religious system and take into consideration the different speeds of the transformation phases (gradual transformation and the promotion of acceptance). Moreover, depending on the context, capacities and expertise (e.g. on land documentation) must be created or expanded (skills, knowledge, archives, institutions). At the same time, as much transparency as possible should be generated (right to inspect plans, participation procedures, etc.) and the different regulatory models discussed (forms of information and dialogue; consideration of regional models such as 'social engineering', i.e. the regulation of ethnic proportional representation in residential areas such as that in Singapore; but above all city-district management).

9.3.2.2

Promote the sustainable stewardship of materials and material flows

Technical progress, 'catch-up' development in many countries, and urbanization, with the associated construction of new urban infrastructures, are expected to lead to a considerable expansion of global material flows. These are concentrated in the cities, which is why essential starting points for a transformative change of direction are to be found there (Section 4.4).

Challenges

The increase in material flows involves a number of undesirable side effects, including the destruction of natural landscapes, the release of toxic substances, and greenhouse-gas emissions. Furthermore, certain key resources could become scarce in a few decades if extraction continues unabated. Today, the economy largely functions according to the 'linear' principle of the throw-away economy, turning raw materials into products and products into waste, which is then incinerated, landfilled or disposed of in the environment. This type of economy threatens to breach planetary guard rails and must be transformed into a sustainable circular economy. This transition means a fundamental change in the existing industrial and urban systems and places high demands on newly emerging structures. It is an important building block of the Great Transformation towards sustainability. The lack of data on urban metabolism rep-

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resents a special problem in this context. In view of the dimensions and the long-term time scale, it means a huge challenge similar to the decarbonization of the energy systems or the transition to a sustainable management of land and water use.

Goals

Goals should include avoiding negative effects along the entire life cycle of products, infrastructures and buildings – such as the accumulation of undesirable substances in the environment and toxic, climate-damaging or environment-polluting impacts – and securing raw materials and resources for the future. Thinking in terms of material flows and life cycles, not only of products but also of infrastructures and buildings, and paying attention to the impacts of emissions or waste in the various stages of production, transport, consumption and even waste treatment, are prerequisites for a sustainable circular economy. The transition to a sustainable circular economy that is as complete as possible in this century is therefore a key element of the Great Transformation towards sustainability. One initial approach is the efficient use of resources and the reduction of material flows. The second priority is minimizing ecological footprints (e.g. by the substitution of materials), and the third is closing material cycles on the required scale.

Focusing on specific examples from the broad diversity of problem areas, the WBGU makes core recommendations on the topics it deals with in depth: building materials, phosphorus and electronic waste (e-waste; Section 4.4).

Overarching recommendations on the stewardship of materials and material flows

- *Substitute toxic and pollutant materials:* Industrialization has led to an increase in emissions of toxic and environmentally harmful substances (Section 2.3.3.3). Long-lived pollutants accumulate in the environment and cause significant risks to human health and the environment. In the WBGU's opinion, substances whose production, use or disposal leads to the release of such substances should be rigorously substituted (Section 4.4.4).
- *Establish policies on the efficient management of raw materials, dematerialization and promoting the durability of products:* Cities should use their strategic possibilities as hubs of global resource flows to ensure the efficient use of raw materials and the restriction of material flows. Urban infrastructures play a role here because their design and use exert a decisive influence on the socio-technical environment in which people's lifestyles develop, and this in turn has a direct impact on the production, use and

disposal of resources (UNEP, 2013d). In addition, framing conditions can be designed and economic incentives created that encourage dematerialization and a more efficient use of raw materials, or focus on the durability and repairability of products. Examples include taxes on resources or the promotion of community consumption and communal use of products (e.g. car sharing).

- *Promote responsible management of waste streams and recycling:* Urban waste streams are increasingly being seen as valuable resources (urban mining). The separation of waste streams is crucial for avoiding pollution with toxic substances and facilitating recycling. For example, bio-based waste should be collected separately and recycled (e.g. cascade use of biomethane and composting; Dehoust et al., 2014; Rutz et al., 2014). Paper, glass, metals and to some extent plastics should, as far as possible, be universally separated in households to form separate waste streams and then recycled. Ideally, waste incineration and landfilling can be largely avoided in this way. Waste-disposal charges and higher taxation on resource consumption can help create incentives to save resources (Hoornweg et al., 2013). Regional networking of industrial processes according to the 'industrial ecology' concept can generate considerable resource savings and should be encouraged (Hoornweg et al., 2013; van Berkel et al., 2009).

Core recommendations on building materials, phosphorus and e-waste

- *Replace CO₂-emissions-intensive building materials (e.g. reinforced concrete) with low-emission alternatives in new construction:* In view of the immense scale of construction activity in cities, the considerable process-related CO₂ emissions from the production of concrete and steel should be reduced or alternative materials used as soon as possible. For example, in China more cement was used in the three years from 2008 to 2010 (4.9 bn tonnes) than in the entire 20th century in the USA (4.56 bn tonnes; Smil, 2014). Global CO₂ emissions from cement production have been rising for years and now represent 6% of anthropogenic CO₂ emissions (excluding land-use emissions; Global Carbon Project, 2015). CO₂-emissions-free production should be achieved worldwide by 2070 at the latest. Building materials should be sourced and used regionally wherever possible. This facilitates recirculation and strengthens regional identity and thus *Eigenart*. Where possible, emissions-intensive building materials should be replaced by low-emission materials.
- *Phosphorus: Stop food wastage:* Food wastage contributes to the growing waste problems, among other

things. About a quarter of all produced food calories (or one third of its weight) is lost or wasted worldwide (Lipinski et al., 2013). This not only increases the pressure on global land use, but also represents a waste of phosphorus as a valuable resource. Edible food waste in industry, commerce and households can constitute up to 50% of biogenic waste in industrialized countries (Fraunhofer-Gesellschaft, 2014). Vice versa, the discarded food adds to municipal waste and thus increases costs. The prevention of food waste is therefore an important starting point for the Great Transformation towards sustainability (WBGU, 2011).

- *Phosphorus: Nutritional habits:* A high proportion of meat and dairy products in nutrition also leads to a larger ecological footprint and a greater demand for phosphorus; it is also problematic from a health point of view (WBGU, 2014b).
- *Phosphorus: Promote the recovery of phosphorus from wastewater and waste streams:* Incremental improvements to existing systems are important; in the long term, however, a strategically oriented transformative change is necessary to stop the loss of phosphorus and to close the loop as far as possible (Section 4.4.2). Recovery from wastewater and waste streams is an essential option for the future to ensure the continued availability of phosphorus as a mineral raw material. The WBGU recommends that phosphorus should be systematically recovered from urban wastewater by 2050 (WBGU, 2014b).
- *E-waste: Promote extended producer accountability, consumer awareness and sustainable recycling:* At the national level, the manufacturers of electrical equipment should be made more accountable for ensuring the sustainability of their raw-material sources and for the longevity and sustainable final disposal of their products (Section 4.4.3). Re-usable raw materials should be easily separable. A largely modular construction could simplify the separation of the components in electrical devices. On the consumer side, more awareness training should be provided on the sustainable use of electrical devices and the proper disposal of e-waste. The informal recycling of e-waste is a basic source of income for hundreds of thousands of people (Lundgren, 2012) and should be developed in a way that does not deprive them of their livelihoods. Urban infrastructures for the further processing and disposal of e-waste, as well as the digital documentation of material flows, are also essential in order to overcome the global environmental problem of e-waste.
- *E-waste: Ensure the implementation of the Basel Convention; stem illegal trade:* The Basel Convention on the Control of Transboundary Movements of

Hazardous Wastes and their Disposal, and its contractual supplements (e.g. the Ban Amendment), provide a framework for controlling the international trade in e-waste. Although the Basel Convention has 183 member states (as of February 2016), the Ban Amendment of 1995, for example, has not yet entered into force, and these international regulations are having little effect in practice, as shown by the figures of an Interpol report on the illegal trade in e-waste (Huisman et al., 2015). Suitable national control mechanisms in the countries of origin should be implemented, for example, to document and monitor the recycling chain for used devices (repair or recycling) to prevent e-waste from disappearing into illegal channels. A continuous chain of responsibility requiring extended producer accountability could dry up the illegal cross-border flow of e-waste at source.

9.3.2.3

Urban health: strengthen resources and potential for healthy living in cities

Urban populations face specific health opportunities and risks that are inherent in cities depending on their location, size and level of development, among other things. In view of ongoing global urbanization, the promotion of urban health is essential, since this is both a goal and a resource for the urban transformation towards sustainability (Section 4.5).

Challenges

On the one hand, cities can offer better conditions for creating and maintaining health than rural or remote locations – by providing better access to health facilities, denser social networks and better earning opportunities. On the other hand, people who live in cities are exposed to certain health hazards such as noise, air pollution, high density, and higher crime and accident rates. The WBGU identifies three key challenges for urban health in cities: (1) the increase in non-communicable diseases (e.g. diabetes and cardiovascular disease), sometimes in connection with the spread of unhealthy lifestyles and habits (especially an unhealthy diet and a lack of exercise), (2) the increasing risk of urban epidemics (e.g. dengue fever, SARS, Ebola) and new infectious diseases (e.g. as a result of drug resistance, H1N1), and (3) the increase in health disparities between different population groups within cities.

In many cities, health-related interventions have hitherto been largely sectoral and pathogenic, i.e. disease-focused, in orientation. The WBGU calls instead for a holistic, resource- and process-oriented approach to promoting urban health in order to meet the current and future health challenges in cities.

Goal

One aim of the urban transformation must be to boost resources and raise the potential for a healthy childhood and life in cities, while at the same time minimizing the burdens and obstacles. Because of the long-term consequences of factors that are beneficial or detrimental to health (e.g. use of toxic materials, high exposure to emissions in childhood, movement-impeding urban design), the path dependencies in this field are very high. The prevention of such path dependencies and the promotion of health are therefore essential as components of sustainable urban development. Furthermore, health promotion is an important cross-cutting subject; a holistic view and approach can generate a wide range of synergies.

Core recommendations

In order to promote health in cities from a salutogenic perspective (i.e. one that supports human health and well-being), the WBGU recommends focusing on the following procedural and sectoral starting points:

➤ *Strengthen integrative, holistic and participatory planning approaches:* Sectoral, linear or cyclical planning approaches are unsuitable for improving urban health because of the complexity of urban systems (Rydin et al., 2012). Health is a cross-cutting topic that must be approached in a holistic and integrative manner, since it impacts on virtually all sectoral issues such as mobility, housing and water supplies. In many countries, planning responsibility for cities lies predominantly at the national or regional level and should therefore be strengthened at the local level in order to do justice to the diversity and heterogeneity of the respective local challenges. This also requires the integration and interaction of different groups of actors. On the one hand, it means incorporating civil society, academia and the private sector into planning concepts. These groups should therefore be properly informed on health-related issues (e.g. air or water pollution) and have the right of appeal, e.g. when pollution thresholds are exceeded. However, networking between different planning authorities and cross-sectoral communication on health-related problem areas are also essential at the local-government level. This requires new forms of communication management to raise awareness of health promotion among experts from other specialist fields. Because of possible unforeseeable emergences in health-related interventions (e.g. forms of use of recreation areas), it is important to try out many small-scale measures, which can also develop as a result of citizen self-organization, and to further enhance them if successful (Glouberman et al., 2006). Measures should also be flexible

and modifiable due to the high fluctuation and non-linearity of urban systems.

➤ *Target-group-specific interventions; support for urban poverty groups:* A city's population is usually characterized by a high level of heterogeneity, which increases with the size of the city; before measures can be taken, therefore, it is necessary to identify and address religious, ethnic, age- or gender-related and socio-economic backgrounds and the resulting divergent needs and vulnerabilities of the specific target groups.

Cities are characterized by socio-economic inequality, which can lead to differences in risk exposure and unequal access to resources. It is therefore in the interests of both urban poverty reduction and overall societal development to reduce socio-economic disparities by means of an integrated urban development, since large disparities have a negative impact on the entire urban population.

➤ *Promote health-related knowledge and action:* The provision of health-promoting infrastructures (e.g. public sports facilities, healthcare) alone is not enough to reach the entire urban population. It is initially necessary to ensure a high level of transparency as regards the possibilities and offers, and to lower access barriers (e.g. the costs of receiving preventive treatment or using sports facilities). Decentralized locations and opportunities for disseminating health information and knowledge about dealing with diseases and using existing options and services should be created (e.g. local shops or neighbourhood centres, district hands-on activities and campaigns) to motivate the population to actively use health-promoting structures and to reflect on and change unhealthy lifestyles and habits. Distributed solutions involving existing social networks also make it possible to activate and use the potential of local health knowledge.

➤ *Promote food security and healthy eating:* In view of the increasing threat to global food security and the disease burden caused by unhealthy dietary patterns, equal access to healthy food should be ensured in cities by changing the supply systems. To achieve this, price increases and fluctuations should be cushioned by better regulation of the markets, particularly in the cities of developing countries and emerging economies. Furthermore, the local availability of food can be improved by promoting urban and peri-urban agriculture. The availability and affordability of healthy food in the neighbourhood must be secured by demand planning. This also includes providing emergency supplies to urban poverty groups, e.g. via food banks. At the same time, food wastage should be stemmed by raising awareness, e.g. by

means of improved supply chains, food donations and behavioural changes at the consumer level. The urban population should be enabled to develop healthy nutrition patterns and a heedful attitude towards handling food.

- *Create and protect areas for recreation, activity and social interaction:* The entire urban population should have access to easily reachable, safe recreation areas that meet their respective needs. These areas should offer peace and relaxation, as well as exercise and community activities in order to strengthen these important resources for maintaining and restoring health. Promoting the 'walkability' of public spaces (e.g. with safe, attractive pedestrian paths, car-free districts) motivates exercise and active recreation. To ensure fair access to recreation areas, especially in districts with a low-income population, these should be publicly owned (no privatization). Especially in densely populated cities, solutions that do not take up much space such as little parks in public areas (pocket gardens) are recommended. Recreational facilities should be adapted to local socio-cultural practices and climatic conditions and be developed in a participatory way to ensure their active use by the population.

9.4 Governance

The WBGU has developed principles for transformative urban governance to enable cities to make the most of their transformative potential and become major arenas of the Great Transformation towards sustainability (Chapter 8). These principles aim to shape global governance structures in a way that are in line with current circumstances, strengthen the ability of cities to steer their development, enable and commit all sections of the urban society to take part in shaping the transformation process and thus creating a polycentric responsibility architecture (Table 9.4-1).

9.4.1 Use the transformative potential of cities and make urbanization a central theme in international cooperation

Although the 21st century can be described as a century of the cities, they only play a marginal role in international governance (Section 8.4.1). One of the WBGU's central recommendations is therefore to shape global governance structures in a way that is in line with current circumstances, in order to also use the trans-

formative potential of cities at this level. This could be achieved by taking the following measures.

Promote 'urban foreign policy'

Cities are actively involved in transnational networks such as C40 and ICLEI (Box 2.5-6), i.e. they pursue their own kind of 'foreign policy' (Section 8.4.2). This engagement has the aim of overcoming global challenges, e.g. climate change. The constitutional and legislative framework within many nation states does not do justice to this commitment; it should be reviewed and adapted in such a way that this engagement is not obstructed, but, in the best-case scenario, promoted.

Give city networks and cities the right to participate in, and speak at, international negotiations

At the international level, cities' status as actors should be enhanced and made more visible. This does not mean recognizing the international legal personality of cities *per se*, but strengthening their role by giving city networks and cities the right to participate in, and speak at, international negotiations that affect them (Section 8.4.2).

Coordinate the activities of city networks and strengthen networks

City networks should coordinate their activities, for example by setting up an umbrella organization that can raise their profile. In addition to being included by the nation states in international negotiations, city networks could also be supported financially. In order to avoid problems of legitimacy and representation, care should be taken to ensure that cities are represented according to their regional diversity and in line with their different sizes.

Reform UN-Habitat

Linking up to earlier recommendations made by the WBGU on global urbanization policy (WBGU, 2011), the reform of the UN-Habitat programme is another important step towards raising the profile of urban and urbanization issues at the international level. In the WBGU's view, several different options are available for a general upgrading of the programme, depending on the level of ambition (Section 8.4.3). Against the background of the global urbanization dynamic, upgrading to the status of a UN organization would be an appropriate measure; and a possible merger with UNEP should also be taken into consideration in this context. Since experience has shown that the creation of new UN organizations takes a long time and is not always successful, in the short and medium term UN-Habitat should be restructured and expanded within the existing programme. The WBGU sees the role of UN-Habi-

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Table 9.4-1

Core recommendations for transformative urban governance.

Source: WBGU

Goals	Important measures and approaches
Global/international level	
<ul style="list-style-type: none"> ➢ Make use of the transformative potential of cities at the international and transnational level ➢ Make urbanization and sustainable urban development a central topic in international cooperation 	<ul style="list-style-type: none"> ➢ Promote 'urban foreign policy' – the transnational engagement of cities ➢ Give cities and cities networks the right to participate in, and speak at, international negotiations ➢ Bundle the activities of city networks and strengthen networks ➢ Pursue UN-Habitat reform: in the short term through management reform by focusing more clearly on content and policy development; create an in-house scientific department ➢ In the medium term, work for an upgrade to a UN organization ➢ Further develop Habitat conferences: shorten Habitat conference cycle to 4 years; New Urban Agenda should contain institutional architecture for implementation ➢ AA, BMUB, BMZ: promote upgrade of UN-Habitat and introduce the elements of the urban social contract into the Habitat III follow-up process ➢ UN, development banks, other multilateral organizations: establish urbanization as a cross-cutting topic ➢ Set up an international scientific panel on urbanization and sustainable urban development ➢ G20: make urbanization and transformation relevant topics – permanently and across the board; Germany's G20 Presidency should put the topic on the agenda in 2017 ➢ BMZ, BMUB, BMBF: make urbanization a central point of development cooperation, environmental cooperation and scientific cooperation
National level	
<ul style="list-style-type: none"> ➢ Equip cities with the necessary decision-making powers or strengthen these powers ➢ Integrate cities better into national and regional decision-making processes by giving them opportunities for consultation ➢ Strengthen capacity of urban administration ➢ Fight corruption ➢ Ensure the compatibility of private investment with the common good and restrict real-estate speculation 	<ul style="list-style-type: none"> ➢ Consistently enforce the subsidiarity principle ➢ Enact legislation on local self-administration or some other form of constitutional recognition of urban autonomy ➢ Improve training of city planners and urban administration staff: make environmental and social principles part of training ➢ Give cities autonomy in staff recruitment ➢ Ensure the transparency, integrity and accountability of administrations ➢ Introduce freedom-of-information laws and legal protection for whistle-blowers ➢ Encourage anti-corruption pledges and programmes in the private sector ➢ Promote social housing ➢ Strengthen rental markets with high standards of tenant protection ➢ Strengthen alternative forms of ownership ➢ Develop and introduce innovative, socially compatible approaches to property taxes and real-estate transfer taxes ➢ Establish sustainable investment standards worldwide
Local level	
<ul style="list-style-type: none"> ➢ Establish collaborative governance structures and integrate the entire urban population ➢ Strengthen informal settlements and city districts and incorporate them into urban development ➢ Support (transnational) civil-society networks ➢ Improve connection to global issues 	<ul style="list-style-type: none"> ➢ Use strong instruments of participation where appropriate ➢ Create affordable housing ➢ Integrate existing, common-law procedures; suppress criminal practices ➢ Provide financial support ➢ Support capacity building ➢ Institutionalize advocates of global issues

tat particularly in generating relevant knowledge, playing a supporting role in policy formulation in developing countries and emerging economies, promoting the exchange of knowledge on urbanization and sustainable urban development as a multiplier, and giving cities a stronger voice within the United Nations. A reform should aim to make UN-Habitat into a strong programme whose influence and efficacy are at least on a par with such programmes as UNEP. To achieve this, a new, more effective and transparent management structure must be created (*inter alia* by setting up an executive board) that makes fast decisions possible. In order to raise the quality of policy work, UN-Habitat should set up a scientific department, appoint a chief scientist and develop a scientific strategy of its own. This scientific department should be able to generate new knowledge, coordinate and publish existing urbanization data, and further develop the collection of sufficiently detailed urbanization data in close cooperation with relevant research institutions. UN-Habitat could also play an important role in the development of indicators and in monitoring (e.g. on SDG no. 11).

The international community is called upon to implement this recommendation. A reform of UN-Habitat should be discussed during Habitat III and a correspondingly modified mandate passed. The German federal government – particularly the Foreign Office (AA), the Ministry for the Environment, Nature Conservation, Building and Nuclear Safety (BMUB) and the Ministry for Economic Cooperation and Development (BMZ) – should promote the reform and upgrading of UN-Habitat and mobilize its international networks to make progress in this matter.

Set up an international scientific panel on sustainable urbanization

In addition to the expansion of UN-Habitat's scientific capacity, regular global assessment reports would help promote an awareness of urbanization in the international community and clarify what still needs to be done for the transformation towards sustainability from a global viewpoint. In a similar way to the IPCC (Intergovernmental Panel on Climate Change), the IPBES (Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services) or the ITPS (Intergovernmental Technical Panel on Soils), such a scientific committee could conduct an integrated assessment of the scientific status quo on global urbanization dynamics and the urban transformation towards sustainability (Section 8.4.3).

Further develop Habitat conferences

The WBGU recommends a further development of the Habitat conferences. Because of the dynamics and scale

of the urbanization issue, the conferences should no longer be held just once every twenty years. The conference rhythm should be speeded up to once every four years. Comprehensive rights for cities and their networks to take part and speak at the conference should be permanently enshrined in its rules of procedure. With the New Urban Agenda, the Habitat III conference could exert a decisive stimulus for the Great Transformation in the cities. The New Urban Agenda should create a bridge to the 2030 Agenda for Sustainable Development and to the Paris Agreement, by applying its results to the local level. For example, the SDGs should be supplemented by city-specific targets. Furthermore, the New Urban Agenda should launch a process to create an international charter for the transformation towards sustainable urbanization. This should be completed by 2020 and could serve as a vehicle and focal point to establish the idea of a social contract for the urban transformation in international urban and urbanization policy (Section 8.4.4). Germany's federal government, particularly the German Federal Foreign Office (AA), the German Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety (BMUB) and the German Federal Ministry for Economic Cooperation and Development (BMZ), should work to ensure that the elements of the social contract and the development of a charter become an integral part of the post-Habitat III process.

G20: make urbanization and transformation permanent topics for discussion

In order to accelerate and intensify the global debate on urbanization and transformation, the G20 should take up the subject on a permanent basis. Germany's federal government has a key role to play here, since it will be assuming the G20 Presidency in 2017. It should take this opportunity to put the topic on the agenda. The WBGU suggests considering a corresponding initiative together with China, which takes on the Presidency in 2016, and India, which assumes it in 2018. These are also the countries with the fastest growing cities. Moreover, the Chinese Presidency should already be given support for the planned outlining of an action plan for the implementation of the 2030 Agenda for Sustainable Development.

OECD-DAC criteria: Make urbanization and urban development a priority area

Up to now, urbanization and urban development have not played a major role in the OECD countries' development cooperation. Under the title 'Urban Development and Management', the issue is a sub-topic of the OECD's Development Assistance Committee's (DAC) funding category 'Other Multi-Sector Activities'. The

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OECD-DAC coordinates the OECD countries' development cooperation. In order to underline the importance of the topic for the transformation towards sustainability and to create incentives for a renewed commitment in the field of urbanization and urban development by the donor countries, the DAC should list Urbanization and Urban Development as an overarching funding category, similar to Agriculture, or Mineral Resources and Mining.

Make urban transformation a key topic in foreign, development, environmental and research policy

In international cooperation, Germany should promote the topic of urbanization and its importance for the transformation to sustainability; it should also actively support the Habitat III follow-up process and the implementation of the Habitat decisions. Furthermore, the financing of these processes should also be ensured, e.g. by multilateral and regional development banks or investment incentives. Germany's federal government should put the topic of the 'urban transformation towards sustainability' onto the agendas of German and European foreign, development, environment and research policy. This topic should also be tackled ambitiously and with "more political courage" (RNE, 2016) in the implementation of Germany's sustainability strategy. Existing activities should be boosted considerably to do justice the urgency and scale of the challenge. Examples include driving forward reform processes in the UN to raise the topic of urbanization to a position that is in line with its key importance for the transformation (e.g. strengthening UN-Habitat); in foreign policy, greater attention should be paid to the role of the cities as international players (e.g. in climate policy); in development cooperation, selected pioneer cities should be specially promoted with a view to sustainable urbanization and the creation of adequate housing conditions for refugees. The BMZ should make urbanization and its related challenges (e.g. large refugee movements, mitigation of and adaptation to climate change, resource use) a central cornerstone of German development cooperation and significantly step up its commitment in this area. Within the German federal government itself, personnel and financial resources for these issues should be reviewed and, if appropriate, increased. National and international research agendas should also increasingly be devoted to the global urbanization surge and its role in the transformation.

9.4.2

Enable local governments to make the transformation

Despite numerous scientific and political discussions on the role of cities as elements of a multi-level form of governance, the cities' ability to shape and plan is not developed to the extent that they can use their transformative potential to the full. The ability of cities to shape and plan should be strengthened in the long term in order to extend horizontally what have hitherto been mainly vertical governance structures, and to create a more effective polycentric responsibility architecture. The diversity of the development paths and local challenges must be taken into account to achieve this. However, whatever the situation, it can be stated that urban institutions must have sufficient skills, personnel and funding if they are to be able to exercise their responsibility for the transformation. It is the task of the national governments and, where appropriate, international cooperation, to create these conditions together with cities.

Consistently enforce the subsidiarity principle

The WBGU recommends in particular the resolute implementation of the subsidiarity principle, according to which each urban governance level should carry out all the tasks for which it is best suited compared to other levels of governance. However, an associated increase in tasks must also be covered by sufficient funding to ensure that the ability of cities to shape and plan is indeed strengthened (Sections 8.2.2, 9.5).

The consistent implementation of the subsidiarity principle means reviewing the distribution of responsibilities between the different levels of governance within a state to determine which levels are best suited to carrying out which city-related tasks. In this context, a 'responsibility prerogative' for the city (Calliess, 2011; Art. 5 EUV, Rn. 20) should lie with the smallest unit.

Involve cities in national decision-making processes

Wherever cities do not themselves take decisions that are relevant for their actions, it makes sense to incorporate them into regional and national legislative processes. The specifics should suit national circumstances and can range from mandatory consultations to rights of approval for cities (Section 8.2.1.2).

Give cities legal security by constitutional recognition

In addition to the subsidiarity principle, and in order to provide a sound foundation for their involvement, cities need to be given constitutional recognition. Ideally, this

should be done in forms of local self-government rights, which should be legally enforceable (Section 8.2.1.3).

Boost the personnel capacity of urban administrations

Motivated and well-trained staff in local governments are a prerequisite for good urban development and the successful implementation of transformation processes. In order to be able to assess the ecological and social effects of planning concepts and building measures and to act in the interests of the Great Transformation, it is necessary to integrate ecological and social-scientific principles into the training of town planners and urban administrative employees. Appropriate IT and data resources should be developed to make the most of the possibilities offered by digitization. Data-protection skills need to be built up within the administrations because of the potential sensitivity of the data involved. It is also expedient to grant local governments full responsibility for personnel management in the selection of qualified employees and the creation of attractive working conditions (Section 8.2.3).

Fight corruption

All urban stakeholders should be involved in anti-corruption strategies. The following measures can be starting points for the prevention of corruption in cities:

- Local governments should act and make decisions transparently and be made accountable for those decisions. Every local government should therefore legally commit itself to a form of integrity management covering the entire city. In particular, civil society should be given maximum possible access to information on the administration's decision-making processes in the field of public contracts. The WBGU also recommends laying down fixed rules on freedom of information (freedom-of-information laws) as well as effective protection for whistleblowers.
- Local governments should moreover establish corruption-prevention measures in public procurement procedures and, for example, introduce an integrity pact for public-works contracts. Direct award procedures and limited invitations to tender should be restricted to authorized exceptions. In addition, local governments should, for example, lay down fixed rules of conduct on accepting gifts, rewards and other benefits. Furthermore, cities should introduce a register on companies suspected of corruption.
- Economic actors in cities, especially in the building sector, should also be required to commit to anti-corruption agreements. Corporate compliance programmes, for example, should be developed which, *inter alia*, enable employees to report

corruption in their area of activity anonymously (e.g. via an ombudsperson).

Ensure the compatibility of private investment with the common good and restrict real-estate speculation

In order to maintain the ability of urban societies to shape the development of their cities, the compatibility of private investments with the common good should be ensured and real-estate speculation restricted. Local and national measures should interlock and be backed up by global initiatives. A diversified housing and real-estate policy is desirable to promote public-good-oriented housing development. The measures include strengthening and expanding social housing to remove part of the housing supply from the (speculative) market and reserve it for vulnerable population groups, thus ensuring substantive inclusion. Policies should also promote a rental market that is characterized by strong tenant protection (protection against termination of rental agreements, caps on rent increases) and alternative forms of ownership such as cooperatives. The introduction and levying of property taxes and real-estate transfer taxes makes it possible to socialize a proportion of speculative gains. Here, innovative developments which also take social compatibility into account are necessary. These measures should be supplemented at the global level by verifiable, sustainable investment standards to which real-estate investors commit themselves (Section 8.2.3).

9.4.3

Establish collaborative governance: empower and commit urban societies to help shape their own cities

Even local governments and administrations that have been strengthened institutionally and financially will not be able to implement the Great Transformation in their cities on their own. One of the WBGU's main recommendations is therefore to empower and commit all parts of urban society to help shape the transformation. The core element of this empowerment and commitment is the implementation of a collaborative form of governance. Collaborative governance is based on strong participation structures; it promotes and recognizes self-initiative in civil society and integrates a city's population into governance processes as equal actors (Section 8.3). It requires a serious interest in the concerns of the urban population, who must be approached and integrated as equals wherever it makes sense. In order to implement the concept of collaborative governance, formal arenas for public dis-

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course should be strengthened; spaces for experimentation should be created. Where informal settlements and structures exist, these should not be eliminated, but recognized and integrated.

Strengthen arenas for public discourse

In order to strengthen arenas for public discourse, the prerequisites for effective participation processes should be created. To this purpose, local governments and city planners should be equipped with the corresponding skills and information. In the case of city planners, this should be an integral part of their training. Once these foundations have been laid, a broad range of participation forms become available; when choosing which forms to use, particular attention should be paid to an inclusive design. Digital technologies offer great opportunities in this context. This requires that all citizens (including disadvantaged and vulnerable groups) have access to the internet, and that digital media and information skills throughout civil society are not limited to receptive use (reading websites, etc.), but also include active use (making comments, sharing, creating websites, etc.; Chapter 6, Section 8.3).

Create spaces for experimentation

In addition to these formal possibilities for discourse, spaces for experimentation and development should be created in cities, enabling the urban population to try out different forms of sustainable living (Section 8.3.2). If such spaces for experimentation are already in use, e.g. in the form of urban gardens or local markets, they should be recognized and supported, without disturbing the creative processes. The implementation and scaling up of niche innovations requires various interfaces with politics, administration and business, as well as mutual interest and support. Politicians and the administration should develop a sensitivity for the value of creative niches.

Incorporate informal districts into urban development and create affordable housing

Informal settlements and districts are integral parts of many cities which, despite their difficult starting position, should take their orientation from the normative compass and develop in the direction of transformation. It is decisive here that existing (common-law) procedures be integrated and, at the same time, criminal practices be suppressed. Overall, it is necessary to also strengthen the rights of people living in informal settlements, to support their skills of articulation, and to help them shape and plan the city through collaborative governance. The existing informal and formal urban structures need to be interlinked, and local governments should communicate and cooperate directly with infor-

mally operating actors in their city. In addition, in urban planning local governments should (again) pay greater attention to the concerns of disadvantaged population groups and implement concepts for creating low-priced housing in their cities. In some circumstances this may also require national programmes.

Support (transnational) civil-society networks

Furthermore, (transnational) civil-society networks should be given greater support. Initiatives like Shack/Slum Dwellers International or the Transition Town movement should be supported, since they have an important role to play as multipliers in the international dissemination of transformative urban approaches. This support should come from all levels of governance.

9.5

Financing

Spanning transformative action fields and urban governance, questions of financing are key to the urban transformation (Sections 2.5.4, 8.2.2; Table 9.5-1).

9.5.1 Challenges

Cities lack the financial capacity to shoulder the growing number of local tasks and the increase in infrastructure investment needs. Estimates of financing requirements for the modernization, expansion and new construction of infrastructure over the next 15 years lie in the high two-digit trillion range (CCFLA, 2015: US\$93 trillion; Gouldson et al., 2015: US\$89 trillion; McKinsey, 2013b: US\$57 trillion). A sufficient amount of private, public and international capital must therefore be mobilized for a transformative urban development.

In many cities, especially in developing countries and emerging economies, it is first necessary to build up an active and assertive administration that can be more autonomous than hitherto vis-à-vis the nation state, and is in a position to make effective use of the financing instruments at its disposal.

Table 9.5-1

Core recommendations for financing the urban transformation. The measures mentioned must usually be taken up at all three levels and networked.

Source: WBGU

Goals	Important measures and approaches
Global level	
➤ Coordinate the international financing of development and climate mitigation and gear it more closely to sustainable urban development	<ul style="list-style-type: none"> ➤ Gear international collaborations to already agreed objectives on sustainable urban development ➤ Direct international financial resources to the municipalities as appropriate ➤ Clarify the rules on accounting with regard to the Green Climate Fund (GCF) to avoid double counting between development and climate financing
➤ Mobilize private capital for urban infrastructure	<ul style="list-style-type: none"> ➤ Take local factors into account when linking the financial sector with sustainable development objectives ➤ Have existing criteria and standards reviewed by external evaluators ➤ Develop binding criteria and standards for sustainable investment and extend them by adding city-specific criteria ➤ Introduce a global insurance mechanism for urban infrastructure and further develop innovative financing instruments
National level	
➤ Strengthen municipal administration and financial base	<ul style="list-style-type: none"> ➤ Ensure solid financing of cities through adequate transfer payments ➤ Use transfer payments to strengthen the endogenous financing potential and support existing development potential ➤ Consider making it easier for cities to use the financial markets
➤ Mobilize private capital for urban infrastructure	<ul style="list-style-type: none"> ➤ Work out a long-term and binding national transformation strategy ➤ Create inclusive financial institutions
Local level	
➤ Strengthen municipal administration and financial base	<ul style="list-style-type: none"> ➤ Make better use of the potential of existing financial instruments ➤ Create transparency with respect to municipal revenue and services ➤ Coordinate policies above and beyond local jurisdictions and, wherever possible, harmonize administrative and functional borders
➤ Mobilize private capital for urban infrastructure	<ul style="list-style-type: none"> ➤ Develop community forms of financing

9.5.2

Goals

The aim is to strengthen municipal administrative capacity and create a solid financial basis so as to enable local governments and administrations to act and to enforce their objectives.

Since public funding alone will not be enough to cover the financing needs of modernizing, expanding and constructing new infrastructure, another goal is to mobilize private capital for urban infrastructures. This should involve committing private actors to sustainable standards to ensure that the public interest is observed.

In addition to this, international financing of development and climate mitigation should be coordinated and geared more to sustainable urban development.

9.5.3

Core recommendations

9.5.3.1

Goal 1: Strengthen the municipal administration and the financial basis

Nationally: Ensure solid financing through sufficient transfer payments

Even if an efficient use of the respective financing instruments is achieved, the financial resources of local municipalities and cities in developing countries will remain weak. The main objective of transfers by nation states to the local level should therefore be to ensure a minimum standard for the comprehensive provision of public services (substantive inclusion). For this, a relative stability of annual allocations must be ensured

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to make long-term budget planning possible. This can be achieved, for example, by earmarking a specific share of national revenue over several years.

Nationally: Use transfer payments to strengthen endogenous financing potential; support development potential

In order to make financing more sustainable in the long term, the WBGU recommends using transfer payments – especially in developing countries and emerging economies – to strengthen cities' endogenous financial potential. Possible methods here include tying transfer payments to reforms aimed at building new structures, e.g. efficient financial management systems, land registry offices and administrative capacities for collecting service charges or determining the market values of land and real estate. In highly developed countries that already offer an extensive supply of public services the distribution keys should support existing development potential.

Nationally: Consider ways to facilitate the use of financial markets

Consideration should be given to granting easier access to the capital and financial markets for those cities and municipalities that generate regular and comprehensive revenues of their own and can show that they have a successful system of financial management. Developing instruments for an efficient system of debt management at the local level is a key element here. Moreover, in order to exclude reckless debt financing, it must be ensured that the borrowed capital is used for investment and not to cover current expenditure. Since to date there are hardly any standards or secondary markets for municipal loans, municipal bonds, Green bonds or similar financing instruments, it is important to further develop the existing instruments and the corresponding market in order to keep the financial risks as low as possible for both investors and the local government. Sectors which potentially could have a great transformative impact should be supported by targeted lending from national and regional banks, e.g. by defining a form of priority sector lending. This applies in particular to technologies with a potential for leapfrogging, e.g. renewable energies and micro-networks. Development banks should support these objectives with appropriate programmes.

Locally: Make use of the potential of existing financial instruments

Since there are huge differences worldwide both in the skills needed by individual cities to take action and in national framework conditions, competencies and instrument portfolios must be adapted to the respective national and local context. In order to improve their

financial situation, cities and municipalities should set long-term financial targets and, if possible, use financing instruments that steer developments in ways that are in line with the WBGU's normative compass.

The potential of existing financing instruments has not yet been fully exploited in many cities. Apart from the additional revenue that cities and municipalities can generate through taxes, especially property taxes, many cities worldwide currently do not charge for municipal services such as water supplies, waste disposal, etc. (UN-Habitat, 2009a). Property taxes represent a dynamic and regular source of income, especially in fast-growing cities, since high price increases are to be expected there. Furthermore, real-estate transfer tax is a relevant source of revenue, particularly in cities that are attractive for investors and thus have a relatively high volume of transactions. Local governments should consider how property taxes might be used not only to boost municipal revenues, but also to have a transformative effect. This could be achieved, for example, by means of progressive tax rates, the use of individual valuations instead of zoning for land and real estate at the upper end of the price scale, or by linking the tax rate to the amount of land consumption involved.

Locally: Create transparency on revenues and services

If a city's financial situation is improved by levying taxes and charges, this should be matched by a visible improvement in the respective municipal services provided, in order to meet the population's expectations and boost their willingness to pay. To ensure transparency, the WBGU recommends that cities and municipalities should provide contextualized information on public revenues and expenditures on infrastructure and public services, and make this information publicly available.

Locally: Coordinate policies beyond jurisdictions and harmonize administrative and functional borders

In order to maximize local revenue potential, cities and municipalities should coordinate their policies above and beyond local jurisdictions and, wherever possible, harmonize administrative and functional borders in the long term, e.g. by merging municipalities. The hectic pace of urbanization is leading to changes in the spatial expansion of urban areas. This can lead to coordination problems in local task management and the efficient use of local sources of finance. The spatial allocation of public services (e.g. waste disposal, water supplies) must therefore be changed, especially in fast-growing cities, and local jurisdictions adapted accordingly (intermunicipal cooperation).

9.5.3.2

Goal 2: Mobilize private capital for urban infrastructure

Globally: Take local factors into account when linking the financial sector to sustainable development objectives

Growing links between the financial policy framework and sustainable development objectives (UNEP and IEH, 2015), and changes in thinking and actions from the short to the long term, are trends in the right direction. Measures at the city level, whose importance within the existing initiatives is highlighted in many places, should also be transferred to a common action framework, while taking higher governance levels into account.

Globally: Have external evaluators review existing criteria and standards

Existing criteria and standards, e.g. those of the Green Bond Principles developed by the International Capital Market Association (ICMA, 2015), or the Principles of Responsible Investment (PRI, 2015), which emerged from a UN initiative, should be reviewed by external and independent evaluators, such as the International Climate and Environmental Research University of Oslo (CICERO). The competencies and capacities of the evaluating institutions should be extended accordingly.

Globally: Review binding criteria and standards for sustainable investment and extend them by adding city-specific criteria

In the long term, uniform criteria and standards should be developed, and voluntary guidelines should be tightened and made obligatory in this context, with the aim of generating transparency on the social and environmental compatibility of investment and financial flows (e.g. by means of carbon-disclosure rules, impact reporting). The existing initiatives should be extended by adding city-specific criteria, in order to make investors more aware of the expectations of urban society with regard to urban quality of life.

Globally: Introduce an insurance mechanism for urban infrastructure and further develop innovative financing instruments

In order to guarantee the grandfathering of earlier rights as well as the protection of investors' legitimate expectations, the government and municipalities must make binding statements on the kinds of planning approaches they will support in the long term and what requirements must be met by the technologies deployed (WBGU, 2012). Investment risks and legal uncertainty should be reduced, especially in develop-

ing countries, to mobilize more capital for investment in urban infrastructure and buildings (WBGU, 2012). Here, the WBGU recommends the introduction of a global insurance mechanism for urban infrastructure and the further development of innovative financing instruments. These might include pooling urban investment in legally independent companies (special-purpose vehicles) or placing bonds or earnings rights from these companies (e.g. yield cos) on the capital market.

Nationally: Lay down a long-term and binding national transformation strategy

A key factor in mobilizing private capital for investment in the infrastructure is to define a long-term and binding national transformation strategy with the aim of improving planning certainty and legal certainty, and laying the foundation for coordination – both at different administrative levels and with private stakeholders. Local stakeholders should be involved in the development of the national transformation strategy to ensure that the diverse local situations are taken into account, and to convert successful measures at the municipal level into a common action framework.

Nationally: Create inclusive financial institutions

In developing countries, the aim must be to develop inclusive financial institutions and to make financial services accessible to poor population groups. Payments transmitted by mobile phones and the increasing number of remittances from migrants are opening up new possibilities for micro-finance products and peer-to-peer loans. These improve the solvency of people living in extreme poverty and create new incentives to develop specifically the infrastructure in informal settlements. The WBGU recommends an increase in funding for these developments, both by international development aid and by public and international development banks.

Locally: Develop community forms of financing

The participation of the urban population is also of key importance in the financing of sustainable urban development, and existing engagement should be supported. To achieve this, community financing forms, e.g. energy and housing cooperatives, should be promoted and disseminated. In addition to this, the WBGU recommends examining the potential of crowdsourcing platforms to fund neighbourhood projects and evaluating the data thus generated to help decide which projects are important for local communities.

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Table 9.6-1

Major risks of the global urbanization surge: superordinate objectives and problem-solving measures with a large leverage effect.

Source: WBGU

Urbanization surge up to 2050 – six development risks of global change	Goals	Measures and approaches
Development within the planetary guard rails:	<p>Whether planetary guard rails can be complied with will be decided in the mature cities, as well as in the fast-growing new city districts of Asia and Africa.</p> <p>Only if low-carbon, sustainable cities are built there can dangerous global environmental change and an associated global threat to prosperity and quality of life be prevented.</p>	<ul style="list-style-type: none"> ➤ Replace all fossil CO₂ emission sources in cities with emissions-free alternatives by 2070 at the latest ➤ Gear urban development towards limiting the demand for energy ➤ Establish as complete a circular economy as possible in this century ➤ Replace CO₂-emissions-intensive building materials (e.g. reinforced concrete) with low-carbon alternatives
Local environmental conditions as key dimensions of urban quality of life:	<p>Good local environmental conditions are a prerequisite for human quality of life.</p> <p>In particular, the quality of life of 2-3 billion people who are expected to be living in informal settlements in 2050 depends on effective local environmental policies.</p>	<ul style="list-style-type: none"> ➤ Reduce climate-change risks for urban societies ➤ Substitute toxic or pollutant substances ➤ In the long term, allow only emissions-free mobility in inner cities
Substantive inclusion and socio-economic dimensions:	<p>Socio-economic disparities and exclusion in cities are increasing worldwide and threatening the quality of life and stability of urban societies.</p> <p>Particularly threatened are the 2-3 billion people who might be living in informal settlements by 2050. Inequality and exclusion can trigger flows of refugees and thus pose a threat to international security.</p>	<ul style="list-style-type: none"> ➤ Initiate a paradigm shift: strengthen initiatives for the poorest 40% of the world's urban societies ➤ Inclusive growth: ensure above-average growth for lower income groups ➤ Secure access to basic infrastructure, education and health facilities for all ➤ Implement inclusive urban mobility by 2030 (SDG 11, target 11.2 'Provide ... accessible and sustainable transport systems for all') ➤ Ensure access to affordable, reliable, sustainable and modern energy for all by 2030 (SDG 7)

Urbanization surge up to 2050 – six development risks of global change	Goals	Measures and approaches
<p>Political inclusion and participation as a prerequisite for quality of life and a goal of transformation:</p> <p>It will hardly be possible to realize political inclusion for the 2-3 billion people likely to be living in precarious, informal settlements by 2050. These urban communities will be dominated by hardship, often also by violence, sometimes by admirable self-organization as a reaction to the absence of basic public services.</p>	<ul style="list-style-type: none"> ➢ Implement the right to adequate housing and secure political inclusion rights ➢ Equip cities with the necessary decision-making powers or strengthen these powers ➢ Integrate cities better into national and regional decision-making processes by giving them opportunities for consultation ➢ Establish collaborative governance structures and integrate the entire urban population ➢ Strengthen informal settlements and city districts and incorporate them into urban development ➢ Support (transnational) civil-society networks ➢ Improve connection to global issues 	<ul style="list-style-type: none"> ➢ Use strong instruments of participation where appropriate ➢ Fight corruption and stem land grabbing ➢ Stem land and property speculation ➢ Secure right of first refusal or veto right for municipalities for plots of land ➢ Establish sustainable investment standards worldwide ➢ Develop and introduce innovative, socially compatible approaches to property taxes and real-estate transfer taxes ➢ Institutionalize advocates of global issues
<p>In the newly emerging, planned settlements, especially in Asia but also in Africa, new middle classes will demand political inclusion. Political instability threatens where this is not granted.</p>	<ul style="list-style-type: none"> ➢ Ensure that land use is oriented towards the common good ➢ Provide buildings and spatial structures to create urban quality of life, e.g. easily accessible, safe spaces with niches for different user groups to allow interaction and relaxation 	<ul style="list-style-type: none"> ➢ Keep enough urban spaces in public or community hands ➢ Introduce or strengthen social-impact analysis for land-use management ➢ Strengthen rental markets with high standards of tenant protection ➢ Create affordable housing
<p>Eigenart as a dimension of urban quality of life and a resource of sustainability transformation – dependent on opportunities for inclusion:</p> <p><i>Eigenart</i> as a condition for quality of life and a resource for transformations is dependent on inclusion.</p>	<p>In mature and newly planned cities/city districts, <i>Eigenart</i> is undermined by social and political inequalities.</p>	
<p>In informal settlements, <i>Eigenart</i> is undermined by hardship and precarious inclusion opportunities.</p>	<p><i>Eigenart</i> is under threat for over 50% of the world's population.</p>	
<p>Eigenart in informal and newly planned cities – squaring the circle?</p> <p><i>Eigenart</i> – in the sense of creative and citizen-influenced urban development – is very difficult to realize for the 1-2 billion people who will probably be living in newly planned cities and city districts in Asia and Africa by 2050. Reasons: high speed of urban construction and the prevailing top-down planning.</p>	<ul style="list-style-type: none"> ➢ Decelerate urbanization surges; polycentric spatial design instead of conventional rural-urban migration ➢ Improve quality of life in informal settlements ➢ Place the lower 40% of income groups at the centre of urban development ➢ Create inclusive city districts (people-oriented, climate-compatible) ➢ Provide buildings and spatial structures to create urban quality of life, e.g. easily accessible, safe spaces with niches for different user groups to allow interaction and relaxation 	<ul style="list-style-type: none"> ➢ Establish locally adapted planning systems ➢ Initiate a paradigm shift: strengthen initiatives for the poorest 40% of the world's urban societies ➢ Counteract the growing concentration of property and land ownership ➢ Win over relevant urban actors (e.g. local governments, architects, planners) for efforts to improve the quality of life of urban poverty groups; mobilize comprehensive public and private financial resources

9.5.3.3

Goal 3: Gear the financing of international development and climate mitigation more closely to urban development

Globally: Gear international collaborations to agreed objectives

Financial support measures in the context of international cooperation are of key importance for cities in developing countries. The WBGU welcomes the agreement reached by 193 countries in the Addis Ababa Action Plan in July 2015 on a stable framework for implementing the Sustainable Development Goals and forging stronger links between the international agendas of development and climate policy; the WBGU also supports the fact that the agreement takes into account both urban investment requirements and the need to boost international cooperation on developing and consolidating local administrative capacities (UN, 2015a: Action Area 34). Furthermore, "Creating climate-compatible cities" is mentioned as one of the five expenditure aims of the Green Climate Fund, so that, according to the WBGU's assessment, sufficient attention is already being paid to the field of urban development in the announcements made to date.

National and multilateral actors in international cooperation should focus more on urban development and, against the background of global urbanization dynamics, coherently gear their operational strategies towards the international agreements, and consistently implement agreed objectives.

Globally: Direct international financial resources to the municipalities as required

In cooperation with national governments, it should be ensured that a direct funding of cities and municipalities is possible in international cooperation. The WBGU recommends steering international financial resources (e.g. funds from official development assistance, development banks, the Green Climate Fund) towards municipalities as required (i.e. on a problem-oriented basis), and to use these resources in particular to reduce structural constraints, for example to secure the basic urban infrastructure and basic functions, consolidate urban management, set up municipal financing instruments, and directly mobilize private funds (Meyer, 2016). Since most international development banks demand a guarantee from the national government for sub-national financing projects, and some development banks – such as KfW Group – are not allowed to take on project financing and the associated project risks, corresponding changes and instruments for risk management are needed to ensure that more money reaches the municipalities in the long term.

Globally: Clarify accounting rules of the Green Climate Fund to avoid double counting

The Green Climate Fund (GCF) to which cities also contribute, will in future be able to make considerable funds available that can also be used for the urban transformation towards climate compatibility. However, up to now no agreement has been reached on the accounting rules on the industrialized countries' financing of climate mitigation. Under the current accounting rules there are overlaps of content and planning between climate-mitigation financing and development financing (KfW, 2015). The WBGU recommends depicting ambiguities in the accounting rules in a transparent way and swiftly finding solutions for them.

9.6

Synopsis

The present report outlines the special challenges and opportunities faced by cities in this century from the perspective of the necessary transformation towards sustainability. One characteristic feature of the debate on the search for solutions is the enormous diversity of instruments and solution pathways. Consequently, there is no such thing as a blueprint for sustainable urban development. Nevertheless, in Table 9.6-1 the WBGU dares to order, concentrate and emphasize the recommendations given in Sections 9.1 to 9.5 and prioritizes them in two ways:

- Six key development risks can be identified in the global urbanization surge with its wide range of dynamics (Section 7.5).
- Necessary paradigm shifts, overarching goals, and appropriate measures with a particularly large leverage effect can be assigned to overcoming these major urban problems and managing the urban transformation towards sustainability. This is not only relevant to planning and governance issues, but also, in many ways, to the activation of the transformative potential of the urban societies themselves.

As an overall, general measure, the WBGU recommends upgrading the topic of 'Urbanization and Transformation' to a permanent item on the agenda of the G20. Germany's presidency of the G20 in 2017 should be used to put the topic onto the agenda. The WBGU also recommends that the federal government should advocate a reform of the UN-Habitat programme and the establishment of an international scientific panel on urbanization and sustainable urban development. International research as well as inter- and transdisciplinary working methods should be strengthened in this field.

Because ultimately, despite the existing broad portfolio of instruments, the urban transformation towards sustainability also remains a societal search process.

Research on sustainable urbanization

10

Research plays a pivotal role in the transformation to sustainable cities and in sustainable urbanization. In its flagship report on the Great Transformation, the WBGU already examined the significance of research and education for transformation processes (WBGU, 2011).

In the 2011 report, the WBGU differentiated between *transformation research*, where "transitory processes are explored in order to come to conclusions on the factors and causal relations of transformation processes" (WBGU, 2011:351) and *transformative research*, which is "only indirectly related to the transformation through the promotion of conversion processes by way of specific innovations in the relevant sectors" (WBGU, 2011:351). It thus refers to the type of research that "supports transformation processes in practical terms through the development of solutions and technical and social innovations, including diffusion processes in economy and society, and opportunities for their acceleration, and demands, at least in part, systemic perspectives and inter- as well as transdisciplinary procedure methods, including stakeholder participation." (WBGU, 2011:351f.). The WBGU recommends transformative and transformation research not as a substitute, but rather as a complement to basic and applied research (Box 10-1).

Improved understanding of urbanization processes within the context of a Great Transformation raises the issue of the transformation research or transformative research that is required to achieve it. In this report, the WBGU advocates expanding the research landscape on urban development and urbanization to include transformative research and transformation research, in order to create more room for research that is oriented to societal goals.

With its report on urban transformation, the WBGU is acting in a field that has been the subject of intensive study. In Germany alone, a large number of universities, non-university institutions and research programmes are conducting urbanization research (Section 10.2). As a result, numerous research questions on the future urban agenda have, at least in part, already been formulated. However, according to the WBGU, some research

questions require further in-depth study or should be completely reformulated and posed anew. This chapter does not aim to comprehensively reappraise the existing research on urban transformation, but rather – against the background of the WBGU's transformation analysis – to identify the requisite shifts in focus for the urban research agenda of the future.

The present Chapter 10 concentrates on research for urban transformation processes. The WBGU is aware that *education* is crucial for sustainable urban development – in particular to facilitate collaborative urban design between multiple stakeholders, especially in interaction with research (Box 10-2). However, a comprehensive analysis of transformative education processes in the urban sphere would constitute a research desideratum in itself.

This chapter is based on a three-part structure, as illustrated in Table 10-1. Section 10.1 outlines the key issues of urban transformation. The three key dimensions of the normative compass (Chapter 3) offer orientation here: (1) *sustaining the natural life-support systems* as an expression of adherence to global and local ecological guard rails or boundaries, (2) *inclusion* as an expression of people-oriented urban development, and (3) *Eigenart* as a perspective for the diversity and specific development dynamics of urban transformation processes. These dimensions are rounded off by the cross-cutting issue of the most suitable *governance of urban transformation*. The issue at stake is not only a programme that relates to transformation research, but also a methodological development programme for basic research, as well as applied and transformative research.

Section 10.2 looks at existing research programmes and institutions based on an extended criteria matrix that specifies the demands on basic and application-related research, and further develops the transformation and transformative research mentioned in the 2011 WBGU report on the Great Transformation. It concentrates on key programmes and institutions that the WBGU considers to be of particular relevance.

Section 10.3 outlines key factors for the contents

Box 10-1**Science in the context of the Great Transformation**

The WBGU explicitly stresses freedom of research: basic research should not be called into question by transformative or transformation research, but supplemented by it. The purpose of transformative and transformation research is to broaden the range of different types of science – from disciplinary basic research to inter- and transdisciplinary applied research.

Traditional disciplinary (basic) research forms the centre of the science system. Knowledge-oriented research helps us attain broader understanding of the societal, natural and technical environment. This means that this type of research is also an important foundation for opinion formation and democracy. Alongside basic research, application-oriented research and technology development have a fixed place in

the research and research-funding landscape.

In the WBGU's view, sustainability-oriented transformative and transformation research are not yet sufficiently developed and rooted in the research landscape. The WBGU advocates extending the research system to make additional room for research that is oriented towards societal objectives (WBGU, 2011).

The blurring of boundaries between the science system and the system of societal and political processes has triggered an intensive debate on scientific and political theory (e.g. Strohschneider, 2014; Ober, 2014; Schneidewind, 2014; Grunwald, 2015). A more intense politicization of science should also be seen in the context of potential dangers, e.g. the abuse of research by totalitarian systems or an orientation towards the objectives of interest groups in democracies. The WBGU therefore emphasizes the importance of discussing the essence of research and its orientation towards sustainability goals. This discussion is of key importance for the way society deals with far-reaching transformation processes.

Table 10-1

Research on the urban transformation: key issues of content, requirements and basic recommendations.

Source: WBGU

Key issues of content in research for the urban transformation	Requirements regarding transdisciplinary research on the urban transformation	Basic recommendations for further developed research on the urban transformation
Systemic view, if possible considering all three dimensions of the normative compass: <ul style="list-style-type: none"> ➢ Urban metabolism (e.g. building materials, phosphorus, electronic waste) ➢ Urban form ➢ Inclusion (urban quality of life, inequality) ➢ Urban health ➢ Mobility and transport ➢ Urban land use ➢ Governance (indicators, facilitating an urban 'foreign policy') 	<ul style="list-style-type: none"> ➢ Normative orientation: guiding concept of sustainable urban development in the context of sustaining the natural life-support systems, inclusion and <i>Eigenart</i> ➢ Structural principles: orientation of research to societal needs by co-design and co-production of knowledge; solution orientation; reflectivity ➢ Results and effects: generation of sustainable alternatives to existing technologies and social practices by technological, social or governance innovation; development of capacity at the individual and institutional level; structure formation 	<p>Coordinate a participatory roadmap process, with the BMBF as the central player:</p> <ol style="list-style-type: none"> 1. Strengthen basic research on the urban transformation 2. Set up new data infrastructures as a basis for indicator formation and the monitoring of the urban transformation 3. Establish new forms of global agenda-setting processes for urban transformation research 4. Build long-term transdisciplinary research centres at the urban and regional level 5. Press ahead with international capacity development in the research field
Cross-cutting issues of research for the urban transformation: <ul style="list-style-type: none"> ➢ Pool of data available to global transformation research ➢ Meta-reflection on transdisciplinarity and participation ➢ Trade-offs and synergies between the sustaining of the natural life-support systems, inclusion and <i>Eigenart</i> in the urban space 		

Box 10-2**Education for sustainable cities**

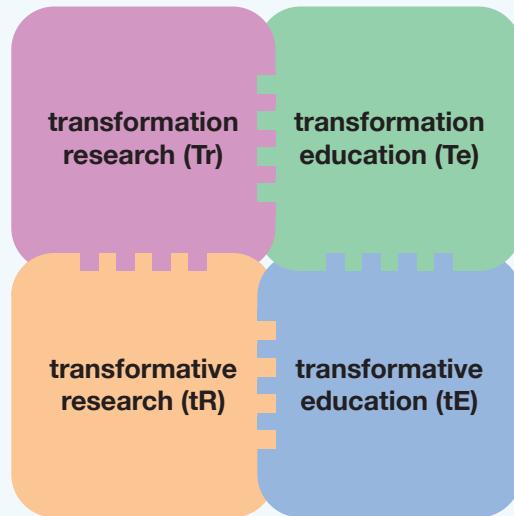
The WBGU believes it is essential not only to produce transformation-related knowledge, but also to anchor it in society and to make it available for societal transformation processes. Such a perspective extends far beyond science and also comprises general education processes. This applies to basic and applied research alike. Furthermore, in its report 'A Social Contract for Sustainability' (WBGU, 2011) the WBGU already distinguished not only between 'transformation research' and 'transformative research', but also between 'transformation education' and 'transformative education' (Figure 10-1).

Transformation education makes 'the scientific findings of transformation research available to society'. In the process, 'suitable narratives of change should be developed, so that these can be fed into everyday discourse through creative forms of knowledge communication, and develop further scope there' (WBGU, 2011:22). *Transformative education* 'generates an understanding of action paths and possible solutions' (WBGU, 2011:22). In a broader understanding of transformative education, it involves the learners themselves in transformation processes and makes this the basis of learning (Schneidewind and Singer-Brodowski, 2014:227 ff.).

Transformation education and *transformative education* ultimately aim for literacy in relation to transformation processes. Transformative literacy means the ability to 'adequately understand the multidimensionality of transformation processes and to integrate one's own actions into transformation processes' (Schneidewind, 2013:83). This applies especially to the urban transformation. Urban transformation processes are an expression of the close interaction between technological-infrastructure, economic, institutional, social and cultural dynamics. This becomes clear in the present report and is expressed in the different city examples (Chapter 5) and in the interplay between sustaining natural life-support systems, inclusion and *Eigenart* ('character') (Chapter 3).

The report shows that, in addition to an understanding of the complexity and multifaceted dynamics of societal development, individual and collective creativity and innovativeness are important characteristics for the transformation (Sections 3.5, 8.3). It is important, on the one hand, to train the skills needed to deal productively and creatively with challenges and, on the other hand, to reduce uncertainties and fears in relation to risks and the danger of failure, which inevitably go hand in hand with any confrontation with complex and unfamiliar tasks. Therefore, innovativeness also means seeing uncertainties as opportunities (John, 2005).

Transformative education means learning in a process of

**Figure 10-1**

Typification of transformation research and education.

Source: WBGU, 2011:22

change – in universities, in schools and outside educational institutions, even in informal environments. Thus, districts and cities undergoing change have an important role to play not only for transformation and transformative research; they are also places of learning and training for actors.

Urban real-world laboratories, for example, discussed as contemporary approaches in this chapter, are important locations for combining transformative research with education processes. Transformative research and education, when embedded in urban transformation processes, increase the reflexivity of urban transformation. In concrete terms, this raises the question as to how to create contexts and places of learning and socialization that make transformative education possible. Not only collective, but also individual learning and development processes should be specifically examined in the light of psychological research, to determine how reflexivity, an understanding of complexity, creativity and innovativeness can be increased as part of transformative education. Starting points for this already exist in environmental-psychology research (Degen et al., 2014; Funke, 2001; Lantermann, 2001; Dörner et al., 1983) and in research on environmental education and education for sustainable development (de Haan and Erben, 2014; Bormann and de Haan, 2008; Hein and Kruse Graumann, 2004); these can be expanded and supplemented.

of a new urban research agenda, while also addressing the related institutional consequences. The recommendations are intended not only for the area of research policy, but also for research institutions that are active in the field of urban research.

10.1 Cities and the Great Transformation: important lines of research

The selection of the research topics presented in this section is based on the focal points of this report and the knowledge gaps it has identified. For deeper insight, important global reports on urbanization issues

(Section 2.6) and the research agendas of international programmes and research alliances were also analysed with regard to open research questions. Moreover, discussions were conducted with national and international experts. Open research questions were discussed with experts from the fields of urban and urbanization research and practice at a meeting on November 20th 2015 in Berlin (Box 10.1-1).

Boxes 10.1-2 to 10.1-11 describe particularly urgent research questions relating to those transformative action fields addressed in the report that are particularly suitable for triggering system turnarounds towards sustainability due to their exigency and dimensions, their potential for preventing path dependencies, and their substantial co-benefits (Section 4.1).

10.1.1 Sustaining the natural life-support systems

Research on the environmental dimension of urban transformation is devoted to the planetary guard rails and the natural life-support systems within the context of urban development at the local, regional and global levels (Section 3.3). The mitigation of climate change and the adaptation of cities to climate change have increasingly become the focus of research in recent years. However, there is still a lack of consistent and comparable data on CO₂ emissions at city level. Moreover, little research has been conducted on the political measures that are best suited at the city level for coping with climate change, or on how effectively cities implement existing climate-action plans (Seto et al., 2014; Corfee-Morlot et al., 2009; UKAID and DFID, 2012; UN-Habitat, 2011a; Urban Climate Change Research Network, 2011; Heinrichs et al., 2011).

The WBGU believes that increased research, in particular in the material-flow dimension of urban development, will be essential in the future (Box 10.1-2). Comprehensive analyses of urban metabolism are hitherto only available for very few cities worldwide (Section 2.3.2). If cities are to become carbon-neutral by 2070, and if predominantly closed material cycles (at the local, national and global level) are also to be achieved during this century, there will be a substantial demand for data, research and monitoring on the metabolism of cities, and on their interaction with the surrounding areas and the globalized world in general (e.g. UNEP, 2012a; Urban Europe, 2015a).

Up to now, cities have rarely been observed as ecosystems. Topics such as biodiversity in cities or the climatic impacts on species living in cities have not been adequately researched. Further research is also required on the potential ecosystem services provided

by cities and the interaction between vegetation and urban metabolism (Revi et al., 2014a; UNEP, 2012a).

10.1.2 Inclusion

In its substantive, economic and political dimensions, inclusion directly targets the core of the societal and social organization of cities (Section 3.4). Comprehensive research on these issues – both conceptual and empirical – is already available today.

Nevertheless, the insufficient availability of data at municipal level is a problem in many cities. The lack of comparable data, above all on social groups within cities (e.g. structured according to ethnicity, socio-economic status) or on migratory movements into cities, impedes research on aspects of inclusion. In the WBGU's opinion, this poses a key challenge to basic and application-related research.

Similarly, the development of transformative research on inclusion in cities (and its catalytic impact on an international scale) opens up new possibilities for a global, interactive learning process; after all, challenges of substantive, economic and political inclusion – with similar structures and partially transferable solution patterns – are emerging not only in industrialized countries, but also in developing countries and emerging economies. The guiding concept of global development has long been characterized by a development model of basic financial security, increasing economic participation in dynamically growing market societies (economic inclusion), and political inclusion in terms of a representative democracy. However, this guiding orientation has been called into question in recent times. Challenges to substantive inclusion in cities are also emerging in the industrialized countries (due to segregation e.g. in education or healthcare or to the increase in migratory and refugee flows). The economic growth model with broad middle-class participation is no longer working in all developed economies. Patterns of economic inclusion applied hitherto are at risk, a fact that is reflected, for instance, in the levels of high youth unemployment in many southern European countries. The patterns of representative democracy are also becoming more fragile – due to trends of political radicalization and the desire for greater direct participation in political processes.

Not only developing countries and emerging economies, but also many industrialized countries are therefore searching for new patterns of material, economic and political inclusion that can meet the challenges of societies marked by growing inequality. As a result, the 'Buen Vivir' movement in South America or Bhu-

Box 10.1-1**Ideas from German urban research and practice**

In November 2015, the WBGU staged a discussion on the topic of 'Research for Sustainable Urbanization' with leading experts from the fields of German urban research and practice. The following recommendations emerged from the technical discussion:

Although inter- and transdisciplinarity is often called for, the current funding and scientific structures (incentive systems, career opportunities, project durations) are not structured accordingly. The predominant, mostly sectoral approach does not do justice to the complexity of the cities.

- Cities and urbanization are international topics, and research in this field also needs to be international. In addition to the cooperation that already exists between industrialized countries on the one hand and developing countries and emerging economies on the other, more South-South collaborations are necessary to gather and exchange relevant and context-specific knowledge.
- Cities need scientifically sound recommendations. However, the urgency of the need for action stands in contrast to the long-term orientation of the research. The different time frames make it difficult to deliver scientific findings to the practitioners quickly enough.
- An eye-level partnership with international actors at different levels is difficult to establish, given the currently prevailing unequal financial conditions in research funding. Moreover, cooperation with the research partners needs a long period of confidence building over a number of years, and this requires medium- or long-term projects. The structures that are customary at present, in which research projects only run for short periods, are not suitable for gener-

ating the necessary mutual trust, especially in developing countries and emerging economies.

- There should be an obligation in all federal government programmes with an urban focus to incorporate sustainability as standard across the board, without it becoming degraded to an empty word or phrase.

The experts see a need for research on the following topics:

- Material cycles, metabolism of the city
- Rural-urban interaction; globalization processes, connections between the cities themselves
- Cross-sector action and governance, also in informal contexts, specifically in developing countries and emerging economies
- Inherent conflicts of objectives between citizen participation and normative sustainability goals
- Diversity of the transformation pathways, identity, individuality and intrinsic logic, as well as the diversity of the cities as the context of the transformation
- Database, comparable measuring methods and indicators on resilience, particularly in the context of the city-related Sustainable Development Goals (SDGs)
- Transferability of contextualized knowledge, scalability of research results
- Economics of the transformation processes in cities
- Importance and contribution of individual changes in behaviour
- Transformation equity and welfare for all population groups
- Ecosystem services and biodiversity in cities, 'green infrastructure'
- The role of urban networks at the global level

The experts also see a need for methodological reflections on mutual learning, on the creation of real-world laboratories, and on participatory processes.

tan's 'Gross National Happiness' policy are stimulating debates in industrialized countries (for example on post-growth societies). The analysis of such developments requires more than transformation research based on empirical observation alone. It should actively accompany and catalyse concrete inclusion experiments and contribute to the exchange of experience and actors.

Research is needed on new or rediscovered forms of alternative economies (cooperative structures, regional money, self-sufficiency dynamics) as well as on alternative forms of participation. Globally networked real-world laboratories, for example, are suitable for this type of research (UNEP, 2012a; Schneidewind and Singer-Brodowski, 2014). Cities and their districts are predestined research areas for this purpose (Section 10.2.1).

Some subject areas within the context of inclusion require more detailed application-related research, for example on inequality in cities. As yet, internationally comparable data on social or economic urban inequality only exist for a small group of cities. Moreover, financing models for an inclusive and fair urban social welfare

system should also be researched (e.g. Urban Climate Change Research Network, 2011).

Research on political inclusion is also required (Box 10.1-11). There should be research in the urban context on how urban planning and development processes can be made more inclusive (Urban Europe, 2015a). This includes, among other things, research into the empowerment and motivation of people from diverse social backgrounds and age groups to practise participation, to enable greater recognition and consideration to be given to their needs. The social-design approach offers possible starting points, although their transferability to different cultural contexts will have to be examined. Not only should the repertoire of methods be expanded and validated; special attention should also be paid to the obstacles to inclusive participation that exist among both city residents and urban planners (administration, architects, real-estate industry). How can greater acceptance for participation be created? How can the necessary resources be activated and the necessary space created?

Box 10.1-2**Research field: materials and material flows****Building materials**

In view of the new urban infrastructures and residential buildings that will be constructed in the future for billions of people, the WBGU sees a need for research into new building materials that conserve resources and are affordable and climate-friendly (Section 4.4.1). If urban development continues with the building materials commonly used today, it will be impossible to comply with planetary guard rails. It is therefore necessary to continue and intensify research on alternative building materials. It would be useful here to also fall back on regional knowledge, e.g. to improve exploitation of the potential offered by traditional building materials such as wood or clay. At the systemic level it is important to also study the dynamics of a dissemination of new products. Research should also be conducted into the role of governance regulating the use of new or traditional building materials. Another aspect that needs to be scrutinized is the scalability of building materials in the overall system, e.g. completely new materials or novel processes for the production of carbon composite materials. There is also a considerable need for research on the use of wood and on the associated systemic implications. Strict demands must be made on land management and consideration given to competition for land use to ensure the sustainability of wood as a building material (WBGU, 2009a).

Phosphorus cycle

Given the great uncertainty relating to data, resources, flows and models, and in order to ensure the promotion and spread of relevant technologies, practices and policy measures, the

WBGU recommends a global scientific phosphorus assessment (WBGU, 2014b). The ground has been gradually prepared for this by the increased attention given to the topic in science and research in recent years, as well as by the emerging scientific networks. There should be holistic inter- and transdisciplinary sustainability research on the phosphorus cycle. It should cover the further development of procedures for the recovery of phosphorus from sewage, household waste and ash. It should also cover cooperation with partners from developing countries and emerging economies on joint research into and adaptation of processes used to recover phosphorus (Section 4.4.2).

E-waste

Globally-oriented research on flows of electrical and electronic waste (Section 4.4.3) is necessary. A quantitative analysis of the material flows in the electronics industry is hampered by a lack of data, especially outside of Europe, and the difficulties involved in documenting the often informally organized treatment of e-waste in households and recycling centres. In addition, there is still no system that ensures the separation of repairable or functioning electrical devices from e-waste. This could reduce the demand for new devices and at the same time give low-income sections of the population access to otherwise unaffordable electrical devices. There is also a lack of studies on the effectiveness of economic incentives (e.g. micro-loans, formalization of scrap collectors in developing countries and emerging economies), on social approaches to urban and state regulations in the field of waste governance (collection systems, charges aimed at controlling the amount of waste generated, etc.), and on simple technical methods for the safe and lucrative processing of e-waste.

10.1.3**Eigenart**

The dimension of *Eigenart* (a German word meaning ‘character’) is a plea for the diversity of urban, future-oriented development processes (Section 3.5). It emphasizes the significance of evolved identities and local factors, as well as the need for creativity in drafting development pathways. In the WBGU’s opinion, urban *Eigenart* is the precondition for heterogeneous urban transformation based on individuality, intrinsic logic and diversity. In this context, research has the role of exploring, supporting and driving the phenomena, processes and actors of the specific *Eigenart*.

In addition to reinforcing and supporting experimental settings, such as those used at district and city level in urban real-world laboratories, real-life experiments designed in cooperation with urban actors play an important role in promoting *Eigenart*. It is decisive that this takes place in a transdisciplinary mode (Section 10.2.1). The formative actors – ranging from urban planners and real-estate agencies to civil-society groups and artists – need to be integrated into pro-

cesses of co-design and co-production, and incorporated into experiments and design pathways that reflect the *Eigenart* of urban development. Action research involving scientists on the ground then itself becomes a method of urban *Eigenart* production. Urban research has so far only included the rudimentary beginnings of research topics and complexes that explicitly point in the direction of *Eigenart*.

In this report, the WBGU recommends gearing the study of urban prosperity and urban development more strongly towards urban quality of life (Section 2.4). The principles and indicators of *Eigenart* play a key role in this context as – unlike the dimension of inclusion – they have hitherto scarcely been part of common indicator systems. This WBGU recommendation involves a substantial need for research work on developing indicator systems for *Eigenart* in the sense of a repertoire of categories. Some of these categories are universally valid (e.g. the provision of space for relaxation and social interaction, the promotion of innovativeness); others are locally grounded and can be combined in a locally specific way. In Section 3.5.4, the WBGU puts forward suggestions for a number of indi-

Box 10.1-3**Research field: urban form**

So far, little research has been conducted into the relationship between urban form and climate change, the interactions between urban form (density of buildings and population, type of construction, etc.) and the transport system, or the resulting emissions and savings potential (Section 4.2.3; Seto et al., 2014; OECD, 2010). Furthermore, in the WBGU's

opinion, the potential of flexible, easily adaptable urban (infra-)structures has also been little studied. Flexible structures could avoid unwanted path dependencies and help keep open options for a subsequent change of course; the need for such changes often occurs in crisis situations and under time pressure. Further research is needed on urban development on a 'human scale' in an environmental psychological sense, i.e. on urban form and its interactions, e.g. with social cohesion and inclusion, safety, gender equality and health.

Box 10.1-4**Research field: 'beyond dysfunctional capitalism'**

No analysis of the urban transformation that follows the normative compass described in the report – sustaining natural life-support systems, inclusion and *Eigenart* – can get by without also asking about a further development of the capitalist exploitation logics that characterize today's urban design.

Economic predictions estimate that investments of more than US\$ 50 trillion will be needed over the next 30 years for a sustainable reconstruction of infrastructure in the world's cities (Section 8.2.2). In view of the currently available global financial capital, this is a significant sum, but definitely one that could be mobilized. Even so, given the current economic climate, one can only partially (UNEP and IEH, 2015) expect this sum of US\$ 50 trillion to be mobilized as real investment in the necessary transport, building and industrial infrastructures. The institutional structure of the current capital and financial system creates a variety of false incentives, e.g.

(1) for financial speculation (and the associated formation of speculative bubbles), (2) for a one-sided concentration of investment on individual countries and locations that are especially attractive economically (such as coveted inner-city locations), and (3) for one-sided focus on certain forms of infrastructure (e.g. real estate in the luxury price segment, construction of office real estate).

To enable policy-makers to take targeted and effective countermeasures, it is important to clarify whether these false incentives are only forms of partial market failure or a systematic failure of existing financial capitalism with a view to overarching questions of sustainability and inclusion (Klein, 2015; Streeck, 2013). The answer to this question will decide whether the mobilization of real capital for global, sustainable urban transformations requires only minor institutional adjustments (e.g. standards in the financial sector, improved state incentives for steering sustainable investment) or a series of institutional reforms of the financial sector (UNEP and IEH, 2015). The scientific debate on these issues needs a greater variety of heterodox research approaches in economics and the social sciences.

cators and categories that could provide an initial orientation (Table 3.5-2). Since objective criteria and quantitative methods of population and household polling can only inadequately ascertain the local specifics of the creation of quality of life and *Eigenart*, the use of qualitative social research methods should be intensified. The significance of urban spaces for social interaction and cohesion and for the emergence of creativity and innovation can, to some extent, only be appraised with qualitative, spatially-sensitive and interactively participating methods. This requires coordinated, internationally networked research activities that develop comparable indicators and methods in culturally different urban contexts.

10.1.4 Governance

Governance in cities, of cities and by cities is key to leveraging the transformation potential of cities for the purpose of sustainable development. For this reason, it plays a decisive role in this report. Chapter 8 makes it clear that a future-proof urban transformation, oriented towards the normative compass with its three dimensions – sustaining the natural life-support systems, inclusion and *Eigenart* – places considerable demands on governance not only within cities, but also within the nation state and at the global level. A polycentric architecture of responsibility spread across the various levels of governance is, in the WBGU's opinion, an advantageous solution. However, there is very little empirical data available on this field. New, workable governance architectures can be developed in well-networked and reflexively supported experiments and pilot tests. Scientific support plays a key

Box 10.1-5**Research field: mobility and transport**

Local public transport is an excellent example of the interconnections between technological, ecological and social components (Section 4.2.2). New, resource-efficient infrastructures and technologies can only successfully assert themselves if they are accepted by the population. Therefore, integrated

research into user behaviour and psychology, incentive systems, cost efficiency and the interrelationships between transport and new building materials is required, as is research into new technologies. There is also a need for further economic research into new business models for the introduction of new transport systems (Sims et al., 2014; Urban Europe, 2015b).

Box 10.1-6**Research field: urban quality of life**

The WBGU is introducing a new concept into the debate – ‘solidarity-based quality of life’ (Section 3.2) – which can generate stimuli for research. On the one hand, this should involve opening up new societal arenas for public discourse, dealing with, *inter alia*, decoupling quality of life from resource-intensive lifestyles. For example, research should focus on where and how such discourses can take place and

how they stimulate changes in individual orientations and lifestyles (for example, the Transition Town movement, the Commons movement, the collaborative economy, the sharing economy). On the other hand, approaches from the fields of religion, philosophy, psychology, sociology and economics to research into happiness, collective self-efficacy and the ‘Good Life’ should be combined. From this, a complex understanding of solidarity-based quality of life should be developed in combination with findings from geography and urban planning.

role in the development of a polycentric governance structure. Effective governance requires a new pact between science and society to facilitate close cooperation between local government and urban society, with research institutions providing scientific support.

The WBGU advocates further research into three major areas of interest in particular. *First*, into governance within the cities – especially in relation to informal structures; *second*, into governance between cities at global level (Corfee-Morlot et al., 2009); and *third*, into interactions between the different governance levels in a polycentric structure.

Although the study of governance in cities varies considerably from region to region, the subject has been relatively well researched on the whole (Chapter 8). As yet, there are few comparative studies that go beyond a comparison of individual or a few cities and urban governance structures and clarify which instruments and structures can be used successfully in which political, legal, economic and cultural contexts.

In addition to this, a number of other important research questions still remain open. They include questions on cross-sectoral governance, leeway for action, and negotiation processes between the different formal and informal stakeholder groups in relation to transformative processes. For example, the question of how the Great Transformation can be advanced and managed in informal settlements largely remains unanswered so far. A collaborative approach should be

developed with which existing informal structures can be intelligently integrated into transformation strategies. The normative compass alone makes it evident that informal settlements cannot be simply ‘replaced’. This raises various questions of a social-scientific and legal nature. How do power structures differ within and between different formal and informal contexts? Why do they differ, what do they have in common, and for what reasons? Where do the key challenges lie when informal and formal areas are linked up to each other? The formalization of informal structures is not necessarily always to the advantage of poverty groups. For this reason, these processes need to be examined and understood more precisely, so that they can be regulated if necessary. More knowledge is required as to when the integration of informal structures is advisable, how this might be achieved, and which criteria could be used to evaluate and manage the process.

There are also very large research gaps regarding the issue of global governance by cities. In its special report ‘Climate Protection as a World Citizen Movement’ (WBGU, 2014a), the WBGU has already endorsed the activities of the cities in mitigating climate change, since the impact of international (in-)action can be felt as far down as the local level. Polycentric responsibility architectures increase the likelihood that problems involving common goods, such as climate change, can be successfully solved (Ostrom, 2010). At the same time, urban ‘foreign policy’ raises further questions, such as

Box 10.1-7**Research field: urban health**

Few global reports on urbanization issues look into urban health (Section 2.6). Intra-urban health disparities are only slowly moving into the focus of research and policy-making (Section 4.5). There is a lack of disaggregated data for describing urban health, i.e. data on morbidity, mortality and risk factors that should be linked with demographic, socio-economic and spatial variables. Such data are important for planning, evaluating and further developing measures to promote and monitor urban health. Particularly in relation to developing countries and emerging economies, there is also little knowledge on what effect climate change, for example,

has on health in cities; what mechanisms can be used to promote resilience; what access the various population groups have to healthcare services; or what interrelationships exist between culture, (urban) nature and health. Furthermore, broader research should be conducted on how non-communicable diseases can be reduced in cities, or on how changes in behaviour can be initiated in specific target groups of the population.

The WBGU also recommends more detailed research into how a paradigm shift from a remedial to a preventive, health-promoting perspective might be achieved, and into what instruments, incentives, actors and policies might make a contribution in this direction.

Box 10.1-8**Research field: urban land use**

In the research field of urban land use, the WBGU identifies several broad topics that should be the subject of further research (Section 4.3). For one thing, there are different models of ownership that have not been sufficiently studied. Apart from private or public ownership of land, there are other property models that also recognize collective forms of ownership based on complex cultural and historical influences. These traditional property models in particular, most of which are in developing countries and emerging economies, should be further explored and incorporated into transformative (research) approaches on land-use management. Not infrequently, mixed forms can be found, for example when the ownership models of rural areas encounter urban models as a result of urban expansion. Dovetailing such models with statutory models requires in-depth analysis and further research in the light of the transformation concept.

There should also be more research into the transferability of concepts. Objectives such as the implementation of an urban land-register system are highly demanding and cannot be put into practice everywhere in the same way. Urban design, and particularly land-use management, must take local and socio-cultural conditions and prerequisites into account. This requires a form of research that links the local circumstances with concrete issues, e.g. a land-registration system for urban plots of land that fits local circumstances. In the WBGU's view, such lines of research are decisive to break the pattern of the usually unsuccessful, blueprint-like transfer of land-management systems or planning models from one urban context to another.

Another broad topic to be processed is the urban commons. In the meantime, a large number of discussions based on general theories on commons are ongoing among scientists. The focus here is usually on comparatively small projects such as urban gardening or food cooperatives. For the transformation in the cities it is necessary to clarify to what

extent ideas of urban commons and urban commoning can be scaled up to the district or city level, in order to advance the transformation towards sustainability. In this context, the economic model of the commons described by Ostrom could also be given more consideration (Ostrom, 1990).

The creation of (adequate) housing is closely connected to land-use management. In particular, access to land and ownership forms seem to play a decisive role here. The exact relationships should be researched more intensively in the respective local context.

In addition, the WBGU recommends engaging in research on the connection between real-estate speculation and housing vacancies. Many cities often have high vacancy rates in the housing sector despite the worldwide lack of housing. This does not only apply to the field of luxury real estate, but can also affect informal housing markets (Section 5.3, Cairo). The precise relations should be researched more intensively.

Despite many differences in national and local political systems and different regulatory systems in cities, the real-estate industry seems to have a strong influence on urban design worldwide. As a rule, the result is that when urban development is controlled by property investors, the welfare of the urban population is hardly or not at all the main priority. The detailed connections should be researched more in depth and alternatives developed.

In the WBGU's opinion, there has also been insufficient research into assessment bases for land and real estate – which are decisive e.g. for the levying of taxes on the acquisition of land and for calculating increases in the value of real estate. The process of defining and laying down assessment bases often lacks transparency and is primarily geared towards the property's market value. For a transformation of the cities towards sustainability, greater consideration should be given to the urban common good.

Furthermore, the WBGU urgently recommends expanding research into the prevention of corruption in cities in general, and land-use management in particular. Models on corruption prevention should be developed.

Box 10.1-9**Research field: urban life and urbanity**

The increasing diversity and inequality of cities, which has led to socio-spatial disparities and political conflicts over the appropriation of public and private urban spaces, should be examined in depth, as should the security and safety of urban spaces and the effects of measures made necessary by the social and ecological dimensions of sustainability.

Urban and regional research is a discipline with theoretical, empirical and practical orientations. As such, it is particularly open to linking up with inter- and transdisciplinary approaches; participatory and collaborative practices of urban design should play an increasingly important role here. The intensification of research on migration and diversity represents a special challenge, among other things because of the influx of refugees. The following can be recognized as current trends and desiderata:

- *The role of global economics in urban life:* The dynamics and local impact of the global financial and real-estate industry on urban life can be observed in many places, yet there are few scientific studies on the subject. This is connected with issues of re-urbanization, as well as rises and falls in the costs of inner-city living. Studies in the field of increasingly international labour markets and related transnational migration are essential.
- *Urban life in a globalized world:* Urbanization as a global phenomenon requires specific research. This field covers questions of population growth in megacities with diverse ecological and social problems (e.g. lack of infrastructures), as well as heterogeneous urban lifestyles.
- *Urbanity:* The special quality of the city, i.e. urbanity, needs to be better understood, especially in view of the fact that more and more people will be living in cities in the future. The different ways of approaching urbanity include cultural diversity and symbolic demarcations, the aestheticization and culturalization of the city, changes in the meaning of public space, and the refiguration of social spaces by digital media. Ultimately, the questions to be asked generally include structural aspects such as the effects of architecture and societal quality expectations.
- *City and environment:* Like many other environmental

changes, climate change stems from and is accompanied by societal change; it ultimately alters urban societies. Research in the field of environmental social science should process in depth questions of lifestyle, consumer practices and spatial configurations, for example urban design and its impact on people and the environment.

- *Digitization:* Without doubt, one of the biggest societal changes in recent decades has been advancing digitization. It plays a significant role in the context of urbanization with specific concepts such as the smart city (Boxes 2.1-4, 2.1-5). Questions of different aggregation levels include, for example: How will the cities change under the current guiding concept of the smart city? How can the resource-conserving aspects of a smart city be merged with fundamental parameters of a liberal-democratic urban society? What options does digitization offer for participatory and people-friendly urbanity? How can data abuse be prevented in the context of smart cities?
- *Public sphere:* One genuine characteristic of the city is that it generates a political public sphere, which seems important in the context of the Great Transformation and its negotiations. However, there is a risk of a loss of urban public sphere as a result of developments related to privatization, commercialization and eventization. It is an open question whether public spaces can be built into new urban public spheres like shopping malls, pedestrian precincts, public viewing areas, and museum or theatre districts, or whether they might also find equivalents in open-to-the-public cyberspace. Empirical research using physico-structural and social-dynamic categories (e.g. social density, atmospheres, identity) into existing places in the public sphere where people meet, articulate and discuss *res publica* is therefore significant. What spaces are available if individuals, groups or organizations would like to gather in public, form opinions and express agreement or disagreement with a *res publica*? What types of space can be identified and how do these affect negotiations on the *res publica*? For what reasons (e.g. physical-structural or socially dynamic) is a certain type of space particularly suitable for generating democratic performance? The debate on the virtual and post-democratic public sphere should also link up with debates about the further development of democracy.

whether the (non-)role of cities in global governance structures still meets present-day needs and opportunities. Cities must be strengthened and their integration into the global governance structures improved. But how can this be achieved, and what are the advantages and disadvantages of the different models? Above and beyond the kind of bold theories expounded in 'If Mayors Ruled The World' (Barber, 2013), it makes sense to examine the role of cities in future global governance regimes (Aust, 2013). Such regimes are beginning to emerge in the form of city clubs and other international network structures with the prominent participation of cities and mayors (Section 8.4). Efforts to make international law more accommodating to cities should be investigated, as cities could contribute to solving global

problems that have an impact not only between nations but also at the local level. If strategies that can help solve global problems are developed at the local level, they should at least not be impeded, but rather recognized and promoted. Further research is therefore required on how local solution strategies can be introduced at the level of international law (Box 10.1-10).

Moreover, research is needed on the long-term restructuring of UN-Habitat, and on the role of the programme in the context of global governance. In this case, the different options brought into the discussion by the WBGU (Section 8.4.3) must be examined and evaluated.

With regard to polycentric responsibility architecture, further research is required as to how inter-

Box 10.1-10**Research field: governance****Governance indicators**

There are various approaches to determining the quality of urban governance. Hitherto, no data sets with viable data over a longer period of time for a large number of cities are available for any of the developed indices (Nuissl and Hilsberg, 2009; Stead, 2014; for an evaluation see UNDP, 2009). Although there are extensive questionnaires and criteria for determining governance at the local level, these are not used comprehensively enough to be aggregated into a meaningful index. The Urban Governance and Legislation Index (UGL) from the City Prosperity Index (CPI), based on a small number of indica-

tors, is an exception. The WBGU sees a need for research to further develop an index for comparing the quality of urban transformative governance.

Facilitate an ‘urban foreign policy’

Research on facilitating an ‘urban foreign policy’, which could be carried out by city alliances, for example, is still in its infancy (e.g. Aust, 2015a, with reference to studies in Canada, South Africa and the USA). It needs to be supplemented and extended. Ways should be sought to enable nation states to promote positive initiatives based on individual cities or alliances within their legal traditions (keyword: innovation promotion by law and economics). There should also be research on the legal, socio-economic and/or political obstacles standing in the way of such positive urban initiatives.

action between the various governance levels can be optimized. Which structures have proven themselves in which contexts? Which structures involve the risk of blocking transformative processes? It should also be examined to what extent findings on polycentric governance from environmental economics (Ostrom, 2010) can also be applied to urbanization and urban development. In addition to this, research is needed into the interaction between polycentric spatial structures and polycentric responsibility architectures. Generally speaking, in wide areas of the social sciences, spatial data (e.g. satellite images, GIS data) have so far rarely been linked with political or social data (election periods, income developments, etc.) for analytic purposes. Many aspects of research in this area are still in their early stages and should be intensified (Geoghegan et al., 1998).

10.1.5**Cross-cutting aspects of urban transformation research**

To have a transformative effect, research findings must be adapted to the local urban context. However, this raises the question as to how this contextualized knowledge can be transferred to other cities; in other words, scientific reflection on the transferability of findings will be required (Future Earth, 2014a).

The hypothesis of this report is that transferability is possible, at least to a rudimentary or exemplary extent, or on the basis of good practical examples. Research on these transferability possibilities is, however, still in its infancy. Moreover, the question is rarely raised as to what – and above all *how* – city-oriented learning from each other is possible across the borders of continents, countries and cities, and how positive behaviour based on this can be generated or reinforced. For this rea-

son, the WBGU recommends making the transferability and scalability of research findings an area of research. General principles need to be identified that can act as a basis for transferability beyond the constraints of rigid blueprints. Among other things, this includes identifying the factors of efficacy, adaptability, system contexts and pathway dependencies.

10.2**Programmes and institutions: where does urban sustainability research stand?**

From the WBGU’s point of view, effective urban research in the spirit of the Great Transformation towards sustainability must not only answer pressing questions of content, but also have access to adequate institutional resources in order to provide the best possible support for transformative processes.

The following section (Section 10.2.1) outlines the demands on urban research based on the criteria for transformative research developed in the WBGU’s report ‘A Social Contract for Sustainability’ (WBGU, 2011:322 ff.). They provide a guideline for classifying existing and future urban sustainability research.

This framework allows an analysis of the existing urban research system: what is the position of research programmes and research institutes that are already influencing the direction and dynamics of urban transformation research today by prioritizing urban research issues? The focus here is on national institutions and programmes. These are rounded off with a look at the EU’s Framework Programme for Research and Innovation, the global Future Earth initiative framing global change research, and selected international institutions of good practice.

German urban research can draw on a broad spectrum of existing building blocks in comprehensive

Box 10.1-11**Reflections on methods and contents of research for urban transformation****Pool of data available to globally-oriented research for urban transformations**

There are large gaps worldwide in the pool of data on cities in numerous research fields (e.g. metabolism, health, governance, migration and land use). In the WBGU's opinion, the data available to individual initiatives and research projects should be expanded and improved in general. Research aiming to successfully accompany global urban change is dependent on solid and comparable pools of data and monitoring. The WBGU warmly welcomes the C40 Cities initiative to make their emissions data available on a comparative platform (C40, 2015).

Concrete data at the global and national levels are just as necessary in this context as data at regional and urban levels, as well as data on different population groups within the city. Knowledge about district and city structures, activity patterns, resource and energy consumption, etc. is the basis not only for more basic, applied research and transformation research, but also for a societal observation of transformation processes. The internal logic of many disciplinary research approaches, which are often guided by the availability of data, can only be overcome by comparable inner-city data. The WBGU therefore proposes the establishment of global data infrastructures (Section 10.3).

Transdisciplinarity and participation

Important criteria for the evaluation of socio-ecological research and transformation processes have already been gathered in the German-speaking and international discourse on sustainability. These focus heavily on an evaluation and quality control of processes and sequences (Jahn and Keil, 2015; Jahn et al., 2012). Furthermore, in the last few years innovative contributions have been made to the assessment of the societal impact of research, and these should be continued. Further research questions arise from barriers and obstacles to transdisciplinarity. Reorientations are needed in the current funding and scientific structures (e.g. incentive systems, career opportunities, project durations). Transdisciplinary methods also need to be developed: How can transdisciplinary research succeed? How can different knowledge forms and actors be interlinked? What possibilities are there, beyond honorary activities, to systematically support and strengthen civil society for cooperation? Research is also needed to improve the dovetailing and compatibility between transdisciplinary research and the established disciplinary scientific system (excellence criteria, rewarding extra-disciplinary progress, etc.).

The limits and problems of transdisciplinary research should be further scrutinized scientifically: How can it be ensured that the stakeholders who are brought in do not represent vested interests that might influence the orientation of the research project? Who has process sovereignty, i.e. who determines when which actors become involved and to what degree? There are points of contact here with the participation research field.

While there have already been debates on the need for and opportunities of participation instruments (Sections 2.5.5, 8.3), less research has been conducted hitherto on the problems associated with participation. For example, the

question arises as to how the transparency, responsibility and accountability of participation can be ensured in different contexts if they are to have more than just a legitimizing effect. Research projects should aim to reveal which instruments are most suitable for application at which level. Funding should be made available to develop an integrated research programme on participation. The aim should be an overall systematization of the different activities to further develop and evaluate participation processes. A central goal could be to work out and institutionalize standards for training and practice – in a similar way to mediation.

Conflicting aims and synergies between sustaining natural life-support systems, inclusion and Eigenart in the urban sphere

In this report, the WBGU introduces a new approach to urban sustainability on the basis of three categories: sustaining natural life-support systems, inclusion and *Eigenart* ('character'; Chapter 3). There is need for research on the interrelations between these three dimensions.

When one dimension of the compass is taken into account, this often already has positive side-effects on another dimension. For example, environmental protection measures in the city can lead to the preservation or creation of green areas. The synergies from interaction between the dimensions still need to be explored. However, conflicts of objectives may also arise, e.g. if action to sustain the natural life-support systems leads to a lack of available land for transport infrastructures and housing. Similarly, normative demands on transformation can be inconsistent with the requirements of participatory decisions. Therefore, there must be further research into which conflicts of objectives and synergies result from inclusion, *Eigenart* and sustaining the natural life-support systems, and how these can be solved or strengthened.

Patterns of observation

The development of pattern languages is a first step towards transferring contextualized experiences into other contexts. In his works 'A Pattern Language' (1977) and 'The Timeless Way of Building' (1979), Alexander describes universal design processes with the goal of a people-oriented and life-sustaining architecture (Leitner, 2007, 2015). Alexander identifies 253 patterns which he classifies using the categories: name, evaluation, image, context, problem, forces, solutions and result; scientists, practitioners and non-experts can make use of these categories for different specific design processes. When the world changes, patterns change too, or new ones are added. The search for urban patterns in the context of the Great Transformation should take place within a scope of possibilities framed by the degree of formalization, maturity and planning (Chapter 7) and covering the dimensions of *Eigenart*, natural life-support systems and inclusion. According to the WBGU, the aim must be to find patterns within this scope of possibilities and to explore how a transfer of the patterns that prove their worth can be made possible, while taking *Eigenart* into account.

transformation and transformative research, not only with regard to content but also in terms of its institutions. This analysis, therefore, focuses on programmes and institutions that stand out in this respect. At the national programme level, these include the BMBF's Future Megacities programme, the agenda process of the National Platform on the City of the Future (Nationale Plattform Zukunftsstadt) launched as a joint initiative between several German ministries, the DFG's Megacities priority programme, and the development of real-world laboratories in Baden-Württemberg (Section 10.2.2). A review of the EU's Framework Programme for Research and Innovation and the Future Earth initiative complements these programme analyses at the international level (Section 10.2.3).

The section on university and non-university research in Germany focuses on the major institutions (Section 10.2.4). These include the Federal Institute for Research on Building, Urban Affairs and Spatial Development (BBSR), a departmental research institution (Ressortforschungseinrichtung) with a special focus on the content and methodology of Germany's municipal and urbanization research, and the German Institute of Urban Affairs (Difu) within the framework of municipal self-organization. The Academy for Spatial Research and Planning – Leibniz Forum for Spatial Sciences (ARL), a member of the Leibniz Association, and the Leibniz Institute for Research on Society and Space (IRS) are also key institutions.

Several avenues of urbanization research are also being pursued at German universities. Interdisciplinary alliances within the university structures have been reinforced in recent years. The national analysis is rounded off by selected international examples of good practice. Table 10.2-1 provides an overview of the institutes and programmes chosen and examined in this Section 10.2.

This report cannot, and does not intend to, provide a comprehensive evaluation of the programmes and institutions mentioned. Its goal is rather to draw attention to existing interesting focal points and thought-provoking shifts in focus in the institutional system of urban transformation research, in order to strengthen the role of research and science in the transformation processes. These initial ideas, which serve as an impetus for further considerations, have been distilled into recommendations in Section 10.3.

10.2.1

Demands on the framework of sustainable urban research

The orientation of research determines the extent of its transformative effects. The contents, goals and structure of research are often defined not only by the research interests of the scientists, but also by the higher-level research programmes of institutions or sponsor organizations. Consequently, they influence the findings and effects of the research.

The WBGU formulates its expectations of programmatic urban research in the following section. They have been largely developed, and in some cases quoted verbatim, from the report 'A Social Contract for Sustainability' (WBGU, 2011:322ff., 339); some parts have been extended and adapted to the special context of urbanization research.

The analysis following the criteria (Table 10.2-2) produces a qualitative image of the different dimensions of research programmes, and outlines their transformative potential (Section 10.2.2). At the same time, the criteria also serve as a basis for recommendations in the sense of good scientific practice in research funding.

The WBGU also sees the criteria as an incentive for researchers and scientists to adopt a transformative approach in their own research. The criteria allow reflection on the extent to which research already meets transformative demands at the level of specific research projects. Conditional or causal interdependencies often exist between the analytical criteria. Transdisciplinarity, for example, is considered the prerequisite for the development of societal relevance in research.

The WBGU explicitly stresses freedom of research. With regard to future research programmes aimed at achieving a transformative effect, the WBGU recommends referring to the contents of the research fields identified in Section 10.1 for orientation, along with the following recommendations for transformative research.

10.2.1.1

Goals

The urban transformation described by the WBGU is intended to lead to cities that sustain natural life-support systems, guarantee inclusion, and make *Eigenart* possible (normative compass: Chapter 3). These goals should serve as points of reference, defining the orientation framework of research activities.

In the spirit of sustainable urbanization, the WBGU advocates a holistic approach to the concept of the city as a system. This involves taking into consideration possible interactions between the research subject and

Table 10.2-1

Overview of research programmes and institutions examined in detail in Section 10.2.

Source: WBGU

	Research programmes	Research institutions
National	<ul style="list-style-type: none"> ➢ National Platform on the City of the Future ➢ BMBF's Future Megacities programme ➢ DFG's priority programme Megacities-Megachallenge: Informal Dynamics of Global Change ➢ Helmholtz's Risk Habitat Megacities initiative ➢ Fraunhofer-Gesellschaft's Morgenstadt - City of the Future initiative ➢ Urban real-world laboratories, Baden-Württemberg 	<ul style="list-style-type: none"> ➢ Helmholtz Association ➢ Fraunhofer-Gesellschaft ➢ Leibniz Association ➢ Federal Institute for Research on Building, Urban Affairs and Spatial Development ➢ German Institute of Urban Affairs ➢ Various university research institutes
International	<ul style="list-style-type: none"> ➢ Horizon 2020 and other EU programmes ➢ Future Earth 	<ul style="list-style-type: none"> ➢ Various inter- and transdisciplinary university and non-university research institutes

environmental problems, sustainable growth and issues of distribution equity at the local and global levels.

Beyond the subject matter of research, normative goals can also be targeted by means of the selected mode of research. Inclusion aspects can, for example, not only be incorporated into research in the form of research questions concerning inequality or participative governance, but also actively implemented through interdisciplinary research approaches, so that the research itself contributes to citizen participation and emancipation.

10.2.1.2 Structural requirements

Societal relevance and problem orientation

To support the transformation process, research should not only be oriented towards a superordinate normative framework, but should also relate to specific societal problems. On the one hand, it should therefore pursue general goals of sustainable urban development while, on the other, being closely linked to the needs and requirements of the respective city; these needs must, in turn, be translated into research questions. Whereas the orientation to societal problems is a prerequisite for generating relevant instructional knowledge at different levels (policy making, civil society, industry), and thus for achieving a transformative effect, conflicts of objectives requiring reflection can also develop from the simultaneously normative and participative approach.

Interdisciplinarity

The WBGU defines interdisciplinarity as "the cooperation of several independent individual sciences

attempting to find an answer to a shared research issue with their own methods." Because it combines different aspects, it can ideally lead to new, holistic solution strategies (WBGU, 2011:323).

The challenges and problems associated with the transition to the sustainable, liveable city are neither exclusively technical nor exclusively societal in nature. In addition to this, the problems are frequently complex, as various urban sectors overlap each other. Only by analysing the systemic problem context can a large number of potential transformation pathways be identified. These can be of a (highly) technical, societal or political nature (Stirling, 2009; STEPS Centre, 2010).

The WBGU therefore advocates interdisciplinary research on questions surrounding the transformation of urban systems. This should be made possible and promoted by means of research funding. Research programmes should not restrict the results to be generated, such as the possible transformation pathways, by specifying the innovation to be generated (such as a specific technology).

Transdisciplinarity

The awareness is gradually growing that non-scientific actors and their knowledge should be brought in, because the transformation processes are so multifaceted. In transdisciplinary processes, representatives of government, industry and civil society are therefore incorporated into the research process as stakeholders. This can include co-design, i.e. the joint definition of research goals, and co-production, i.e. cooperation in generating knowledge and developing solution approaches. An orientation to real-world problems can increase acceptance of research-led problem solutions and their long-term implementation, and trigger

Table 10.2-2

Criteria for the analysis of research funding.

Source: adapted and further developed from WBGU, 2011:339

Analysis field	Requirements	Criteria
Goals	Sustainable urban development in the context of sustaining the natural life-support systems, inclusion and Eigenart	Reflection of interactions between one's own research subject and other dimensions of the compass made up of the natural life-support systems, inclusion and Eigenart, as well as potential conflicts of objectives
Structure	<p>Societal relevance and problem orientation</p> <p>Interdisciplinarity</p> <p>Transdisciplinarity</p> <p>Openness for reflexive research</p> <p>Openness to experimentation</p> <p>Time frame</p> <p>International scope</p> <p>Recombination of knowledge</p>	<p>Research topics also oriented towards the requirements of political decision-makers and society; solution-oriented, innovation-oriented, applied research</p> <p>Cooperation between engineering and the natural, cultural and social sciences</p> <p>Problem focus, cooperation with stakeholders (co-design and co-production of knowledge processes)</p> <p>Learning, reflexive research and flexible funding programmes</p> <p>Model projects, innovative methods, e.g. urban labs and real-world laboratories</p> <p>Adequate time frame and adequate time periods</p> <p>Integration of scientists from non-OECD countries, particularly in developing countries and emerging economies</p> <p>Targeted research; combining existing knowledge with knowledge creation with regard to the opportunities for innovation</p>
Results and effects	<p>Technological and social innovations</p> <p>Conditions for diffusion of innovations</p> <p>Political strategies</p> <p>Capacity development</p> <p>Implementation</p>	<p>Generation of sustainable alternatives to existing technologies and social practices; reinforcing a solution orientation</p> <p>Consideration of global diffusion, acceptance and national or international framework conditions</p> <p>Development and discussion of possible political measures to improve diffusion conditions and/or implement transformation</p> <p>Development of capacities at the individual and institutional levels, structure formation</p> <p>Long-term implementation and consolidation of research findings and innovations</p>

transformation processes as a result. Transdisciplinarity does not replace the disciplinary basic research, application-related research or the interdisciplinary integration of knowledge, but, as an additional possible type of research, can contribute to integrating knowledge on a broad societal basis and making it socially robust (Gibbons et al., 1994; Cash et al., 2003).

Reflective research and funding programmes

The WBGU sees the Great Transformation as a societal and scientific search process. Transformative research, therefore, does not mean investigating a rigid catalogue of research questions or following a strict set of rules prescribed by the research mode, but rather repeatedly putting the contents and forms of research organization to the test. Research itself – and therefore also the framing research programmes – should consequently be organized dynamically.

Cities are diverse. An examination of the respective constellation of actors and an understanding of the

respective dynamics are prerequisites for identifying governance structures and transformation pathways, as well as for triggering processes of development and change. For this reason, the funding programme should be allowed to readjust research-programme structures if the research subject has implications for research questions and budgets.

Reflective research, therefore, also means that possibilities for self-reflection, and consequently for a readjustment of the research orientation, should be possible. The introduction of newer transdisciplinary research approaches is associated not only with opportunities, but also with risks. For example, experience with real-world laboratories or other experimental research modes leads to new research questions on the methodology of transformative research (and of participation in general) in relation to process sovereignty (Box 10.1-11).

The concept of transformation equally includes the need to reflect on the content of research. Research

and research-based innovations – whether economic, technological or social – can have a negative impact on social and ecological systems. Systemic interactions, including potentially undesirable or unintended effects of innovations, should therefore already be considered during the research process.

The Green Revolution, for example, led to a significant increase in agricultural production in developing countries (Bohle, 1981), bringing an end to the major hunger crises that had previously occurred, e.g. in India. At the same time, however, the Green Revolution also had negative systemic effects. Socio-economic dependencies increased because farmers now had to buy high-yield seed, fertilizers and pesticides from major corporations (FAO, 1996; Bohle 1989). The Green Revolution also had effects on the environment: e.g. in many places, intensified agriculture in monocultures caused soil erosion and a loss of biodiversity; the increased irrigation led to soil salinization (Smith, 2009; Conway et al., 2010).

Openness to experimentation

Action research in the sense of reflective and simultaneously involved research is a suitable method for research into cities and urbanization. The analysis of urban transformation processes shows that, compared to more general aspects of transformation and transformative research, urban research scientists are themselves often involved in transformation processes and have thus become transformation actors. This can also be attributed to a willingness to try out new methodological approaches and experiments. Research approaches such as sustainable living labs, sustainability labs, urban transformation labs, real-world laboratories, etc. (Nevens et al., 2013; Schneidewind, 2014; Bergvall-Kåreborn et al., 2009; Liedtke et al., 2015; Karvonen and Heur, 2014; Wittmayer et al., 2014) have proved to be of such value that today they are prescribed as methodologies in urban-research programmes (Urban Europe, 2015a).

The WBGU advocates testing innovative methods in urbanization research, since trying things out and experimenting play a key role in shaping the urban transformation. They should therefore play a stronger role as a component of solution-oriented urban research. Spaces for experimentation, such as real-world laboratories, offer potential that needs to be developed further to take possible changes and their effects into account. New methods of mutual learning that connect different scientific communities and actors with different mentalities, cultures and languages should also be further experimented with. New paths should be tried and risks taken in terms of contents and methods. In the WBGU's opinion, research needs to learn more from so-called

failures to make constructive use of learning opportunities and experiences. Freedom of research also means that so-called failures should not constitute a potential threat to later project applications.

Time frame

The transformation to sustainable cities is one of the most urgent problems of our times. For this reason, it should be made a research-policy priority for which adequate financial funds must be made available. At the same time, tension is caused by the different time frames required by research and the need for action in cities.

To promote a long-term and enduring transformation to sustainable urban development and urbanization, science – in particular reflective and transformative science – needs time. The essence of science intrinsically demands that research questions must be answered in a methodologically correct manner, and that innovative solutions must be soundly designed and tested, especially if new, unfavourable path dependencies are to be excluded. On the one hand, this stands in direct contrast to the dominant model of project-based research funding over short periods of time, which promises fast, presentable innovations but does not fit into the time frame required for the transdisciplinary dialogue with stakeholders in research projects. On the other hand, the urgency of and acute need for practical solutions in cities also conflicts with long-term research planning. New paths should be found here to accommodate the needs of both sides.

Internationality

All over the world, cities not only drive global change but are also impacted by it, and find themselves confronted with similar social, ecological and economic problems. Urban transformation towards sustainability should also take place at the global level to ensure that planetary guard rails are jointly complied with.

International research cooperation can contribute to generating synergies and finding solution approaches for similar urban problems. Cooperation can include a multi-oriented north-south, south-south and north-north knowledge transfer and/or exchange of ideas on solution strategies, in which all the actors involved in the transdisciplinary process participate. The shift in the role of knowledge and technology transfer to a knowledge exchange on equal terms and mutual learning, confronts the research process and researchers involved with major challenges, e.g. in relation to cooperation, communication and reflection on the understanding of roles and tasks.

In the WBGU's view, researchers need to cooperate more intensively at the international level – across

all country groups. This should also be promoted and financed by the research-sponsoring institutions, in which case funding should cover not only the research but also the implementation of the research findings. The currently prevailing ‘no exchange of funds’ rules, which prevent cooperation on an equal footing with colleagues in developing countries and emerging economies, should be reconsidered.

Recombination of existing knowledge

The WBGU reiterates its 2011 position on recombin-
ing existing knowledge and states: “Transformation
research should combine and further develop existing
knowledge with future knowledge by means of search-
ing and networking processes. It should be a knowl-
edge exchange involving different disciplines, but
also between basic and applied research. This could,
for example, be realised by broadly examining basic
research results with regard to their transformation-re-
levant innovation potential, subsequently to be com-
bined with applied research with regard to technolog-
ical realisation or the social implementation of trans-
formative actions” (WBGU, 2011:323).

10.2.1.3

Results and impacts

The aim of research is to effectively support the trans-
formation towards a sustainable, liveable city. This
means that the research and development process
should bring forth not only scientific results such as
publications, but also results in the form of (applicable)
solutions to problems.

The development of adapted solutions, i.e. technolog-
ical and socio-economic innovations, is an essential
component of research. Practical application shows that
science-based innovations are particularly successful
when they are geared to the needs of the users. In the
WBGU’s opinion, transdisciplinarity (Section 10.2.1.2)
is an important prerequisite for achieving transforma-
tive effects through research.

This applies both to innovations based on the latest
scientific findings and to solutions that have already
been successfully introduced as an innovation in other
contexts. A standardized transfer of innovations is not
possible due to different overall legal conditions, cul-
tural and social norms and economic and political cir-
cumstances. The implementation of sustainable alter-
natives to existing technologies and social practices,
therefore, requires a precise definition of the social
conditions required to disseminate an innovation and
adapt it to the *Eigenart* of the specific urban context.
Political strategies and instruments should be devel-
oped to disseminate solutions in transdisciplinary pro-
cesses.

Research can have further positive societal effects
above and beyond the development of transformative
innovations. Research can strengthen transformative
capacities at the individual and institutional level. In
particular, cooperation between researchers in industri-
alized countries and scientists in developing countries
and emerging economies can engender and reinforce
new educational, scientific and research structures
that, in the long term, can counteract the so-called
brain drain from developing countries and emerging
economies, and allow a wide range of future research
capacities to develop.

In the WBGU’s opinion, the long-term implementa-
tion and consolidation of research findings and innova-
tions – in other words, the application or implemen-
tation of research findings to solve problems – is decisive
for the transformative effect. The transition between
research work, application and consolidation is blurred
in this context. For this reason, the implementation of
the findings, the integration of relevant stakeholders
and possible application financing should already be
taken into consideration in the research process.

10.2.2

German research programmes

The topics of urbanization and the city find their
way into German research policy and funding not
only through the Federal Ministry of Education and
Research (BMBF), the Federal Ministry for the Envi-
ronment, Nature Conservation, Building and Nuclear
Safety (BMUB) and the Federal Ministry for Eco-
nomic Affairs and Energy (BMWi), but also through
the Federal Ministry of Transport and Digital Infra-
structure (BMVI). The interministerial New High-Tech
Strategy (Bundesregierung, 2014) plays an overarch-
ing role in this context. It is the centrepiece of Germa-
ny’s research policy. The latest version of the strategy
embeds technological research and development into
the societal context. The WBGU therefore believes that
it has the potential to develop from an economy- and
technology-driven innovation approach to a more com-
prehensive form of transformation research. However,
to achieve this, it would be necessary to also critically
review the underlying sustainability concept and not to
subordinate social and ecological benefits to primarily
economic benefits.

As regards sustainable urbanization, the fact that
the ‘CO₂-neutral, energy-efficient and climate-adapted
city’ is one of the federal government’s ten so-called
Future Projects within its High-Tech Strategy merits
positive recognition (Bundesregierung, 2014:50). For
its implementation, the four ministries involved in the

High-Tech Strategy further developed their city-related research activities in a joint platform and participation process between 2013 and 2015. Under the title 'National Platform on the City of the Future' (Section 10.2.2.1), this process represented an important development in research policy-making in several ways.

At the moment, sustainable urbanization is prominently rooted in diverse BMBF initiatives. For example, the Science Year 2015 was dedicated to the topic of City of the Future (BMBF, 2015d). Concrete funding for urban and urbanization research is largely provided within the framework programme 'Research for Sustainable Development' (FONA; BMBF, 2015b). In the Science Year 2012, titled 'Project Earth: Our Future', the BMBF already launched a research initiative on sustainable development in German cities called 'ZukunftsWerkStadt' (Shaping the Future of Cities). The initiative continued into a second phase in 2015 under the aegis of the Science Year and the key initiative, City of the Future (BMBF, 2015a). At the international level, the BMBF's 'Future Megacities' research programme has in many respects set an example and will be examined in more detail in Section 10.2.2.2.

The BMUB funds research on the priority themes defined by the 'BMUB Research Framework and Ministerial Research Plan for 2015'. For the field of urban and urbanization research, it draws on the capacities of the Federal Environment Agency (UBA) and the Federal Institute for Research on Building, Urban Affairs and Spatial Development (BBSR), which not only conduct research themselves but also fund research work by external researchers on the main topics of the research framework (Section 10.2.4). Urban and urbanization research within the research framework is interdisciplinary in orientation and covers a wide spectrum of topics. They range from general subjects of spatial planning, urban development, housing and civil engineering to experimental and applied research on housing and urban development, to transport and 'Zukunft Bau' ('Future Building') which, among other things, includes energy efficiency and renewables, building refurbishment, sustainable building and construction materials.

This report focuses on three programmes that differ with respect to their orientation (disciplinary, interdisciplinary, transdisciplinary) and their focus (national, international):

- The National Platform on the City of the Future and the real-world laboratories in Baden-Württemberg which, as transdisciplinary processes or programmes, are nationally oriented.
- The BMBF's 'Future Megacities' programme, the EU's 'Horizon 2020' and the international 'Future Earth' programme, which are interdisciplinary and in

part transdisciplinary in orientation and have an international focus.

- The DFG's flagship programme 'Megacities-Megachallenge – Informal Dynamics of Global Change' which was interdisciplinary with an international focus.

10.2.2.1

National Platform on the City of the Future

Goals

The National Platform on the City of the Future (Nationale Plattform Zukunftsstadt, NPZ) was a two-year agenda process (2013–2015) aimed at identifying priority fields of action and research in urban spaces. In 2016, the federal government's City of the Future innovation platform was launched on the basis of the NPZ's results.

Structure

The NPZ was set up as a participation platform to which representatives from science and research, industry, civil society, politics and ministries and, in particular, from cities and municipalities and their associations were invited. Although the majority of the stakeholders came from science and industry, the broad integration of societal actors opened up new possibilities at the interface between traditional research and the later, long-term implementation of innovative research approaches in cities, e.g. with regard to generating and prioritizing new topics.

To accommodate the diversity of different perspectives, they were integrated in a systematic, multi-stage process. The findings of different work groups and discussions were integrated into a strategic research and innovation agenda, and submitted to the ministries in February 2015 as a guideline for future calls for research proposals (BMBF, 2015c).

Results and effects

The often technological focus of many BMBF research programmes was complemented by emphasizing social, cultural and economic perspectives in the research and innovation agenda. For example, 'socio-cultural quality and urban communities' was identified as a strategic priority theme, while 'civil-societal actors as drivers of urban transformation' was identified as a priority field of innovation (BMBF, 2015c). Transdisciplinary BMBF calls for research proposals already formulated within the framework of the NPZ process had already made provisions for the integration of the municipalities and future implementation processes, such as the 'Innovative Communities' project (BMBF, 2014) and the 'City of the Future Competition' (BMBF, 2015g).

In addition, the funding measure on the 'Sustainable Transformation of Urban Spaces' within the funding priority Socio-Ecological Research (Sozial-ökologische Forschung, SÖF) is based on results of the NPZ process. The first research projects are beginning in 2016 (BMBF, 2015e).

Further future calls for research proposals will reveal whether or not the demands on holistic inter- and transdisciplinary urban research placed by the strategic research and innovation agenda will actually be implemented, or whether the technological approach to solutions traditionally enshrined in the BMBF, which can still be recognized beneath the surface of the strategic research and innovation agenda, can assert itself.

The programme primarily remains a national research programme. Considering the significance of global networking and learning in urbanization processes presented in this report, a stronger international orientation and more networking would have been desirable.

On the whole, the NPZ deserves a positive assessment. As such, the process represented a kind of research-policy real-world laboratory and thus a further development of the federal government's research programme policy. Approaches and instruments such as stakeholder participation and process-structuring tools were tested as part of the process – and these can also be beneficially used to develop other thematic and programme fields in the future. Consideration could be given to the possibility of special capacity-development formats for civil-society organizations which, unlike science and industry, have hitherto gathered little experience with national scientific agenda-setting processes.

10.2.2.2

BMBF's 'Future Megacities' programme

The programme 'Research for Sustainable Development of Megacities of Tomorrow' (Future Megacities) of the Federal Ministry of Education and Research (BMBF) was launched in 2004 and ended in 2014. The programme was awarded a total funding volume of €50 million, shared by nine joint research projects during the main phase (PT-DLR, 2015).

Goals

According to the call for research proposals, the programme was conceived to "draw up solution proposals and strategies for the sustainable development and design of (mega-)urban regions of the future, and implement them in the form of pilot studies" (BMBF, 2004). The projects funded from 2005 onward focused on a wide range of specific urbanization problems (such as water management, urban agriculture, mobility, energy-efficient housing) in partner cities such as Addis

Ababa, Casablanca, Hefei, Ho Chi Minh City, Hyderabad, Johannesburg, Teheran/Karaj, Lima and Urumqi. The programme adopted a systemic approach. The individual projects, staffed by interdisciplinary teams, sought to contribute to urban development by starting from a specific problem.

Since 2014, findings from six of the projects funded through the Future Megacities programme have been incorporated into the BMBF-funded follow-up programme 'Rapid Planning'. The project, which also involves UN-Habitat, aims to develop methodologies to support municipal councils in making decisions pertaining to several different sectors of urban planning. In addition, it also develops specific entry-level projects (AT-Verband, 2015).

Structure

The Future Megacities programme was designed to generate solutions. Unlike the BMBF's technology-oriented funding programmes, it did not prescribe a specific solution approach. The researchers were thus able to reflect on appropriate innovations together with the local stakeholders. The programme was open to innovative, participative methods, but the possibilities of learning-oriented research and reorientation were limited by predefined project-funding mechanisms.

The focus on rapidly growing megacities in developing countries and emerging economies was prescribed by the programme. The programme was designed in Germany; the megacities themselves were hardly involved at the agenda-setting phase. Although the BMBF attached importance to transdisciplinary cooperation with local scientists and stakeholders within the project definition and implementation, it was only able to finance these to a limited extent.

Results and effects

The Future Megacities Programme was aimed at finding solutions to specific problems and expected pilot projects and results to be implemented during the final funding phase. The protracted overall duration of the programme, spanning a period of nine years, can be regarded as positive in terms of generating transformation knowledge. The long-term consolidation of the innovations was not included in the programme funding. It remains to be seen whether the transdisciplinary integration of the local stakeholders will suffice to ensure that the introduced innovations will stand the test of time.

The BMBF attached great importance to the transferability of the findings to other cities. The necessary adaptation of the innovations to the local context (or to the consideration of *Eigenart* as a dimension of the normative compass developed in this report), and the

desired transferability of the research approaches are potentially at odds with each other and constitute a methodological challenge.

The programme had a further transformative objective beyond the implementation of the project results in the form of innovations: it was also intended that accompanying measures, such as training for technical staff and a scholarship programme for young scientists, would have a structurally transformative effect and contribute to the development of technical and scientific capacities.

10.2.2.3

Priority programme 'Megacities' of the German Research Foundation

In contrast to a political funding institution such as the BMBF, the German Research Foundation (Deutsche Forschungsgemeinschaft, DFG) traditionally does not stipulate specific topics but funds research work on themes identified by the researchers themselves. The priority programme 1233 'Megacities: Informal Dynamics of Global Change' was funded from 2004 to 2014 by the DFG as a research programme of the institutions engaged in research in this priority area (DFG Priority Programme Megacities, 2009).

Goals

The DFG priority programme conducted 17 sub-projects researching on types of informality in the urban context in cities in China's Pearl River Delta (around Guangzhou, Shenzhen and Hong Kong) and in the Bangladesh capital, Dhaka. The thematic and regional focus reflects the research interest of the participating researchers. Unlike the BMBF's explicitly transformative Future Megacities Programme, the DFG's programme funded basic research and scientific findings on the research topic without asserting a claim to influence later effects and implementations.

Structure

Featuring 16 different disciplines, the DFG's Megacities priority programme was strongly interdisciplinary in structure and, consequently, played a pioneering role in the otherwise predominantly disciplinary-oriented DFG funding schemes. The local problem context formed the basis for the selection of the cities studied. The knowledge produced on the political, economic and social aspects of globalized mega-urbanization and substantive inclusion within informal processes targeted a future application of this knowledge. The fact that there were close-knit feedback processes between scientists and politicians, as well as with research and educational institutions in the cities studied, also played a supportive role. Research was conducted in close coop-

eration with researchers from China and Bangladesh; in all, more than 100 scientists were involved (DFG Priority Programme Megacities, 2009).

Results and effects

With a total of 450 publications, of which more than 160 were refereed articles and 26 monographs including dissertations, the priority programme produced scientific findings on a very large scale. It achieved the goal of scientific excellence to which it aspired. In terms of content, the programme aimed to develop theoretical-conceptual approaches and models to explain informal structures in megacities and understand the diversity of the phenomena, processes and actors of informal practices and arrangements. In addition, further-reaching questions – on new forms of governance and self-organization, on the way in which urban economies function, on informal settlement development, and on resources and (inter-)national migration flows – were analysed in depth. A substantial body of knowledge has thus been made available, which can be used to understand the impacts on urban sustainability in megacities and catalyse transformation processes.

10.2.2.4

Urban real-world laboratories in Baden-Württemberg

Goals

Baden-Württemberg's Ministry of Science, Research and the Arts has been funding sustainability-oriented research within the framework of its Science for Sustainability initiative since 2012. The new orientation was based, among other things, on the report of an expert committee appointed by the Ministry (MWK, 2013). In 2013 and 2015, two research-project calls were issued on the themes of 'Real-World Laboratories' (with seven selected real-world laboratories, of which six were urban in orientation) and 'The City as a Real-World Laboratory' (with seven selected urban real-world laboratories) focusing on the societal challenges of urban space. The two programmes support cooperative projects between actors in research and practice with funding to the amount of €15 million. The research work in the real-world laboratories is supported by comprehensive accompanying research (MWK, 2015; Schäpke et al., 2015).

Structure

The programme explicitly funds research in real-world laboratories in which the city itself becomes the laboratory and site of transdisciplinary problem-oriented research. In this way, it aims to build up infrastruc-

tures for transdisciplinary and transformative urban research. The research topics are developed in the real-world laboratories in cooperation with practitioners and civil society, thereby integrating them into the research process from the very beginning. The diversity of local problems thus gave rise to a wide range of project topics: whereas in Heilbronn, for example, research is being conducted on self-driving transport vehicles to reduce local goods traffic, the real-world laboratory in Karlsruhe is studying pedestrians from different perspectives; the promotion of alternative energy is being examined in Tübingen; the Rhine-Neckar real-world laboratory is dedicated to the economic and social integration of refugees; and 'Stadt:quartier 4.0' in Stuttgart is looking into digitally simulated city-district planning with direct citizen participation (MWK, 2015).

The programme is being accompanied scientifically to ensure that the research conducted in the real-world laboratories is analysed and systematized. Together with the real-world laboratories, the accompanying research examines what overarching knowledge can be gained from the projects with regard to the methodology of the transdisciplinary process or the transferability of findings, among other things (BF-Teams, 2015).

Results and effects

As a result of its transdisciplinary composition and orientation towards a transdisciplinary mode of innovation generation, the programme provides interesting stimuli for transformative urban research. The programme has a local or regional focus on cities and areas in Germany. Nevertheless, programme findings are also dispersed internationally. The WBGU believes that a transfer of the experience gained in Baden-Württemberg to the consideration of international problems of urbanization would be desirable, as would a continuation of the programme.

10.2.3 International research programmes

10.2.3.1 EU programmes

The topic of cities and urbanization is widely represented in the EU's Framework Programmes for Research and Innovation. The Seventh EU Framework Programme already issued several calls for research on questions of urban transformation. Research projects on different aspects of sustainable urban development were funded, particularly in the main research areas of energy, transport, environment, social sciences and the humanities. The work programme on information

and communications technology, too, supported urban research on 'Smart Cities'. International research projects in these fields received additional funding to support international exchange on questions of sustainable urban development beyond Europe's national borders. The initiative included the development of networks and platforms such as the CIVITAS initiative on sustainable mobility in Europe and the EU-China Urbanization Partnership. The projects funded by the Sixth and Seventh EU Framework Programmes covered a series of sustainable urban-development aspects such as energy efficiency, sustainable mobility, health and quality of life, integrated urban planning, resilience, as well as integrated data and information management. As supporting and coordinating measures, the projects were devised to take stock of the urban research activities funded by the EU, prioritize research issues, and build networks between researchers, stakeholders and policy-makers.

The city as a topic also features prominently in the EU's current Framework Programme for Research and Innovation, Horizon 2020. As a priority topic, research on smart cities is being funded by several thematic programmes. Aspects of sustainable development are integrated into the calls for proposals as a cross-cutting subject (European Commission, 2015a).

In addition to the sponsorship of specific research projects through Horizon 2020, cities are also the subject of other EU research-policy initiatives. The urban network European Innovation Partnership on Smart Cities and Communities (EIP-SCC) was set up in 2012. The EIP-SCC promotes mutual learning between the partners from different European municipalities and the exchange of information on innovations and synergies. The partnership operates under the umbrella of the Digital Agenda for Europe, an initiative belonging to the Horizon 2020 programme (European Commission, 2015b).

The Joint Programming Initiative Urban Europe (JPI Urban Europe) is an association of twelve different EU nations formed in 2010 with the goal of transforming European cities into sustainable and liveable living environments. The JPI partners are mostly EU ministries and research institutions. JPI Urban Europe coordinates research and innovation activities by the individual member states and the EU's framework programmes, and develops a joint research strategy. This was drafted in a multi-stakeholder process with the additional participation of the EU Commission, research institutions, funding institutions and city representatives. The research recommendations are, therefore, based on scientific findings, priorities and strategies at the municipal, national and EU level, and on the requirements of different civil-society actors (Urban

Europe, 2015b).

By contrast, the Smart Cities Member States Initiative is more technology-oriented. Founded in 2011 within the framework of the European Strategic Energy Technology Plan, this association of 21 EU member and associated states supports the development of technology for energy efficiency and sustainable transport in cities; the aim is to contribute to a low-carbon economy in the spirit of the Europe 2020 goals and the European Energy Roadmap 2050 (Climate and Energy Fund, 2013). To complement the major lighthouse projects funded by Horizon 2020, JPI Urban Europe and the Smart Cities Member States Initiative are sponsoring a joint call for proposals explicitly targeting smaller towns or cities.

Furthermore, the city as a topic is also being addressed by other EU institutions. In February 2014, a conference entitled Citizen Science and Smart Cities was hosted by the Institute for Environment and Sustainability of the Joint Research Centre, which conducts research on behalf of the EU Commission. In addition to this, the European Institute of Technology and Innovation is planning a Knowledge and Innovation Community on urban mobility for 2018.

Structure

As in previous research framework programmes, the EU is funding joint research projects directed at research alliances with partners from at least three EU countries. The calls for proposals are also open to international partners. EU research funding is strongly oriented towards societal problems. The application of results and transfer of research findings to society are considered highly important. The interdisciplinary and often transdisciplinary orientation of the consortia is therefore a selection criteria.

In addition to national and EU programmes, JPI Urban Europe has also been inviting proposals for urban research projects since 2012. The focus lies on the transformation of the city into a centre of innovation, sustainable and intelligent transport and logistics systems, social cohesion and integration, and the ecological footprint of cities. The main principles are the long-term orientation towards needs and the generation of innovations through inter- and transdisciplinarity in partly experimental set-ups such as 'Urban Living Labs' (Urban Europe, 2015b).

Results and effects

Overall, the European Commission funds a wide spectrum of research that is of relevance to cities. However, the Horizon 2020 emphasizes digitalization and the development of technology. This runs the risk of losing sight of sustainability objectives and creating

new pathway dependencies. In the WBGU's view, the priority goal of the research efforts should be the transformation of the cities towards sustainability. Non-technological pathways should be opened and kept open. JPI Urban Europe's research agenda and funding measures provide ideas for possible forms of transdisciplinary and reflexive research. The WBGU welcomes such integrated approaches and recommends incorporating socio-ecological aspects to a greater extent into the EU's research programmes.

10.2.3.2

Future Earth

Future Earth is an international research programme on global change that was founded during the Rio+20 conference in 2012 by the International Council for Science (ICSU), the International Social Science Council (ISSC), the Belmont Forum of Funding Agencies, UNESCO, UNEP and UNU (Future Earth, 2014b). Future Earth is the successor to several expiring programmes: the Earth Science System Partnership (ESSP), the International Geosphere-Biosphere Programme (IGBP), the International Human Dimensions Programme (IHDP) and the Diversitas programme of biodiversity research. The World Climate Research Programme (WCRP) will remain in operation as an independent programme and work in close cooperation with Future Earth. Future Earth also comprises the Urbanization and Global Environmental Change Project (UGEC), which was launched under the IHDP and, in 2005, published a research agenda on urbanization and global change (IHDP, 2005).

Goals

Future Earth is a research programme aimed at supporting the transformation towards global sustainability (Future Earth, 2014a). In contrast to the national and European research programmes described in the preceding sections, Future Earth does not work with fixed budgets, but rather serves as an umbrella for the global coordination of research activities in the field of sustainability and global change. Future Earth initiates research, synthesizes research findings, and sees itself as a multiplier and interface to international politics.

The research itself continues to be financed by national and regional funds (within the framework of institutional or programme-oriented funding) and the Belmont Forum. Future Earth and the national research activities are, therefore, related synergetically.

The Future Earth concept is divided into three parts: (1) Dynamic Planet – drivers of global change, (2) Global Sustainable Development – global development challenges in relation to ecological and social change, also in the context of the SDGs, and (3) Transformations towards Sustainability – solution-oriented research on

the institutional, economic, social, technological and psychological prerequisites of transformation (Future Earth, 2014b). It thus combines scientific, technical, economic, social and cultural questions of global change relating to sustainability in one research programme.

Future Earth is currently setting up Knowledge for Action Networks to advance integrative research on, initially, eight topics. One of these Future Earth Knowledge for Action Networks will conduct intensive, interdisciplinary research on the topic of cities and urbanization (Future Earth, 2014b).

In addition, the WBGU appreciates the efforts of the Urbanization and Global Environmental Change Project to set up a Future Earth Urban Platform to allow exchanges between researchers, decision-makers and stakeholders on different levels (UGEC, 2016).

Structure

Unlike the predecessor programmes that were frequently criticized for the lack of interdisciplinary inter-twinement and societal connection (Reid et al., 2010; WBGU, 2011), Future Earth emphasizes its inter- and transdisciplinary character. The programme sees itself as a global research platform on which diverse actors network and conduct joint research and exchange knowledge to support transformations to global sustainability (Future Earth, 2014a). Future Earth aims to allow researchers in the social sciences, humanities, engineering and natural sciences to draw even closer to one another. Furthermore, a dialogue is being conducted with diverse societal actors. In this way, representatives of governments, industry, research-funding organizations and civil society are integrated into Future Earth not only at the programme level (co-design) but also at the research level (co-production). They are thus actively involved in defining the research agenda to ensure the societal relevance of the research conducted (Future Earth, 2014b).

Results

With its solution orientation and its co-design and co-production strategies, Future Earth aims at enabling the resulting research findings to be efficiently applied. The wide-ranging scope of the programme allows the creation of innovations at the political, technological and social levels – Future Earth does not exclude any approach. It remains to be seen whether or not the transdisciplinary structure has a positive effect on the actual implementation of innovations and their consolidation. One challenge that Future Earth faces is ensuring adequate financing for the priorities outlined in the research strategy (Future Earth, 2013). Nevertheless, the WBGU believes that Future Earth offers an opportunity to provide substantive and structural stimuli,

and could become an umbrella programme for international research activities. This would make it possible to improve the coordination and networking between research programmes and activities on sustainable urbanization.

10.2.4

German research institutions

While research programmes generate temporary stimuli for (re-)determining the direction of urban transformation research, research institutes and university research centres ensure that topics with an urban focus are dealt with on a permanent basis in the scientific landscape. Here, the levels of federal and state (i.e. regional) science policy come together, since the states (*Länder*) have the main financial responsibility for the universities and co-finance the major research organizations. The following characterization of important institutions of non-university and university research on urban transformation can only provide a general overview of the current situation and development trends. For example, there is as yet no Max Planck Institute dealing with urban transformations (Section 10.3.1). Some ideas are suggested below for further developing the institutional landscape against the background of this urbanization report.

10.2.4.1

Helmholtz Association

The Helmholtz Association's large-scale research institutions focus mainly on technological research. The research issues covered have diverse urban references, particularly in the field of energy research. Apart from technological aspects, however, the Helmholtz Association essentially only researches questions of urban transformation at the Karlsruhe Institute of Technology (KIT) – which, among other things, plays a leading role in the development of one of Baden-Württemberg's real-world laboratories – and at the Centre for Environmental Research (Zentrum für Umweltforschung, UFZ) in Leipzig. Overall, urban and urbanization research is an increasingly inter- and transdisciplinary topic at the Helmholtz Association.

Scientists from the UFZ's department of Environmental and Urban Sociology are currently engaged in research on sustainable urban development within the priority research area of 'Urban Transformations'. The focus is on urban resource efficiency, quality of life and resilience. The research aims to "explore different pathways and options, opportunities and risks – as well as steering options – of urban transformations" (UFZ, 2016).

10 Research on sustainable urbanization

From 2007 to 2011, the Helmholtz Association funded interdisciplinary cooperation among its associated institutes on the theme of 'Risk Habitat Megacity'. Sixty researchers took part in the initiative, which was coordinated by the UFZ. The programme's main topics were the processes and risks of mega-urbanization. The initiative has been continued since 2011, focusing on adaptation to climate change. As in the case of the priority programme of the German Research Foundation (DFG), the Helmholtz Association's focus also shows a research interest in urban and urbanization issues; the initiative's thematic focus was not prescribed.

The Helmholtz Megacity initiative was normatively embedded in the sustainability discourse. Unlike the comparative structure of the DFG and BMBF programmes, the Helmholtz Initiative focused exclusively on Santiago de Chile. The city was chosen as the research subject because it has the typical characteristics of megacities, and not because of any specific local problem situation. The research initiative was broadly interdisciplinary in its approach. It collaborated with scientific partners in Chile and also with Santiago's regional government (*Gobierno Regional*). The initiative thus had transdisciplinary tendencies.

Results and effects

In a similar way to the DFG's priority programme, the Helmholtz Megacity initiative was geared towards the production of knowledge (with the option of using it later). The aim was to develop risk-management scenarios, strategies and instruments with the involvement of local stakeholders. Through the disciplines taking part and the type of results produced, the project aimed to use the research findings to improve governance.

The KIT is going a step further by setting up and running an urban real-world laboratory in Karlsruhe's Oststadt district called *Quartier Zukunft* ('District Future'). The coordinating Institute for Technology Assessment and Systems Analysis (ITAS) is embedding these activities into a systemic consideration of the energy transformation (KIT, 2016).

10.2.4.2

Fraunhofer-Gesellschaft

The institutes of the Fraunhofer-Gesellschaft conduct applied research on a large number of mostly technological and industry-related topics. The transformation of cities, particularly with regard to their technological aspects, therefore plays an important role at a large number of Fraunhofer Institutes. Consequently, the Fraunhofer-Gesellschaft played a leading role in coordinating the process of the National Platform on the City of the Future (Section 10.2.2.1). The main

basis for urban research in the Fraunhofer-Gesellschaft is the Morgenstadt innovation network, which has existed since 2011 and provides a platform for city-related research. In the Science Year 2015 on the city of the future, the Fraunhofer-Gesellschaft's 'Morgenstadt – City of the Future' initiative supported the German federal government's project 'CO₂-neutral, energy-efficient and climate-adapted city' within the framework of the New High-Tech Strategy. The aim of the Morgenstadt initiative is to design a research-based "vision of sustainable and liveable cities in Germany" (FhG, 2015). Part of the Morgenstadt initiative is the 'Morgenstadt: City Insights' innovation network; it is made up of several Fraunhofer Institutes, urban and industrial partners, who jointly research system innovations for cities and their subsequent implementation in so-called 'city labs'. The intention is to develop technological innovations for sustainable infrastructure in the fields of governance, business, information and communication, mobility and transport, logistics and production, security, buildings, energy, water and waste (IAO, 2014). The Morgenstadt initiative shows that urban and urbanization research is also increasingly gaining in importance in applied and technology-oriented research.

10.2.4.3

Leibniz Association

In Germany's non-university research landscape, the Leibniz Association is the research organization with the greatest potential for an interdisciplinary treatment of issues relating to the urban transformation, since it has institutes working in a wide range of different disciplinary fields. In its Economics, Social Sciences, Spatial Research section, the Leibniz Association has a number of institutes that explicitly deal with questions of spatial and urban research (Leibniz-Gemeinschaft, 2016). These include the Academy for Spatial Research and Planning (ARL), the Leibniz Institute for Regional Geography (IFL), the Leibniz Institute of Ecological Urban and Regional Development (IÖR), the Leibniz Institute for Research on Society and Space (IRS), and the Research Institute for Regional and Urban Development (ILS) in Dortmund, a Leibniz-associated institute. These have come together in the 5R Network, the Leibniz Association's spatial sciences network (5R-Netzwerk, 2013). The Leibniz institutes often work in an interdisciplinary, sometimes transdisciplinary way. Different institutional forms of interdisciplinary work have evolved in this context. Particularly interesting is the model of the Academy for Spatial Research and Planning (ARL, 2015a; Leibniz-Gemeinschaft, 2015).

The ARL engages in inter- and transdisciplinary research on urban development and urbanization from

the economic, social and ecological perspectives. Under the ARL model, scientists and practitioners research together in a network (ARL, 2015a). Strategic topic selection also follows a comprehensive, multi-level, joint co-design process. This ensures "communication at the earliest possible moment with the main addressees at the interface between science and practice on issues of spatial development," and gears the research topics to the needs of the actors in urban development practice (ARL, 2011:1). The ARL thus sees itself as a mediator "between science, administration, politics, business and the general public" (ARL, 2011:2). In terms of content, the ARL's guiding concept is sustainability. At present, its focus still lies on national issues, but the ARL is successively extending its international activities in the form of collaborations and working groups as part of a strategy of internationalization.

In the WBGU's view, the ARL's institutional model, with its transdisciplinary network organization, can also be an example of good practice for global urbanization issues. With a view to new international research-network structures, associated institutes like the Leibniz-associated Research Institute for Regional and Urban Development (ILS) can also be a useful point of reference. In this context, the Leibniz Association itself has the potential to become even more internationally oriented in urban research and to make a coordinated contribution to national and international agenda-setting processes, such as Future Earth.

10.2.4.4

Federal Institute for Research on Building, Urban Affairs and Spatial Development

There are other non-university urban research institutions with a specific mission and institutional links in addition to the non-university research institutes of the major research communities. One of these is the Federal Institute for Research on Building, Urban Affairs and Spatial Development (BBSR), the research institution on urbanization questions of the BMUB (formerly BMVBS). On behalf of the German Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety (BMUB), the BBSR conceives, awards and manages research assignments in various sub-programmes of the Environmental Research Plan, as well as other programmes such as the National Urban Development Policy, accompanying research in urban planning, the 'Future Building' programme, and accompanying research on the Energy-Efficient Urban Refurbishment programme of the KfW Group. The BBSR uses the full range of scientific research formats from grant-funded and contract research to the funding of pilot and model projects. The Institute also conducts research itself.

Sustainable urban development is the normative guiding concept of all the programmes attached to the BBSR and funded under the Environmental Research Plan. Questions of sustaining natural life-support systems in the urban context play an important role here. The dimensions of social and political inclusion are also sub-goals of individual programmes. For example, the Experimental Housing and Urban Development sub-programme (ExWoSt) examines citizen-participation procedures for immigrants and the integration of refugees. The funded research projects aim to produce concrete results; the ExWoSt programme's goal is to conduct applied research, so as to make political recommendations on the legal framework and on funding policy in housing and urban planning. Other societal actors such as local authorities, urban planners or the urban population can also benefit from the model projects, i.e. by emulating them as examples of good practice. The model projects are therefore highly transdisciplinary in orientation. The initiative for new model projects will not be launched by scientists, but by actors in the field of housing and urban development in cooperation with their Länder (BBSR, 2015). As a result, ExWoSt has already led to the implementation of many building blocks and elements that are currently being taken up and further developed under the guiding concept of urban real-world laboratories.

The BMUB's research framework and departmental research are mainly geared towards the national level, but they do draw on or incorporate European and international research experience and knowledge. International cooperation is currently limited to a few research projects, although it will gain in importance under the federal government's urbanization strategy.

10.2.4.5

German Institute of Urban Affairs

The German Institute of Urban Affairs (Difu) is another non-university research, training and information institution; it is the largest urban research institute in German-speaking countries. About 25% of its basic funding comes from municipalities and the federal government. Its research is closely geared to the needs of German cities and municipalities and is mainly application-oriented. The Difu sees itself as an interface between research and municipal practice (Difu, 2013). Based on megatrends relevant to urban development, the Institute deals with topics such as sufficiency, the energy transformation, new governance models and urban inequality. The Difu's research is thus concerned both with sustaining the natural life-support systems and with inclusion within the city.

As the Institute's main sponsors, the cities suggest topics for the Difu's research agenda that are topical and

relevant for them. This co-design process is the starting point for needs-oriented consulting and research (Difu, 2015a).

10.2.4.6

Germany's university research landscape

Because of the diverse technological, economic, social and cultural aspects of urban transformation, central building blocks of urban research can be found today at every German university. However, there are a number of universities that have in the past developed a critical mass of city-related professorships and priority research areas, making urban research a distinguishing feature of their institution and translating this into corresponding interdisciplinary institutional structures. The following section examines three universities as representatives of a number of further centres of city-related research, and describes patterns, possibilities and limitations of university urban research. The aim is to help judge the extent to which university research can do justice to the criteria of urban transformative and transformation research laid down in this report.

HafenCity University Hamburg

The HafenCity University Hamburg – University of Architecture and Metropolitan Development (HCU) was founded on 1 January 2006 with the merger of four departments from three Hamburg universities. It is an ambitious German university project explicitly targeting urban transformation processes.

The HCU is one of the few interdisciplinary and mission-oriented universities in Germany committed to the aim of developing new approaches to solving the problems of our cities in the 21st century (HCU, 2016). The HCU combines research and teaching in five relevant fields of urban research: architecture, civil engineering, geomatics, metropolitan culture/urban design, and urban planning; it thus aims to bridge the gaps between the technological/engineering, planning and cultural sciences.

The HCU puts this into practice institutionally by doing without faculty structures and running interdisciplinary courses and specialized research areas. This flexible and open structure was also chosen to make it possible to collaborate quickly and pragmatically with policy-makers, civil society and business on current topics. Even ten years after its foundation, the HCU project remains ambitious, since the university's convincing mission is constantly struggling with the differences in disciplinary logic of the faculties of different universities from which it emerged, with financing challenges, and with disciplinary mechanisms relating to third-party funds, gratification and reputation in the science system (HCU, 2015).

Technical University Berlin

The Technical University Berlin (TU Berlin) has had a tradition of comprehensive research and teaching connections with urban and regional research. In the restructuring of faculties in 2005, these were brought together in a separate Faculty (VI) for Planning, Building and the Environment, linking all building- and space-related studies at the TU Berlin and creating a unique pool of architects and civil engineers, urban and regional planners, landscape architects and environmental planners, geo-engineers, social scientists, geodesists and ecologists within one faculty.

Important stimuli for national and international urban research have emerged from the TU Berlin over the last few years. Researchers have participated in key programmes of inter- and transdisciplinary urban research, e.g. the BMBF's Future Megacities programme. The TU Berlin is currently endeavouring to translate this potential even more consistently into an overall strategy aiming at transdisciplinary research. Urban issues, e.g. the field of urban development in Berlin, play a central role in this context (TU Berlin, 2015).

As at the HCU, the challenge lies in putting this transdisciplinary perspective into practice in the long term at the faculty and overall-university levels in the context of a traditional excellence orientation and disciplinary reputation and cooperation patterns.

University Alliance Ruhr and the Research Institute for Regional and Urban Development: Ruhr Area cluster

The Ruhr Area is not only one of the most important urban agglomerations in Europe (Section 5.6), it also has an intensive research landscape. One important component is made up of the three Ruhr universities of Duisburg-Essen, Dortmund and Bochum, which joined together in 2007 to form the University Alliance Ruhr (Universitätsallianz Ruhr; UA Ruhr, 2014). Questions of urban research are of key importance at all three Ruhr universities. The School of Spatial Planning at the TU Dortmund plays a prominent role among the spatial-science faculties in Germany. Up to now, however, the University of Duisburg-Essen is the only one of the Ruhr universities that has made urban research a strategic core research portfolio, i.e. the main research area of Urban Systems (University Duisburg-Essen, 2015). It bundles the skills of around 70 scientists in the fields of urban health, the environment, energy, infrastructure, logistics, culture and society within the framework of interdisciplinary, applied metropolitan research, and uses them in its own interdisciplinary courses of study. Transdisciplinary approaches are still at an early stage of development and limited to

individual fields of research.

With all Ruhr universities working on city-related topics, the institutional umbrella of the University Alliance Ruhr, and additional non-university research institutions such as the Research Institute for Regional and Urban Development (Section 10.2.4.3), the Ruhr universities all have the potential to develop into a cross-university international centre of transdisciplinary urban transformation research; this is documented by numerous joint projects. A joint field of expertise – metropolitan research – which bundles specialized areas of knowledge at the three universities, has been under development since the beginning of 2016.

10.2.5 International research landscape

International institutions of university and non-university urbanization research are even more diverse than the national ones. It is not possible to give an insight into all the existing successful international institutions here. The following section is therefore limited to providing an overview (Table 10.2-3) of some examples of interesting international nodes of urbanization research. Ideas can be drawn from them for the further development of the German research landscape. It would be a good idea to process this in a more comprehensive report. It seems important to focus more closely on the urban research landscape particularly of developing countries and emerging economies, in order to embed urgently needed urban research more deeply in these countries.

10.2.6 Evaluation of the existing institutional and programme landscape of urban transformation research in Germany

The research landscape for the scientific study and monitoring of urban transformation processes in Germany is broad and impressive in terms of content, methods and institutions. Many research questions on urban transformation are already being taken up in the German research system (Section 10.1).

A look at the total number of existing programmes, institutions and approaches shows that in fact all the building blocks for ambitious urban transformation research proposed by the WBGU are in fact already in place.

Scientists are laying the foundations of disciplinary and interdisciplinary knowledge for urban transformations at several non-university and university urban-re-

search centres in Germany. Basic research in this field is well anchored in the science system, and some projects are being funded by such research programmes as the DFG's priority programme 'Megacities-Megachallenge: Informal Dynamics of Global Change'.

In the sphere of *basic research*, the WBGU sees a need to look in greater depth at questions that require innovative and especially interdisciplinary answers, and to further improve the infrastructural and institutional framework conditions under which basic research is taking place:

- As far as *content* is concerned, lines of research on interdisciplinary issues have developed selectively in mainly thematically and regionally focused research associations over the last few years, e.g. within the urban-climate community, in the activities of UGEC, or the different German megacity initiatives (Sections 10.2.2, 10.2.3). There should be targeted funding for innovative interdisciplinary future fields, such as increasingly networked urban systems, the consequences of the urban environment for cognitive recognisory and emotional development processes (in childhood, youth, old age), and socio-political systems for the early detection of crises and conflicts.
- As regards the *infrastructure*, there is a need to systematically document, prepare and improve access to databases and literature collections dealing specifically with cities, including data and information that are currently outside of classical knowledge infrastructures (e.g. grey literature, city-related statistics, primary data from developing countries and emerging economies, digitization of cultural heritage information). Hardly any large-scale facilities specifically designed for social-science research are available (e.g. for urban photographic, film or sound archives, satellite image databases). There is also a lack of city-related social-research infrastructures (places for communicative exchange to develop innovative research questions), and provisions for their long-term financing.
- In terms of *institutions*, there is a lack of interdisciplinary and international, established platforms, think tanks and institutions in the field of basic research, especially with an international and global orientation (e.g. European networks, transcontinental networks in developing countries).

There are also sensitive gaps in *applied research*. Explicitly city-oriented, applied research needs greater recognition in the scientific communities, as well as stronger financing instruments. In most developing countries and emerging economies applied urban research has only existed in a rudimentary form or not at all up to now. For the most part, established training networks

oriented towards teaching research exist only within and for cities in industrialized countries. Established structures and institutions of applied research cooperation in and with the developing countries and emerging economies need to be expanded systematically. National development programmes directed at cities with an interdisciplinary, holistic approach should be encouraged. The Jawaharlal Nehru National Urban Renewal Mission (JNNURM) in India, a US\$ 20 billion programme of the Indian government that has been running for over seven years, is a positive example in this direction (MUD, 2011).

Many different building blocks for *transdisciplinary research* can be found today:

- New (albeit improvable) participation approaches for co-designing complex research programmes have been tested in the process of the National Platform on the City of the Future (NPZ).
- Project-related co-production of knowledge was an important component of the BMBF-funded Future Megacities programme. A wide variety of requirements for the co-design and co-production of research projects in the context of urbanization can also be found in many of the initiatives of the EU's 8th Framework Programme for Research and Innovation, Horizon 2020.
- Topics for urban transformation research are moving in the right direction with such examples as the urban real-world laboratories that have been set up in Baden-Württemberg, the EU-funded living labs, and the extensive experience with the Experimental Housing and Urban Development programme (ExWoSt).
- There is also a wide range of institutional forms for promoting inter- and transdisciplinary research. These include networks like those in the Leibniz Association with the ARL, university centres, and even the establishment of universities focused on urban issues, as in the case of the HCU in Hamburg. Having different funding bodies for non-university research institutes is an important institutional basic condition for delivering transdisciplinary research designs. These forms range from classic research institutions in the major research communities to ministerial research institutions like the BBSR with direct links to the government, and the Difu, a research institute funded by the municipalities themselves.
- At the programme level, the research agenda and research funding of the European Joint Programming Initiative Urban Europe, for example, show how cross-sectoral and reflexive research can be structured. The BMBF's Future Megacities programme (and other transdisciplinary BMBF calls for

proposals in different areas of sustainability research) can also serve as examples of good practice in the field of systemic, interdisciplinary and international research.

The existing approaches of transdisciplinary research for the urban transformation should not obscure the fact that these are still niche phenomena. A large proportion of urban research is carried out in a disciplinary or interdisciplinary form. Transdisciplinary research structures with the necessary infrastructures to allow co-design and co-production, which meet the methodological demands for accompanying capacity development, are yet to be set up.

Overall it is the case that many research institutions and programmes have committed themselves to the normative goal of sustainability. Up to now, the programmes and institutions examined do not cover the full range of proposed demands on transformative urban research (Table 10.2-2). Although some programmes and institutions can be rated as exemplary in terms of their transdisciplinary structure (e.g. Academy for Spatial Research and Planning, ARL, or German Institute for Urban Studies, Difu), their innovative methods (e.g. Baden-Württemberg's real-world laboratories) or their participatory agenda process (e.g. the National Platform on the City of the Future), they lack international orientation and networking. Other programmes, while internationally oriented, are too narrowly focused. The EU's Framework Programme for Research and Innovation, Horizon 2020, for example, places a great deal of emphasis on digitization and technology development. This means there is a risk of creating new path dependencies and losing sight of comprehensive sustainability objectives as defined by the normative compass.

10.3

Towards a new urban research agenda

10.3.1

Five basic recommendations for reforming research on the urban transformation

Based on its analysis and evaluation of research desiderata (Section 10.1) and existing research programmes and institutions (Section 10.2), the WBGU recommends five basic elements to further develop research on the urban transformation. They are, *first*, the strengthening of basic research on the urban transformation, *second*, the development of new data infrastructures, *third*, a newly designed agenda-setting process, *fourth*, the global establishment of innovative methods, e.g. urban real-world laboratories, and, *fifth*, a proposal on

global capacity development for scientific and societal actors. As a consequence of these recommendations, the WBGU proposes a roadmap process involving all relevant actors.

1. Strengthen basic research on urban transformation

With its transdisciplinary orientation, urban transformation research operates at the interface between basic and applied research. A deeper understanding of urban transformation processes makes it necessary to take up numerous subject areas and research desiderata of basic research. Although there are many different programmes of relevance to cities – in some cases involving more than one institute – at the Helmholtz Association, the Fraunhofer-Gesellschaft and the Leibniz Association (Section 10.2.4), issues of urbanization hardly play any role at all among institutes specializing in basic research, such as the Max Planck Society. In university research, few institutions have developed urban or urbanization research nuclei to date, and certainly not with a focus on comparative urbanization processes or urbanization dynamics in developing countries and emerging economies.

The WBGU therefore proposes setting up a separate Max Planck Institute for Urban Transformation as a hub for basic research on the urban transformation. Such an institution could become a nucleus for the many issues of fundamental research in the context of urban transformation in the German and international science system. It could build bridges to research activities at the many other Max Planck Institutes that are in some ways relevant to urban research. Especially the interaction of ecological, technical, economic, social and cultural dynamics in urbanization processes requires profound, fundamental skills in the understanding, description and modelling of complex systems. A Max Planck Institute for Urban Transformation could become an important engine of interdisciplinary basic research spanning the borders between technology and natural sciences on the one hand and the social and cultural sciences on the other.

Furthermore, increased funding for urban transformation research should be made possible by the major German research sponsors: the various federal and state ministries, the DFG, the DAAD, the Alexander von Humboldt Foundation, but also the science academies and private foundations. This includes in a narrower sense the funding of research projects, graduate schools, but also networks, conferences and platforms.

2. New data infrastructures

In the WBGU's opinion, research for urban transformation requires new data infrastructures. Compact sets of indicators are required both at the city level and at

the level of national urban systems to make an internationally comparative, detailed analysis of the development parameters of transformative urban development along the normative compass – both in temporal longitudinal section and in thematic cross-section. These sets of indicators would also provide the foundation for empowering cities to operate as independent actors on global environmental and climate governance. Targeted social, political and economic indicators, which can be collected and updated in the context of an international comparison, should be created on the basis of existing sets of indicators – such as the exemplary bundle of indicators of sustainability development created over a period of years by Germany's Federal Institute for Research on Building, Urban Affairs and Spatial Development, BBSR (BBSR, 2016).

Especially in developing countries and emerging economies, the data required to construct indicators have not been collected either continuously or in a way that enables comparisons (Boxes 10.1-11). This relates to general sustainability parameters such as demographic and migration data, settlement- and housing-related data, infrastructures, ecological parameters or basic economic data, and specifically to action fields such as the urban metabolism, transport, health and urban land use. The WBGU therefore recommends setting up internationally comparable and comprehensive structures on data collection, monitoring and control.

Beyond individual action fields, *Eigenart*, as a dimension of the normative compass, denotes the emergence of individual and specific pathways of urban transformation. While the idea of transferring solutions blueprint-like from one city to another have not proved to be viable, a transfer via patterns would be conceivable. Such patterns describe recurring structural principles that can be transferred to real situations. Via pattern languages (Stark, 2014) that have been developed, for example, in architecture (Alexander, 1977), it is possible to capture patterns of urban transformation and make them available for international learning processes (Hopkins, 2011). Developing corresponding pattern databases into successful urban transformations represents another important field in the development of data infrastructures.

The possibilities of crowdsourcing through innovative forms of citizen science should be considered when building data infrastructures (Wechsler, 2014). The considerable growth in the (technological) possibilities of data collection via remote sensing and tracking over the last few years – thanks to the globalized use of smartphones – has greatly increased the potential for robust data collection. In this context there is a need for method development, process innovation and basic research into the reliability of the informa-

10 Research on sustainable urbanization

Table 10.2-3

Overview of selected interesting institutions of transdisciplinary urbanization research in an international context.
Source: WBGU

Institution	Brief description
African Center for Cities, Cape Town, South Africa	Interdisciplinary research and teaching programme on urban transformation, run by a large number of African universities and research facilities (ACC, 2016).
Arizona State University in Tempe, USA	Leading US university in interdisciplinary sustainability research. Own sustainability institute with a focus on urban processes: the Julie Ann Wrigley Global Institute of Sustainability (ASU, 2016).
Centre for Urban Resilience and Energy, Manchester, UK	The Centre for Urban Resilience and Energy engages in research on the relations between transformations in the fields of energy, the city and the environment (CURE, 2015).
CEPT University, Ahmedabad, India	CEPT University's teaching, research and advisory services cover a wide spectrum from urban design, urban planning and urban development to social inequality, transport and decarbonization (CEPT, 2016).
Cooperative Research Centre for Water Sensitive Cities, Melbourne, Australia	At the Cooperative Research Centre for Water Sensitive Cities, an interdisciplinary and international research team engages in research on solutions for sustainable water supplies to Australian cities (CRCWSC, 2014).
Dutch Research Institute for Transitions, Rotterdam, Netherlands	DRIFT's researchers focus on the systemic transitions to sustainability. They also conduct empirical research in and on cities (DRIFT, 2014).
ETH Zurich, Switzerland	The ETH conducts research into future cities; the focus is on ecological, social and economic sustainability issues. The university cooperates closely with Asian and African partners at joint centres such as the Singapore-ETH Centre for Global Environmental Sustainability (ETH Zurich, 2016).
Global Cities Research Institute, Melbourne, Australia	Researchers at the Global Cities Research Institute at the Australian RMIT University work on urban challenges, e.g. sustainability. The regional focus is on cities in South-East Asia and the Pacific region (GCRI, 2016).
Indian Institute for Human Settlements, Bangalore, India	Non-governmental research and teaching institute for questions of urban and spatial development in India (IIHS, 2013).
Institute for Global Environmental Strategies – Kitakyushu Urban Centre, Kitakyushu, Japan	Research in the field of low-carbon, sustainable urban development on topics such as waste disposal, water and sanitation, air pollution and climate change in the Asian region (IGES, 2016).
Institute for Housing and Urban Development, Rotterdam, Netherlands	Research at the Institute for Housing and Urban Development at the University of Rotterdam focuses on urbanization in developing countries and emerging economies. One of the main activities is international capacity development – both in the courses of study offered and in e-learning courses, e.g. on 'Transition Management in and for Cities' (IHS, 2016).
Institute of Urban Environment, Xiamen, China	The Institute of Urban Environment is affiliated to the Chinese Academy of Sciences and deals with urban ecology and health, urban air pollution, environmental technology and the circular economy, and urban environmental management (IUE, 2016).
Intel Collaborative Research Institute Cities, London, UK	UCL, Imperial College and Intel engage in research on sustainability in the smart city at the Intel Collaborative Research Institute Cities. A special focus lies on the development of technology (ICRI Cities, 2012).
International Institute for Industrial Environmental Economics, Lund, Sweden	The International Institute for Industrial Environmental Economics conducts research into the transition to a low-carbon and resource-efficient economy (IIIEE, 2016).
LSE Cities, London, UK	LSE Cities researchers at the renowned London School of Economics focus on urbanization from a socio-economic perspective (LSE Cities, 2016).
School of Planning and Architecture, New Delhi, India	The School of Planning and Architecture is one of the leading Indian universities in the field of architecture and urban planning. Research is conducted, for example, on such topics as urban poverty and inequality, the effects of and adaptation to climate change, and local transport (SPA, 2008).



Stockholm Resilience Centre, Stockholm, Sweden	A new, internationally oriented line of research on urban resilience is being set up at the Stockholm Resilience Centre, where transdisciplinary research is carried out into resilience from the socio-ecological perspective (Stockholm Resilience Centre, 2015).
Tyndall Centre for Climate Change Research, Norwich, UK	Research into the risks, vulnerability and adaptation of coastal cities to climate change is conducted in the 'Cities and Coasts' research programme at the transdisciplinary Tyndall Centre for Climate Change Research (TCCR, 2016).
University of São Paulo, Brazil	The faculty of Architecture and Urban Planning at the University of São Paulo conducts research into various topics of sustainable urbanization, e.g. adequate housing or the energy efficiency of buildings (FAUUSP, 2016).
Urban and Regional Development Institute, Jakarta, Indonesia	Independent research institute engaged in research on sustainable urban and regional development in Indonesia (URDI, 2016).
Urban Indian Health Institute, Seattle, USA	The UIHI conducts research into urban health, especially in relation to the indigenous population groups of North America (UIHI, 2016).
Urban Land Institute, Washington, DC, USA	Interdisciplinary forum on property and real estate in cities, aiming at exchanges between science, practice and politics. Offshoots with a regional focus on Europe and the Asia Pacific region (ULI, 2016).
World Bank Urban Development Research, Washington, DC, USA	Research is conducted at the World Bank on urban development, especially from the perspective of poverty reduction (World Bank, 2016b).
World Resources Institute's Ross Center for Sustainable Cities, Washington, DC, USA	The Ross Center for Sustainable Cities at the World Resources Institute, which was founded in 2014, conducts global and implementation-oriented research into various aspects of urbanization. It uses a transdisciplinary approach to develop practical solutions across sectors (WRI RCSC, 2016).

tion provided, as well as into aspects of citizen science relating to fairness and inclusion.

One example of linking technological potential with citizen-science approaches is Geo-Wiki from the International Institute for Applied Systems Analysis, where citizens can use their smartphones to take part in environmental monitoring (IIASA, 2016).

3. New forms of agenda setting

Linking research into urban transformations with practice and institutions is a prerequisite for providing adequate support for the transformation in cities. The WBGU therefore recommends both research sponsors and researchers to get the key actors of urban transformation already involved at the planning stage of transformative research programmes (co-design). In this context, the specific requirements and the respective contexts of the partner countries and cities must be taken into account. In international research programmes, particular value should be attached to setting a common agenda with the partners. The majority of recent, internationally oriented BMBF research initiatives, for example, have been coordinated with the governments of the partner countries (Box 10.3-1). In view of the targeted eye-level partnership between national and international actors, co-designing research programmes is a key element, so that all partners can assume substantive and financial responsibility. City administrations, business and a broad spectrum of civ-

il-society actors as stakeholders of an urban transformation should be integrated into the agenda-setting process for new research programmes, if the research sponsors want the research not only to deliver basic findings, but also have a transformative effect.

Experience gained with participation in the context of the National Platform on the City of the Future could be systematically evaluated and further developed for use in planning the programmes of future transformative research. Experience shows that the systematic involvement of stakeholders is necessary. This requires knowledge – and therefore an analysis – of the range of actors involved before agenda setting begins. Co-design approaches at the level of transformative research programmes should form part of the design of individual research projects. Early involvement of actors in formulating and shaping the research questions seems to be of key importance. The aim should be to advance the co-design of research projects by slowly building relationships of cooperation and trust. The research sponsors should therefore react flexibly to the fact that transdisciplinary research needs more time and financing. The current practice – as followed by the BMBF, for example – of funding the preliminary phases and preparatory measures of research projects, should be further developed.

4. Development of innovative long-term research centres at the city and regional level: '50 global urban real-world laboratories for 50 years'

The generation, provision and application of regional and social urban knowledge represent core elements in the process of strengthening local urban societies for the shaping of urban development. Such a body of knowledge, based primarily on local geospatial, historical and societal experience, networks and skills, should be facilitated by creating and continuously supporting research centres at the urban and regional levels. In the WBGU's opinion, the establishment of urban think tanks, international collaborative research projects and institution networks is essential, especially for promoting institutional integration in developing countries and emerging economies.

International interdisciplinary research is so important for the urban transformation that research infrastructures should be built up over long periods of time and be as globally networked with each other as possible.

The '50 global urban real-world laboratories for 50 years' proposal stands for the idea of networking and internationalization. The WBGU's idea is to create 50 urban real-world laboratories distributed all over the world to increase knowledge of transformation processes in an urban context, exchange this knowledge, and make it internationally available. The intention is to build up and finance these real-world laboratories by joint efforts of national research funding, via foundations, development and international cooperation funds, and European research funding. These measures could be coordinated under the auspices of the Future Earth Initiative, for example. The recommendation is symbolic of the long-term nature that should characterize such a venture from the outset. Up to now, since project funding has been geared to short time scales, many of the cooperation structures that have been built up by projects have tended to collapse at the end of the project period. In order to have a permanently transformative effect, research needs long-term and stable structures. The long-term establishment of urban real-world laboratories therefore requires approaches that go beyond classic options of project financing. These approaches place more obligations on established research institutes and universities and make long-term studies possible by means of corresponding collaborations. They also require closer coordination between the ministries traditionally responsible for research funding, such as the BMBF, with those in charge of development cooperation (BMZ) and urban and infrastructure design (BMUB).

In the WBGU's view, a global exchange of knowledge on the urban transformation, facilitated by network-

ing between the real-world laboratories, would generate added value. The contextualized knowledge emerging in the individual real-world laboratories could be compared with the findings of other research initiatives in terms of sizes, constellations, world regions and forms of urban transformation processes, making it possible to draw generalizable conclusions. When setting up real-world laboratories, close cooperation should be sought with the respective leading centres of basic research and applied transdisciplinary research on urban transformations; these should be incorporated into the infrastructure of real-world laboratories to ensure good links to the science system.

Cities themselves often need fast action. Recommendations derived from scientific findings that can be made available at short notice would make decision-making easier. A mechanism should be found here whereby cities can take their research needs and knowledge to the scientists in the short term, and the scientists can respond quickly to those needs without violating any scientific principles. Real-world laboratories could function here as an interface between science, politics and society to promote short-term exchanges of transformation-relevant knowledge.

Long-term real-world laboratories are spaces for experimentation on content and methods; they offer great potential that should not be curtailed by specific targets on content, methods or other aims. In the WBGU's opinion, research should learn more lessons from so-called failures, so as to make constructive use of all learning opportunities and experiences. So-called failures must not be allowed to pose a potential threat to future project applications; instead, learning from them should be seen as a success.

5. Capacity development and the exchange of knowledge

The WBGU believes that international capacity development is required to exploit research on urban transformations for real transformation processes, and to apply scientific findings to practical solutions. Selected hubs of basic and applied research on urban transformations should be established especially in developing countries and emerging economies, and in close cooperation with actors from these countries.

Existing approaches of capacity development in international research cooperation, e.g. funded by the BMBF (Box 10.3-1), can be taken up, linked to the requirements of transformative urbanization research, and developed accordingly. In a similar way to the creation of regional climate-research centres with affiliated graduate schools, the WBGU recommends setting up global urban transformation research centres with the aim of building the necessary disciplinary research

Box 10.3-1**Good practice by the BMBF in the field of capacity development in other sectors**

Since 2010, the German Federal Ministry of Education and Research (BMBF) has been funding two research initiatives within the 'Research for Sustainability' (FONA) programme, which the WBGU regards as exemplary and which could be used as models for new urban research initiatives: the West African Science Service Centre on Climate Change and Adapted Land Use (WASCAL) and the Southern African Science Service Centre for Climate Change and Adaptive Land Use (SASSCAL). The two BMBF-funded science service centres on climate and land use in western and southern Africa were built up together with the partner governments in the countries concerned, and are to be financed by the partner countries in the future. The BMBF is funding SASSCAL and WASCAL with a total of €100 million, thus going beyond what is customary in project funding not only in terms of finance. The

centres combine interdisciplinary research activities with the development of regional research infrastructures and capacity development in graduate schools (SASSCAL, 2015; WASCAL, 2014). Because of their scope and size, such funding initiatives are not the rule within the BMBF's portfolio. However, approaches like a transdisciplinary orientation, or dovetailing research with elements of capacity development, can also be found within the traditional project-based research funding programmes. In addition to the Future Megacities Programme (Section 10.2.2.2), the BMBF's recent announcement on the funding of research measures and integrated postgraduate education and training in cooperation with the DAAD, is an example of good practice in the dovetailing of research and capacity development (BMBF, 2015f.) on topics to be jointly decided, e.g. in the field of global challenges. In the WBGU's opinion, joint agenda setting with the foreign partners in such development initiatives as CLIENT for research into environmental technologies in cooperation with the BRICS countries (BMBF, 2010) is also a trend-setting development.

capacity and infrastructures within developing countries and emerging economies.

There is also a global need for capacity development in using inter- and transdisciplinary and participatory methods. Actors both in science and in practical applications often lack expertise in using existing participatory or transdisciplinary methods. The WBGU therefore sees a need for further-reaching competency development among all the relevant actors involved in transdisciplinary or participatory processes. Both collective learning and participation require supervision and support. It seems worthwhile to institutionalize and develop quality standards in order to professionalize the development of methods and instruments.

In addition to developing capacities, the international exchange of urban knowledge should also be strengthened. Networks between industrialized and developing countries and emerging economies, as well as within and between these countries, are required for the exchange of relevant and context-specific knowledge. This requires suitable knowledge-exchange structures, especially in the science systems of developing countries and emerging economies (Table 10.2-3). There are several initiatives – the Global Urban Commons, the Urban Gateway, the World Urban Forum and Connective Cities – which aim to promote networking between international research and practice, both on virtual platforms in the internet and at regular conferences. The WBGU recommends further promoting such networking initiatives.

10.3.2**The way forward: a roadmap for the direction of transformation-related urban research**

Many and various building blocks of good practice in urban research already exist today in various programmes and institutions (Section 10.2). The WBGU believes considerable synergies can be generated by interlinking them. Optimally combining the different elements requires a structured and systematic replacement process across the various institutions. This is not only a challenge for individual research institutes and departments; it also requires strategic and coordinated action by the large research communities and universities. The future programme design should be discussed and agreed with representatives of cities, as well as with the ministerial actors at the state and federal levels.

Especially the idea of long-term transformative real-world laboratories (50 for 50 years) in a global context requires a new dimension of interministerial cooperation. The positive experience gained with interministerial cooperation in the process of the National Platform on the City of the Future could form a basis here.

Closer cooperation between the BMBF and the BMZ could help overcome the challenges of limited project durations in traditional research. The BMZ should contribute its experience from the implementation of development projects. In addition, in terms of the planning of more experiment-oriented research designs, the BMBF could benefit from the experience gained by the BMUB in programmes such as experimental housing and urban development.

It is a good idea to sound out corresponding synergies between ministries and other actors. The WBGU

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therefore proposes the development of a roadmap process for the urban transformation. This should be initiated in Germany by the BMBF, be based on the participatory pattern of the ‘National Platform on the City of the Future’ process, and could be closely coordinated with national research institutions, research sponsors, and such global programmes and platforms as Horizon 2020, the Belmont Forum of Funding Agencies for Global Change Research, or Future Earth.

This process could ultimately lead to a roadmap for a well-developed form of global, sustainability-related urbanization research, incorporating the fields of basic, applied, and transformative research. The roadmap would outline its institutional roots in both the non-university and the university field. The WBGU believes this would lead to an adequate institutional set up to accompany the national and international urban transformation processes in terms of its orientation towards sustaining the natural life-support systems, inclusion and *Eigenart*, as described in this report.