World Disasters Report

2010

Focus on urban risk

Together for humanity
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A global humanitarian organization

The **International Federation of Red Cross and Red Crescent Societies** is the world's largest humanitarian organization, providing assistance without discrimination as to nationality, race, religious beliefs, class or political opinions. The International Federation's mission is **to improve the lives of vulnerable people by mobilizing the power of humanity.**

Founded in 1919, the International Federation comprises 186 member Red Cross and Red Crescent Societies – with an additional number in formation – a secretariat in Geneva and offices strategically located to support activities around the world. The Red Crescent is used in place of the Red Cross in many Islamic countries.

The International Federation coordinates and directs international assistance to victims of natural and technological disasters, to refugees and in health emergencies. It combines its relief activities with development work to strengthen the capacities of National Societies and through them the capacity of individual people. The International Federation acts as the official representative of its member societies in the international field. It promotes cooperation between National Societies, and works to strengthen their capacity to carry out effective disaster preparedness, health and social programmes.

National Red Cross and Red Crescent Societies embody the work and principles of the International Red Cross and Red Crescent Movement. National Societies act as auxiliaries to the public authorities of their own countries in the humanitarian field and provide a range of services including disaster relief, health and social programmes. During wartime, National Societies assist the affected civilian population and support the army medical services where appropriate.

The unique network of National Societies – which covers almost every country in the world – is the International Federation's principal strength. Cooperation between National Societies gives the International Federation greater potential to develop capacities and assist those most in need. At a local level, the network enables the International Federation to reach individual communities. Together, the National Societies comprise 97 million volunteers and 300,000 employees, who provide assistance to some 233 million beneficiaries each year.

The **International Committee of the Red Cross** (ICRC) is an impartial, neutral and independent organization whose exclusively humanitarian mission is to protect the lives and dignity of victims of war and internal violence and to provide them with assistance. It directs and coordinates the international relief activities conducted by the Movement in situations of conflict. It also endeavours to prevent suffering by promoting and strengthening humanitarian law and universal humanitarian principles. Established in 1863, the ICRC is at the origin of the International Red Cross and Red Crescent Movement.

Together, all the components of the International Red Cross and Red Crescent Movement are guided by the same seven Fundamental Principles: humanity, impartiality, neutrality, independence, voluntary service, unity and universality. In the same manner, all Red Cross and Red Crescent activities have one central purpose: to help those who suffer without discrimination and thus contribute to peace in the world.

Cover photo: Storm cloud hangs over Hangzhou City before the coming of typhoon Haitang in east China's Zhejiang province. Storm cloud hangs over Hangzhou City before the coming of typhoon Haitang in east China's Zhejiang province July 19, 2005. Typhoon Haitang swirled towards China's southeast coast on Tuesday after killing up to six people in Taiwan, injuring 30 and wreaking damage estimated at US$41 million. CHINA OUT REUTERS/China Newsphoto.

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The urban risk divide:
A 21st century challenge

The signs of our vulnerability to urban risk are everywhere.

An earthquake can bring hospitals, schools and homes tumbling down with unspeakably tragic consequences. A volcano can throw city airports into chaos. Flood waters can turn well-kept streets into detritus-strewn canals. The drug trade can turn an inner city into a war zone. An epidemic can spread rapidly through a crowded slum.

As the pendulum of human development swings increasingly away from the countryside to the city, we see that rapid urbanization and population growth are combining to create enormous new challenges for the humanitarian community and pushing us out of our comfort zone to deal with a strange new urban world.

When it comes to the impact of natural disasters, well-run cities can be among the safest places on earth. They can also be the best places to raise a family, for schooling, healthcare and employment. You can expect to live longer in a city.

Cities can also be the most dangerous places on earth for those who live in an urban environment where the authorities have little presence and where the will and the resources are lacking to ensure basic social services, food security, policing, running water, sewerage and respect for building codes.

This urban risk divide is a major challenge for humankind in the 21st century if we are to ensure that the worldwide movement from the countryside to cities does not fuel a growth in sickness and deaths from the re-creation of 19th century-like public health hazards exacerbated by exposure to risks generated by climate change and the threat of pandemics.

The stresses and strains of urban living can be compounded immeasurably for those who end up living on the peripheries of cities in low- and middle-income countries, barely surviving on one US dollar or less a day.

Despite the heartbeat of commerce and other signs of vibrant life which pulsate through many informal urban settlements, slum life can be nasty, brutal and short for many inhabitants as they lose out in a Darwinian struggle for survival against disease, malnutrition, illiteracy, crime and natural disasters.

It is this urban 'underclass' that should concern the humanitarian community most. Their numbers are almost 1 billion and they are growing at the rate of 10 million

annually despite commendable efforts to reach the Millennium Development Goal on shelter in some parts of the world.

Before the tide of urbanization leaves us behind, the humanitarian community needs to bring about a sea-change in how we respond to these vulnerable people, and how we engage with governments who are struggling to understand what is happening in their cities and finding it difficult to resource an adequate response.

This year's *World Disasters Report* does not have all the answers but it does have sound advice on how the urban risk divide between the developing world and the developed world can be reduced. It also highlights how, in a globalized world, a deficiency on one side of the world can create problems for us all.

Urbanization can be a strong bulwark against the worst that climate change is throwing at us. Where there is good urban governance, you find economies of scale in terms of risk reduction and response capacities. Where there is good urban governance, you will also find citizens who are empowered and active in their communities because they have security of tenure and their housing, land and property rights are respected.

The challenge for humanitarian actors is to find new and concrete ways of engaging with local authorities and vulnerable communities to ensure that risk reduction is all encompassing and not simply focused on the obvious and on the post-disaster clean-up.

It is clear from many examples in this report that urban communities are capable of finding their own solutions, asserting their rights and playing a full role in post-disaster recovery and risk reduction but that many need external support which is appropriate to their circumstances.

One man's flood drain is another man's home. This paradox – the elimination of one risk to replace it with another – must encourage us to engage intelligently with communities struggling to survive along the fault lines of urban risk. In the long term, if we are looking after the vulnerable in our cities, we are looking after ourselves.

Bekele Geleta
Secretary General

CHAPTER 1

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Avoiding the urbanization of disasters

The early part of 2010 saw two of the worst earthquakes of recent times strike separate parts of the Americas. An 8.8 magnitude earthquake hit Chile, a country which had just joined the OECD (Organisation of Economic Co-operation and Development) club of wealthier nations, and caused widespread damage to property but the death toll was counted in hundreds. It followed an earthquake of slightly lesser magnitude in January which struck Port-au-Prince, the capital of the region's poorest country, Haiti, and resulted in more than 200,000 deaths according to best estimates and left more than 1 million people homeless. While the concentration of people in urban centres can greatly reduce or increase disaster impacts, the disparity in the impact of these two earthquakes is in part explained by the differences in disaster preparedness and the quality of housing, infrastructure and services.

Far more attention needs to be given to urban risk in a world which is urbanizing rapidly and where, for the first time, over half the world's population lives in cities and towns. More than 1 billion people today live in appalling conditions in urban areas and their numbers are growing. And it is mostly this population – whose basic needs are not always provided for – that is at most risk from cyclones, floods, earthquakes, infectious diseases, crime, fires, and transport and industrial accidents. This underlines the need for a radical rethink in how the international community addresses urban risk. Few governments or non-governmental organizations (NGOs) work successfully with low-income groups to improve their living conditions and there is evidence to suggest that poverty thresholds are unrealistically low when estimating the full extent of deprivation in urban settings.

A disaster-prone urban future can be avoided. Trend is not destiny. But as the world's population becomes increasingly concentrated in large cities, we are seeing an urbanization of disasters and disaster risk. This presents rapidly evolving challenges for international agencies, NGOs, and central and local governments in how they approach disaster response in an urban setting, particularly in low-income countries where endemic poverty underpins vulnerability to disaster events. Nonetheless, there are cities in Africa, Asia and Latin America where disaster risks have been dramatically reduced as the proportion of the population living in homes and neighbourhoods with basic infrastructure and services has increased rather than decreased, and where local governments have learned to map disaster risk and to act on it in partnership with local communities. Instances of good practice show that it usually comes down to the quality and effectiveness of urban government and it is just as often achieved without the support of large institutional donors who have no real dialogue with poor communities living in informal settlements (often called 'slums' or 'shanty towns').

Photo opposite page: The February 2010 earthquake in Chile, which also triggered a tsunami, caused much devastation to infrastructure, but with an estimated 490 deaths, fatalities were far fewer than in the January quake in Haiti.

© Carola Solis/ Chilean Red Cross

The United Nations (UN) Population Division's projections suggest that almost all the world's population growth in the next few decades will be in urban areas in low- and middle-income nations (see Table 1.1). Much of this population growth is currently in informal settlements where housing conditions are generally very poor and even the most rudimentary protective infrastructure is often lacking. A high proportion of this urban growth is in cities at risk from the increased frequency and intensity of extreme weather events and storm surges that climate change is bringing or is likely to bring.

Table 1.1 Growth in the world's urban and rural population (millions of inhabitants)					
	1950	**1970**	**1990**	**Projected for 2010***	**Projected for 2030***
World's urban population	**737**	**1,332**	**2,275**	**3,495**	**4,965**
High-income nations	427	652	818	925	1,016
Low- and middle-income nations	310	680	1,456	2,570	3,949
Africa	33	86	204	412	759
Asia	237	485	1,015	1,770	2,669
Europe	281	412	509	530	550
Latin America and the Caribbean	69	164	314	471	603
Northern America	110	171	214	286	351
Oceania	8	14	19	25	31
World's rural population	**1,798**	**2,367**	**3,020**	**3,412**	**3,426**

Source: United Nations (2008)

* The figures for 2010 are projected because no data are available yet from the new round of censuses held in 2009 and 2010 or planned for 2011. The projections for 2030 may overstate urban population growth in Africa; poor economic performance and/or conflict have slowed urbanization there and this will have to change if the region is to urbanize rapidly.

But a city can be among the safest places when a storm, flood or earthquake hits. This can be seen in the many extreme weather events or earthquakes in high-income nations (all of which are highly urbanized) that have no, or very few, fatalities. Most extreme weather events in high-income nations cause no fatalities. For those that do, high-quality buildings and infrastructure usually keep down deaths and injuries, and rapid, good-quality emergency responses limit the impact of injuries. Of course, we cannot measure what has been avoided – the floods that did not happen as the drainage system coped; the fire disasters and building collapses prevented by good-quality buildings and emergency response; the industrial, mining and transport disasters avoided by the application of sensible standards and safety measures. But without the investment in physical capital and institutions, the situation would have been much worse (although many of the measures that avoid disasters were taken in response to previous disasters).
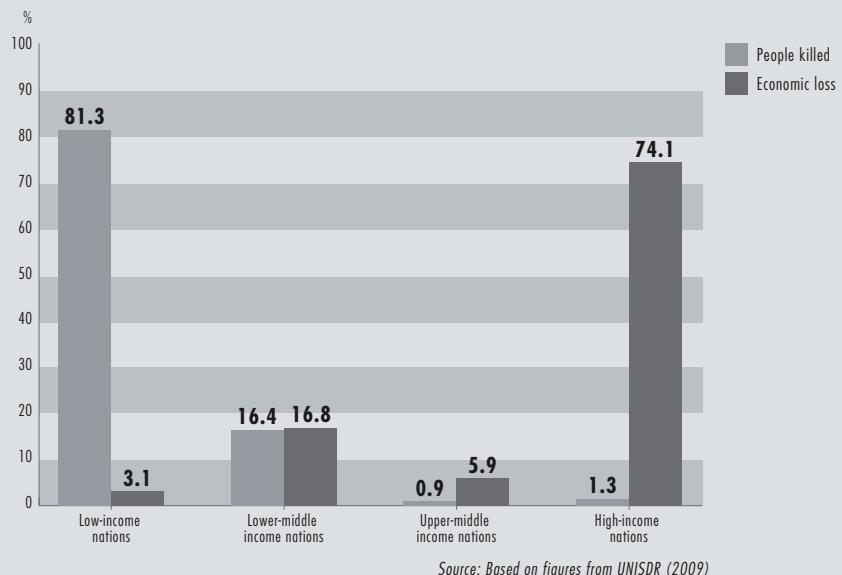
Part of what can be avoided can be seen in the distribution of fatalities from disasters. Figure 1.1 shows the extent to which deaths from cyclones are concentrated

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in low-income nations even though a high proportion of the population exposed to cyclones lives in high-income nations. In viewing the dramatic differences in fatalities between the different categories of nations, it should be remembered that low-income nations are the countries that are the least urbanized while almost all upper-middle and all high-income nations are predominantly urban.

Japan has more people exposed to tropical cyclones than the Philippines. However, if both countries were affected by a cyclone of the same magnitude, past experience suggests that mortality in the Philippines would be 17 times higher than in Japan. This does not mean that cities in high-income nations are always safer, as was shown by the deaths and devastation in New Orleans after Hurricane Katrina, but relative to the intensity of the disaster, fatalities are much less common. Disasters from fires and from transport and industrial accidents are much less common in cities in high-income nations than in low- and middle-income nations (although this certainly was not the case historically as many of today's wealthiest cities experienced disastrous fires or industrial accidents in the past).

Figure 1.1
Distribution of fatalities and economic loss from tropical cyclones per year

Source: Based on figures from UNISDR (2009)

In high-income countries, Japan has the largest number of people exposed, followed by the Republic of Korea and the United States.

When an earthquake hits a city, it can be a very dangerous place to be – as was seen in Port-au-Prince in January, in Bam, Iran in 2003 or in Turkey's Marmara region in 1999. But this need not be so. For instance, in July 2007, a large earthquake struck the

north-western part of the Niigata region in Japan. Although it was the most costly disaster in the world for that year, only 11 deaths and 100 injuries were reported. Again, this is not always the case as, even in Japan, the complex web of causal relations means that the general rule does not always apply, as shown by the 1995 Kobe earthquake which claimed 6,400 lives and injured 15,000 people.

With more than half the world's population now living in urban areas, this edition of the *World Disasters Report* looks at where cities and smaller urban areas are centres of risk for disasters and where they are not. It will also consider why this is so – and the extent to which disaster risk can be reduced or removed in urban areas and what measures contribute to this. This will be discussed within the context of a world that is urbanizing rapidly.

Why focus on urban areas?

This report's focus on urban areas does not mean that urban and rural disasters should be considered separately. Most disasters impact rural and urban areas. There are too many links between both areas which are relevant to disasters – for instance, disasters in rural areas bring disruptions to urban centres to which they supply food, fuel, water or other goods, while disasters in urban areas disrupt the suppliers of goods and services that farmers and rural populations use.

But urban areas need separate consideration because their very character – the concentration of population, homes and other buildings, transport infrastructure and industry – presents both problems and opportunities for disaster risk reduction and humanitarian assistance. In low-income and most middle-income nations, there is also more 'government' in urban than in rural areas, as urban populations and enterprises are subject to more rules and regulations, and state institutions are more likely to be present. Of course, such government activities should reduce disaster risk but in reality, as will be discussed later, they may often exacerbate it. There are also more market pressures in urban areas, especially in large or successful cities where low-income groups struggle to find accommodation and health services they can afford and are at risk from price rises or falling incomes. Thus, there is a need for finance if households are to protect themselves.

Urban populations also need some consideration simply for their scale:
- By 2010, there were 2.5 billion urban dwellers in low- and middle-income nations; this is roughly the same as the world's total population in 1950
- Africa is usually considered to be predominantly rural but its urban population is now much larger than that of North America
- Most of the world's largest cities are in low- and middle-income nations; this is unprecedented historically as most large cities have been in the wealthiest nations.

The last few decades have also brought a very large increase in the number of urban dwellers living in poverty, mostly in low- and middle-income nations. This is most evident in the poor-quality and overcrowded housing and the lack of provision for the basic infrastructure and services which should protect them from environmental health hazards and help prevent disasters. Although precise numbers are lacking, an overall view of UN estimates suggests that around 1 billion urban dwellers live in poor-quality, overcrowded housing in slums or informal settlements with this rising to 1.4 billion by 2020 unless governments and international agencies become far more successful in supporting housing improvements for low-income groups. The UN Human Settlements Programme (UN-Habitat) recently published revised figures stating that the "absolute number" of slum dwellers in the developing world has actually increased from 776.7 million in 2000 to some 827.6 million in 2010. This assessment is accompanied by a claim that during the same decade, a total of 227 million people have moved out of slum conditions, which means that the Millennium Development Goal target has been surpassed 2.2 times. However, an inquiry by the *World Disasters Report* elicited the response that this number is partly based on a redefinition of international sanitation standards which retrospectively excluded families that have access to a slab-pit latrine which in itself may have very little impact on their health and well-being.

Other UN estimates show a massive deficit in provision for water and sanitation. Estimates for 2000 suggested at least 680 million urban dwellers lacked adequate provision for water supplies and at least 850 million lacked provision for toilets or latrines to a quality that reduced health risks. Since 2000, the urban population in low- and middle-income nations has increased by more than 500 million. As few governments have worked successfully with their low-income urban population to improve conditions, this also means there are now hundreds of millions more urban dwellers living in poverty and lacking adequate provision for water and sanitation. Other estimates suggest a lower proportion of the urban population in low- and middle-income nations are poor, but these take little or no account of housing conditions and often do not factor into the poverty lines the full costs of non-food needs in many cities. Set a poverty line unrealistically low and it can suggest there is almost no poverty in cities where a high proportion of the population lives in very poor-quality housing in informal settlements.

Urban poverty and disaster risk are often closely intertwined. Accidents or outbreaks of disease that kill or seriously injure people and/or damage or destroy property are classified as disasters if they exceed certain thresholds for the number killed (typically ten or more) or seriously injured (typically 100 or more). In all urban areas, there are many accidents that kill or seriously injure fewer people than this, such as most road traffic accidents and accidental fires. Urban poverty can dramatically increase premature deaths and serious injuries due to dangerous, overcrowded housing lacking infrastructure and services. For instance, the lack of access roads may stop fire engines from getting to the site of an accidental fire, which has spread owing to housing clustered close

together and made of flammable materials. Or the absence of drainage infrastructure may turn heavy rainfall into a disastrous flood.

The links between urban poverty and disaster risk are likely to be increased by climate change. Tens of millions of urban dwellers face, or will soon face, life-threatening risks from the increased intensity of storms, flooding and heatwaves that climate change is bringing, with associated threats to their livelihoods, their asset bases (including housing), environmental quality and future prosperity. Here, it is largely those people and nations that have contributed least to global warming which face the greatest risks. Climate change is driven by greenhouse gas emissions which have brought benefits to affluent individuals and societies yet most of the burdens fall on low-income (rural and urban) individuals and societies. Without global agreements that succeed in reducing greenhouse gas emissions dramatically in the next few decades, the number and scale of extreme weather events, coastal flooding and serious constraints on agriculture and water supplies will increase and much of this will be in urban and rural areas that lack the capacity to adapt. However, good practice in urban development and government can also contribute much to disaster risk reduction and climate change adaptation. But to focus only on the current and likely impact of climate change is to miss a very large preventable disaster burden that has long been present in urban areas and that remains independent of climate change.

Urbanization and disaster risk

Being vulnerable should not of itself generate disaster risk. So why is it that, in most nations and urban centres, deaths, injuries and loss of homes from disasters are greater among vulnerable groups? If risks are removed – for instance, the installation of decent drains that cope with heavy rainfall – vulnerability to those risks is no longer a problem. Vulnerability is not the same as lack of income but lack of income may also mean lack of access to safe housing with good provision for water and sanitation, healthcare, education and capacity to recover. And this, of course, is what increases risks for vulnerable groups. In cities where a high proportion of the population lives in poverty, under-5 mortality rates can be 15 to 20 times what they should be. Again, it has to be stressed that vulnerable groups are not at risk if the hazards to which they are vulnerable are removed. Women are often the mainstays of community organization and collective action reducing disaster risk, and the young can be resilient to disasters with proper support.
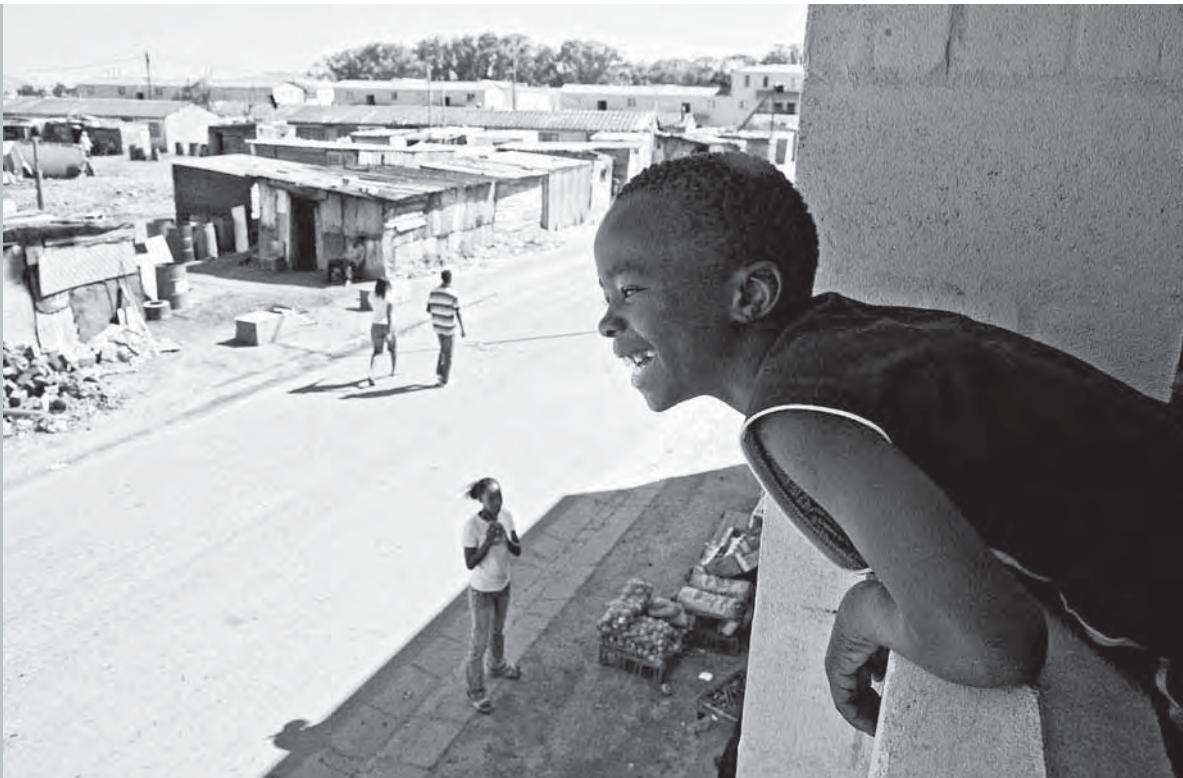
In high-income nations, the concentration of people, buildings, motor vehicles and industries (and their wastes) in cities is not generally associated with higher disaster risks because this same concentration also means many economies of scale and proximity for the comprehensive web of infrastructure and services that reduce disaster risks and disaster impacts. Urban populations in these nations take it for granted that they will be protected from disasters, including extreme weather, floods, fires and technological accidents.

But only a very small proportion of urban centres in low- and middle-income nations have a comparable web of institutions, infrastructure, services and regulations, although there are very large variations between urban areas in these nations as regards the extent of both provision and coverage. For instance, the proportion of urban populations living in legal homes that were constructed in accordance with appropriate building regulations varies from 10–20 per cent to close to 100 per cent. The proportion of the population living in homes adequately served by sanitation, waste-water removal and storm drains also varies enormously – most urban centres in Africa and Asia have no sewers and for many of those that do, these serve only a very small proportion of the population. No family in urban areas in high-income nations, however poor, expects to have to walk several hundred metres to collect water from a communal standpipe shared with hundreds of others, to have no toilet in their home or to have no service to collect household waste.

It is common that between one-third and one-half of the population of cities in low- and middle-income nations lives in informal settlements. And this is not just the case in cities with little economic success – around half the population of Mumbai and Nairobi, both of which are successful economically, lives in informal settlements. It is also common in such cities for the local authorities and utilities to refuse to extend to informal settlements (or to be prevented from doing so by law or regulation) all the infrastructure and services that do so much to reduce disaster risk. There are no statistics on the proportion of the urban population covered by good-quality fire services or rapid response to serious injuries or illnesses (including ambulances and hospitals able to provide rapid treatment), but the inadequacy or complete absence of such services is evident in many informal settlements. Only 1 per cent of households and businesses in low-income countries and 3 per cent in middle-income countries have catastrophe insurance, compared to 30 per cent in high-income nations.

Urban myths

The discussion of urbanization is still full of myths (see Box 1.1). It is often seen as 'the problem' (nations being 'too urbanized', cities growing 'too fast', 'too many migrants' flooding the city) when it is associated with economic success. All high-income nations are predominantly urbanized and most of their rural population are 'urbanized' in that they no longer work in agriculture and a high proportion of them commute to urban areas. All low- and middle-income nations that have had the greatest economic success have urbanized; most of those that have not had economic success are among the world's least urbanized nations. There are worries about 'mega-cities' with more than 10 million inhabitants but there are relatively few of them (17 in 2000, the last year for which census data were available for most cities) and they are concentrated in the world's largest economies. There is an economic logic to where urbanization and large city development is taking place – and also good evidence to show that in successful economies that are urbanizing and where the competence of city governments is strengthened, urban development decentralizes to community and urban district levels.

The crisis of urban poverty, rapidly growing informal settlements and growing numbers of urban disasters arises from the failure of governments to adapt their institutions to urbanization. It stems also in part from the failure of aid agencies to help them to do so – most aid agencies have inadequate or no urban policies and have long been reluctant to support urban development at a sufficient scale. Governments fail to stop urban disasters when they fail to help local government structures in cities and metropolitan areas to provide the web of institutions, infrastructure and services noted above. In so many cities, disaster risk is produced over time by the failure of city governments to ensure that neighbourhoods are not built with bad-quality housing and on dangerous sites without adequate infrastructure. Often this failure is linked to their weak financial status, lack of trained staff and lack of capacity due to the refusal of central and provincial governments to provide them with resources commensurate with their responsibilities. Perhaps the most important issue that runs through all the chapters in this report is that city and municipal governments should be working with their low-income populations and other vulnerable groups to take disaster risk out of urban development and expansion. We have enough examples to illustrate that this is possible, despite the constraints that city governments face.

If national and international databases on disasters become more precise and comprehensive as to the impact on individual cities, it is certain that the observed trends would

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reinforce the view that disaster risk increases in badly governed cities and decreases in well-governed cities. It would show that cities with rapid population growth and ensuing economic growth introduce measures to reduce disaster risk, while cities with slow population growth or even population decline still have high disaster risk as they have fewer resources to invest in reducing disaster risk.

Observed trends would also show that many city governments increase disaster risk as they ignore the population living in informal settlements or as they bulldoze these settlements, destroying the homes, assets and livelihoods of tens of thousands of people but providing no alternatives – either to those who are displaced or to low-income groups in general. Low-income groups do not want to live in poor-quality housing in dangerous, crime-ridden settlements lacking infrastructure, law and order and other services. They do so because only in such areas can they find affordable accommodation within reach of income-earning opportunities.

Box 1.1 Urban myths and misconceptions

1. *"Cities are parasitic, growing everywhere without the economy to support them."* In general, the more urbanized a nation, the stronger and more productive its economy. The nations with the greatest economic success over the last few decades are generally those that have urbanized most rapidly; most of those with the smallest increase in their level of urbanization are those with the least economic success.

2. *"Africa is the most rapidly urbanizing region and it is urbanizing without economic growth."* Asia is the most rapidly urbanizing region, driven by urbanization in its most successful economies. Africa's rate of urbanization has slowed because many African nations have had little or no economic growth in recent years and are urbanizing slowly or may even have stopped urbanizing.

3. *"Mega-cities are growing rapidly and will dominate the urban future."* There are relatively few mega-cities (17 in 2000, the most recent year for which census data are available), they concentrate less than 5 per cent of the world's population and many have more people moving out than in, as smaller cities within their nation attract more new investment.

4. *"More than half the world's population lives in cities."* More than half the world's population lives in urban centres, not cities, and a large part of this is in small market towns or other urban centres too small to be considered a city.

5. *"The speed of urban change in poorer nations is unprecedented with new cities mushrooming everywhere."* Many high-income nations had periods with faster increases in their levels of urbanization than those taking place in recent decades in most low- and middle-income nations. There are relatively few new large cities; most large cities in Asia, North Africa and Latin America (and Europe) have been important cities for centuries. Several of the world's fastest-growing large cities over the last 100 years are in the United States.

6. *"Urban development is opposed to rural development."* Much of the demand that produces rural incomes comes from urban populations and urban enterprises. Many higher-paying jobs in rural areas (including off-farm work) come from urban demand. Successful farmers depend on urban-based facilities and services – markets, banks, processing plants, cold-storage facilities, supply and repair of machinery and agricultural inputs. Rural populations often depend on their local urban centre for access to hospitals, secondary schools, post offices and most consumer goods and services. Many low-income rural households have their incomes boosted by remittances from a family member working in urban areas.

7. *"Large and rapidly growing cities have the worst environmental problems."* Large cities often have better standards of environmental health than most other urban centres in their nation (and most rural areas). Well-governed cities have the world's best quality of life (and highest life expectancies). It is not the size and speed at which a city grows that determines environmental problems but the quality of its government and its relations with its low-income population. ◼

Disaster impacts in rural and urban areas

Disasters have long had their largest impacts in rural areas in terms of deaths, serious injuries and impoverishment. In part, this was simply because most people lived and worked in rural areas but this is no longer the case. It was also partly because most of those with the least resilience to disasters lived in rural areas. This is changing with the growth in what can be termed the 'vulnerability gap' in urban areas and as it does, it brings with it a need to consider why more disaster risk is in urban areas and what this implies for both development and disaster risk reduction. The vulnerability gap is produced by two factors: the lack of knowledge and financial capacity (and sometimes willingness) of urban authorities to reduce risks and vulnerabilities; and a high proportion of urban households and communities limited in their capacity to reduce risk by inadequate incomes, limited political influence, high land prices (often driven up by speculation) and corrupt practices in land-use management that combine to force people to live in high-risk areas.

The priorities for disaster risk reduction depend on how disaster risk is viewed. If disaster risk is viewed in terms of economic impacts, the list of 'vulnerable cities' is dominated by wealthy cities in high-income nations. So in the index of risk to multi-hazards in large cities developed by Munich Re, 17 of the 20 cities at highest risk are in high-income countries. This makes sense if gauging the risk for insurers and thus the value of exposed assets but it makes very limited sense in terms of identifying cities where populations are particularly at risk from disasters.

Cities in low-income nations do face very high levels of risk – not because of the monetary value of exposed assets, but due to the inadequacies in their infrastructure, the poor quality of the housing for much of the population and the weakness of city

institutions. Poor people have a lot to lose when disaster strikes. Better mapping of smaller urban disasters would illustrate clearly the large impact they have on vulnerable households.

Table 1.2 What different aspects of urban poverty imply for everyday and disaster risk

Aspect of urban poverty	Implications for everyday risk	Implications for disaster risk
Inadequate and often unstable income and thus inadequate consumption of necessities, including food and, often, safe and sufficient water. Often, problems of indebtedness, with debt repayments significantly reducing income available for necessities. Inability to pay for insurance.	Very limited capacity to pay for housing which in urban areas means living in the worst-quality and most overcrowded homes in illegal settlements on dangerous sites lacking provision for infrastructure and services – so very high levels of environmental health risk.	In most cities and many urban centres in low- and middle-income nations, most low-cost housing is on dangerous sites, e.g., at high risk from flooding or landslides. The lack of public provision for infrastructure and services adds to such risks, particularly for flooding.
Inadequate, unstable or risky asset base (e.g., property, skills, savings, social networks) for individuals, households or communities.	Very limited capacity to cope with stresses or shocks in everyday life – including rising prices or falling incomes, injuries and illnesses.	Very limited capacity to cope with disaster events when they occur including lacking assets that are not damaged or destroyed by the disaster and having no insurance.
Poor-quality and often insecure, hazardous and overcrowded housing (often rented) located on dangerous sites such as flood plains, steep slopes and soft or unstable ground.	High risk levels from physical accidents, fires, extreme weather and infectious diseases – with risks often increased by overcrowding.	Housing is often of poor quality so at risk from storms/high winds, earthquakes, landslides, floods, fires and disease transmission which may cause epidemics.
Inadequate provision of 'public' infrastructure (piped water, sanitation, drainage, roads, footpaths, etc.), which increases the health burden and often the work burden.	High levels of risk from contaminated water, inadequate sanitation, house flooding from lack of drainage.	Lack of protective infrastructure against flooding. Lack of roads, footpaths and drains inhibiting evacuation when disaster threatens or happens.
Inadequate provision of basic services – day care, schools, vocational training, healthcare, emergency services, public transport, communications, policing and good information on safe building practices.	Unnecessarily high health burden from diseases and injuries because of lack of healthcare and emergency response.	Lack of healthcare and emergency services that should provide rapid response to disaster (and should have had a role in reducing disaster risk and in disaster preparedness).
Limited or no safety net to ensure basic consumption can be maintained when income falls; also to ensure access to housing, healthcare and other necessities when these can no longer be paid for (or fully paid for).	Very limited capacity to cope with stresses or shocks in everyday life – including rising prices or falling incomes, injuries and diseases.	Very limited capacity to recover from disaster, for instance to afford food and water, rebuild homes and livelihoods. Lack of documentation often means not getting post-disaster support.
Lack of influence over what government does, including what it does in post-disaster responses.	Low-income survivors often not allowed to move back to their former settlement and rebuild their homes and livelihoods.	Little external support for low-income groups and their organizations to rebuild in ways that reduce disaster risk.
Limited influence over external civil society actors such as international aid agencies during disaster risk reduction and response.	Lack of local input can lead to inappropriate development investments or missed opportunities to reduce risk and to build more secure local economies and livelihoods.	International humanitarian actors can overwhelm local government and civil society organizations alike. Lack of partnership inhibits good governance.

Housing and urban disasters

The official statistics on disaster impacts suggest that the damage to, or destruction of, housing (and other assets) is far more serious in high-income nations. But this is misleading in that damage to or destruction of housing is usually far more serious in low- and middle-income nations in terms of the number of households affected and how much they are affected. This does not translate into a large monetary loss because most of the homes destroyed or damaged were not worth much in monetary terms or their monetary value is simply ignored because they are informal dwellings. This is so even though the house is not only the most valuable asset for those affected but also their home, and they receive little or no compensation when it is damaged or destroyed. Of course, they also have no insurance so they do not figure in any calculation of insurance payments. This is how disasters create or greatly exacerbate poverty.

Each year, millions of households have their homes damaged or destroyed by disasters. For instance, in 2007 there were extensive floods throughout South and South-East Asia and in many nations in West and East Africa, while Hurricane Felix triggered floods in Nicaragua. This pattern was repeated in 2008, from the hurricane season in the Caribbean, to cyclones in Myanmar and Bangladesh and the devastating Sichuan earthquake in China. In 2009, millions were affected by the earthquake in Sumatra, Indonesia, and the floods in India and the Philippines.

Greater consideration is needed of the role that housing plays in urban areas for low-income groups such as the hundreds of thousands of slum dwellers rendered homeless by the January 2010 earthquake in Haiti. The value and importance of housing to such groups far exceeds its monetary value. What seems to outsiders to be no more than a shack built mostly of temporary materials is actually the home with all its key attributes for family and social life, privacy and safety, and is the primary defence for those living there against most environmental health risks. It may also be the place of work for some household members and is often the household's most treasured asset. As family members build or improve their home, they increase the value of their asset and its capacity to protect them from hazards. It is also the means by which they get access to income and services – and in urban areas, its location in relation to income-earning opportunities and services is often more important for low-income households than its size, quality or legality. This explains why such a high proportion of informal settlements are on flood plains or steep slopes at risk of landslides, because these are the only land sites within a city close to centres of employment that low-income groups can occupy.

Urban areas present two very specific challenges for housing. The first is that in low- and middle-income nations, land prices for housing are usually much higher than in rural areas. There are also often far more official rules and regulations governing the acquisition and use of land for housing, which usually restricts land available and

Box 1.2 Can Haiti build back better?

All eyes are on Haiti to see if some good can come of the tragedy which overtook the country on 12 January 2010 when its capital, Port-au-Prince, was shaken to its foundations by an earthquake that killed 230,000 people and left some 1.5 million people homeless, according to Haitian government figures. Can the impoverished nation 'build back better' in the years to come? Can it, in collaboration with the international humanitarian community, restore not just its physical infrastructure but also rejuvenate its urban governance and risk reduction capability?

In a country that has a slum prevalence rate of 70 per cent, there had been previous attempts to coordinate urban planning projects between the Haitian government and international aid agencies. But these efforts failed. According to the 2009 UN-Habitat report *Strategic Citywide Spatial Planning*, "Lack of coordination between the implementing agencies has been one major reason, but the lack of public participation, weak accountability and transparency, low staff capacity and the centralized system have contributed to the inertia."

That inertia hopefully evaporated with the 12 January cataclysm. The long-term question now is how the government and its international partners can implement a post-quake plan comprehensive enough to cover the needs of not just the affected population but the entire nation in the years to come. While short-term relief goals were met – including the provision of temporary shelter materials and food – the long-term shelter needs are complicated by unresolved issues concerning land ownership, urban density and debris clearance to allow families to return to the sites of their original homes.

Designed to hold 250,000 people, Port-au-Prince grew to become one of the most densely populated cities in Latin America. Its 2 million people consumed nearly all of Haiti's resources. A mass influx to the capital began in the early 1980s following the swine flu alert worldwide and the subsequent slaughter of more than 2,000 native 'Creole' pigs – the peasants' emergency cash-in-hand.

There they built homes with no regulatory oversight, creating new slum areas and further weakening a fragile environment. This unplanned growth hindered the immediate rescue efforts because there were no access roads between streets, just a patchwork of unmarked 'corridors'.

The capital's eight municipalities which, before the quake, shared responsibility for city management with numerous central government bodies, were even less sure of their roles and mandates after the quake.

"It was, in effect, the collapse of what was already a house of cards," said Charles Clermont, who leads the government-appointed commission charged with housing and relocation. "We didn't even have communication. On top of that, we had to figure out how to communicate with the international community. They have their own rules of the game and we had to figure out how to understand each other."

Much of the success of the reconstruction and recovery effort depends on involving and engaging the Haitian people themselves. Quake survivors pulled people from the rubble moments after it happened but they need to work together now and in the years ahead for the long-term good of their communities. Haiti is limping from emergency to temporary shelter to reconstruction, a process that could take several years before all the people affected by the quake are re-housed. Some say it will take five years; others say 25. ◾

further increases its price. This is why so much of the urban population in low- and middle-income nations lives on land that is illegally occupied or illegally subdivided (i.e., the land-use plan did not get official approval). High land prices also put pressure on local municipalities to open high-risk areas for construction. The second challenge is that housing is not only 'the home' but also the 'access to income' and 'access to services', and for those with limited incomes, the house's location in relation to where its occupants work and children can go to school is as important, or more important, than the quality of the house and the security of the tenure.

The pavement dwellers in Mumbai who construct tiny 'houses' on the pavement do so because their incomes are so low that they cannot afford the cost of commuting from the cheapest 'proper housing' they could afford. The problem is not unemployment as most are employed. They are also not 'recent migrants lacking knowledge of the city' as some have sought to portray them – most pavement dwellers have been in the city for many years. The problem is the gap between their incomes and the cost of housing in locations with good access to employment. This is compounded by their lack of access to credit and the lack of incremental housing options (housing that can be built or extended over time) that are affordable. The same is true in Dharavi, the informal city of some 600,000 inhabitants which originally formed on the outskirts of Mumbai but which, as the city grew, became a valuable inner-city location. Housing conditions in Dharavi are very poor but at the same time, it provides a very good location with regard to income-earning opportunities and cheap accommodation.

This point has great relevance for any post-disaster reconstruction because most of those whose homes are damaged or destroyed want to return to the same location due to the access it provides both to income-earning opportunities and services, and to their social networks with neighbours. To relocate those made homeless by a disaster to 'safe' places far from where they have income-earning opportunities simply compounds still further the disaster's impact and most will not stay there. It also has great relevance for any initiative to improve housing conditions because most households in an informal settlement are far better served by in-situ upgrading than by moving them to new housing in a new – almost always worse – location. In Haiti, as this report goes to press, there is much discussion of decentralizing urban development so the high-density informal settlements in and around Port-au-Prince are not rebuilt. But such a decentralization will only work if underpinned by a decentralization of livelihood and income-earning opportunities – which is unlikely to happen. Households need a choice: some may wish to leave owing to the risks and trauma to their families, while others prefer to remain in, or return to, the areas where they had previously made their homes. And it should not be only those with proof of land and housing ownership that get help for rebuilding.

A final complication for disaster response is that the very poor quality of so much housing prior to the disaster, including inadequate infrastructure and the fact that it

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was 'illegal', makes reconstruction very difficult. There is rarely a map of the settlement showing plots and plot boundaries. There is often little infrastructure to repair. The sites are frequently difficult or impossible to reach with trucks or any construction equipment as there are no paved roads and they are often built on challenging terrain (on swamps or hills). In most informal settlements, there is no register of who owns each plot and most of the population has no formal documentation. And there is the complication that many are tenants and their 'landlords' (who may also be occupying the land illegally) want to retain control of any reconstruction. If the informal settlement is on land that has become valuable, a further complication is that developers want to displace the population from it and governments often support them in evicting the residents.

External agencies also wish to obtain adequate accommodation for those whose homes have been damaged or destroyed – but they are rarely very good at dealing with all the complications mentioned above. And in most instances, they will face opposition from middle- and upper-income groups, government agencies, landlords and often developers regarding the solutions that work best to enable low-income groups to reconstruct their homes and settlements. We know the good principles on which housing reconstruction should be based – the greater the control of local residents, both individually and as a community, the more successful the support is likely to be. The International Federation of Red Cross and Red Crescent Societies has specified key principles: "It is increasingly recognized that the meeting of shelter needs in the aftermath of disaster should be seen as a process of 'sheltering' undertaken by the affected household with varying types of material, technical, financial and social assistance as appropriate rather than simply the provision of a pre-determined shelter 'product'." Even if governments understand this important principle, it does not mean they will allow it to be implemented on the ground. Governments may prefer to control the emergency shelter finance that is being made available but their record in housing provision is poor. Top-down housing provision tends to be expensive, often of inadequate quality, with insufficient flexibility to take on board community requirements, and in a disadvantageous location if resettlement is involved.

What you do after a disaster

To state the obvious, disaster response should centre on the needs and priorities of the survivors – and others who are negatively impacted. In low- and middle-income nations, very few home-owners will have insurance to help fund rebuilding or reconstruction and most people will have very limited savings or assets to tide them over until they can get back to paid work. So helping them to re-establish sources of income and livelihoods rapidly is a high priority. In most instances, a high proportion will want to return to their damaged or destroyed settlements and there re-establish their homes and their own organizations. They need to feel supported as they do so – supported to meet, to network, to give space for their community organizations, often

to share their grief and in their own time begin to participate in rebuilding. These responses have to strengthen and support the survivors' own organizations. They have to keep women at the centre of these associations, even though this is often difficult as priorities and actions are dominated by more aggressive and well-connected groups. This is not easy. People have been affected in many different ways and may have different priorities; they may see other affected groups as competitors in seeking funds or support from different external organizations. Good practice means involving local people right at the outset of any discussion of rebuilding and in managing the shift from relief to reconstruction.

The shift from immediate response to reconstruction in an urban environment is never easy. Rarely does this help those most affected with their two most pressing priorities: supporting the survivors to rebuild their homes and their livelihoods. After a disaster, the needs for medical treatment, healthcare, food and water, and often temporary accommodation are so obvious. But the disaster does not undo the often antagonistic relationships between local governments and the urban poor and their informal communities and livelihoods. Disaster relief agencies cannot address the root causes of why so much of a city's population was so heavily impacted – because they lived in illegal settlements with poor-quality homes on dangerous and disaster-prone sites to which the government had refused to provide infrastructure and services. Disaster relief agencies often fail to secure safer, well-located land sites for housing where those who lost their homes in informal settlements can build; such sites are too valuable and those in government and higher-income groups would not support this. All they can offer are sites far away that do not have good access to income-earning opportunities. So all the inequalities and difficulties that faced the urban poor prior to the disaster remain to constrain post-disaster responses. As the Asian Coalition for Housing Rights has noted, unless disaster aid quickly learns to work with the untitled, the unregistered, the unlisted and the undocumented, it can support and even reinforce the inequalities that existed prior to the disaster.

Strengthening and supporting local action for disaster risk reduction in urban areas

Good development, good disaster risk reduction and good adaptation to climate change are all intensely local with many links and complementarities between them. They need effective local institutions that are accountable to citizens including those living in informal settlements. It all amounts to a difficult challenge for the international agencies that fund development and will be difficult for those assigned the responsibilities of funding climate change adaptation. All such agencies are under pressure to keep down staff costs and to have exit strategies. All such funding agencies are only as effective as the local intermediaries that they fund. The strong emphasis of this year's *World Disasters Report* is on supporting community-level initiatives because in almost all low-income and most middle-income nations, this is the only way to ensure

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that the needs and priorities of those most at risk from disaster are addressed. But large development assistance agencies frequently do not know how to support community-level organizations – indeed, often they never talk to them; they were set up to channel large sums to national governments, not to support the myriad community and local government initiatives that can reduce disaster risk and that need modest external support.

Where city and municipal governments have sufficient capacity, focus on their low-income households and have good relations with their citizens, the possibilities for disaster risk reduction are greatly enhanced. These cities and municipalities provide us with the evidence that an urbanizing world need not 'urbanize' disaster risks. Most disaster risk reduction is within their conventional urban management roles – for instance, in land-use management, in strategic urban planning and in setting and enforcing regulations for land use, buildings and infrastructure. So it is the competence and capacity of city and municipal governments to work with and support their low-income populations that defines whether urbanization is associated with disaster risk.

It is down to the governments of high-income nations to agree to the greenhouse gas emission reductions that are needed to avoid 'dangerous climate change'; of course, this depends too on low-carbon development paths for successful low- and middle-income nations but their governments will not agree to these unless high-income nations demonstrate their commitments. And, again, it is down to the competence and capacity of city and municipal governments to work with and support their low-income populations that will define whether the climate change impacts that cannot be avoided do actually result in urban disasters.

This report has enough examples of good practice from low- and middle-income nations to show that urban disaster risk reduction is possible but these are still the exceptions. Good local land-use management supported by good local risk assessments can transform urban plans into disaster reduction plans as unsafe sites are avoided or made safe. Good upgrading programmes for informal settlements that are well informed in risk reduction measures can dramatically reduce disaster risk. A framework of support from higher levels of government and international agencies is required. Learning networks need to be nurtured for city authorities, urban professionals and citizen groups. Overall, this needs a sea-change in the preparedness and capacity of most bilateral aid agencies to work in urban areas with urban organizations and local authorities.
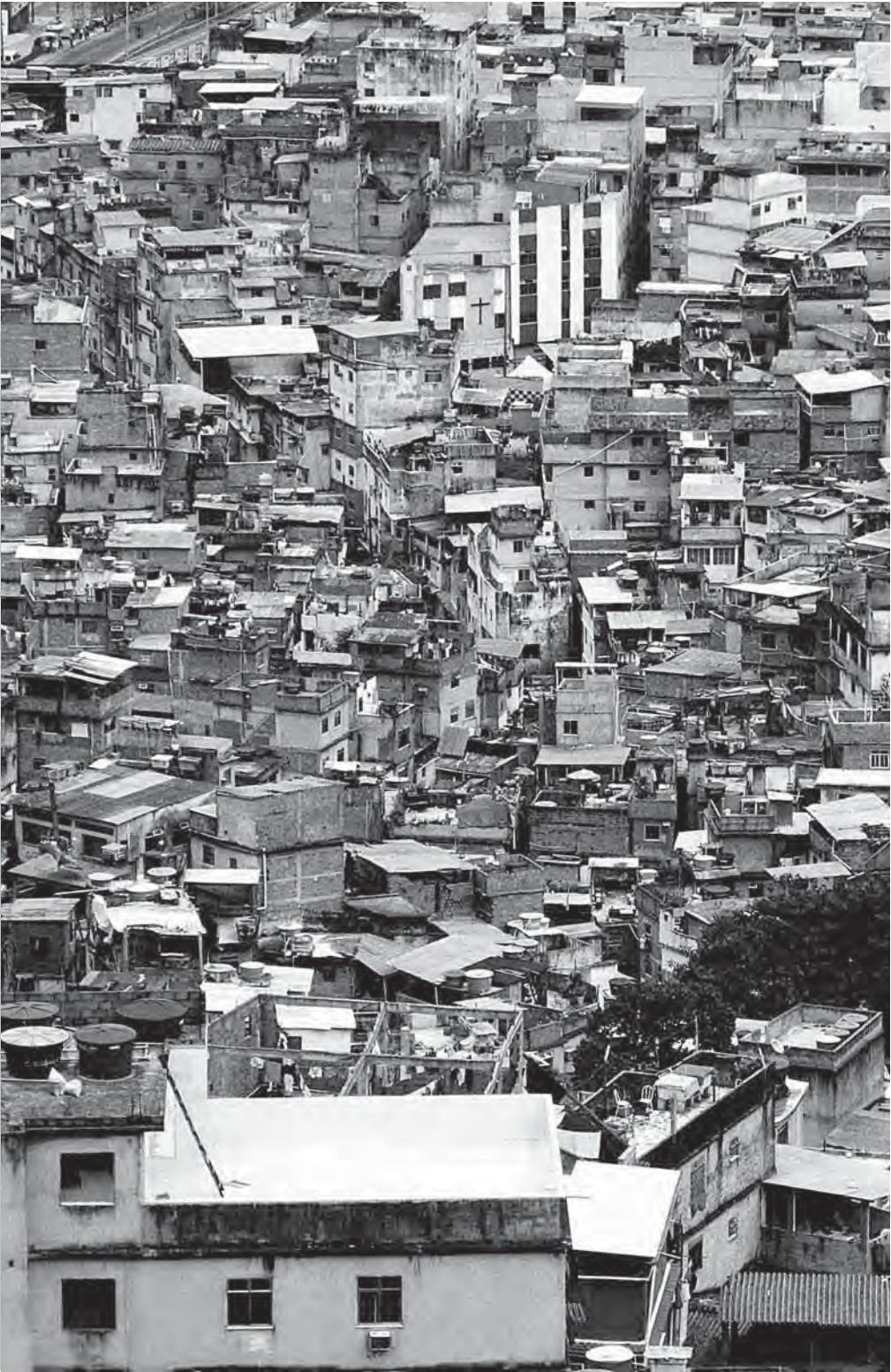
This chapter, including Box 1.1, was written by David Satterthwaite, Senior Fellow, International Institute for Environment and Development (IIED). Box 1.2 was written by Kathie Klarreich, a freelance journalist and Haiti specialist.

CHAPTER 1

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CHAPTER 1

Urban disaster trends

It is well known that more than half the world's population lives in urban areas. Perhaps less well known is that most of the world's urban population and most of its largest cities are now in low- and middle-income nations where an estimated 2.6 billion urban dwellers, out of an estimated 3.5 billion worldwide, live. This is unprecedented since, for millennia, most of the urban population and most of the largest cities have been in the wealthiest nations. With one in three of the world's total population now living in cities and towns in low- and middle-income nations, attention should focus on how well these cities and towns protect their inhabitants and enterprises from disasters. It should be borne in mind that even though the United Nations Human Settlements Programme (UN-Habitat) claimed earlier this year that 227 million people no longer meet the limited criteria for defining slum dwellers, it still acknowledged that their numbers had increased from 776.7 million in 2000 to 827.6 million in 2010, and these people are among the most vulnerable to a wide range of urban risks stemming from natural hazards, disease and inadequate support services in areas such as transport and health.

One of the key elements to reduce disaster risk is to better understand how urban areas are at risk and how these patterns of risk differ from rural areas. Part of this risk profile requires a detailed knowledge of past disaster-related events in the city in question, showing the spatial distribution of losses and damages. However, this information is available at the urban level in only a handful of cities. A part of the capability of governments and people to reduce risk and vulnerability is influenced by the availability of accurate information about the risks to their city and, at present, there is a great deficiency with regard to accurate monitoring and reporting of urban disaster trends.

Urban growth and its relation to disasters

Figure 2.1 shows the growth in the world's urban population from 1950 to 2010 and then what the United Nations (UN) projects for 2030. The projections suggest that, from 2010 to 2030, almost all the growth in the world's population will be in urban centres in low- and middle-income nations and that Asia will undergo massive urban growth. For many nations, the most recent data are from censuses held around 2000, as the results from the new round of censuses that took place in or around 2010 are not yet available. So some of the projections may prove to be too high if, for instance, urban populations grow more slowly due to rates of natural increase decreasing more rapidly than expected or if economic stagnation or decline reduces or stops rural-to-urban migration. But even if this happens, the scale of the change in less than a century is phenomenal:
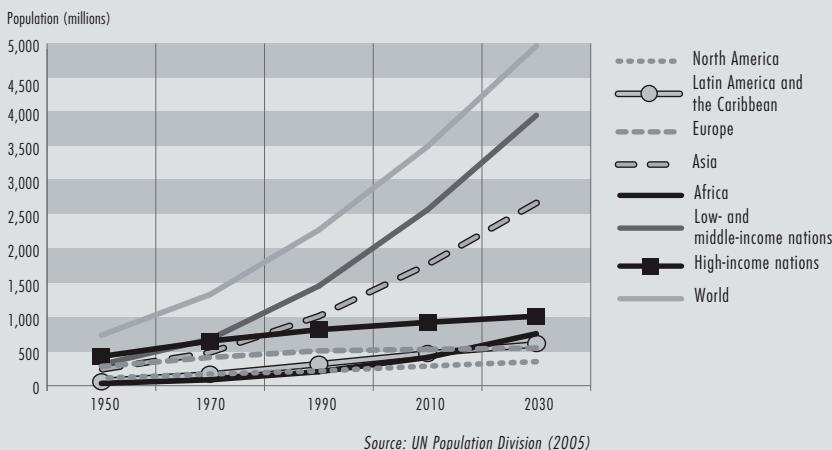
- A global urban population that grew from 737 million in 1950 to around 3.5 billion today and to an expected 5 billion by 2030.

Photo opposite page: Slum dwellers in the cities of low- and middle-income nations are among the most vulnerable to risks stemming from natural hazards, disease and inadequate support services. Rocinha, shown here, is the largest *favela*, or slum, in the Brazilian mega-city, Rio de Janeiro, and is home to an estimated 250,000 people.

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- A shift from most of the urban population being in high-income nations (1950) to most of the urban population being in low- and middle-income nations (2010 and beyond).
- Africa with 4 per cent of the world's urban population in 1950 and 15 per cent by 2030.
- Asia with 32 per cent of the world's urban population in 1950 and 55 per cent by 2030.

Figure 2.1
Growth in urban population globally
and by region

Source: UN Population Division (2005)
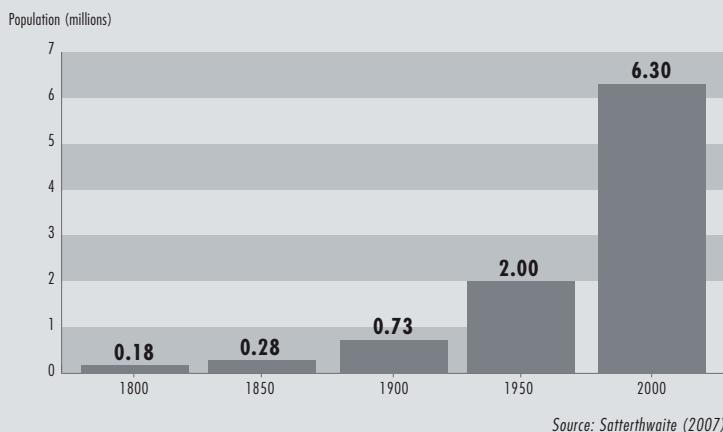
Two aspects of the rapid growth in the world's urban population are the increase in the number of large cities and the historically unprecedented size of the largest cities. Just two centuries ago, there were only two 'million-cities' (cities with 1 million or more inhabitants) – London and Beijing (then called Peking). By 1950, there were 75; by 2008, 431. A large and increasing proportion of these million-cities are in Africa, Asia and Latin America. The average size of the world's largest cities has also increased dramatically as Figure 2.2 illustrates. While there are examples of cities over the last two millennia that had populations of 1 million or more inhabitants, the city or metropolitan area with several million inhabitants is a recent phenomenon – London being the first to reach this size, in the second half of the 19th century. By 2000, there were 17 'mega-cities' with more than 10 million inhabitants.

However, the economic transformations that underpin these statistics on rapid urban change are just as impressive – the six-fold increase in the size of the world economy between 1950 and 2010 and the fact that most of this increase came from the growth in industrial production and services largely located in urban areas. There is a strong economic logic underpinning rapid urbanization (see Figure 2.3). Today, around 97per cent of the world's gross domestic product (GDP) is generated by industry and services,

about 65 per cent of the world's economically active population works in industry and services and a very high proportion of all industry and services are in urban areas. Most of the world's largest cities are in the world's largest economies.
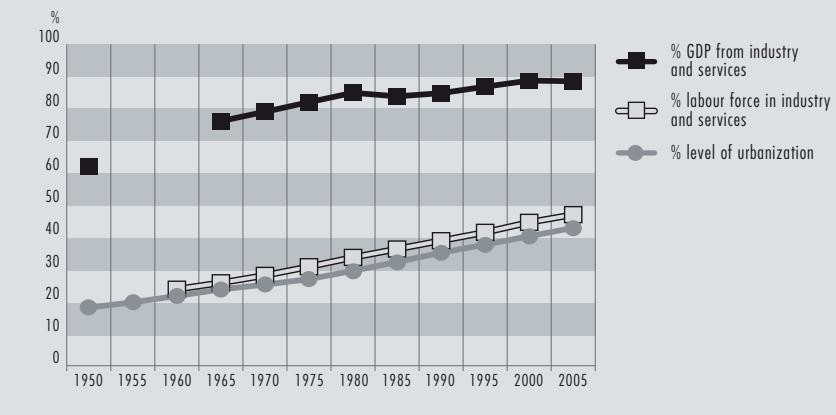
Figure 2.2
The change in the average population size of the world's 100 largest cities, 1800 to 2000

Population (millions)

Source: Satterthwaite (2007)

Figure 2.3
Changes in the proportion of GDP for low- and middle-income nations, 1950–2005

% GDP from industry and services
% labour force in industry and services
% level of urbanization

Source: Satterthwaite (2007)

There is a very large deficit in provision for the infrastructure and services that reduce disaster risk for much of the population in Latin America, Africa and Asia. But much of the reason for this is institutional failure and governance failure. Although rapid urban

growth is often seen as a problem, it is generally the nations with the best economic performance that have urbanized most in the last 50 years. All the world's wealthiest nations are predominantly urbanized; almost all the world's poorest nations are predominantly rural. In addition, there is often an association between rapid urban change and better standards of living. Not only is most urbanization associated with stronger economies but, generally, the more urbanized a nation, the higher the average life expectancy and the literacy rate, and the stronger the democracy, especially at local level. Of course, beyond all these quantitative measures, cities are also centres of culture and of social and political innovation. Mega-cities may appear chaotic but most have life expectancies and provision for piped water, sanitation, schools and healthcare that are well above their national average – even if the aggregate statistics for each mega-city can hide a significant proportion of their population living in very poor conditions. Some of world's fastest-growing cities over the last 50 years also have the best standards of living within their nation.

Looking over the trends of large-scale disasters of the last decade from the Centre for Research on the Epidemiology of Disasters (CRED) database (EM-DAT), it seems that regions of the world that are more urbanized tend to have fewer deaths from natural disasters, but higher economic losses. This is understandable, given that urban areas concentrate high-value assets and that well-governed cities, especially those in high-income countries, should enormously reduce deaths and serious injuries – even if it is often less easy to guard against economic losses. It is noteworthy that cyclones, floods and earthquakes produce massive economic costs in Europe and Japan but very few deaths. Both Europe and Japan are highly urbanized, Europe has 72 per cent of the population living in cities and Japan, 66 per cent. In 2007, 65 disasters reported in Europe accounted for 1 per cent of the deaths worldwide but 27 per cent of the economic damages. In 2007, Japan had the highest reported economic damages for one single earthquake event on 16 July, costing US$ 12.5 billion whereas nine people were reportedly killed. In Africa, northern Africa has 21 per cent of the continent's population and is the only highly urbanized region (51 per cent of its population lives in cities). In 2007, northern Africa had 12 per cent of the disasters that affected the continent, 6 per cent of affected persons, yet 45 per cent of economic damages for all of Africa. In the period from 2000 to 2006, northern Africa had 13 per cent of disasters, 1 per cent of affected persons, yet 75 cent of damages recorded for the continent as a whole.

Identifying 'urban' disasters and their impacts

Cities, with their concentration of people, buildings, infrastructure and economic activities, are the locus of both large and small-scale disasters. A look at the major disasters over the last ten years highlights that large-scale disasters, which affect a whole region, usually have an urban component to them (see Table 2.1). Some disasters could also be called 'urban' disasters, since the great majority of damages are concentrated in city centres. This is made evident by the recent earthquake in Port-au-Prince, Haiti and Hurricane Katrina in New Orleans, where urban areas sustained most of the losses and damages.

With the exception of the South Asian tsunami in 2004, many of the deaths and losses from earthquakes have been in cities. Of all large disasters, seismic events have killed the greatest number of people in recent years, averaging 50,184 people per year from 2000 to 2008. Flood events have affected the largest numbers of people, averaging

Table 2.1 Large disaster events over the period 2000–2010 impacting on cities

Popular name	Main countries affected	Date of event	Type of hazard	Main cities affected	Total number of deaths	Total number of affected	Total damages US$
Haiti earthquake	Haiti	12 January 2010	Earthquake	Port-au-Prince	222,570	3,400,000	n/a
Sichuan earthquake	China	12 May 2008	Earthquake	Beichuan, Dujiangyan, Shifang, Mianzhu, Juyuan, Jiangyou, Mianyang, Chengdu, Qionglai, Deyang	87,476	45,976,596	85 billion
Cyclone Nargis	Myanmar	2 May 2008	Tropical cyclone	Yangon	138,366	2,420,000	4 billion
Java earthquake	Indonesia	27 May 2006	Earthquake	Yogyakarta	5,778	3,177,923	3.1 billion
Kashmir earthquake	Pakistan	8 October 2005	Earthquake	Muzaffarabad	73,338	5,128,000	5.2 billion
Hurricane Katrina	United States	29 August 2005	Tropical cyclone	New Orleans	1,833	500,000	125 billion
Mumbai floods	India	26 July 2005	Flood	Mumbai	1,200	20,000,055	3.3 billion
South Asian tsunami	Indonesia, Sri Lanka, India, Thailand, Malaysia, Maldives, Myanmar	26 December 2004	Earthquake and tsunami	Banda Aceh, Chennai (some damages)	226,408	2,321,700	9.2 billion
Bam earthquake	Iran	26 December 2003	Earthquake	Bam	26,796	267,628	500 million
European heatwave	Italy, France, Spain, Germany, Portugal, Switzerland	Summer 2003	Extreme heat	Various	72,210	Not reported	Not reported
Dresden floods	Germany	11 August 2002	Flood	Dresden	27	330,108	11.6 billion
Gujurat earthquake	India	26 January 2001	Earthquake	Bhuj, Ahmedabad	20,005	6,321,812	2.6 billion

Source: EM-DAT: The OFDA/CRED International Disaster Database (www.emdat.net), Université catholique de Louvain – Brussels – Belgium. Complied by author.

99 million people per year between 2000 and 2008. While we do not know how many people affected by floods live in urban areas, we can understand that it must be a significant proportion.

While it is possible to identify certain disasters as urban disasters, it becomes more complicated to assess what proportion of the total losses of a disaster are in urban areas and what proportion are outside the urban areas. At the global or regional scale, we have little sense of what proportion of deaths and injuries are within urban centres. For instance, Cyclone Nargis caused an estimated 140,000 deaths in Myanmar and had serious impacts in urban centres including Yangon, but we have little idea of what proportion of these impacts were in urban areas.

Precise information about impacts in urban areas for a disaster that affected a region is not widely reported, yet it is important in order to understand who, and what, has been affected. Consider, for example, the 1988 floods in Bangladesh, which inundated 52 per cent of the country. This flood also impacted Dhaka, the nation's capital, which then had about 6 million residents. Flood waters covered 85 per cent of the city for several weeks. For two weeks Dhaka was completely cut off, with depths of inundation ranging from 0.3 to more than 4.5 metres. Across the country, 45 million people, of a total population of 110 million, were affected by the floods. It is estimated that between 2.2 and 4 million of the affected were in Dhaka, or some 30 to 60 per cent of the city's population. The total death toll is reported to have been around 2,379 deaths for all the affected regions with 150 deaths in Dhaka. Ten years later, in 1998, floods again affected Dhaka, covering large portions of the city for a two-month period. An estimated 918 people died in the 1998 floods, but the number of deaths, if any, that occurred in the capital was not reported. We do know that 30 per cent of housing in the Dhaka metropolitan area sustained damage, and that almost 32 per cent of damages were to houses of the very poor, while 36 per cent of houses belonging to lower-middle class and poor people were damaged. In one sense, distinguishing between rural and urban deaths and injuries might be considered inappropriate in that disaster risk reduction should seek to prevent them all. But this lack of a more spatially precise idea of where deaths and injuries occur also hinders an understanding of where and how risk reduction should take place.

Cities are affected by a wide range of disaster events, which extend beyond our conception of 'natural' hazards. In *African Cities of Hope and Risk,* Ben Wisner and Mark Pelling used the data available from CRED to identify 166 urban disasters affecting 28 African cities between 1997 and 2008. They identified natural hazards such as urban drought, earthquakes, windstorms, floods and extreme temperatures. Floods are most represented in the data, accounting for one-third of the total 3.3 million people affected by urban disasters in Africa. However, disasters in cities are also largely technological hazards. A review of urban disasters shows the wide range of disasters that occur in African cities, such as aircraft crashes, fires and explosions, ferry-boat sinkings, subsidence and sink holes, illegal dumping of hazardous materials, shack

fires and traffic accidents. Building collapses, documented from a media review, show that in a two-year period (from 2006 to 2008), nine building collapses killed at least 100 people. Cities are also the locus of social hazards such as violent crime, riots and terrorism, as well as public health hazards such as HIV/AIDS, which has a higher incidence in cities. Epidemics are a major disaster affecting people in African cities, and it was found that 300,000 people were affected by urban epidemics over the period, linked to poor water quality, inadequate sanitation and flooding.

Food insecurity is another type of disaster event that is now recognized as seriously affecting urban dwellers. Urban food insecurity may be a cumulative effect caused by other disaster events (see Box 2.1 on food security and Tropical Storm Ketsana) or it may be caused by international economic conditions, such as the rise in food and fuel prices that peaked in mid-2008. Large-scale disasters, especially flooding and droughts, may reduce food availability in cities, however urban food insecurity is, for the most part, considered to be a food access problem, rather than a food availability problem. Generally food is available in cities, but the poor cannot afford to buy it, either because prices are too high or their incomes have decreased due to lack of work. UN-Habitat's data on malnutrition in urban areas collected between 1990 and 2007 show that serious malnutrition has been widespread in urban slums of Africa, Asia, Latin America and the Caribbean. In 2007, in the Democratic Republic of the Congo, 41 per cent of children from poor urban areas

More than 56 per cent of the population of the Philippines, including inhabitants of the capital, Manila, live on the island of Luzon. In September 2009, Tropical Storm Ketsana brought torrential rain to the area, causing the worst floods in more than 40 years.

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were malnourished, compared with 16 per cent in non-slum urban areas. Since income in urban areas is strongly tied to the opportunity for work, disasters can quickly impact on a family's wages and purchasing power for food. Furthermore, since people in cities spend a disproportionate amount of their income on other expenses, such as rent, utilities, transport and education, this leaves an insufficient budget for food. Research in Bangladesh during the recent commodities crisis shows that in March 2007, daily labourers in urban areas were able to purchase 5 to 7 kilograms of rice for one day of work, yet one year later, the same day's work purchased only 3.7 to 5 kg of rice, the main staple food.

Box 2.1 Tropical Storm Ketsana and urban food insecurity

Tropical Storm Ketsana struck the Philippines on 26 September 2009 with torrential rains, the heaviest in more than 40 years, causing severe flooding and massive population displacement in urban areas, but also in the surrounding countryside. The joint UN rapid needs assessment indicated that Luzon, a highly populated island in the north of the country, inhabited by 56 per cent of the total population of the Philippines, had been the hardest hit. More than 2.2 million people were reported directly affected by the typhoon and approximately 736,000 people were displaced (390,000 staying in 561 evacuation centres and 346,581 with host families). Most households lost their assets and livelihoods. Estimates indicate that more than 36,728 hectares of rice fields and 541 hectares of plantations of high-value commercial crops in central Luzon were damaged by the heavy rains and flooding caused by the storm. Tropical Storm Ketsana destroyed about US$ 33 million worth of roads and bridges, with Metro Manila and central Luzon the worst hit, leading to major disruption of food supplies and spikes in food prices. ■

Four visions of urban risk

The definition of what constitutes a disaster, and whether small and everyday disaster events are included, is important in portraying an accurate vision of risk in cities. More problematic is trying to compare disaster risk across cities and across urban areas in different countries. For this, information is most readily available for large cities, and in fact large cities and mega-cities have been the subject of several efforts to understand global urban risk. The DesInventar database, which now includes several countries, offers some detailed information that can contribute to a better understanding of risk at the urban district level, but the approach needs to be more widely adopted in order to provide a more sophisticated understanding of risk across cities.
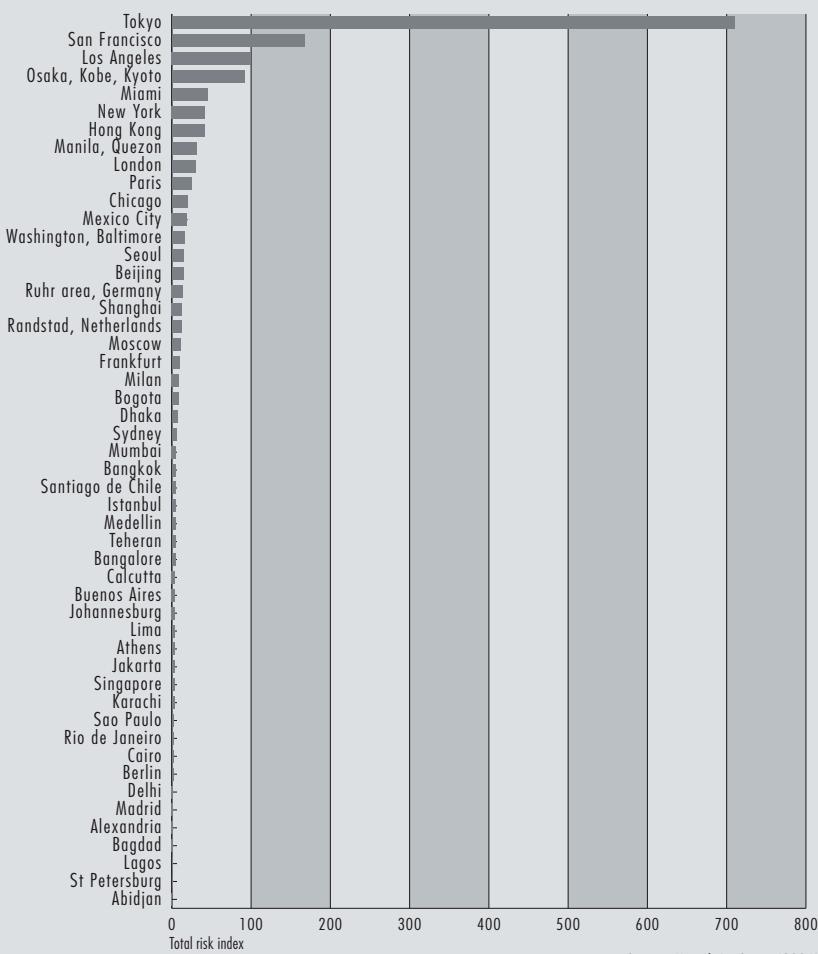
Vision one: Asset exposure to multi-hazards in large cities

Munich Re Group's NatCat database was used to prepare a natural hazard risk index for 50 of the world's largest (over 2 million population) and most economically important cities (city GDP as a percentage of a country's GDP). The index analysed 30

large cities in low- and middle-income nations and 20 large cities in high-income nations (see Figure 2.4). This index, which was intended as the basis for discussion, was the first international index for cities to take a multi-hazard perspective including earthquakes, windstorms, floods, volcanic eruption, bush fires and winter damage. It is composed of three variables: exposure to hazards; vulnerability of the built environment; and value of exposed property. Vulnerability is based on an estimation of the vulnerability of the predominant form of residential construction to hazards, the standard of preparedness and safeguards including building regulations, urban planning in respect of specific hazards and flood protection, as well as building density. The values of exposed property are estimated using the average values per household and the GDP for commerce and industry.

Figure 2.4
Hazard risk index for large cities, as defined by Munich Re Group

Source: Munich Re Group (2004)

The index is most heavily influenced first of all by values of exposed assets and their degree of vulnerability. Figure 2.4 shows that Tokyo is, by far, the city at highest risk, followed by San Francisco. Of the 20 highest-risk cities in the index, 17 are in high-income countries. This makes sense given that the index is trying to gauge the risk for insurers and thus the value of exposed assets, which is greater in high-income countries and is an important factor in understanding the potential for economic losses in a disaster.

The index shows that for large disasters, the economic costs are often much higher in high-income nations and much of this will be in urban areas, but this is not an indicator of how many people faced serious economic losses and did not have insurance. The index does not at all convey the reality that very large numbers of low-income urban dwellers can lose their homes and most or all their assets from disasters; the total monetary value of this is small but the hardships on individuals and families are immense.

Vision two: Flood exposure in port cities
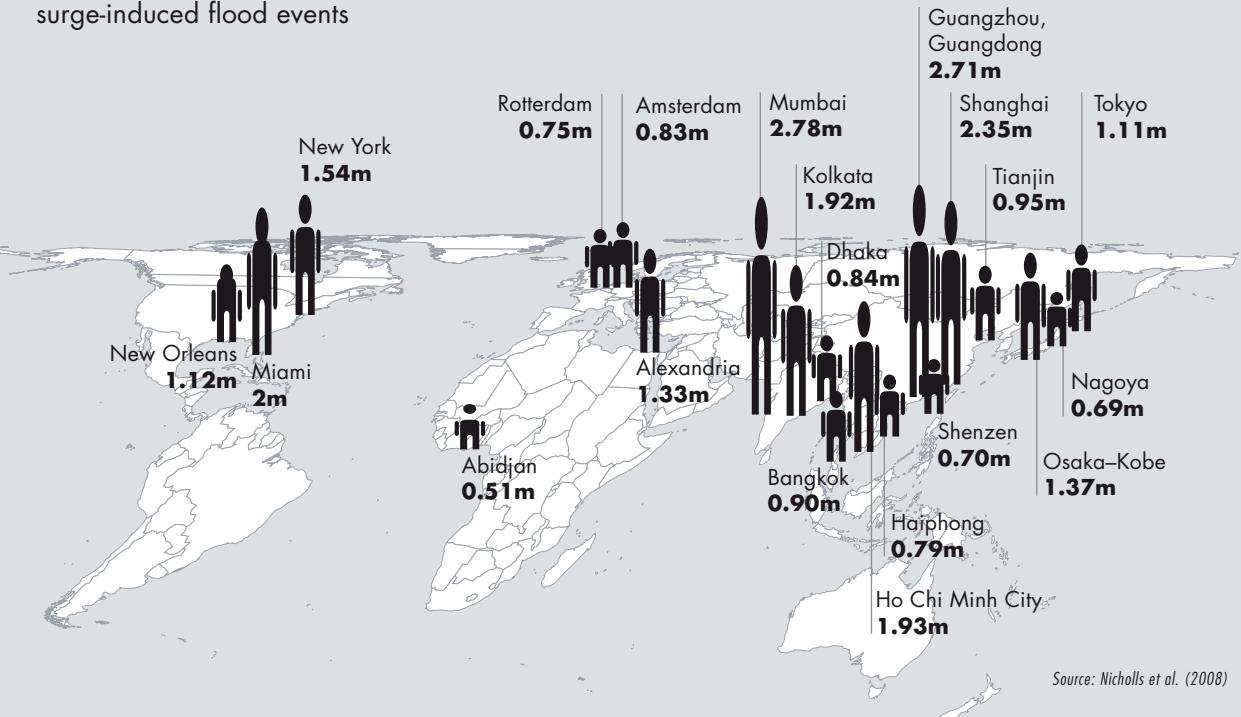
An index published by the Organisation for Economic Co-operation and Development ranks 136 port cities of over 1 million population with high exposure to one-in-100-year, surge-induced flood events. It looks at the exposure of population and assets, in 2005 and those predicted in 2070. Future predictions account for population growth, urbanization, ground subsidence and climatic changes.

Population growth and investment in urban infrastructure are the most important drivers for increase in exposure to surge-induced floods. This is especially true in developing regions, which are expected to have large growth. Overall, without any increase in water levels, asset exposure could grow eight-fold. Climate changes, as predicted by the *Fourth Assessment Report* of the Intergovernmental Panel on Climate Change, including increased storm intensity and sea-level rise, also influence increased exposure. The influence of human-induced subsidence due to shallow groundwater extraction is especially important in deltaic cities that are rapidly developing.

The index overwhelmingly shows that cities in Asia have the highest exposure to surge-induced flooding now and in the future. Of the 20 cities with the highest population exposure in 2005, half are in low- and middle-income nations in Asia. In real numbers, out of the total 38.5 million people currently exposed, 65 per cent of them live in Asian cities. Figure 2.5 shows the top 20 world port cities with exposed populations in 2005. In the 2070s, the index predicts that 17 out of the 20 cities with the highest population exposure will be in present-day low- and middle-income countries and 14 out of 20 of the cities will be in Asia (four in China and two in Bangladesh). Asia's increasing dominance in terms of population and asset exposure is a result of increased urbanization and economic growth during the period, compared with other regions.

Figure 2.5

Port cities with highest exposed population in 2005 to one-in-100-year, surge-induced flood events

Guangzhou, Guangdong **2.71m**

Rotterdam **0.75m** Amsterdam **0.83m** Mumbai **2.78m** Shanghai **2.35m** Tokyo **1.11m**

New York **1.54m** Kolkata **1.92m** Tianjin **0.95m**

Dhaka **0.84m**

New Orleans **1.12m** Miami **2m** Alexandria **1.33m** Nagoya **0.69m**

Abidjan **0.51m** Shenzen **0.70m** Osaka–Kobe **1.37m**

Bangkok **0.90m**

Haiphong **0.79m**

Ho Chi Minh City **1.93m**

Source: Nicholls et al. (2008)

As a result of projected growth and climatic change over the period, many smaller cities will also experience very rapid increases in population exposure, for example, Mogadishu in Somalia and Conakry in Guinea are expected to see population exposure increased by 12-fold (see Table 2.2). Of the 15 cities that will see the highest population exposure increase, six of them are in sub-Saharan Africa and eight are in Asia. One needs to view these findings with caution, however, because the projections for urban growth over the period may be totally distorted. Some countries, especially those in sub-Saharan Africa, may not have had a census for over 20 years. For example, Mogadishu is within a failed state, yet the index envisages it growing hugely.

Nonetheless, while absolute exposure is low in some of these cities, a rapid increase in exposure to flooding can lead to increases in small-scale disasters. The potential for losses at the household level in these cities is especially acute in the fast-growing and low-lying informal settlements lacking adequate flood protection and drainage infrastructure.

Furthermore, Dhaka, Chittagong and Khulna in Bangladesh, Yangon in Myanmar and Ningbo in China are all expected to experience high absolute exposure, meaning that these cities will also be at risk for large-scale flooding disasters, which could impact on large portions of the city, damaging infrastructure and economic activities.

Table 2.2 Port cities with population over 1 million estimated to have highest increased population exposure to surge-induced floods, 2005 to projected 2070

City	Country	Population 2005 (000s)	Population exposed 2005 (000s)	Population exposed 2070 (000s)	Increase
Quingdao	China	2,817	88	1,851	2,103%
Luanda	Angola	2,766	1	18	1,800%
Dhaka	Bangaldesh	12,430	844	11,135	1,319%
Mogadishu	Somalia	1,320	9	115	1,278%
Conakry	Guinea	1,425	41	496	1,210%
Chittagong	Bangladesh	4,114	255	2,866	1,124%
Ningbo	China	1,810	299	3,305	1,105%
Dar-es-Salaam	Tanzania	2,676	36	351	975%
Yangon	Myanmar	4,107	510	4,965	974%
Karachi	Pakistan	11,608	49	473	965%
Douala	Cameroon	1,761	11	101	918%
Lagos	Nigeria	10,886	357	3,229	904%
Kulna	Bangladesh	1,495	441	3,641	826%
N'ampo	Republic of Korea	1,102	22	181	823%
Port-au-Prince	Haiti	2,129	1	8	800%

Source: Nicholls et al. (2008)
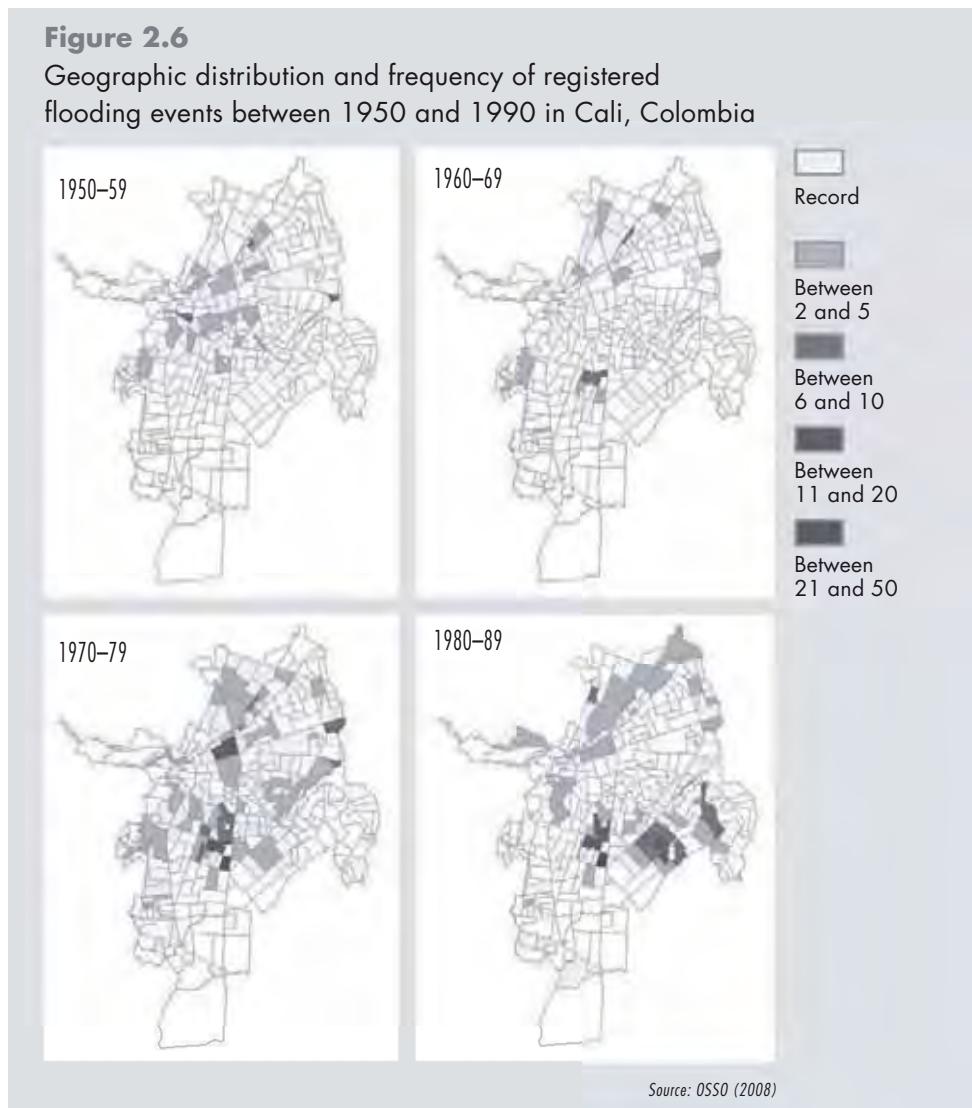
Vision three: City-level data for multi-hazards

The DesInventar database offers a finer scale of data, with greater information at the local level, portraying a more detailed reality of risk facing cities and urban dwellers including small-scale events and everyday hazards.

Using the city-level database from Cali, Colombia and plotting the events geographically, it is possible to see how the location of flooding events changes over time (see Figure 2.6). The details from Cali (analysed by Colombia's Seismic Observatory of the South-West or OSSO) show how the pattern of flooding events is related to informal urban expansion in low-lying areas along the rivers, and to subsequent improvements in infrastructure over time. In Cali, risk patterns for small flood events expand concentrically from the centre of the city outwards to the periphery following the expansion of informal settlements. Additionally, small pockets of risk may be found in central areas ignored by formal urbanization, such as riverbanks and steep slopes.

Case studies of cities in Argentina, Costa Rica and Mexico also support the findings from Cali, showing how extensive risk is generated through urban expansion and closely linked to increased run-off from new urban development, chronic underinvestment in city-wide storm and surface drainage, location of informal settlements in flood-prone areas and inadequate water management for wider watersheds. It is likely that urban

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expansion is driving risk in many Asian and African cities, too – and quite possibly even more strongly than in the above examples from Latin America, since a much lower proportion of the population in Asian and African cities have infrastructure and services.

Figure 2.6
Geographic distribution and frequency of registered
flooding events between 1950 and 1990 in Cali, Colombia

1950–59

1960–69

1970–79

1980–89

Record

Between
2 and 5

Between
6 and 10

Between
11 and 20

Between
21 and 50

Source: OSSO (2008)

Vision four: Settlement-scale data for fire disasters

Another vision of urban risk is offered by the Monitoring, Mapping and Analysis of Disaster Incidents in South Africa (MANDISA) database, which has records for 18,504 fire events in Cape Town, South Africa from January 1995 to the end of 2004. The database, unique to Cape Town, provides an extremely detailed picture of fire risk, and shows us the massive extent of small-scale disaster events that are usually not part

of urban risk calculations, yet have a devastating effect on households affected by the fire. It also offers an unprecedented opportunity for a better understanding of a city's risk profile and is an extremely useful resource for defining priorities for risk reduction.

Most of the fire incidents in the database are localized small and medium events, with over half destroying ten houses or less. Nonetheless, it is estimated that the fires affected 40,000 people in informal settlements over the period in 8,554 events. The cost of these small events is also considerable, not only for the households which lose their house and belongings in the fires, but also for the emergency and social services of Cape Town. For example, in Joe Slovo, an informal settlement of Cape Town, it was estimated that the fires in 2000 cost 702,989 South African rand (worth US$ 91,000 in February 2010). Two-thirds of these losses represented direct losses to the households and the rest were borne by fire services, social services and the South African Red Cross Society.

Historically, devastating fires were common in cities – fires destroyed much of London in 1666, Chicago in 1871 and Thessaloniki in 1917, for example – but large fires in residential areas are no longer commonplace in cities in high-income nations. Fires figure prominently among the disasters that take place in informal settlements – although most may not get recorded, in part because there is no emergency fire service or, if there is one, it will not serve informal settlements or cannot access them. The reasons for fires are obvious: the use of candles and kerosene lamps for lighting (due to a lack of electricity); the use of wood-, charcoal- or paraffin-fuelled cookers; overcrowded houses made of flammable materials; the high density of population within settlements; the lack of firebreaks; and, frequently, the lack of piped water supplies to help fight fires. It was found that fire incidents in Cape Town peak over the summer and holiday months of November, December and January due to hot, dry and windy summer conditions coupled with holiday season activity such as increased alcohol consumption and people travelling away from home. Fires also peak again in the winter month of August due to people bringing stoves inside to warm their houses. Box 2.2 gives the example of a fire disaster in an informal settlement in Hout Bay (close to Cape Town) and explains why serious fire disasters are commonplace in many informal settlements.

Box 2.2 Fires and fire risks in Imizamo Yethu, Hout Bay, South Africa

A fire in February 2004 in Imizamo Yethu, an informal settlement in Hout Bay, destroyed 1,200 homes and left some 5,000 people homeless. The settlement was created in 1990 when forestry land was converted into an 18-hectare site for 429 housing plots with services. Imizamo Yethu means 'through our collective struggle'. It is a mix of brick houses and shacks. It has piped water, mostly through public taps – but the supply is irregular and at the time of this fire, there had been no water in the piped system for the previous 24 hours. The fire brigade was called but only half an hour after the fire started (many people did not

know the phone number) and the fire engines could not access some areas because there were no roads or because people had put their possessions in the road.

The settlement has had other serious fires – for instance, before the February 2004 fires, there had been fires which destroyed between 40 and 90 buildings in 1995, 1997, 2001 and 2003. In 2008, about 23 houses were burnt down in February, 60 in August, 200 in late November and 200 in early December.

The initial causes of these fires are often not clear but the widespread use of candles for lighting and open fires or dangerous paraffin stoves for cooking and heating is clearly part of the reason. The close physical proximity of buildings and the many that are made of flammable materials help explain why fires spread from house to house – although many of the more severe fires here and in other informal settlements in Cape Town are also associated with high winds. ■

The vulnerability gap: How trends in disasters fit within a broader picture of risk and vulnerability

One thing these different visions of urban risk have in common is that risk we are experiencing in cities both today and in the future are produced over time, through the economic processes of urban development and various decisions taken at different times by the authorities and the citizens. What we see as risk in cities, such as growth in informal or illegal settlements, inadequate infrastructure or services, building on sites at risk from high winds, floods or landslides, or building with flammable materials, is actually caused by a 'vulnerability gap'. On one side of the gap is the lack of knowledge or financial capacity and sometimes willingness of urban authorities to reduce vulnerabilities. Priorities in cities for economic growth, urban expansion and the fact that the well-off in cities may not be overly vulnerable to disasters thwart efforts to reduce risk. On the other side of the vulnerability gap are the poor urban communities, who do what they can to reduce their vulnerability, but ultimately are limited in their financial and political capability to reduce the risk they face.

Box 2.3 shows how in Istanbul, Turkey this vulnerability gap has emerged over time to produce a city highly vulnerable to earthquakes and flood hazards. As in Istanbul, this vulnerability gap in cities can eventually be narrowed as governments understand better the risks and develop the capability to take actions to reduce vulnerability in ways that are accountable to everyone in the city.

Box 2.3 The vulnerability gap in Istanbul, Turkey

Istanbul, the largest city and centre of production in Turkey, is highly vulnerable to earthquakes, landslides and flood hazards. This

vulnerability is partly a factor of Istanbul's location, lying just north of the seismically active Anatolian fault line, but it is the precarious and

fast-growing urban environment created over recent years due to the absence of strategic planning and informal development that has resulted in elevated risk. In 1950, Istanbul had a population of 1.16 million; today it is home to 12.5 million people and produces one-quarter of the country's GDP. Since the 1999 Izmit earthquake, which killed more than 17,000 people and impacted partly on the eastern edges of Istanbul, the city has been well aware that another devastating earthquake will happen and the next time possibly with even greater impact and closer to Istanbul.

In addition to earthquakes, flooding is also becoming a problem. Throughout the city, industries, residences and even major transport arteries are located on riverbeds and riverbanks. Small-scale flood events are a regular occurrence, and local news channels periodically report that one or two people have died in flash floods. In September 2009, the heaviest rainfall recorded in Istanbul in 80 years caused flash flooding leading to the deaths of at least 40 people and to US$ 550 million in damages. The bodies of seven women were discovered in Bagcilar, a working-class suburb. They had drowned in a minibus that was taking them to jobs at a textile factory.

The vulnerability of Istanbul to multiple hazards today, in 2010, is a result of decisions and actions about urban development made over the last 60 years. Looking at the example of housing production in Istanbul shows us how a vulnerability gap is produced over time.

Starting from the first waves of immigration into Istanbul in the 1940s and continuing through the 1980s, housing was produced through informal building, called *gecekondu* (meaning 'built overnight'). Different versions of amnesty laws throughout the years (1949, 1953, 1963, 1966, 1976, 1983) effectively gave many occupiers the 'right to use' of the land, and municipalities provided services to these areas and undertook upgrading of public infrastructure. In 1984, a law was passed that allowed the building of *gecekondu* areas up to four storeys, which dramatically transformed the landscape of the city from single-storey garden plots built by families themselves to multi-storey apartment buildings built by small-scale developers. Today, it is estimated that 70 per cent of the housing stock is either illegal or legalized and much housing has been built with no supervision for earthquake building codes. If a 7.5 magnitude earthquake (similar to the one in 1999) were to occur, it is estimated that of approximately 800,000 buildings in Istanbul, 25 per cent would have moderate damage, 10 per cent would have extensive damage and 5 per cent could be expected to collapse completely.

In the past ten years, since the great earthquake of 1999, the government has undertaken several initiatives to try and reduce the earthquake risk in Istanbul, including urban master plans for earthquake risk reduction, legislative changes regarding building supervision, mandatory earthquake insurance and mandates for municipalities to undertake urban regeneration projects to replace vulnerable buildings. Thus, on one side of the vulnerability gap, the political will and the expertise for risk reduction are now present in Istanbul, yet the capacity for implementation is still lacking as these government initiatives have had little impact on the ground thus far.

The other side of the gap – people's ability to reduce risk – is limited by many factors, including their perception of risk, their knowledge of earthquake-safe building techniques, complicated ownership structures and financial constraints. For example, to make existing buildings safer, authorities have proposed retrofitting to meet earthquake safety standards.

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However, the incentive for owners to retrofit is very low for an earthquake that may or may not happen over the next 50 years. The cost for retrofitting is high and amounts to little financial return in terms of increased property value or rental value; furthermore, multiple owners must agree and the building must be vacated for several months.

The Greater Municipality of Istanbul has also started to earmark *gecekondu* areas for rehabilitation, under the Greater Municipalities Law (Law No. 5216, 2004), which gives authority for the "vacating and demolishing of dangerous buildings and all other 'non-conforming' structures". This has led to forced evictions and massive threats of eviction across the city, where *gecekondu* areas will be bulldozed and rebuilt by the Mass Housing Adminstration, leading to the likely displacement of poor urban dwellers. While relocation into new earthquake-safe areas is planned, the new houses – even though subsidized – are too far away from jobs for most people to afford, so people are left homeless. Thus rehabilitation may physically reduce the vulnerability of the built environment of the city, yet it is dramatically increasing people's level of poverty and exclusion. ∎

Conclusion

Urban vulnerability is generated differently at the scales of the individual, household, community and city. City-scale investments, for example, in flood drainage may succeed in protecting core functions but can also generate vulnerability for the poor. In Delhi, a lack of foresight has led to the construction of storm drains during a housing crisis and, not surprisingly, the colonization of drains by landless informal settlers. The drains now generate flood risk among the poor while helping protect the wider city from flooding. Identifying and reducing vulnerability is no easy task in an era of rapid urbanization.

Historically, the focus at city level has always been on physical over social infrastructure. This is beginning to change as city authorities recognize the importance of social safety nets (including support for the elderly and homeless), access to good-quality health and education, and implementation of building standards.

The commoditization of urban life means that, in contrast to more rural contexts, money is required to meet even the most basic of needs – water, food and shelter. This restricts the ability of the vulnerable poor to accumulate assets and to protect themselves from hazard. It also makes it difficult to recover from disaster, magnifying impact where the loss of accumulated assets, such as a dwelling, can set back household development irretrievably.

However, looking at the trends for the future, we see that increasing urbanization also brings the potential to reduce the losses from disasters in the long term even though it may increase disaster losses in the short term. Rapid urbanization, of the kind that is happening in parts of Asia and Africa, will, in the short run, most likely increase losses

from disasters. This is partly because urbanization is happening at such a fast rate that governments are not able to keep pace in managing disaster risk. Floods, earthquakes and the impacts of climate change are likely to cause more deaths and damages in rapidly growing cities with high exposure to natural and public health hazards. Industrial growth will bring with it more technological hazards. However, once urban areas become more consolidated, and likely more wealthy, it will be possible for governments to implement risk reduction measures to protect people. This is assuming that governments will want to act in good faith and in a way that is accountable to all urban residents, wealthy and poor.

The availability of information on urban disasters is still quite poor. At present, it is not possible to understand the number of urban disasters, the extent of disaster impacts on urban areas or how trends in urban disasters differentiate between global regions. The problem of climate change and how it will affect cities shows some promise for better regional data on urban risk. However, the profile of hazards that are studied under climate change are limited and do not include the full range that would encompass a disaster's perspective.

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The focus on assets, especially higher-level indicators like economic or insured losses, as a major factor in determining disaster risk is providing a deceptive view of how disasters are actually impacting on people, especially poor households in cities. If we are to look at risk at the household level and affecting the urban poor, the types of events that would seriously impact on people's lives and their ability to recover such as assets lost, days of work and school missed, increased expenditure on food and prevalence of sickness, we would get a different risk picture with poor urban dwellers at highest risk.

More detailed understanding of urban risks is needed at two levels. First of all, at the scale of the individual city, where more data are needed such as that provided by the MANDISA database. Second, a disaggregated view of risk should also be pursued at the urban district level as per the DesInventar model, to improve analysis of small, everyday disasters in order to better understand more subtle but important variations in risk which, in turn, will enable more appropriate disaster risk reduction measures to be put in place around often 'unseen' or unrecorded events. This can be invaluable for urban programming and provide a full perspective on the extent of hazards faced by the urban poor or those living in informal settlements. Third, more precise reporting is needed at the national and international levels to understand how large-scale disasters impact on urban areas. For example, more precise information in the CRED database about the location of the event, including which urban areas the event impacted.
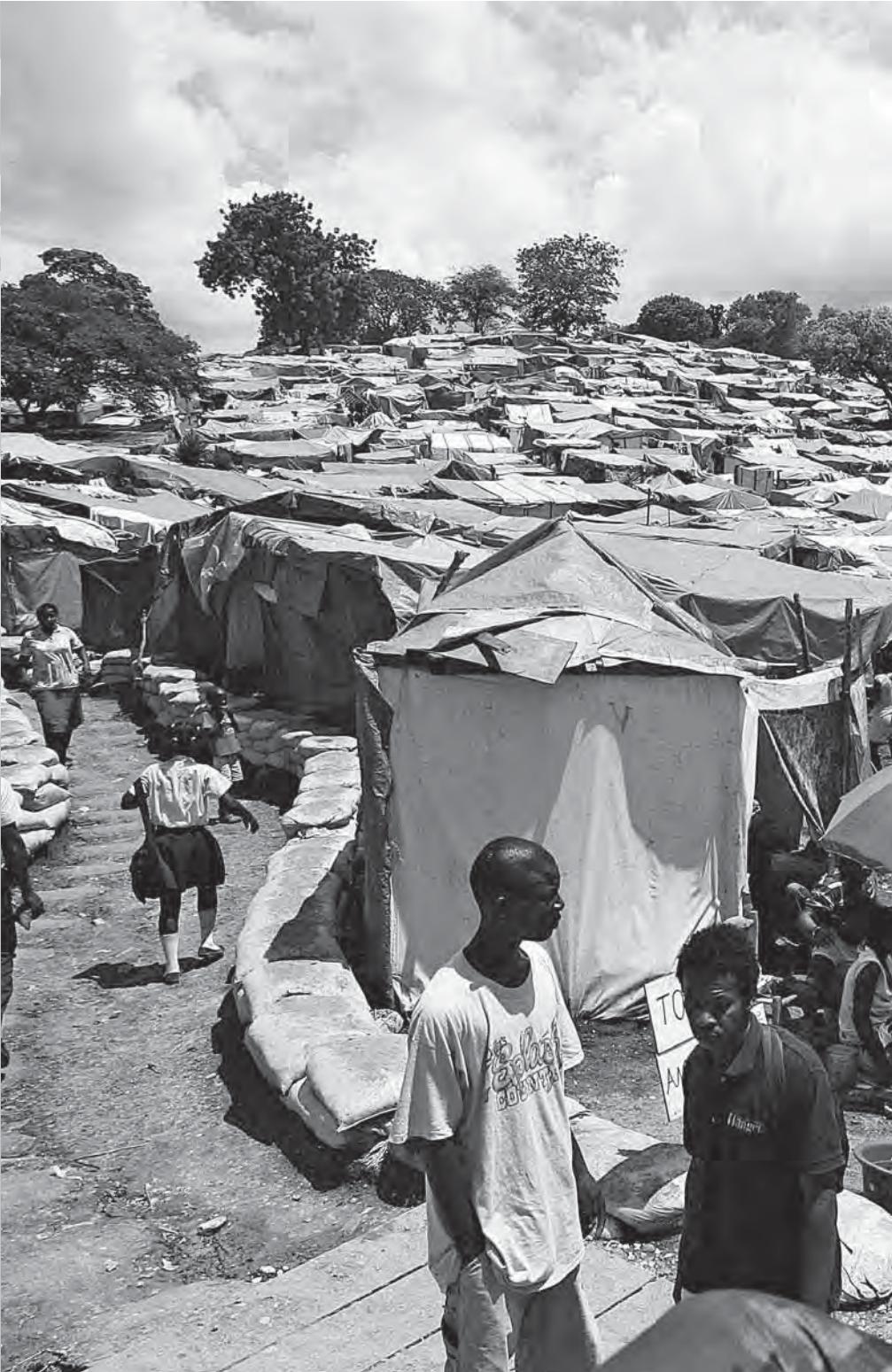
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CHAPTER 2

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CHAPTER 2

CHAPTER 3

International Federation
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Starting over: Community rights and post-disaster response

When a large disaster occurs, the initial responses from governments and from better-off households unaffected by the disaster are usually admirable. But rarely does this carry over to help those most affected with their two most pressing priorities: reconstructing their homes and livelihoods. While most national and international disaster relief agencies have become increasingly effective in the much-needed rapid response to disasters, they are less effective in developing longer-term responses that allow the survivors to rebuild their homes and livelihoods. They focus on what they can do for the victims, not what needs to be done by them. After a disaster, the needs for medical treatment, healthcare, food and water, and often temporary accommodation are obvious, as is the need for specialist help to find and help free many of those trapped in the wreckage. This is what both national and international disaster relief agencies are set up to do. But the stage after this is more difficult particularly where all well-located land sites are valuable and where most of those who are most impacted live or lived in informal settlements.

The disaster does not remove what are often antagonistic relationships between local governments and the urban poor and their informal settlements. Disaster relief agencies can provide relief but they cannot address the root cause of why so much of the city's population was so heavily affected, i.e., because they lived in illegal settlements with poor-quality homes on dangerous sites to which the government had failed to provide infrastructure and services. Disaster relief agencies cannot get safer land sites for housing where those who lost their homes in informal settlements can build – such sites are too valuable and those in government and higher-income groups would not support this. If the people who lost their homes are allowed to occupy public spaces after the disaster (parks and school buildings, for instance), the local government usually wants them to move on after a certain period of time in order to return the spaces to their designated uses. Local governments may want to prevent people living in informal settlements from returning there and rebuilding. Indeed, disasters can provide possibilities for well-connected developers and businesses to acquire sites that were previously occupied by informal settlements as was evident in many coastal communities devastated by the 2004 Indian Ocean tsunami. The obvious and essential principle of allowing those most affected to be at the centre of decisions about where, and how, to rebuild is ignored. Disasters do not often change attitudes within government agencies in regard to the needs and rights of the inhabitants of informal settlements. However, as some examples given later in this chapter show, disasters can provide the opportunity to catalyse a change in relations with longer-term benefits for the urban poor.

Photo opposite page: Terrain Golf, a sports club in Pétionville, Haiti, was turned into a refugee camp almost overnight after the 12 January quake. It is managed by the J/P Haitian Relief Organization, set up by the actor Sean Penn.

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Even if urban poor groups have some assets undamaged by the disaster, these can be quickly eroded by having to pay for consumption needs and through loss of livelihoods or sources of income, so all the inequalities and difficulties that the urban poor faced before the disaster remain to constrain the post-disaster response. Having a home in an informal settlement usually means lacking land tenure and any official documentation of 'ownership' of the land and house. It also often means living in a settlement with no infrastructure, such as piped water supplies, sewers, drains and paved roads, because local governments refuse to provide these to 'illegal' settlements. It is this lack of infrastructure that greatly increases the impact of the disaster event. Most informal settlements have little or no public provision for healthcare or emergency services, which further limits needed responses to disasters. After a disaster, the lack of tenure and documentation, combined with an absence of links to local government, compounds the constraints on response. Disaster relief and support for rebuilding often depend on proof of residence and identity cards, which also explains why many do not move to safer sites when warned about an approaching storm or flood as they fear they will not be allowed to return home. The Asian Coalition for Housing Rights has noted that, unless disaster aid quickly learns to work with the untitled, the unregistered, the unlisted and the undocumented, it can support and even reinforce the inequalities that existed prior to the disaster.

Local governments may allow people whose homes were destroyed to settle in temporary camps but would never sanction these as places where they can stay and rebuild permanent homes. They often do not permit them to return to their former settlement but they are also unwilling to provide them with alternative land sites (or if they do, these are peripheral sites with little or no infrastructure, far from their previous homes, social networks and places where they work). There may be good reasons for not wanting them to return to their former sites because these are so much at risk (from floods or cyclones, for instance) and post-disaster reconstruction could provide an opportunity to allow those affected to get safer sites on which to rebuild. However, they almost never get appropriate new sites and they are hardly ever consulted about the appropriateness of new locations. Fine words about 'rebuilding a new, safe city' and 'decentralizing' to avoid the previous high concentration of informal settlements usually become distant camps and reconstruction sites where no one wants to live.

Alfredo Stein, commenting on the reconstruction plan in Haiti to move people away from the capital and drawing on his work in post-Hurricane Mitch reconstruction, said, "You are going to be constructing ghettos that are far away from where people will need to restore their economic lives." The estate agent's mantra 'location, location, location' is actually even more relevant for low-income groups. Stein, an expert on urban planning based at the Global Urban Research Centre at the University of Manchester, notes that planners must assume that people will return to their homesites and work closely with them to rebuild. If their former site is destroyed or too dangerous for them to rebuild on, then they must be included in real discussions about what would be appropriate relocation sites given government capacity to act rapidly

on this. However, it is complicated to get them new land sites that they can afford and that meet their needs as regards livelihoods. Host communities, for instance, may not want them in their neighbourhoods, or the legal and institutional obstacles may be insuperable.

Despite these difficulties, there is now a rich experience of community-driven responses to disasters in urban areas upon which this chapter draws as it examines the experiences of community groups following a disaster. The complexity of needs and constraints created by the institutional framework in urban areas means that successful engagement with the state is critical in securing a pro-poor response, and this chapter explains how this can be achieved.

Experiences with community-driven responses to disasters

Drawing on the experience of many communities and local non-governmental organizations (NGOs) after disasters, one of the most important responses is to support the people affected to meet, network and often share their grief and, in their own time, begin to participate in creating solutions. This means involving local people from the start in any discussion of rebuilding and in managing the shift from relief to reconstruction. If people are living in temporary camps, they should also be engaged in camp organization and management. Well-organized, representative, community organizations are also valuable allies for agencies supporting reconstruction as they can provide much of the information base for rebuilding, contribute to the rebuilding and supervise local builders and contractors (all of which are time consuming and difficult for staff from donor agencies or international NGOs).

Post-disaster responses have to strengthen and support the survivors' own organizations and keep women at the centre. This is often difficult, however, as more aggressive and well-connected groups frequently dominate priorities and actions. People are affected in different ways and may have different priorities, and they see other affected groups as competitors in seeking funds from external organizations.

Visits and exchanges between community organizations have proved important in many instances to allow survivor groups to learn from other community-driven experiences and also to show what they are doing or planning. In Banda Aceh, Indonesia, after the 2004 tsunami, a network of community organizations of survivors was needed to cope with what was called the second tsunami – the surge of unplanned, unregulated, uncoordinated international aid that poured into the city, often bypassing community structures. With international aid under pressure to spend and to build, many buildings were put up, but when construction was finished and aid agencies withdrew, communities were left with no source of income, no social cohesion and little support for the future.

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After the earthquake in the Marathwada region of Maharashtra, India in 1993, two Indian NGOs with long experience in working with grass-roots associations organized meetings for affected communities in the two most-impacted districts to share their loss, grieve and also share their experiences of how they had saved many people. This was the first time that women were included in such meetings. It also allowed them to discuss what they needed and how they could become involved in rebuilding. A local NGO working with the 20,000 households displaced by a mud volcano disaster in Sidoarjo, Indonesia in 2006, noted: "Perhaps the most important support from external donors could have been on-the-ground, long-term support for those affected to develop their capacities, to agree on and put forward their solutions and then implement them. It seems that changes in donor structures and staff have actually moved many donors further away from such an approach."

Box 3.1 describes the experiences of the Philippines Homeless People's Federation in community-driven responses to five disasters between 2000 and 2008. The federation is a national network of 161 urban poor community associations and savings groups with more than 70,000 individual members from 18 cities and 15 municipalities. Members promote community savings in order to build their own financial capacities and to promote community development and social cohesion.

Box 3.1 The Philippines Homeless People's Federation's role in community-driven disaster response

The Philippines' location within the circum-Pacific seismic belt means that the country is regularly affected by earthquakes, volcanic eruptions, typhoons, storm surges, landslides, floods and droughts. The link between vulnerability, and disaster and poverty is strong – many low-income groups live in high-risk sites and have poor-quality housing. They also have less protective infrastructure and fewer resources to call on after being impacted by disasters.

The Philippines Homeless People's Federation (HPF) is a national network of urban poor community associations and savings groups that are engaged in many initiatives to secure land tenure, build or improve homes and increase economic opportunity, working wherever possible in partnership with local governments. The five disasters listed in the table below encouraged the HPF to develop its own policies and practices first for disaster response, and later for disaster risk reduction.

The HPF was already active in Payatas when the trash slide happened and had been implementing a mix of community-based development programmes (savings and loan schemes, secure tenure initiatives) and welfare programmes (for the elderly, health, childcare and rehabilitation of children with disabilities) with support from the Vincentian Missionaries Social Development Foundation Inc. However, it recognized its lack of knowledge and skills in how to address disasters.

The HPF's response to these disasters was to work with the survivors, helping them to organize and to influence reconstruction. For instance, in Barangay Guinsaugon, after the landslide, they worked with survivors, helping them to organize (including a survey covering

all those in the evacuation centre), supporting them in developing savings schemes, organizing exchange visits to see other community-based housing schemes and organizing the construction of 103 temporary housing units within four months of the disaster. The HPF's immediate response to the Mount Mayor mudflow and floods was the dispatch of a team to establish links with all the affected communities and to help them set up community organizations. It also supported surveys, organized exchanges and promoted savings. These efforts focused on three municipalities where there were several communities on particularly dangerous sites, supportive local governments and communities interested in the HPF and an absence of sustained relief from aid agencies. Surveys were organized that included families in high-risk areas that had not been affected by the mudslide and families living in homes at risk of eviction along the railway tracks. The organized communities were able to select and acquire resettlement sites. The importance of this experience "is the pervading belief and commitment of affected families and communities to act and save to recover and to prepare for and evade future disasters. The communities showed this through their volunteering efforts and adoption of the savings programme, collectively saving close to P500,000 [US$ 11,000] in less than a year. Their willingness to provide counterparts in terms of volunteer work and savings prompted the federation to support their land acquisition initiatives," said Jocelyn Cantoria, HPF's regional coordinator. ■

The disasters	Year	Details
Trash slides at the Payatas solid waste dump in Quezon City (metro Manila)	2000	Heavy rains from typhoons caused a 15-metre (50ft) slope in the dump to collapse, burying hundreds of homes; 288 people were killed and several hundred families displaced. Subsequent flash floods affected the homes and livelihoods of many more people.
Landslide in Barangay Guinsaugon	2006	The whole *barangay* (district) was buried and another 80 *barangays* affected. A total of 154 deaths were recorded, 968 people reported missing, 3,742 displaced and 18,862 affected.
Mount Mayor mudflow and floods	2006	Typhoons triggered huge floods, mudslides and avalanches. In the Bicol region alone, at least 208 people died and another 261 were reported missing. These settlements were recovering from a previous typhoon.
Fire in the settlement of the lower Tipolo Homeowners Association in Mandaue	2007	246 structures were destroyed leaving 913 people homeless.
Flash flood in Iloilo	2008	In the city of Iloilo, 152 of its 180 *barangays* were affected by heavy rain and flooding. Up to 500 people were killed, 261,335 affected. Many houses were washed away and many households lost their documentation.

The work of the Philippines HPF in responding to disasters identified some constraints on community-driven responses that are common in most urban areas. These include:
- ■ The difficulties faced by the affected population to produce documents required by the government because these were either lost or destroyed by the disaster
- ■ The common response of those affected to wait for others, especially government agencies, to do things and not to take the lead themselves

- The response limitations of local governments to provide land needed for temporary accommodation or permanent relocation and the stringent land-use subdivision and conversion regulations that inhibit this
- The lack of funds to help with relocation (funding is often only available for immediate relief and not for resolving the more fundamental problems)
- The difficulty in getting official permission for necessary actions that often require the agreement of many different bodies
- The high price of building materials for reconstruction (especially for disasters with widespread impacts, such as the floods in Iloilo).

Community organizations take the lead

Problems always arise after a disaster in urban areas that need representative community organizations to manage them, such as who gets the temporary accommodation, who gets priority for new housing, how to design the 'reblocking' (reshaping of plot boundaries to improve access) that is acceptable to both tenants and 'owners'. In 2007, CARE's Kabul Area Shelter and Settlement Project, funded by the United States Agency for International Development's Office of Foreign Disaster Assistance, began with a land-usage survey and the creation of community councils to select beneficiaries in clusters rather than individually. CARE also signed a memorandum of understanding with the Kabul municipality, which linked housing to broader issues of land tenure, occupancy rights and housing security, and partnered with the Afghan Development Association and the Sanayee Development Organization, two local NGOs. CARE's report on the project noted: "Essentially, a successful shelter intervention must include strategies for good governance that focus on increasing people's understanding of their rights and responsibilities, as well as enhance the ability of authorities to listen to the needs of the people, that encourage all to find solutions to problems that affect everyone."

Shack/Slum Dwellers International (SDI) is a confederation of country-level organizations of the urban poor from 28 countries throughout Africa, Asia and Latin America. According to the SDI affiliates that have responded to disasters, certain factors have facilitated effective responses. The first is the existence of savings groups in the affected settlements, which helped to provide immediate support for those impacted by the disasters. The second is the existence of community organizations which were able to help with immediate relief and support the social cohesion needed to take action to resolve longer-term issues such as rebuilding or relocation (see Box 3.2).

Community-leaders from SDI affiliates often visit disaster sites and impacted communities and encourage and support the formation of local representative organizations and savings groups. They also bring their experience with savings management, organizational development, community surveys and house modelling, developing life-size models of houses to see which design and which materials produce the best low-cost housing. They support community profiling and surveys in order to mobilize

those affected, help them get organized, gather necessary data about the disaster site and support them in showing their capabilities to local government. Where relocation is necessary, they help highlight the importance of being able to get land on suitable, well-located sites where access to income-earning opportunities is as important as the site itself. The effectiveness of this is much enhanced if there are supportive local governments and national agencies. Obtaining, when necessary, land or title to

Box 3.2 Inclusive equitable cities

Shack/Slum Dwellers International seeks to build local movements at a neighbourhood level, primarily around land and basic services. The network grew from the seven founding members in 1996 (Cambodia, India, Namibia, Nepal, South Africa, Thailand and Zimbabwe) to 16 core affiliates in 2006 (Brazil, Ghana, Kenya, Malawi, Philippines, Sri Lanka, Tanzania, Uganda, Zambia) with links to ten more countries by 2010 (Angola, Argentina, Bolivia, Egypt, Indonesia, Mozambique, Nigeria, Pakistan, Sierra Leone and Swaziland). SDI's methodology encourages local communities to design housing solutions to address their needs, refining these solutions through practice. It also seeks, in general, to be non-confrontational in its relations with local authorities with the understanding that city-wide solutions to the problems of insecure tenure and lack of access to services need to be in place.

SDI affiliates have achieved significant success with secure tenure in India, Kenya, Malawi, Namibia, Philippines, South Africa, Thailand and Zimbabwe. Local groups have negotiated for state subsidies to secure land and basic services for over 150,000 families. Their experience highlights the importance of strong local organizations if community solutions are to be allowed to prevail and if communities are to have the capacities they need to take up new challenges once they move to permanent sites and new homes. In terms of disaster preparedness,

there is an increasing awareness in SDI communities about the work required with local authorities and local NGOs to minimize disaster-related risk.

The interest of tenants and those who claim to 'own' land may differ considerably. The exceptions are notable because they are rare. SDI's Kenyan affiliate, the Kenyan People's Homeless Federation, supported by local NGOs, worked with local savings schemes in Huruma, one of Nairobi's many informal settlements, to regularize the settlement. A community survey had identified 1,105 tenants, 1,002 structure owners (i.e., owners of the house but not legal owners of the land) and 202 resident landowners. The residents were unanimous in seeing security of their homes and land as their biggest need. Hence, when the government said that they could have legal tenure if the residents could agree on a land-sharing arrangement, they negotiated to divide the land. The outcome was inclusive of all groups and offered the owners sufficient land for them to accept a compromise.

Communities that come together to address their need for tenure, infrastructure and services are more likely to be prepared in the event of a disaster. As the risks of climate change are increasingly recognized, more community groups want to educate themselves about the risks attached to their location both to prepare themselves and to negotiate for appropriate assistance from the authorities. ■

it (which often requires high-level political support for a more rapid response from bureaucracies) and permission to begin rebuilding are particularly urgent. In some disasters, technical support for affected populations in developing responses (for example, forming home-owner associations, drafting memoranda of understanding with local governments, designing houses and site layout, and raising funds) proved important.

Building the information base for effective responses

One obvious first step in reconstruction is surveys of settlements and impacted households in order to assess the damages and to develop a costed plan for rebuilding, but a key issue is who should be engaged in this process? Is this to be done by external experts who report to the official organizations 'in charge' or might it be better done by involving community organizations and volunteers? In a growing number of cases, community organizations formed by survivors have taken the lead role in these surveys and, in doing so, have reinforced their opportunities to influence responses. This draws on the experiences of federations of slum/shack dwellers in informal settlements in cities in Asia and Africa which have undertaken careful, detailed surveys and mapping of their settlements to provide the information base for upgrading and for negotiating with local governments for support.

This documentation, covering every household and providing detailed maps undertaken by the survivors, helps not only to provide necessary documents for reconstruction but it also fosters the strong community organization needed to cope with inappropriate government policies and with the commercial forces which often seek to take advantage of the disaster. For instance, the surveys help provide households with documentation of the land site they occupy or occupied prior to the disaster. Community-managed surveys also help build the confidence and capacity of the inhabitants. This is real disaster prevention because it provides the basis for low-income communities to avoid eviction and to negotiate the right to rebuild and to get tenure, and thus avoids the catastrophic impact of relocation to inappropriate locations. The surveys and maps also help to ensure that the government takes the local organizations seriously. An engagement with local organizations that have information about the population to be assisted changes the nature of the relationship and the potential capacity of the local community is better appreciated.

Starting repairs and reconstruction

A second obvious step is to start with repairs and reconstruction. And, again, who should undertake this? In Pakistan, after the devastating earthquake in 2005, there was a legitimate desire within government to make sure that the rebuilding produced buildings and infrastructure that were more resilient to likely future

disaster events. Governments often try to ban rebuilding until there is a detailed assessment of damages and until it can set guidelines and standards for rebuilding – but this can very often delay essential responses. For those with the least assets, who need to restart livelihoods and rebuild homes, all delays add to their difficulties. Community-driven reconstruction can draw on people's own knowledge and skills. There are, for instance, often many skilled artisans and experienced builders among the affected population who can play an important role in the reconstruction if given appropriate technical support to ensure they build disaster reliance into new structures.

It is important for the network of affected communities to develop their relations with local governments and with professionals who are part of the reconstruction effort. They need to develop a common understanding among professionals, aid organizations, government departments and other community groups about what should be done and then use this common understanding to devise ways to deal with problems in a more collective and coordinated way. This is necessary to avoid a lack of coordination among different organizations and competition among community groups for funds or recognition. Again, community exchanges are key mechanisms by which everyone can learn – and slum dwellers' federations have long learned the value of bringing government agency staff and other professionals into these community exchanges. This also allows successful partnerships between government agencies, professionals and community organizations to be highlighted so, for instance, government staff worried about allowing more flexible standards for building and infrastructure can visit a site where local government has successfully followed such an approach.

In urban areas, community-based initiatives to build or improve housing and to install infrastructure and services have shown their effectiveness in many places but they are limited by their impossibility to put in place large infrastructure, such as water mains to supply communities with piped water systems or the trunk sewers and storm drains into which community-developed systems can feed. Clearing household waste from streets, gutters, drains and open spaces can be organized by communities but it needs a larger system to collect and remove it. So community-driven strategies have to forge linkages and develop partnerships with local governments and this is where a real partnership between community-managed 'little pipes' and government-provided 'big pipes' can achieve risk reduction at scale.

Getting land

It is much easier to rebuild in existing settlements as no new land site has to be acquired and most existing urban settlements have some infrastructure or at least have trunk infrastructure (roads, water mains, sewers, drains, electricity cables) close by. But wherever land is valuable – which means most urban contexts – it is often more difficult for affected communities either to get back the land on which they lived prior to the

disaster or to get safer sites on which to rebuild. 'Safe' sites are of no use to low-income households if they are far from former homes and from income-earning opportunities. Whenever a large-scale disaster hits a city, there is always a temptation to envisage a reconstruction process that avoids the sites most impacted, especially the informal settlements. Governments often respond to disasters by passing new land-use regulations that prevent rebuilding in many of the most affected areas.

One common community-driven response is for community organizations to demonstrate to governments and, where relevant, international agencies their competence and capacity in rebuilding. One way to do this is by reoccupying the old sites and building permanent homes. This is what took place in Gujarat, India, after the 2001 earthquake when the government tried to stop people moving back to 'unsafe' places. But when the people who moved back showed evidence of their investment in permanent houses, the government had little choice but to agree with them staying there. In the immediate aftermath of the 2004 tsunami in Banda Aceh, survivors from 25 coastal settlements moved back in defiance of the government relocation programme. When they proved they were able to rebuild and to establish a plan to create protective ecological buffers between their settlements and the sea, the government supported their actions. In the responses to the disasters in Payatas described in Box 3.1, it was possible to get land for temporary or permanent accommodation on suitable sites.

The need for 'flexible' money for affected households and communities

There is a need for national and local disaster funds that are able to respond rapidly and have the capacity to provide support right down to affected individuals and households. These funds should support both immediate responses and the development of longer-term solutions in ways that serve each affected community. Cash support for affected households has proved effective in many instances and can also stop the erosion of household assets, which is particularly serious for low-income groups.

As noted earlier, key priorities – apart from guaranteeing basic needs (shelter, food, clean water, sanitation) and avoiding household asset depletion – are supporting livelihoods and rebuilding. This often needs administrative streamlining to get faster responses from bureaucracies in terms of approving community-driven plans and helping to resource them. This is not easy, especially for external funders who respond to the emergency with neither contacts nor knowledge of the areas in which they are suddenly working. It is difficult for outsiders to know how to support livelihoods and those most in need. This is more easily done if community organizations, such as local savings groups, can help. In many nations, national federations of slum/shack dwellers have set up their own national and local funds through which external support for their work can be channelled.

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In urban areas, rebuilding homes and restoring livelihoods are usually closely linked, as the home provides a safe place for families, access for income earners and, often, a site for home-based enterprises. An evaluation of responses to the Gujarat earthquake noted: "People constantly emphasized the need to restore livelihoods rather than receive relief and expressed some frustration that outsiders did not listen to them on this point."

Community-driven initiatives for disaster risk reduction

Most disasters, including the five listed in Box 3.1, could have been anticipated and much death and destruction avoided, had surveys of settlements in high-risk sites been undertaken and follow-up action carried out to address problems the surveys highlighted. Interviews or discussions with those living in informal settlements that flood point to a range of measures that they take in the home to reduce the impact. Obvious modifications can be made to houses to make them more resistant to disaster. These include having high or raised cupboards or other types of furniture that people can sit on in case of floods, fitting high shelves on which goods can be stored (including food and water) and keeping all electric wiring and plugs close to the roof (if the house is connected to a source of electricity). In Indore, India, many households had heavy

The Indian state of Andhra Pradesh was hit by one-in-100-year floods in 2009. After such a disaster, people need help not only to access food, shelter and clean water, but also to rebuild homes and livelihoods.

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metal beds that did not wash away. Stores of food and water are essential in places prone to flooding. Brazilian President Lula da Silva has described how the homes he lived in as a child were often flooded. "When our house flooded, I sometimes woke up at midnight to find my feet in water, cockroaches and rats fighting over space, and various objects floating around the living room, so I had to get up in the middle of the night," he said. "Our biggest concern was preventing the furniture from getting ruined. Not that we had much to get ruined… Every time it rained, we used to nail another piece of wood across the doorframe, and dump another truckload of earth to reinforce the barricade. But every time it rained the water level rose further. And the authorities never did anything." Houses can be protected against flooding to some degree by building on stilts, creating drainage ditches nearby, erecting barriers to stop water coming in (these include temporary measures such as sandbags) or having outlets so that flood waters flow out.

Community-driven 'upgrading' of informal settlements is an important aspect of disaster risk reduction, as it improves the quality of housing and puts in place the infrastructure and services that reduce disaster risk. Upgrading slums has become one of the most common and effective ways to improve housing conditions in cities in Latin America and Asia. In nations such as Argentina, Brazil and Thailand, upgrading programmes have reached a significant proportion of the urban population that lives or used to live in informal settlements. At their best, upgrading programmes on sites at risk of flooding make space for necessary storm drains but also rehouse people who have to move to make way for infrastructure within the same community.

Box 3.3 Housing, land and property rights and post-disaster shelter programming

Problems concerning housing, land and property (HLP) rights and other issues frequently arise following natural disaster. These are often instrumental in determining the extent to which post-disaster shelter programming succeeds or fails. HLP issues can determine the extent to which the rights of those affected by disaster are respected, protected and, ultimately, fulfilled and enforced. If left without suitable policy (or sometimes legal) interventions, such HLP problems can create obstacles for the implementation of shelter programmes. What works well in a highly urbanized context may prove entirely ill suited for post-disaster shelter needs in a rural area of a developing country. Likewise, relocation of disaster-affected communities may be necessary and desired by certain groups in some contexts, but may be wholly inappropriate or illegal in many others. There is a growing realization that HLP rights perspectives need to be woven into the international community's shelter programming activities. Though HLP rights issues may play themselves out in different ways, it is possible to identify the most likely types of HLP challenges to emerge following disaster. These include:

HLP rights issues in informal, customary or extralegal settlements. Dwellers residing within informal, customary or extralegal settlements (those without explicit

ownership or other formalized/legal rights to reside at a given location) often bear the brunt of natural disasters and resultant displacement and damage to property. However, on the whole, post-disaster HLP policy tends to provide clearly preferential treatment to formal property owners, often to the detriment of the rights of those within the informal or customary sectors, thus raising questions of equity and rights.

Structural landlessness and home-lessness. Even though pre-disaster landless and homeless families constitute one of the most vulnerable groups affected by disaster, these families are frequently excluded or at best marginalized in relief and recovery processes. This group can include informal occupants or squatters on public or private land who are unable to return to their homes, such as people living in a coastal buffer zone in post-tsunami Sri Lanka. They can also be pre-disaster tenants who were not allowed to return to their former homes and lands or households headed by women who were not permitted to purchase property or not on the same terms as men. In post-tsunami Aceh, more than 15,000 land parcels (7,000 hectares) were irretrievably damaged, with resettlement on public land as the only available option. Following the 2005 Pakistan earthquake, the failure of the authorities to provide housing assistance to the landless was identified as a major reason for long-term displacement and the prolonged existence of temporary shelter settlements.

Land grabbing and illegal/unfair land acquisition. The unjust acquisition of land following a disaster can have a detrimental impact both on the people whose land is literally stolen and on humanitarian agencies engaged in shelter activities. Land grabbing can take a variety of forms ranging from outright violence (by both public and private actors), to carefully orchestrated legislative measures designed to achieve outcomes in the aftermath of disaster that would have been politically infeasible had the disaster itself not taken place. Following Hurricane Katrina in New Orleans, public officials attempted to undertake a range of planning and zoning measures during the reconstruction process, which had the actual effect of significantly changing land use and land and housing ownership patterns – in other words, a land grab.

Restitution or resettlement? According to relevant international standards, such as the United Nations Principles on Housing and Property Restitution for Refugees and Displaced Persons (2005), there is, when conditions so permit, a presumption of restitution and an emerging right to return to one's original home for displaced people following both disaster and conflict. In many instances, however, restitution can be blocked due to HLP disputes over a land plot or dwelling, real or attempted land grabs, the secondary occupation of homes and lands and various other common post-disaster situations. In post-tsunami Thailand, HLP restitution rights for communities living on land informally were secured through the resolution of many HLP disputes by a special land sub-commission, but in many cases, the technically extralegal or informal tenure status held by disaster victims can greatly affect their rights in post-disaster settings.

Proving who has which HLP rights. Following the Pisco earthquake in Peru, shelter programming was affected due to the difficulties in clarifying the existence of property titles for the land potential beneficiaries were occupying. The international community developed procedures to select reconstruction beneficiaries, which procedures rely on vulnerability criteria (i.e., the elderly, disabled people, children and others) and on criteria related to the tenure of the land and properties built on it.

Inequitable treatment of owners and non-owners. Although housing, land or property owners (many of whom may have forms of HLP insurance protection) and tenants and other non-owners are equally affected by disaster, frequently the latter groups face inequitable treatment within the HLP sector. Following the Pisco earthquake, 78 per cent of the population that had title received grants for reconstruction, while tenants and informal dwellers generally did not. The same distinctions were made after the 1995 Kobe earthquake in Japan, where owners were invariably entitled to return to their pre-quake homes, whereas tenants were often forced to find new housing as their former neighbourhoods were transformed into new and more expensive areas. After Hurricane Katrina, relatively small amounts of financial assistance were provided to rebuild rental units compared to the considerable sums provided to owner-occupiers to rebuild.

HLP disputes and secondary occupation. HLP disputes generated by the secondary occupation of homes and lands are commonplace following disasters. Such disputes can occur between many different parties, such as two poor families struggling over access to a single piece of land. More ominously, disputes between poor communities and private sector interests, which seek to control the disputed land for development purposes, can seriously undermine broader post-disaster recovery efforts and cause forced and arbitrary evictions.

Insecure tenure. Inadequate or insecure HLP tenure can significantly worsen the HLP prospects of disaster-affected populations, as well as creating considerable challenges for shelter providers in the aftermath of disasters. Tenure insecurity – or the reduced degree of protection against eviction and other threats – can arise through a wide range of pre-existing or post-disaster circumstances. These can relate to structural weaknesses of the HLP rights registration and record-keeping systems in countries affected by disaster, a lack of clarity between customary and formal HLP rights frameworks, systemic bias against non-owners (resulting in far lesser tenure protection) and the loss, damage or manipulation of land registers and other methods of recording HLP rights. Insecure tenure can make people reluctant to flee from their homes and lands when disaster strikes for fear of losing access to them after the event.

In the specific context of HLP rights and disaster, the 'do no harm' principle should mean that humanitarian actors only support local or national HLP laws and policies that are consistent with internationally protected HLP rights. International agencies should build these perspectives into their overall activities to ensure the broad promotion and protection of HLP rights. It should also mean that humanitarian institutions consciously ensure that they are not complicit in any approaches to HLP issues pursued by national and local governments that are contrary to international rules and regulations. In effect, such an approach would prioritize rights over expediency, strive to remove the pro-ownership bias that still dominates many shelter efforts and develop new internal and external mechanisms to continually strengthen HLP rights issues in the context of shelter programming. Five key principles are worthy of consideration in this respect:

- Expand beneficiary participation in HLP processes and decision-making
- Define 'building back better' as 'lands for the landless and homes for the homeless'
- Treat owners, tenants and informal dwellers equally by emphasizing security of tenure
- Oppose openly arbitrariness and disaster-driven land grabs
- Prioritize restitution first. ∎

However, the scope of the upgrading varies from minor improvements such as communal water taps, paved roads and street lighting, which do little to reduce disaster risk, to comprehensive improvements to each house and good-quality infrastructure (piped water and sewers to each house) and services (including schools and healthcare centres). Upgrading should also include the provision of legal tenure of the land and house to the occupants but this is often avoided due to costs and legal complications, which may also involve compensation for the landowner.

The concept of upgrading implies an acceptance by governments that the settlement to be upgraded is legitimate and that the inhabitants have a right to live there and the right to the infrastructure and services that are so central to risk reduction. But the extent to which it engages the inhabitants and their community organizations in its design and implementation varies a lot. One of the most interesting upgrading initiatives is that of the Thai government because it supports community-driven upgrading, and scale is achieved by the very large number of local initiatives that it supports.

Managed by the Community Organizations Development Institute (CODI), this channels government funds in the form of infrastructure subsidies and housing loans direct to savings groups formed by low-income inhabitants in informal settlements. It is these savings groups that plan and carry out improvements to their housing or develop new housing, and work with local governments or utilities to improve infrastructure and services. From 2003 to early 2008, within the *Baan Mankong* or secure housing programme, CODI approved 512 projects in over 200 urban centres covering 53,976 households, and it plans a considerable expansion of the programme within the next few years. Overall, CODI (and the organization out of which it developed, the Urban Community Development Office) has provided loans and grants to community organizations that reached 2.4 million households between 1992 and 2007.

This initiative has particular significance in three aspects: the scale; the extent of community-involvement; and the extent to which it seeks to institutionalize community-driven solutions within local governments. Its funding is drawn almost entirely from domestic resources – a combination of contributions from national and local government and from households and communities. CODI also provides support to networks of community organizations formed by the urban poor, to allow them to work with municipal authorities, other local actors and national agencies on city-wide upgrading programmes. It also demonstrates how to regularize illegal land tenure. Those living in illegal settlements can get legal land tenure by a variety of means, including purchasing the land from the landowner supported by a government loan, negotiating a lease, agreeing to move to another location provided by the government agency on whose land they are squatting, or agreeing to move to part of the site they are occupying in return for tenure (land sharing). CODI also provides loans to community organizations to lend to their members to help build or improve their homes.

CHAPTER 3

Conclusion

Most of the experiences described above are from nations where national federations of slum or shack dwellers have developed and have actively sought to work with local governments. The kinds of post-disaster interventions described in this chapter, including the capacity to reduce or avoid extreme events, should be a key part of urban poverty reduction strategies. Often, however, they are not seen as the responsibility of agencies that work on poverty reduction. Meanwhile, guidelines for urban poverty reduction, such as the Poverty Reduction Strategy Papers fostered by the World Bank and the International Monetary Fund, often give little or no attention to disaster risk reduction in urban areas – although in fact, this is part of a larger problem: that these institutions do not give much attention to urban areas at all.

This chapter, including Box 3.1, was written by David Satterthwaite, Senior Fellow, International Institute for Environment and Development (IIED), with contributions from Sheela Patel, Director, Society for the Promotion of Area Resource Centers, Somsook Boonyabancha, Secretary General, Asian Coalition for Housing Rights, Thomas Kerr, Asian Coalition for Housing Rights, and Arif Hasan, Visiting Fellow, IIED. Box 3.2 was written by Diana Mitlin, Senior Research Associate, Human Settlements Programme, IIED. Box 3.3 was contributed by Scott Leckie, Director, Displacement Solutions.
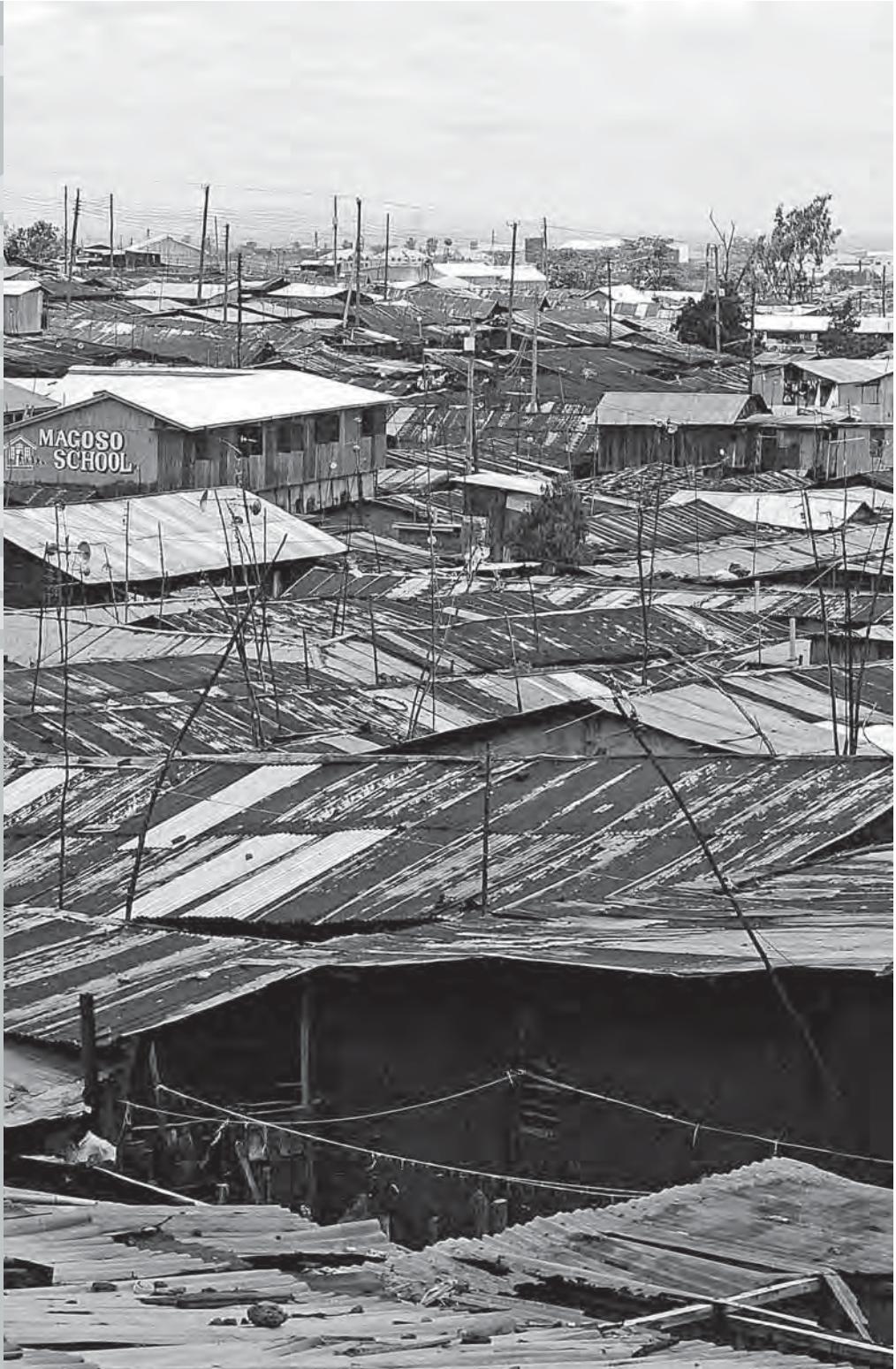
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Urban violence

As more people crowd together into cities, urban violence has become a defining feature of daily life in some developing countries. In Latin America, the Caribbean and sub-Saharan Africa, the bloodshed reaches a scale as bad as, or worse than, that of many wars. The United Nations Human Settlements Programme (UN-Habitat) reports that in a recent five-year period, approximately 60 per cent of urban dwellers in developing countries have been victims of crime. That number rises to 70 per cent in parts of Latin America and Africa. Nairobi, the capital of Kenya, once the pride of East Africa and home to the headquarters of United Nations (UN) agencies, has been dubbed 'Nairobbery'. Many of South Africa's cities are characterized by a new form of apartheid, with the rich isolated behind electric fences and the poor penned into slums where law and order is markedly absent.

Over the past 20 years, the increasingly rapid pace of urbanization in developing countries has resulted in a dramatic increase in urban violence. The transition from an agriculture-based economy to a primarily industrial one involves mass migration from the countryside to the city. Most migrants gravitate to slums or squatter settlements, home to some 1 billion people today. These areas are generally large and sprawling, making it difficult to supply their residents with the most basic of needs.

For some, migration brings real improvement as skilled workers enjoy higher wage levels in the cities and this promotes education and supports broader development. For many others, however, this transition results in extreme poverty, insecurity and increased vulnerability. As they crowd into shanty towns and slums, sometimes in appalling conditions with little or no access to clean water and sanitation, they clash with older populations and other migrants for scarce jobs, housing and basic services. The police are very often too overstretched or intimidated to maintain law and order and these ungoverned areas provide a fertile breeding ground for criminal networks trafficking in drugs, guns and people.

This chapter presents an overview of the causes and costs of urban violence and analyses how extreme inequality and political instability are fuelling the increase in violence in cities in the developing world, before reviewing some of the strategies currently being applied to tackle the problems caused by urban violence.

The causes

There are many definitions of violence. The Crisis States Research Centre at the London School of Economics and Political Science recently adapted a three-fold categorization of political, economic and social violence to provide a particularly useful classification in urban contexts.

CHAPTER 4

Economic violence is driven by material gain and includes street crime, drug-related violence and kidnapping. This type of violence is common where urban inequality and poverty combine to produce unequal access to economic opportunity. In some cases, societal transformation and development policies such as structural adjustment have exacerbated poverty and inequality and contributed to increased crime and violence. It is also closely associated with the existence of an informal economy where the poor find ways to earn a living providing informal services and trade. In Latin American cities, 'social cleansing' campaigns by the authorities to remove poor people and street vendors from the cities and to segregate them in designated areas have resulted in increased levels of violence and crime. At household level, social violence increases as a result of failure to meet family expectations, while economic violence increases as desperation and frustration drive some people to commit robbery and other crimes.

Social violence is mainly an interpersonal phenomenon, driven by the desire to get or maintain social power and control, between individuals and within and between families and communities. Gangs are a common manifestation of social violence, formed in response to social and economic exclusion where young people find a sense of belonging and status. Social cleansing, spatial segregation of urban areas and extrajudicial killings by police are also categorized as social violence. For example, in Nairobi, where 60 per cent of the population lives on 5 per cent of the city's land, corruption is rife and youth gangs wreak terror with guns smuggled in from Somalia and Uganda. The privileged classes live in walled-off houses with 'safe havens', complete with radio alarm panic buttons, where they can hide during robberies. The poor rely on vigilante groups to protect them.

Political violence is driven by a desire to gain or maintain political power, often by elite groups. It is closely associated with lack of reform within the police and judiciary or the de facto abandonment of urban areas to criminal networks and drug gangs. A 'criminalization of governance' occurs when these gangs impose their own rules in poor neighbourhoods, often providing security and dispensing justice but institutionalizing violence. In May 2010, Jamaica's government declared a state of emergency in parts of Kingston, the capital city, after shooting and firebomb attacks on police stations by suspected supporters of an alleged drug lord. Seventy-three people were killed as thousands of soldiers and police laid siege to a district of the capital that officials say serves as a 'garrison community' for the alleged drug gang. Attempts to arrest the suspect were violently repelled by his supporters. Hundreds of residents blocked the roads into the neighbourhood carrying placards proclaiming their support for the alleged gang leader, who they said provided security and other essential services for their community.

Organized crime

Organized crime, international drug trafficking, trade in lethal weapons and urban street gangs are acute manifestations of urban violence which usually comprise overlapping dimensions of political, economic and social violence.

Drug production and trafficking

South America produces about 900 tonnes of cocaine a year, mostly for sale to the United States and Europe. Drug trafficking organizations have openly challenged governments in a number of countries including Colombia, Mexico and Jamaica through conflict and intimidation and the use of advanced military tactics and military-grade weapons. Violence is mostly associated with the transit, rather than the consumption, of illicit drugs – to the US through Central America and the Caribbean and to Europe through West Africa. Mexico's drug cartels reportedly command more than 100,000 foot soldiers, putting them on a par with the Mexican armed forces which command 130,000 troops. The cartels are said to earn up to US$ 40 billion from the drug trade, a figure which exceeds the gross domestic product (GDP) of many low-income countries. The US Department of State recently reported that entire regions of Guatemala are now essentially under the control of drug trafficking organizations, the most visible of which is the Mexican group known as the Zetas.

When governments react with force the violence can spiral out of control. One United States travel advisory warned US citizens about the levels of violence in Mexico, describing the shoot-outs between Mexican security forces and the drug cartel gunmen as similar to "small-unit combat". Indeed, the global intelligence company Strategic Forecasting, Inc., or STRATFOR, reports that Mexico's armed forces have now been deployed in nearly every state in the country. Increasingly they are charged with maintaining general public safety.

Firearms

Firearms increase the lethality of violence. According to the Small Arms Survey, civilians own about 650 million firearms worldwide (three-quarters of the known total) and gun violence kills at least 200,000 people each year in countries at peace.

The illegal trade in small arms is believed to be worth at least US$ 1 billion per year. Many small arms remain in urban areas following a conflict, while others trickle over borders from countries currently or formerly at war. South Africa gets guns from Mozambique and Angola, and Nairobi receives weapons from Somalia and Uganda. In Brazil, where more than 100 people die from firearm violence every day, gangs have been seen with arms either pilfered or sold from military arsenals. In the *favelas* of Rio de Janeiro, youths carry assault rifles, machine guns and submachine guns.

The 'guns for ganja' trade – where undocumented handguns from Haiti are exchanged for marijuana from Jamaica – is seen as a major factor contributing to the record levels of murder and violent crime in Jamaica. According to the US State Department's *2010 International Narcotics Control Strategy Report*, around 70 per cent of the illegal firearms entering Jamaica originate in the United States. Mexico is another major recipient of guns from the US. The Bureau of Alcohol, Tobacco, Firearms and Explosives estimates that Mexican drug trafficking organizations acquire thousands of weapons each year in Arizona, California and Texas and smuggle them across the border to Mexico.

Urban street gangs

Urban street gangs are made up mostly of marginalized young men between the ages of 15 and 24, a sector of society that commits a disproportionately large share of violent acts. Some of the reasons people join gangs include finding a sense of belonging, reacting to repressive treatment, resisting the status quo, climbing out of poverty and achieving social status. (See Box 4.2.)

The appeal of American gang culture has spread into Latin America and the Caribbean, often with members who brought it back to their countries of origin after being arrested in the United States and deported. Between 2000 and 2004, around 20,000 youths associated with gangs in the Los Angeles slums were deported to Central American countries many had never even visited. Their families had fled to the United States in the 1980s to escape civil war and children born into or brought up in the slums drifted into gangs and criminality and fell foul of the crackdown that followed the 1992 Los Angeles riots. The notorious Mara Salvatrucha gang, for example, started in the Los Angeles region and is now entrenched in Central America, sending youth homicide rates soaring.

Nairobi's gang names are inspired by conflict and political movements, such as Taliban and Boys of Baghdad. Sometimes they work as mercenaries for political leaders. The streets of Lagos, Nigeria, are plagued by the Area Boys, tens of thousands of loosely organized delinquent youths who harass, threaten, bribe and extort money from passers-by. What started as a small band of hoodlums in the 1980s has grown with the influx of unemployed migrants to the city, in an oil-rich country where up to 70 per cent of the population lives below the poverty line.

The costs

It is difficult to measure the exact costs of urban violence, both tangible and intangible, but they are substantial, affecting the economic, political and social development of cities and nations. A study in El Salvador, for example, put the total national cost of violence at 11.5 per cent of GDP.

Lives lost and ruined

One simple calculation is homicide rates, which are highest in Latin America, the Caribbean and sub-Saharan Africa. Drug-producing countries have a homicide level 35 per cent higher than the average rate for the rest of the world. In Mexico, violent confrontations between drug cartels have killed some 23,000 people since late 2006. In Rio de Janeiro, the homicide rate has tripled since the 1970s. In São Paulo, it has quadrupled. In some cities of Latin America, the homicide rate is as high as 120 per 100,000 people. In Jamaica last year, the murder rate reached 1,672 – one of the highest rates per capita in the world. A worsening economic climate has been blamed for a significant increase in other violent crimes including theft, robbery and rape.

Economic development

In economic terms, large numbers of dead, injured and imprisoned people mean a loss of work productivity and income, a lower GDP, higher hospital and healthcare costs, increased expenditures for policing, justice and prisons, and more. And while urban violence is rooted in underdevelopment and inequality, there is a vicious circle by which urban violence undermines development and further weakens state institutions.

Significant levels of crime and violence discourage foreign investment and impede entrepreneurs from investing in their own country. Insecurity can lead to capital flight and a brain drain. Tourists stay away. Property values plummet. Geographical segregation worsens, as small businesses and educated middle-class residents flee high-crime neighbourhoods, leaving these areas to the criminals and those too poor to leave. As a result, the situation continues to deteriorate.

Social costs

Urban violence damages social capital, prevents social mobility, destroys communal bonds, erodes neighbours' trust in one another and in police or local authorities, and creates a wall between marginalized communities and the establishment. The worst affected are the most vulnerable people, who become poorer, more segregated and less equal.

Simply the fear and anxiety that persistent violence engenders can increase the costs to society. While the rich shut themselves off behind elaborate security systems, the underprivileged are forced into slum settlements or stigmatized neighbourhoods. The most vulnerable – women, the elderly, the destitute – may stop going to work, drop out of night school or keep their children at home. A nationwide survey revealed that in South Africa, fear of crime prevented about one-quarter of respondents from starting their own businesses or taking public transport. In Lagos, 70 per cent of those surveyed feared becoming victims of crime.

Democratic freedom

High levels of urban violence constrain the exercise of democracy by weakening institutions' legitimacy through corruption, undermining the authority of local government and preventing political participation through fear and intimidation.

There is a loss of press freedom when gangs and criminal groups target and sometimes kill investigative journalists who report on their activities. "Scores of reporters and numerous news outlets are engaging in self-censorship for fear of retribution," warns the Committee to Protect Journalists. Crimes are underreported and corruption is unchecked.

The militarization of law enforcement in a growing number of countries also threatens freedom. To confront the drug cartels behind so much of the urban violence, states are

increasingly calling on national armies and other military forces. In Mexico, Colombia and Jamaica, the sight of troops being deployed to conduct searches, secure neighbourhoods and hunt down suspected criminals is leading to a blurring of the distinction between civil and military responsibility. This may be necessary when criminal networks' firepower becomes a threat to the state's monopoly on force, but the use of the army for public security should be an exception and should never be allowed to dilute the principle of civilian control of the military.

Box 4.1 Violence and young people in urban settings

For young people, the risk of experiencing violence – as victims, perpetrators and/or observers – is highest in urban environments where more than 1 billion people under the age of 18 years live, many of them in slums.

Young people are impacted by, and inflict on themselves and others, violence across a variety of urban settings. Violence – such as being beaten, exploited, bullied, sexually abused, exposed to rage and angry blows between others, or having self-esteem constantly crushed – occurs in communities, homes, schools, institutions, workplaces and online.

Some of these settings are considered 'private' such as homes, institutions and workplaces; in these settings violence can stay hidden, invisible and secret behind closed doors. It is not spoken of and is denied, ignored or even accepted as an inevitable reality. As one youth put it: "I have been sexually abused four times. I really want help but I'm too scared. My friend had the same thing happen but won't tell anyone. No one understands. I'm scared."

In contrast, in public settings like city streets, slums and school yards, violence can often be flagrant, unconcealed and visible to the community. "It is easy to get beaten if you are a street boy. People can rape you. Men can beat a boy and rape him. There is nothing you can do but run away if you are lucky," said a child surviving on the streets of a mega-city.

Too often the private and public forms of violence against young people are treated as though they are separate and unconnected. In reality, violence against young people in private and public settings is deeply intertwined; violence in homes and private settings spills out to all aspects of a young person's life. A common example of this spill-over can be seen in the role of young people in urban gangs and crime networks. Although not often recognized as such, these are a visible, public culmination of violence that begins in the private sphere.

Through child abuse in the home, bullying at school or exposure to family members physically and psychologically tearing each other down, young people learn that violence can be tolerated and used effectively to control those who have less power, and it can even help gain benefits. "Witnessing violence teaches you violence and makes you hate," explained one young person. In addition, these experiences can push young people away from their homes and leave them dependent on and vulnerable to others. A former gang member recounted that: "A lot of the young women are escaping from horrible home situations, especially with their fathers… So if the girls go out with these guys from the paramilitary it gives them a sense of rebellion, of power. These guys protect them – a guy with a gun. It is very common."

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Surrounding what happens in homes and on the streets is a set of social, economic, political and environmental factors that shapes the opportunities and choices available to the young. To escape, some young people can make harmful choices and be drawn into a world of drugs, guns and crime. Each young person caught in the cycle of violence means adults have failed in their responsibility to protect; it means a diminished potential for prosperity, safety and success for each community.

In 2007, the International Red Cross and Red Crescent Movement defined violence in urban settings, especially for children and youth, as a "great humanitarian challenge". In 2010 the International Federation of Red Cross and Red Crescent Societies (IFRC) reinforced and expanded on this by launching the IFRC Global Strategy on Violence Prevention, Mitigation and Response with a particular focus on urban environments and the risk among children and youth.

The strategy builds on the diverse, grassroots experience of Red Cross and Red Crescent Societies in addressing violence in each corner of the globe through working with orphans, young migrants fending for themselves or fleeing with their families, children living on the streets or those caught in the crossfire in *favelas*; helping young people to finish school, learn livelihoods and hold on to their dreams in the aftershock of war or disaster that has left their cities depressed; or enabling adults or youth to reach out to young people and educate them on violence prevention.

Root causes include the availability and misuse of alcohol, drugs and weapons; gender inequalities; discrimination and exclusion; violent cultural norms; poverty and a lack of economic opportunity; weak or missing support systems; and tolerance for the misuse of power.

While adults in their families, workplaces and communities have clear responsibilities, it is only in partnership with young people themselves that violence can be prevented, mitigated and responded to – in any setting, private or public. ■

Risk factors

A study of the world's hot spots reveals a range of reoccurring preconditions or risk factors that combine to provide fertile ground for urban crime and violence. Two sets of factors in particular are linked to higher levels of urban violence: socio-economic factors, which entrench poverty, exclusion and inequality, and political-institutional factors, which can produce a crisis of governance.

Socio-economic factors

Deprivation

Deprivation of human needs has been widely recognized as an important underlying source of social conflict. In towns and cities of developing countries, one out of every three people lives in the slums. And because slum dwellers rarely pay taxes, many municipalities decide they are not entitled to public services or security. As a result, slum dwellers find themselves ignored by the state, deprived of basic services and excluded from society. In the particular context of rapid urbanization, government failure to provide security and basic social services, such as clean water, sanitation, health and education facilities, may fuel tensions arising from the integration of rural

migrants into city life creating a volatile atmosphere and leading to violent confrontations between groups competing for scarce resources. Forcible eviction is a constant threat. Large-scale evictions by public authorities displace millions every year, sometimes for redevelopment or beautification projects, or simply to target and remove undesirable groups.

In Mumbai, India, up to 400,000 people were displaced by a slum-clearance drive in late 2004 and early 2005, while in Zimbabwe, 700,000 people were forced to vacate their homes in six weeks in May–June 2005. Most of these people ended up even more vulnerable than before. Cambodia has one of the fastest-growing rates of urbanization in Asia and, in recent years, Phnom Penh has experienced an unprecedented boom in property values. As market prices have increased, whole communities have been relocated from land they occupied or bought in the post-war period, or forced out of their homes to make way for condominiums, shopping malls and office blocks. Housing rights groups estimate that 133,000 people – 10 per cent of the city's population – have been evicted since 1990.

Many of these conditions can also be seen in Dhaka, Bangladesh, one of the world's fastest-growing cities. Here, the population was 400,000 in 1950, grew to around 12 million by 2007 and is projected to reach 20 million by 2020. Between one-third and one-half of its residents are poor, living in 3,000 slums and squatter settlements. Many experience physical harm or murder at the hands of *mastaans*, armed thugs who control the slums through extortion and terror. Migrant women who work long hours and walk home late at night are particularly vulnerable. In 2001, the government enacted an urban cleansing programme in the slums. Reportedly, while the police carried out mass evictions, *mastaans* raped and looted unhindered.

Inequality

A factor even more important than poverty is inequality. Countries with high levels of urban violence tend to suffer from very unequal income distribution patterns and this unequal access to economic opportunity is frequently cited as the main risk factor for urban violence. Studies have shown that income inequality – which is highest in Africa and Latin America – is much more strongly associated with violent crime than poverty. In Latin America, homicide rates are between 40 and 56 per cent higher than the rest of the world. According to data compiled by the UN Economic Commission for Latin America and the Caribbean (ECLAC), 180 million people in the region are living in poverty, 71 million of whom are classed as indigent or ultra-poor. Figures for 2008 indicate a slowdown in poverty reduction and a reversal of the downward trend in indigence since 2002. Only Brazil, Paraguay and Peru continued to reduce the number of people living in ultra-poverty, by around 1 percentage point. Indigence increased by between 1.4 and 2.5 per cent in Venezuela, the Dominican Republic, Ecuador, Mexico and Panama. Costa Rica and Uruguay recorded very slight increases. In Colombia, indigence rose by 2.7 per cent between 2005 and 2008, or 0.9 per cent per year.

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Table 4.1 Measuring inequality

Country	1992–2007*
Chile	52
Mexico	48.1
Brazil	55
Colombia	58.5
Peru	49.6
Ecuador	54.4
Dominican Republic	50
Jamaica	45.5
El Salvador	49.7
Honduras	55.3
Bolivia	58.2
Guatemala	53.7
South Africa	57.8
Kenya	47.7
Haiti	59.5

Source: UNDP (2009)

* The Gini index co-efficient lies between 0 and 100.
  A value of 0 represents absolute equality and 100 absolute inequality.

Although income distribution also improved compared with 1990, with an average drop of 4 per cent in the Gini index, income inequality in Latin American countries continues to be among the highest in the world. The most significant improvements were in Venezuela, Nicaragua, Panama and Uruguay, while Argentina, Costa Rica and Ecuador recorded increased levels of inequality.

These increases no doubt contributed to citizens' perception that their countries suffered from great distributive injustice. A 2009 ECLAC report found that: "The perception that income distribution is highly inequitable is associated with a distrust of political institutions and a belief that governments serve the elites more than they serve the majority." For many people, inequality is a consequence of an elite minority retaining a disproportionate level of control and influence over income and economic opportunity. This was seen as a threat to social cohesion, particularly in the context of increasing poverty and deprivation.

Spatial segregation is also an important factor in increasing urban violence. The geographical concentration of the poor in slums, shanty towns and outlying semi-urban areas isolates them from the rest of society and from the housing, health and education services, employment opportunities and social capital they need to improve their lives. As cities expand and develop, the poor are increasingly subjected to a combination of economic decline and social cleansing programmes to remove them from the streets.

This dislocation significantly reduces their access to opportunities for informal business or self-employment, running hawker stalls, kerbside repairs or providing cheap transport. Without access to the economic and social life of the city they become trapped in a vicious circle of poverty and exclusion, which passes from generation to generation. Desperation and frustration can often boil over into conflict, crime and violence.

Social factors

There are social factors, too, such as a culture of machismo, where males earn status by proving their strength and masculinity. Demographics also count, since young men are most often the victims and the perpetrators of violent crime. High youth unemployment is another cause. Worldwide, young people aged 15 to 24 represent one-quarter of the working-age population, yet account for almost one-half of the global unemployed. Nearly 25 per cent of the workforce in this age group earns less than US$ 1 a day.

In Latin America and the Caribbean, drug use and trafficking have been central to a process of social decomposition producing violence within families, between gangs, between dealers and with corrupt officials. As traditional social institutions are eroded, they are replaced by perverse social capital in the form of gangs, drug mafias who 'govern' neighbourhoods and networks of corrupt public servants and politicians.

Street children, who may number in the tens of millions worldwide, are easy targets for membership in youth gangs. They end up on the street due to poverty, child abuse or the disintegration of the family. In general they have little education, are exposed to drugs and sex and live at risk of HIV/AIDS and teenage pregnancy. They are both victims and perpetrators of crime, which they commit in order to survive. In Nairobi, where approximately 60,000 people are homeless, street children mug pedestrians and snatch purses, pick pockets, extort money and engage in prostitution. Here and in many other cities from Guatemala to India, street children are seen as a menace to society and police brutality against them is widely accepted.

Political-institutional factors

In cities around the world, from Managua and Lagos, to Kinshasa and Karachi, there is a generalized lack of trust in the state's ability to prevent crime and violence. Authorities are unwilling or unable to protect the populations of rapidly expanding urban areas. Many local governments lack the financial resources to recruit additional police officers or buy basic equipment such as handcuffs or helmets. Often, underpaid police officers refuse to risk their lives by entering dangerous neighbourhoods. In some countries the vast majority of crimes are never investigated – overload, lack of resources, incompetence and corruption lead to the erosion of the investigative capacity of the criminal justice system. In some cases, criminal networks become so powerful that they even threaten the state.

Crisis of legitimacy

Many states with high levels of urban violence are characterized by their inability to provide services or security, maintain an effective presence throughout their territory or collect taxes. The social contract between the state and society is dysfunctional. When the social contract functions well, the state mobilizes sufficient public revenue and provides security and other essential services, and citizens pay taxes to finance state activity to produce these public goods. The state's legitimacy – public confidence in the political institutions, rules and cultural and social norms that regulate the operation of government – is enhanced and stability reinforced. When the state fails to meet the citizens' expectations, legitimacy is eroded.

States may be unwilling or unable to meet the expectations of the people. In some countries elite groups are not willing to fund social programmes and significant proportions of the national budget may go towards military or other elite sectors while health and education receive only a fraction of the allocation needed to provide basic services. When citizens commit to the social contract and consent to be governed, they expect that their basic needs will be met – this is the essence of legitimacy. If these expectations are ignored or repeatedly frustrated, legitimacy is eroded. When legitimacy is very low, citizens may be reluctant to pay taxes and may condone or engage in anti-social, violent or criminal activity. For example, tax revenues in Mexico amount to 11 per cent of GDP, in Guatemala they are equivalent to 12 per cent, in Peru 16 per cent. In Pakistan, tax revenue has fallen to 9 per cent.

Jamaica Red Cross volunteer providing counselling to children living in the Tivoli Gardens garrison community in the capital, Kingston, following an eruption of violence earlier this year.

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Unconsolidated state formation and weak political institutions

Countries undergoing a transition to democracy, emerging from periods of authoritarian rule or recovering from internal conflict are particularly vulnerable to high levels of urban violence. In the past, political authority may have been monopolized by a dominant ruling class or coalition of powerful groups. This culture of monopolizing power and limiting access to other groups has frequently led to political instability and populism, sometimes precipitating a crisis of legitimacy. These countries also tend to have weak political institutions with multiple and often competing centres of power. When regimes are paralysed by divisions and state–elite conflicts, critical judicial and economic reforms, which are necessary to consolidate democratic transitions, promote economic growth and develop a genuine social contract, become impossible because they threaten the vested interests of elites. Unreformed judicial systems remain politicized and corrupt and are often overwhelmed by the rise in crime and the demands of international counterterrorism and counter-narcotics campaigns. Failure to respond effectively to rising crime and violence creates a chain reaction as impunity destroys the credibility of the law enforcement system and this in turn erodes its capacity for deterrence. This inhibits economic growth and undermines state capacity to deliver basic services, contributing to a worsening of the conditions of deprivation and inequality that drive people to commit violent acts.

When the effectiveness of the law does not apply to all citizens and groups, or to all the territory of the state, the state loses its authority. Impunity also contributes to a culture of excessive force or brutality by police in poor neighbourhoods, including the practice of torture and even summary execution of crime suspects from slum or shanty town settlements. Police have been known to target entire communities rather than individual offenders, so that civilians view them as 'enforcers' and not protectors. These crimes often go unpunished. Data from the US State Department and Amnesty International show that in 2006, extrajudicial killings accounted for more than 50 deaths in 31 countries. In the *favelas* of Rio de Janeiro, military police combat drug gangs by conducting violent mass raids, turning neighbourhoods into urban battlefields. According to the UN Special Rapporteur, Brazilian police declared extrajudicial killings and summary executions to be "acts of resistance followed by death", and recorded 1,330 of these 'resistance killings' in 2008.

Exclusion

Government failure to provide essential public goods leads to exclusion. For the wealthy this situation is often pre-empted by self-exclusion as they choose to hire private security forms, send their children to private schools or seek medical treatment and preventive healthcare at private hospitals. But this self-exclusion only compounds the government's failure and contributes to the creation of a different class of citizen, an underclass with little access to basic human needs, living on the fringes of an elite society whose opulence it can only access on a satellite TV channel. Research has shown that the urban poor feel rejected by society, discriminated against and systematically denied the opportunities to improve their quality of life. This discrimination is internalized and expressed in lack of confidence in the state and its institutions

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and in a sense of hopelessness for the future. Research also demonstrates that this systematic segregation of the poor entrenches and perpetuates poverty over generations. One Latin American expert refers to a "dissident conscience" which develops in marginalized urban communities and is commonly expressed through violence. When the excluded and the marginalized look around and see business owners evading tax, politicians buying votes and appointing family members and friends to public posts, or using public money for personal gain, they lose confidence in the institutions of the state and begin to question what they gain from obeying the law.

Strategies

The recently passed benchmark – more than half the world's population living in urban centres – served to focus international attention on a major crisis that has not been adequately addressed until now. Thus far, solutions to the problems of urban violence have been scattershot and poorly financed, with little in-depth evaluation of what works and what doesn't.

Asking the police and criminal justice system to fix everything may only make matters worse. A broad-based response looks at better urban planning, effective and inclusive local governance, community involvement, reform of police and judicial systems, education and jobs for youth, effective international laws against organized crime, disarmament and gun awareness, and tailored responses to the specific circumstances of each particular local context.

Meaningful citizen involvement in local governance is key to reducing urban violence. The social contract between the state and society is based on an active dialogue about the expectations that citizens have of the state, its capacity to provide services, including security, and to secure revenue from its population and territory to provide these services. In addition, because people's needs and expectations of the state evolve over time and the state's capacity and resources are impacted by changes in both domestic and international political and financial conditions, this dialogue needs to be continually revisited and the agreement updated. A fundamental precondition for an effective social contract, therefore, is a set of effective political institutions and processes through which the state and its citizens can engage, consult and dialogue to renegotiate and reinstitutionalize aspects of the contract.

As the government representatives closest to the people, strong local leaders can increase a state's legitimacy. Local authorities that engage with constituents, respond to their needs and include them in decision-making can build trust in the community and encourage inter-group dialogue to ease any tensions. At the same time, community involvement in urban planning, service provision and violence-reduction strategies increases the chances that they will work. To ensure they can deliver on their commitments, municipal governments need to have enough autonomy and resources to act effectively.

In Latin America, several countries have delegated authority to the cities, with positive results. In Medellín, Colombia, the homicide rate fell from 174 to 29 per 100,000 inhabitants between 2002 and 2007, largely thanks to local government initiatives. Mayors emphasized violence prevention, worked with civil society organizations and invested in supplying informal settlements with public transport, education, housing and even libraries. In Bogotá, mayors backed police training missions, improved public transport, built libraries and put restrictions on guns and alcohol. These and other measures brought down the homicide rate from 80 per 100,000 inhabitants in 1993 to 19 per 100,000 in 2007.

Following an increase in firearm violence, Toronto, Canada, is advocating for a countrywide handgun ban.

Urban planning, design and management are important elements in safety. Criminal acts tend to occur and reoccur in specific places: dark alleys, unlit areas, isolated bus stops. The physical layout of a city, its lighting, landscape maintenance and transportation systems can create or diminish opportunities for crime. A woman who commutes from work late at night and must walk on a dark, empty road from her bus stop to her home is easy prey for potential offenders.

In 1996, UN-Habitat launched the Safer Cities Programme, after several African mayors asked the organization for help in addressing urban insecurity. This programme contributes to UN-Habitat's main goal of sustainable urbanization by creating partnerships with local governments to prevent crime and violence through planning and management.

Community policing has spread to cities around the world and in a variety of forms. Basically, it holds that community participation is a necessary part of the security process and that the police are accountable to the people. In Mumbai, where police are often corrupt or absent, authorities have created a system of *panchayats*, neighbourhood organizations that serve as links between slum dwellers and the local police. The *panchayats* resolve disputes at the local level, improve police accountability and empower women, since many of the volunteer representatives are female.

A form of community policing is now having an impact on the *favelas* of Rio, too. In late 2008, Brazil's military police moved into the Santa Marta slum, battling the drug gangs and eventually clearing them out. Then the city's first 'pacifier police division' stayed on, opening permanent bases in the *favela*, while the state invested in paving the streets, painting houses and building a health centre. The project has been copied in other *favelas*, reducing violent crime by up to 85 per cent in some areas and there are plans to extend it throughout the city by the time of the 2016 Olympics. It must be noted, however, that the police alone cannot solve the pressing problems of unemployment and a lack of public services, which continue to weigh heavily upon Rio's *favelas*.

At the same time, many of the world's largest cities are relatively secure, proving that urban settings are not automatic backdrops for murder and mayhem. With enough leadership, imagination and cooperation, solutions can be found to make the 21st century metropolis a safe and desirable place to live.

Box 4.2 Red Cross Red Crescent action

The Red Cross Red Crescent strives to prevent urban violence by improving children's self-esteem, teaching them skills and demonstrating peaceful resolution of conflict. In Sierra Leone, where children suffered through 11 years of civil war and were often made to fight, the Sierra Leone Red Cross Society developed child advocacy and rehabilitation centres (since expanded to Liberia). The programme offers psychosocial, educational and vocational training to war-affected youth and ex-combatants, helping them to reintegrate their communities. In South Africa, a programme entitled 'Soccer against crime' brings young people of different backgrounds together to play the sport, to help end the kind of discrimination and violence against foreigners that devastated Gauteng province in 2008.

In Central America and the Caribbean, the Spanish Red Cross runs a violence prevention project with eight countries. It targets youth leaders at risk and involves them in a variety of social projects which differ from country to country. In Guatemala, they do theatre and singing. In Nicaragua, young people learn to make necklaces and bracelets by hand and sell them in their communities. In the Dominican Republic, youth help to clean up national parks and coastlines. "Our work is to help them become part of their communities," Juan José Martinez Solis, violence prevention coordinator for the Spanish Red Cross, told the *World Disasters Report*.

A Canadian Red Cross programme called RespectED teaches children and youth to stop bullying, harassment, dating violence and abuse. It has been expanded to urban settings in Sri Lanka and Guyana. And in Norway, the Red Cross has a street mediation programme, where young people teach their peers how to communicate peacefully and manage conflict. A standby mediation team intervenes in ongoing conflicts, such as those between gangs.

When Michel Minnig, former head of the International Committee of the Red Cross (ICRC) in Southern America, arrived in the region in 2004, he was struck by the gravity of the situation in Rio's *favelas*. As he explained, "The consequences for the civilian population of this armed violence in an urban setting were similar to the ones we used to see in an armed conflict – people killed and wounded, a lack of infrastructure, a whole range of tension and abuse." Minnig was one of the early proponents of ICRC action to help improve dignity for and respect towards the most vulnerable inhabitants of Rio's *favelas*. And so in December 2008, the organization launched a pilot project in seven of the city's most wretched slums.

Since then, the ICRC, the Brazilian Red Cross and other local and state actors have started to work together, conducting first-aid training for residents, ensuring access to medical care including mental health, addressing the situation of adolescent mothers and their children, working with seven schools to improve humanitarian values and space in their surroundings. Very importantly, the ICRC works with the police to integrate international

human rights standards and humanitarian principles into their work.

The IFRC promotes the Youth as Agents of Behavioural Change programme, which invites children to participate in role-playing games or visualization exercises and then discuss their emotions. For example, a group forms a circle and prevents others from breaking through, a game that teaches empathy for excluded immigrants. The games are an instinctive, non-cognitive way to learn compassion, active listening, critical thinking, non-judgement, mediation and a peaceful resolution of tensions. Games and exercises are adapted to meet the needs and challenges of each national context and peer education is essential. "The programme is about changing mindsets, attitudes and behaviour in a society and how youth can play a leadership role in that," said IFRC's Katrien Beeckman, who founded the programme. ∎

The future of urban violence

At best, however, these strategies can only hope to lessen the impact of violence in the targeted communities. This is not to deny the important progress that has been made through community-centred approaches and development initiatives. For example, the adoption of targeted social programmes that deal directly with the problem of poverty, such as the Benazir Bhutto Income Support Programme in Pakistan, Progresiva in Mexico or Bolsa Familia in Brazil and other conditional cash transfer schemes, have helped reduce income inequality in targeted communities. But these gains are threatened by global economic conditions, ageing populations and the failure to extend the benefits through reforms that improve the quality and reach of health and education services nationally. For example, while developed countries regularly spend up to 18 per cent of total government expenditure on health, Kenya spends only 6.1 per cent, Jamaica barely 4.2 per cent and Pakistan a paltry 1.3 per cent. And while important progress has been made in the number of children attending primary and secondary school education, the quality is often appalling. In Brazil where 70.4 per cent of the population is qualified as 'low education attainment' in the UN Development Programme's 2009 Human Development Index, a quarter of the education budget is spent on free university education while primary and secondary education is neglected. In parts of Pakistan, the female literacy rate is 3 per cent.

Regardless of how sophisticated the economic models used to develop government strategies to cushion the effects of economic crisis and support income redistribution are, no amount of social spending or development programming innovations will be able to withstand the corrosive impact of corruption or to resist being derailed by elite groups if the political system does not establish equality before the law. The principle that the law of the land should apply equally to all is a cornerstone of a free society and one which is often markedly absent in countries where urban violence is rife. The discretionary application of tax codes, zoning laws, public procurement and contracting regulations, criteria for public appointments, restrictions on the exploitation of natural resources and even court rulings, benefits the few and establishes a neo-feudal hierarchy of elite groups, special interests and favoured individuals, creating one of the most powerful incentives for widespread crime and violence. International assistance

can help, but – as the Organisation for Economic Co-operation and Development's Development Assistance Committee points out – international actors have not yet adequately incorporated into policies or practice a sufficiently nuanced understanding of the dynamics of state failure to establish stable political order or developed appropriately contextualized state-building strategies.

International assistance is also needed to tackle the tidal wave of urban violence driven by drug production and trafficking in Latin America. It is no coincidence that the Caribbean basin has the world's highest murder rate. The 2008 report of the Latin American Commission on Drugs and Democracy – chaired by Fernando Henrique Cardoso, Ernesto Zedillo and César Gaviria, former presidents of, respectively, Brazil, Mexico and Colombia – stated categorically that the so-called 'war on drugs' was a failure, with staggering costs for the hemisphere, and called for a new paradigm to deal with the problems of narcotics. Similarly, calls for the restoration of the United States ban on the sale of assault weapons which expired in 2004 have been echoed by officials in both the US and the countries of the Caribbean basin in which tens of thousands of weapons originating in the United States are seized every year.

As this chapter illustrates, the dramatic increase in urban violence is rooted in the economic, social and political conditions in which rapid urbanization takes place and the globalization of international crime and in particular drug trafficking and the illegal trade in firearms. Without comprehensive action to tackle these conditions, address economic inequality and reform political systems characterized by weakness and instability, violence is likely to continue. Ultimately, confronting elite and special interest groups may be the single most important challenge for violence reduction.

Chapter 4 was co-written by Amy Serafin, freelance journalist, and Sean Deely, independent conflict and development analyst. Box 4.1 was contributed by Gurvinder Singh, Canadian Red Cross, and Sandra Gutiérrez, IFRC Principles and Values Department. Amy Serafin contributed Box 4.2.

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CHAPTER 4

Urban risk to health

The rapid rise in the number of people living in urban centres and cities around the globe brings with it new forms of urban risk in the health sector. It is a tragic irony, but millions of people continue to be exposed daily to diseases that medical science has long known how to prevent and/or to cure. Acute respiratory infections, dysentery and diarrhoea, largely under control in cities in high-income countries, continue to exact a significant toll on the health and well-being of a disproportionate number of those who live in the sprawling slums of the developing world. Tuberculosis (TB) is rampant in many cities worldwide regardless of their overall economic status. At the same time, more recent non-infectious conditions such as diabetes, heart disease and depression, which are linked to urban lifestyles, threaten both rich and poor in all countries. On World Health Day in April 2010, Jacob Kumaresan, director of the World Health Organization's Centre for Health Development based in Kobe, Japan, said: "While urban living continues to offer many opportunities, including potential access to better healthcare, today's urban environments can concentrate health risks and introduce new hazards."

The World Health Organization (WHO) cites a multitude of health challenges in modern cities, relating to "water, environment, violence and injury, non-communicable diseases (cardiovascular diseases, cancers, diabetes and chronic respiratory diseases), unhealthy diets and physical inactivity, harmful use of alcohol as well as the risks associated with disease outbreaks. City living and its increased pressures of mass marketing, availability of unhealthy food choices and accessibility to automation and transport all have an effect on lifestyle that directly affect health."

The conundrum of urban living is that, on the one hand, in well-governed cities where health and social services are available alongside safe and well-functioning infrastructure, people can aspire to live to a ripe old age. People living in the progressive city environment of Porto Alegre in Brazil have a life expectancy of 76 years. But even in the United Kingdom, a member of the G8, variations in urban wealth and employment seem to be key determinants of good health and life expectancy. Research by the Chartered Society of Physiotherapy has found that men live an average of 69.3 years in the city of Glasgow compared to 80.8 years in the more affluent environs of London's Chelsea and Kensington. WHO has cited "the extremely poor health, more characteristic of a poor developing country" of the inner city poor as a factor in reducing overall life expectancy for the United States.

Nonetheless, city life can bring significant health benefits. Cities where environmental health hazards are reduced through provision of a safe water supply, sanitation, waste management and adequate shelter, and in which pollution is monitored and controlled, have lower mortality and morbidity rates. People in well-organized urban

Photo opposite page: Living in towns and cities can bring notable health benefits, but urban areas can also attract infectious disease, while non-infectious conditions such as diabetes and heart disease are linked to urban lifestyles and threaten city dwellers all over the world.

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environments can generally expect to live longer as they will also be well informed about the health benefits of not smoking, hygiene, good diet and exercise.

The other end of the urban health spectrum can be found in low- and middle-income countries where most of the world's impoverished urban dwellers live. In households lacking basic shelter services – water supply and sanitation in particular – the prevalence rate of diarrhoea among urban children soars, averaging 38 per cent in Pakistan, 33.3 per cent in Cameroon, 23.9 per cent in the Democratic Republic of the Congo and 32.3 per cent in Jordan. Diarrhoeal diseases account for nearly 2 million deaths out of a total of almost 10 million among children under the age of 5. There are parallels here with what we see unfolding in relation to the impact of natural disasters on urban centres and the dramatic differences in fatalities between low- and high-income nations (as highlighted in Chapter 1). Over the period from 1990 to 2006, industrialized countries saw under-5 child mortality rates drop from 10 to 6 per 1,000 live births, while in developing countries overall the reduction was only 103 to 79, a staggering gap which captures the urban risk divide in health.

In 2008, the average urban centre in Australia would not have experienced an infant mortality rate (IMR) of more than 5 per 1,000 live births, whereas, in the same year, the Nairobi Urban Health and Demographic Surveillance System, which covers a demographic surveillance area that straddles the two slums of Korogocho and Viwandani with a combined population of 73,661, found an IMR of 87 per 1,000 live births, above the national average of 81. It is not the fact of urban life as such that poses the problem for health; rather, it is the way in which these cities are governed and the application, or not, of appropriate public health and housing policies which determine the health consequences for the inhabitants.

Hunger and malnutrition in urban settings result not only from food insecurity (see Box 5.1) but are also a consequence of environmental hazards and shelter deprivation. Unhealthy living conditions in urban slums create a vicious circle whereby the likelihood of a child contracting diarrhoea, an acute respiratory tract infection and/or malaria are greatly increased by poor waste management and non-existent water treatment systems. According to current research almost half of all nutritional problems are linked to slum living conditions. Malnutrition is particularly lethal in combination with infectious diseases such as pneumonia, malaria, measles and diarrhoeal diseases – the major killer diseases affecting children. It is an underlying factor in over half of all child deaths.

Data cited by the United Nations Human Settlements Programme (UN-Habitat) show that the prevalence of child malnutrition can often be higher in urban areas than in rural areas in countries such as Benin and the Democratic Republic of the Congo. In the case of the latter, "46 per cent of children living in non-durable urban housing

are malnourished, compared with 16 per cent in rural areas […] in India, 45 per cent of children from households without adequate sanitation are malnourished according to recent Demographic and Health Survey data".

Today, over 25 per cent of the world's urban population live in informal settlements or slums. A slum household is defined by UN-Habitat as lacking one or more of the following: durable housing; sufficient living area; access to water and sanitation; and secure tenure. There are no reliable statistics available for this last indicator. Boosted by immigration from rural areas and continuing high birth rates, today's UN-Habitat estimate of 827.6 million slum dwellers is expected to hit a total of 889 million by 2020 assuming government efforts to tackle the issue are maintained and stepped up.

In many cases and especially in the developing world, urbanization has taken place so quickly that governments have struggled to keep up when it comes to providing needed infrastructure. When people are crowded together in unsanitary conditions, disease thrives. A 2005 report in *The Lancet* estimated that nearly half the urban population in Africa, Asia and Latin America has one or more of the main communicable diseases associated with inadequate water and sanitation – including diarrhoea and worm infections. Even in the developed world, cities can attract infectious disease. TB incidence, for example, is much higher in big cities, even in developed countries. New York has four times the national average TB infection rate. In some parts of London, TB is more common than in China.

But infectious diseases are only a part – and an increasingly small part on a global scale – of the health challenge facing urban dwellers. Non-communicable diseases and medical conditions, such as heart disease and diabetes, kill 35 million people a year. According to a 2009 WHO survey, the leading global risks for mortality in the world are high blood pressure (responsible for 13 per cent of deaths globally), tobacco use (9 per cent), high blood glucose (6 per cent), physical inactivity (6 per cent) and overweight and obesity (5 per cent). These risks are responsible for exposure to chronic diseases such as heart disease, diabetes and cancers.

Countries in South-East Asia and sub-Saharan Africa are particularly affected by the burden of disease as measured by WHO in disability adjusted life years (DALYs). These are underweight (6 per cent of global DALYs) and unsafe sex (5 per cent), followed by alcohol use (5 per cent) and unsafe water (4 per cent). While the other three particularly affect South-East Asia and sub-Saharan Africa, alcohol use shows a unique geographic and sex pattern, with its burden highest for men in Africa, in middle-income countries in the Americas and in some high-income countries.

On current trends, non-communicable diseases – those that are not infectious and do not spread from person to person – will be responsible for 75 per cent of all deaths

within a decade, according to the *Global Risks 2010* report by the World Economic Forum. In developing countries, chronic 'lifestyle' diseases are increasingly the cause of premature death in urban centres. In Kenya, 17 per cent of people living in urban slums suffer from diabetes or hypertension and cannot get screening services or drugs. Many of the factors spurring this growth in non-communicable disease can be linked directly to city living. In particular, obesity, which is a major risk factor in heart disease and diabetes, is becoming increasingly common, fuelled by more sedentary lifestyles and the ready availability of cheap, fattening, but not particularly nutritious, fast foods.

Research shows that the more urbanized a developing country becomes, the higher the consumption of sweeteners and fats. In *World Development*, B.M. Popkin noted that "a shift from 25 per cent to 75 per cent urban population in very low-income countries is associated with an increase of approximately four percentage points of total energy from fat and an additional 12 percentage points of energy from sweeteners". In both urban Brazil and South Africa, those with a higher education are less likely to be overweight.

In short, cities may often offer the best of what life has to offer, but they come with a heavy health warning.

Box 5.1 Hunger is back with a vengeance

In March 2007, a day's labour in Bangladesh could fund the purchase of 5 to 7 kilograms of rice but 12 months later a survey found that a day's wage could purchase only 3.7 to 5kg of rice.

In Kenya, 4.1 million urban poor were classified as 'highly food insecure' in March last year as rising prices combined with floods, drought and conflict to force slum dwellers to reduce food consumption and live with chronic hunger. The price of maize rose by 130 per cent in Nairobi.

The economic slowdown on top of stubbornly high food prices, despite a plentiful global food supply, added 100 million people to the ranks of the hungry last year. In May 2010, the Food and Agriculture Organization of the United Nations (FAO) launched an online petition for people to express their anger about hunger (www.1billionhungry.org), as for the first time in human history over 1 billion people are estimated to go hungry around the world.

The breakdown of 1,017 million hungry is: 642 million in Asia and the Pacific; 265 million in sub-Saharan Africa; 53 million in Latin America and the Caribbean; 42 million in the Near East and North Africa; and 15 million people in developed countries. FAO estimates that global agricultural production needs to grow by 70 per cent if the estimated 9 billion people that will inhabit the planet in 2050 are to be fed.

Surveys by the World Food Programme (WFP), the United Nations Children's Fund (UNICEF) and other agencies underpin International Monetary Fund statistics which

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show that prices of imported rice and local cereals have risen by 230 to 350 per cent since early 2008 as the worldwide economic crisis kicked in with disastrous consequences for both the urban and the rural poor.

The perception of hunger as a largely rural phenomenon is being challenged increasingly by statistics which show how malnutrition is taking root in urban centres especially among children.

A recent review by UN-Habitat of demographic and health survey data collected between 1990 and 2007 in various countries in Africa, Asia and Latin America and the Caribbean found that there has been serious malnutrition in these regions' urban and rural areas since 1990. In several African countries more than four out of ten children suffered from stunted development.

WFP cites one major lesson learned from its urban interventions during the high food price crisis: "Food insecurity due to the high food prices in urban populations was caused by restricted food access rather than insufficient availability." WFP considers that targeted food assistance and non-food-based interventions (cash and vouchers) are more appropriate in urban settings.

However, to date no systematic approach has been universally adopted to tackle endemic hunger among the urban poor to ensure that available food becomes affordable for those in need. In recent times there have been food protests in Burkina Faso, Cameroon, Côte d'Ivoire, Egypt, Haiti, Indonesia, Mauritania, the Philippines and Senegal. Some of these protests have turned violent. Some food-exporting nations have significantly reduced food exports to preserve their domestic supply.

Frank Orzechowski of Catholic Relief Services, a major food distributor to the urban poor, told the 10th International Food Aid Conference two years ago: "In the 34 years that I have been involved in the grain trade I've never seen conditions such as these. There is a danger that the situation will spin out of control in large parts of the developing world. Particularly vulnerable are fledgling democracies that have recently adopted free market economies."

He gave his audience a sober reminder of what happened in Liberia "where in 1979 riots in response to rising rice prices were eventually followed by a coup that submerged the country under a period of dictatorship and bloodshed that lasted over 20 years". ∎

Returning to the 19th century

Crowding people together without proper water supplies, sewage and sanitation increases the risk of transmission of communicable diseases, but it was only in the 19th century that doctors and medical researchers made the necessary connection between living conditions and disease. Over the course of the 1800s, London was repeatedly swept by epidemics. In 1839, for every person who died of old age or violence in Britain, eight died of disease. At the time, nearly one infant in three in England failed to reach the age of 5 and mortality rates in large British cities were much higher than the national average. The misery of 19th century city life for the majority was captured in novels such as *Oliver Twist* and *Hard Times* by author Charles Dickens.

Fast-forward to the 21st century and much of the burden of ill health is shouldered by those who live in the slums of some of the developing world's largest cities. In the

slums of the Indian capital, New Delhi, many health indices, such as infant mortality, are worse than in rural areas, which were long considered to suffer the worst ravages of poverty and deprivation. Like other big developing country metropolises, New Delhi attracts migrants from rural areas in search of work and what they hope will be a better life. For instance, many were attracted to the city by the prospect of jobs in construction as the city set about putting in place the necessary infrastructure for the Asian Games in 1982. Ironically, many of those workers who settled with their families in the Pashta slums on the banks of the Yamuna River have now found themselves among the 150,000 people who have been made homeless as the courts ordered a 40-hectare (100-acre) strip along the Yamuna to be cleared for a riverside promenade close to a key site for 2010's Commonwealth Games.

In New Delhi, slum dwellers make up over 40 per cent of the population. People defecate outside in the fields or the drains, according to Asha, a non-governmental organization (NGO) that works with slum dwellers to improve their living conditions. Residents are exposed to stagnant water, open drains, floods, rubbish, and noise and air pollution. It is little wonder that people get sick. Open sewers are just one of the unsanitary aspects of slum conditions. In addition to helping the spread of dysentery, cholera and other preventable diseases, the water contains parasites such as hookworm, whipworm and roundworm that infect the slum dwellers and children in particular.

In a country with a fast-growing economy and a middle class larger than that of the United States, New Delhi is also a glaring example of the health inequalities to be found in big cities. "There is a stark dichotomy here. On the one hand, Delhi has a good health infrastructure with excellent health facilities, which are, in fact, better than other parts of the country. For instance, it is possible to have a heart transplant here, at a cost. Yet, the urban poor cannot access even the most basic of healthcare facilities," said Thomas Chandy of Save the Children India.

Sometimes, people living in slums and informal settlements do not even show up on official population statistics, so it is little surprise if health and other services are also not provided. The population of the Haitian capital Port-au-Prince was 700,000, according to the last official census taken in 2003. But the real number is more than three times higher. "You see people moving for economic need into unplanned peri-urban environments, with a great deal of overcrowding, re-creating the conditions of the 19th century. It is as if none of the lessons of the 19th century health movement had been learned," said Michael J. Ryan, director of WHO's Global Alert and Response department.

Children bear the brunt

Children are most at risk from the precarious sanitary and health conditions reigning in slum areas. UN-Habitat's *State of the World's Cities 2006/7* report states that

pneumonia, diarrhoea, malaria, measles and HIV/AIDS account for more than half of the deaths of slum children under 5 and that the prevalence of these diseases is largely due to bad living conditions. Children from the highest income groups in slums still have higher rates of diarrhoea than children of the poorest rural families, because they are exposed to contaminated water and food. Pneumonia and diarrhoea each kill more than 2 million children in developing countries annually.

According to Asha, New Delhi's children suffer from vitamin-A deficiencies that can lead to blindness, and tuberculosis, diarrhoea and respiratory tract infections are very common. The mortality rates for the under-5s are among the highest in the world at 142 per 1,000 live births. Maternal health is poor and women frequently die in pregnancy or childbirth due to lack of access to suitable facilities or trained midwives.

Nobody knows with any precision how many street children there are around the globe. They hustle to get by in difficult conditions and are largely cut off from family support structures. A generally quoted UNICEF figure of 100 million dates back to 1989 with an estimated 10 million of those actually sleeping on the street. They live a precarious existence on the margins of urban life, constantly exposed to violence, disease, pollution and the threat of exploitation. Many of them indulge in substance abuse. Respiratory disease and skin conditions are rife among this population and they generally lack access to healthcare. Though research is thin on the subject, their condition is thought to be the result of many factors such as increasing urbanization and migration, poverty, food insecurity, HIV/AIDS and other factors which contribute to the disruption of normal family life.

Disease goes global – the pandemic threat

Eleven years ago, WHO observed that: "In the Middle Ages deadly plagues were shipped from one continent to another – carried by flea-infested rats on board ships. Today they travel by plane – carried by airline passengers from one corner of the earth to another. And all in a matter of hours." The number of international airline passengers commuting between urban centres has jumped since then from 1.4 billion to 2.2 billion. The rapidity and frequency of inter-city commuting has profound implications for public health.

Deadly airborne diseases such as pneumonic plague, influenza and TB can easily spread in crowded airport lounges, on a packed plane or by passengers after their return home. The poliovirus was imported into Canada in 1978 and 1992 by travellers from western Europe. Disease has gone global and cities are an important link in the chain. Large urban areas act as incubators for new diseases, creating the ideal conditions first for them to develop and then to travel. They offer a springboard for new international epidemics or even global pandemics.

New research suggests that HIV may have been around in central Africa for far longer than was initially suspected. It was possibly only with the growth of urban centres, such as Kinshasa, the capital of the Democratic Republic of the Congo, that the disease took root and then picked up the momentum to spread quickly around the world. In most parts of the world, HIV/AIDS is a predominantly urban phenomenon. UNAIDS, the UN's Joint Programme on HIV/AIDS, estimates that, on average, HIV is 1.7 times more prevalent in urban than in rural areas. This is largely explained by the fact that many of the risk factors, such as injecting drug use, are also more common in cities. Sex workers or men who have sex with other men, two other high-risk groups, are also more numerous in cities, if only because of the higher population density. But even in sub-Saharan Africa, where HIV is transmitted principally through unprotected heterosexual sex, research shows that urban women are more likely to be infected than rural women.

New diseases can emerge by jumping the species barrier from animals to humans. This was certainly the case in one of the two diseases that have most alarmed international health officials in recent years – the H5N1 flu virus, more commonly known as 'bird flu' or 'avian flu', which is believed to have originated in wild fowl. It was also probably true of the other, SARS (severe acute respiratory syndrome). Both diseases demonstrated how dense, urban living conditions provide the ideal breeding ground for new viruses.

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SARS caused near global panic for a while after it erupted in mainland China and then Hong Kong in late 2002 and early 2003. It has been called the first disease of the internet age because global communications helped fan fears about its potentially deadly impact. In the end only some 8,000 people caught the respiratory disease, mainly in South-East Asia and Canada, but it was fatal in nearly 900 cases. The newness of the disease, the fact that it was initially little understood and its high fatality rate, compared with the one in 1,000 of normal seasonal influenza, all stoked the worldwide anxiety. International flights were cancelled and schools, shops and offices shut in heavily affected cities such as Hong Kong and Singapore.

People in Hong Kong stopped going out and donned face masks. Sales of bottled vinegar soared because it was believed to act as an effective disinfectant. Tourism in the most affected areas slumped. Switzerland even barred jewellers from Hong Kong from taking part in the annual international jewellery fair at Basle, and the women's soccer World Cup was moved from China to the United States. Hong Kong's economy shrank 2.6 per cent and Singapore's by 2 per cent in the first half of 2003. Overall, the Asian Development Bank estimated losses in tourism revenue at nearly US$ 15 billion, or 0.5 per cent of gross domestic product.

Fortunately, the H5N1 virus, with a fatality rate of some 60 per cent – far higher than SARS – is not easily transmitted between humans. Since first appearing in China and Viet Nam in 2003, it has infected some 500 people, mainly in South-East Asia and Egypt. Nearly 300 deaths have been confirmed. The disease is now endemic in poultry in certain parts of the world. Worryingly, cities of South-East Asia – where the keeping of live poultry and live poultry markets are common – offer a pool of possible future infection and raise the spectre that the virus could yet mutate and pose a new threat.

If the H5N1 virus were as contagious as the latest new influenza bug – H1N1 – then the impact in terms of loss of life could be catastrophic. H1N1, which was first detected in Mexico in April 2009, has been among the fastest-spreading viruses ever recorded. By the time WHO declared a global pandemic a mere two months later, 74 countries and territories had reported infections. As of April 2010, cases had been reported in 214 countries, including 17,798 deaths. Again, cities speeded contagion locally, with international travel doing the rest.

"In terms of risk management human populations are now forced to live in a way that provides a wonderful point of amplification for disease and then travel and trade and the whole connection between these urban centres is creating a pathway to globalization for these diseases," noted WHO's Ryan.

Perhaps one of the best examples of how urban living can stoke epidemics is the tropical disease dengue fever. The incidence of dengue, whose effects can range from mild fever to fatal haemorrhaging, has grown dramatically worldwide to the point that some 2.5 billion

people – two-fifths of the world's population – are now at risk, according to WHO. The organization estimates that there may be as many as 50 million infections every year, with most going unreported. In the Americas there were more than 890,000 reported cases of dengue in 2007, of which 26,000 were of the often-fatal haemorrhagic fever type.

Yet 50 years ago, the disease was virtually unknown. It first appeared in Manila in the Philippines in 1953 and had jumped to Bangkok, Thailand by the end of the decade. Before 1970, only nine countries had experienced epidemics of the severe haemorrhagic fever, which kills in almost 25 per cent of cases. By 1995, this number had risen to around 40. The disease is now endemic in more than 100 countries in Africa, the Americas, the eastern Mediterranean, South-East Asia and the western Pacific. Not only is the number of cases increasing, as the disease reaches new areas, but so too is the number of serious outbreaks. In 2007, Venezuela reported over 80,000 cases, including more than 6,000 cases of haemorrhagic fever.

The disease is spread by the *Aedes aegypti* mosquito, which has come to thrive in tropical urban environments. It breeds in and around city homes, in roof gutters, beneath refrigerators, under flowerpots and anywhere there is stagnant water, including in waste packaging and discarded food tins. Used tyres are a favourite breeding ground. With globalization, the mosquito also gets to travel easily. Dengue is thought to have arrived in Brazil, now one of the most affected countries, in the rims of tyres exported from Asia.

Cities change us

With 70 per cent of the global population forecast to be living in urban areas by 2050, the predominant lifestyle around the world will become increasingly an urban one. But what are the implications of an urban lifestyle for health? It is a mixed picture whereby many improvements in basic health indicators, such as infant and child mortality rates and life expectancy, have to be balanced against health threats which stem directly from urban living.

The major risk factors for non-communicable disease are an unhealthy diet, lack of exercise, smoking and excessive use of alcohol: all of them fostered one way or another by urban living.

Perhaps the most visible and most health-threatening manifestation of the risk factors is obesity. Being significantly overweight greatly increases the chances of developing type 2 diabetes, heart and respiratory problems and even some forms of cancer. According to WHO, over 1.6 billion adults are overweight and nearly one in four is obese. By 2015, the figure for those overweight will have risen to 2.3 billion. As an example of the likely impact on health, WHO forecasts that the number of people with obesity-related diabetes will double to 300 million between 1998 and 2025 – with three-quarters of that growth projected in the developing world.

Urban life affects the way people work, move around and relax. Office jobs require less physical exertion than farm work, while getting around in a city is more likely to involve some form of transport – often door to door, if it is a car or motorcycle – rather than walking. Pressure to build within urban areas can leave less and less space for parks and areas of recreation. "What urbanization does is to change behaviour patterns," noted WHO's Kumaresan. "People have different eating habits, different levels of physical activity. If there are no fields or parks, kids have nowhere to run around and play. These are some examples of what urbanization does to our changing patterns of lifestyle."

Although there is no firm statistical correlation between rising urbanization and the growth of non-communicable diseases, there is no doubt that both have been advancing almost hand in hand. At the beginning of the last century, only some 10 per cent of the world's population was urban, and infectious diseases, such as malaria and tuberculosis, were still by far the biggest causes of premature death among adults. But by the final decades of the 20th century, nearly half of the world already lived in urban centres, some too small to be considered cities, and the burden of early death had also changed radically.

In the developed countries of North America and Europe, non-communicable diseases had long been fatal, which is why they used to be known as the 'diseases of the rich'. But by the beginning of the 21st century, 60 per cent of premature deaths around the world were being caused by non-communicable disease. In Latin America and the Caribbean, they account for two out of every three deaths, according to the Pan American Health Organization (PAHO).

New ways, new diet

The Gulf region is a case in point. Over the last 30 years it has experienced remarkable economic growth, modernization and urbanization. As the population has become richer and increasingly urban, diets have changed and now include a greater intake of processed and fast foods, rich in fats, saturated fats, salt and sugars, all of which fuel obesity. The percentage of people who are overweight in Kuwait, the United Arab Emirates and Egypt ranges from 68 per cent to 74 per cent.

In the Americas, the story is similar. The Latin American and Caribbean region is one of the most urbanized in the world, with more than three-quarters of its 433 million people living in towns and cities. Eating habits are changing, with people consuming less fruit, fewer vegetables and more processed food. According to PAHO, 50 to 60 per cent of adults in Latin America and the Caribbean are overweight or obese. Even more worrying for the future, the same goes for 7 to 12 per cent of children under 5. At the same time, 30 to 60 per cent of the population do not take the minimum level of exercise – 30 minutes a day – recommended by WHO. Predictably, in the past few years, the region has witnessed an explosion in chronic non-communicable disease – cancers, hypertension and heart problems. According to WHO figures, more than

75 per cent of the 6.2 million deaths estimated to have occurred in the region in 2005 were related to chronic diseases. In urban settings, poorer people have access to cheaper foods, which will often be less nutritious than more expensive varieties. It often costs less to eat badly.

But the health problems of urban dwellers, particularly the poor, extend well beyond eating badly and doing little exercise when it comes to exposure to non-communicable disease. In 2004, some 1.2 million people died from respiratory illnesses caused by outdoor urban air pollution. According to WHO, some 1.5 billion urban dwellers – mostly in developing countries – face levels of air pollution that are above the maximum recommended limits. Emissions from motor vehicles and factories are estimated to cause about 8 per cent of lung cancer deaths, 5 per cent of cardiopulmonary deaths and about 3 per cent of respiratory infection deaths. This is likely to get worse as World Bank projections indicate that motorized vehicles in cities will quadruple by 2050. Traffic kills and maims in large numbers. Around 90 per cent of the 1.3 million deaths a year attributable to road accidents occur in low- to middle-income countries.

Indoor pollution can be even more lethal. About 25 per cent of city dwellers in developing countries and 70 per cent of city dwellers in least developed countries use solid fuels for household heating and cooking. In 2004, exposure to indoor pollution was estimated to cause about 2 million deaths worldwide, mostly from pneumonia, chronic lung disease and cancer.

Box 5.2 Hi-tech rescue in a mega-city

Imagine you are in charge of delivering much of the emergency health services to a mega-city of over 20 million people and 4 million vehicles. It is a city so choked with traffic that drivers are only allowed take to the road on alternate days. There are 500,000 traffic accidents a year, countless heart attacks and fires.

How then do you meet the challenge of providing a 24/7 service, 365 days of the year, with 1,100 staff and a fleet of just 153 ambulances, each of which will normally respond to an average of five calls a day?

The Beijing branch of the Red Cross Society of China, led by Executive Vice President Lu Han, has come up with a series of innovations designed to maximize the use of limited resources by applying technology to the provision of ambulance services to a degree not seen in any other urban environment of its size. Speaking to the *World Disasters Report* during a Red Cross forum on urban risk at the Shanghai Expo, she said: "Urban response has become a priority in a crowded city. The Beijing Red Cross 999 line responds to over 50 per cent of the emergencies in the city. In comparison with the government's 120 line, our 999 emergency services line offers more choices. We are more focused on meeting the needs of our patients. For instance, we have 32 first-aid stations located in the traffic bureau's branch offices to ensure timely response to traffic accidents and there is also close coordination with the fire brigade."

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The Red Cross has 90 first-aid stations throughout the city and all its ambulances are equipped with GPS and closed circuit television. The command centre at headquarters always knows where its ambulances are and they can be diverted at a moment's notice to the scene of a major accident. Doctors can assist remotely with the early treatment of seriously injured patients and ensure patients are brought to the appropriate hospital department.

In 2009, in pursuit of their goal of saving both time and lives, they augmented their vehicle fleet with 50 motor bikes for first aiders who are equipped with Personal Digital Assistants (or palmtops) and GPS. "Motorcycles can reach the patients very fast when there are traffic jams. So we can make good use of the first four to six minutes after the call comes in, for this is the most precious period of time especially if the ambulance is going to be delayed by traffic," said Han.

In addition, she explained: "999 has a special programme for more than 200,000 households in Beijing. If they press a certain button on their phone panel, 999 will be aware of the basic medical background of the family, medical records, address and phone number. These are usually families looking after an elderly person."

The Chinese Red Cross has developed a unique mobile phone platform with many features not found on standard models. The GPS-equipped phones have proved useful to many families caring for a senile senior citizen lost in the city. The phones have an alarm button which will alert the Red Cross emergency centre when activated without even making a phone call. The phones can vocalize text messages for those who have poor sight and act as a torch and they also have an in-built radio.

A third generation of this mobile phone, which costs less than US$ 100, is now under development. It can dial 999 when activated by an immobilized patient wearing a watch-like device on the wrist.

The Beijing Red Cross provides many other services including helping victims of traffic accidents compile insurance claims through the 999 forensic centre's reports and providing medical care to anyone being held in police custody.

"Hi-tech equipment is only one aspect of our work. In addition to the technology we have also been focusing on increasing people's knowledge, skills and general awareness about disaster risk reduction. The Beijing Red Cross issued 6 million copies of its family first-aid manual in Beijing last year. More than 3 million people had received basic first-aid training by the end of 2009. We will continue to enhance our smart power – strategic planning and management in order to build a safer and securer mega-city," concluded Han.

Visitors to one of the city's most popular tourist attractions, Tiananmen Square, will be happy to hear that there is a first-aid post and ambulance stationed there 24/7. You are also in a city where more than 3 million people have received basic first-aid training – so help may never be too far away. ■

Mean streets

Violence is a serious risk to health in many large cities (see Chapter 4), whether it is Rio de Janeiro, Los Angeles or the banlieues of Paris. Much of this violence is related to the illicit drugs business which largely depends on end users living in cities. But there are other urban factors such as social exclusion, xenophobia and marginalization, unemployment and alcohol abuse that also fuel violence.

Illicit drugs are not just a source of violent crime, their use also poses a huge health challenge in itself and it is a problem that is heavily concentrated in cities. The same goes for alcohol abuse. Use of illicit drugs is fuelled by social and economic pressures and facilitated by easy availability in urban areas. According to WHO, urbanization is associated with twice the rate of hospital admission for drug or alcohol disorders.

Given the pressures of city life, it is no surprise that urban living fuels mental disturbance and distress. Levels of fear, anxiety and mental illness have been shown to be higher in urban environments. In a study carried out in Sweden in 2004, adult Swedes living in densely populated areas had nearly twice the rate of serious mental illness as those living in thinly populated parts of the country. A sense of lack of control, fear of unemployment, the breakdown of traditional social ties and bonds – a particular problem for immigrants – and urban overcrowding are all factors that can trigger high levels of stress.

One private clinic quoted in Britain's *Guardian* newspaper reported a 33 per cent rise in the number of people from the financial sector seeking advice for anxiety, depression and stress after the global financial crash of late 2007 and 2008. Unemployment, or the threat of it, undermined their sense of personal worth. Another group particularly exposed to stress in urban settings is the elderly. Older city dwellers, particularly in richer countries, often face loneliness and depression unless they are rich enough to be able to pay for private care.

WHO forecasts that within the next ten years unipolar depression will account for the greater burden of disease in developing countries. Community-based studies of mental health in developing countries support the view that 12 per cent to 51 per cent of urban adults suffer from depression in some form or other. Risk factors include marital breakdown, poverty, exposure to stressful events, long-term stress and lack of social support. Symptoms of depression are more common among urban women than men and among poor urban neighbourhoods rather than in non-poor urban areas. Inadequate shelter, unemployment and the relentless struggle to cope with adversity are all drivers of mental ill health for the urban poor.

Box 5.3 Safety on the urban road

Road transportation has become a key element of urbanization. By speeding up communications and the transport of goods and people, it has generated a revolution in contemporary economic and social relations.

However, this has not come about without cost: environmental pollution and urban stress are directly linked to growing road transportation. Above all, it is increasingly associated with the rapid escalation of road crashes and premature deaths, as well as with physical handicaps and psychological trauma.

Losses are not limited to reduced worker productivity and trauma affecting a victim's

private life. Equally significant are the rising costs in health services and the added economic burden (estimated between 1 and 3 per cent of gross national product). In developing countries, the costs often exceed the international development assistance received each year. Consequently, there is a direct link between road safety improvement and poverty reduction.
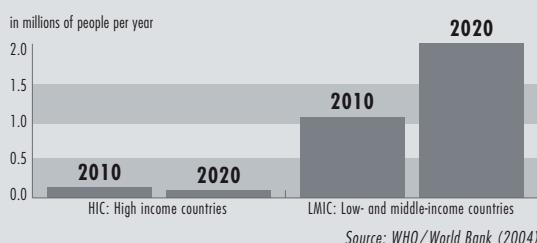
The situation is made worse in developing countries by rapid and unplanned urbanization. The absence of adequate infrastructure in cities, together with the lack of a legal regulatory framework, makes the exponential rise in the number of road crashes all the more worrying.

Road crash fatality numbers are comparable to the number of global deaths caused by TB or malaria. Worldwide, road traffic injuries are the leading cause of death among young people aged 15 to 29 and the second most common cause of death for those aged 5 to 14. An estimated 1.3 million people are killed in road crashes worldwide each year and as many as 50 million are injured. For every death, 20 to 30 people are disabled, many permanently.

"If significant preventive actions are not taken, we estimate that by 2020 road trauma will rank as the sixth biggest cause of death." *WHO*

Cost-effective solutions do exist and have already achieved very positive results in many countries. Together with its hosted project, the Global Road Safety Partnership (GRSP), the International Federation of Red Cross and Red Crescent Societies (IFRC) has prioritized the reduction of disastrous road safety crashes affecting young people. IFRC and GRSP are advocating for the adoption of straightforward solutions to avoid or significantly decrease the tragic human, social and economic consequences of urban road crashes. These include: implementation of national road safety action policy; better road systems; first-aid training; and closer partnerships with governments, the private sector and civil society

Viet Nam offers a good example of success. In 2006, the Vietnamese National Traffic Safety Committee, the Asia Injury Prevention Foundation, the Red Cross of Viet Nam and the French Red Cross contributed to efforts to create a national action helmet plan supported by GRSP. That led to enactment and enforcement of a new helmet law. In 2008, Viet Nam saw the first results: 1,500 fewer lives lost compared with 2007 when 12,500 people died on the road. ■

Campaign posters produced by the Red Cross of Viet Nam and the French Red Cross in Hanoi and Ho Chi Minh City

Road crash mortality projection 2020

in millions of people per year

	2020
2.0	
1.5	2010
1.0	
0.5	
2010	2020
0.0	
HIC: High income countries	LMIC: Low- and middle-income countries

Source: WHO/World Bank (2004)

Conclusion

Modern city life takes a heavy toll on health, partly through the unsanitary and often dangerous conditions in which millions of people are forced to live, partly through the lifestyle choices that it encourages and partly from the strains and stresses that it imposes. Lack of policy and poor planning by municipal and central government play a significant role in these outcomes.

While it is true that the number of slum dwellers continues to rise, some of the most significant strides in health improvements are being taken in countries where good urban governance is actively encouraged and supported and where lifting people out of slum conditions is a public policy goal. China and India have made progress in recent years in reducing their slum populations, showing what economic growth and political will can do. Some specific examples of how this can be done, particularly through community-based initiatives, are cited in Chapter 3 of this report, including the Thai government's support to community-driven upgrading whereby scale is achieved through the very large number of local initiatives that it supports. At a local level, NGOs such as Asha show what can be achieved by working with slum dwellers to improve living conditions and fight disease. In the 49 New Delhi slums in which Asha is active, child mortality is now 36 for 1,000 live births, which is less than half the rate of India as a whole.

When it comes to non-communicable disease, there are signs that political leaders are waking up to the threat. Whether it be Bogotá's *ciclovia* (specially constructed routes for cyclists in the Colombian capital) or Singapore's green labelling of dishes on school menus to help students identify healthy foods, examples are multiplying of countries and cities taking initiatives to tackle the problems of inadequate diet and lack of exercise. Community networks are being forged to overcome the challenges of social breakdown and violence in poor and underprivileged city zones of both developing and developed countries.

Underpinning all such initiatives is the growing awareness that tackling city health problems is not just a question of doctors and nurses. Nor is it solely a matter of alleviating poverty, although that is a crucial and necessary condition. It requires that cities be well planned, well managed and also well governed. Only then will they pose less of a threat to the health of those who live in them.

Chapter 5 was written by Richard Waddington, freelance writer and former Reuters bureau chief. Boxes 5.1 and 5.2 were contributed by Denis McClean, Editor, World Disasters Report. *Box 5.3 was contributed by Gérard Lautrédou, Road Safety Adviser, IFRC.*

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CHAPTER 5

CHAPTER 6

Urbanization and climate change risk

All successful urban centres provide proof of the ability of human societies to adapt to the particular physical and climatic conditions in which they are located. While disaster events have long had the capacity to disrupt urban communities, livelihoods and economies, climate change presents a new and systematic challenge to urban development and sustainability. Last year was the fifth warmest year on record and the decade 2000–2009 was warmer than the previous two record-breaking decades. In 2009, severe climate events included: a record-breaking heatwave which badly affected major urban centres in southern Australia; drought-related food shortages in Kenya which affected slum dwellers in Nairobi; and heavy rains which caused floods in many towns across central Europe.

This chapter explains the need for a specific focus on climate change and how it impacts urban centres, while recognizing that good practices in disaster risk reduction are at the core of climate change adaptation in most instances. Firstly, it assesses the ways in which climate change will affect patterns of risk, using both a geographical analysis (the distribution of risk between cities) and a social analysis (the distribution of risk within cities). This highlights how, without adequate adaptation, the increase in disaster risk in the next few decades is likely to be unprecedented through more intense or frequent storms, more intense precipitation and more serious heatwaves and drought. Secondly, it illustrates the ways in which efforts to reduce risk from disasters will increasingly need to incorporate an explicit awareness of climate change issues. Finally, it looks at the ways in which cities can address climate change – both through reducing greenhouse gas emissions and through adapting to cope with the consequences. These practices are particularly important in the global context of increasing urbanization and the need to improve the well-being of urban residents – including issues of mobility, shelter and food supply – without increasing energy use and greenhouse gas emissions.

Responding to climate change requires improving existing structures and building the capacity of departments responsible for urban development and environmental management – and their links to the institutions responsible for disaster response. At the same time, climate change adaptation can be used as an entry-point to develop more effective environmental strategies that meet the needs of urban residents. If properly addressed, adapting to climate change can help cities to meet a wider range of desirable objectives concerning liveability, service provision and the reduction of disaster risk. This will require a sharing of knowledge and skills between the two communities of practice, so that climate change practitioners can learn from the experiences of disaster risk reduction, and disaster risk reduction can cope effectively with new climate challenges.

Photo opposite page: Many people living in developing countries' coastal cities, such as here in Dakar, Senegal, face ever more severe floods due to more frequent storm surges, heavy rainfall and inadequate drainage systems.

© Ricci Shryock/IFRC

Box 6.1 Key organizations and concepts in climate change

The growing policy focus on climate change has led to the development of new institutions and the use of new terminology, some of which differs from that used in disaster risk reduction.

The **Intergovernmental Panel on Climate Change (IPCC)** is the global scientific body established by the United Nations Environment Programme and the World Meteorological Organization (WMO). It produces *Assessment Reports* (most recently, the *Fourth Assessment Report* in 2007) that summarize the state of knowledge on climate change and its potential consequences. Its preparation for the *Fifth Assessment Report* acknowledges a need for greater attention to adapting cities to climate change and incorporating knowledge and experience on disaster risk reduction.

The **United Nations Framework Convention on Climate Change (UNFCCC)** provides the global legislative framework for reducing global warming and responding to climate change and convenes the annual meeting for negotiating emissions reductions and adaptation financing known as the Conference of Parties, or COP (e.g., COP15 in Copenhagen, held in December 2009).

Greenhouse gases are gases that absorb and emit radiation of specific wavelengths, leading to the trapping of heat in the earth's atmosphere, a process known as the **greenhouse effect.** Although the process occurs naturally and is important in supporting life on earth, the emission of carbon dioxide, nitrous oxide, methane and other gases as a result of human activity has raised the concentration of these gases sufficiently to result in **anthropogenic climate change.**

Adaptation is an adjustment in natural or human systems in response to actual or expected climate change in order to reduce its harmful impacts. It may take place before the impacts are felt, may be planned through deliberate policies, or may be spontaneous. It can involve individuals, communities, local governments and nation states.

In the climate change arena, **mitigation** refers to a reduction in atmospheric greenhouse gases, thereby limiting the extent of anthropogenic climate change. It involves both reducing the quantities of emissions and enhancing the ability of natural and human systems to absorb greenhouse gases. ◼

Changing patterns of risk: The effects of climate change

Although the earth's climate has always been dynamic, over the last 100 years global temperatures have been rising largely as a result of human activities, a process known as anthropogenic climate change. This has been driven by the production of greenhouse gases – and their increasing concentration in the atmosphere – since the industrial revolution. Observed changes include an increase in the global average temperature of 0.740 degrees Celsius, increased ocean temperature and acidity, a decline in snow coverage in the northern hemisphere, more frequent and intense extreme weather events, shifts in the distribution of animal and plant species, and a rise in global average sea levels of 17 centimetres. The IPCC's *Fourth Assessment Report* concluded that likely future changes in climate include warmer and fewer cold days and nights, warmer and

more frequent hot days and nights, increased frequency of warm spells and heatwaves over most land areas, increased frequency of heavy precipitation events over most areas, increased areas affected by drought, increased intense tropical cyclone activity and increased incidence of extreme high sea level. These changes will result in a range of impacts on urban areas, as shown in Table 6.1.

Table 6.1 Climate change impacts on urban areas

Change in climate	Possible impact on urban areas
Changes in means	
Temperature	■ Increased energy demands for heating/cooling ■ Worsening of air quality ■ Exaggerated by urban heat islands
Precipitation	■ Increased risk of flooding ■ Increased risk of landslides ■ Distress migration from rural areas as a result of crop failures ■ Interruption of food supply networks
Sea-level rise	■ Coastal flooding ■ Reduced income from agriculture and tourism ■ Salinization of water sources
Changes in extremes	
Extreme rainfall/tropical cyclones	■ More intense flooding ■ Higher risk of landslides ■ Disruption to livelihoods and city economies ■ Damage to homes and businesses
Drought	■ Water shortages ■ Higher food prices ■ Disruption of hydroelectricity ■ Distress migration from rural areas
Heat- or cold-waves	■ Short-term increase in energy demands for heating/cooling
Abrupt climate change	■ Possible significant impacts from rapid and extreme sea-level rise
Changes in exposure	
Population movements	■ Movements from stressed rural habitats
Biological changes	■ Extended vector habitats

Source: Adapted from Wilbanks et al. (2007)

The extent to which urban centres are vulnerable to these changes in climate is influenced by a variety of factors. The location of cities affects the types of climate hazards to which they are exposed, and whether they are particularly likely to be affected by higher temperatures, changing patterns in precipitation, sea-level rise or more frequent or severe extreme events. However, and more importantly, vulnerability to these impacts is mediated through the social and economic circumstances of the city and its residents, and through the ability of stakeholders and institutions to address the challenges of climate change, sometimes referred to as adaptive capacity. Because of this, cities in low- and middle-income nations are particularly vulnerable to climate change – indeed, the IPCC concluded that "the distribution of impacts and vulnerabilities is

still considered to be uneven, and low-latitude, less-developed areas are generally at greatest risk due to both higher sensitivity and lower adaptive capacity".

It is also worth noting that most developing world cities – and the countries in which they are located – have contributed very little to the global greenhouse gas emissions that are causing climate change in the first place. At a national level, average annual per capita greenhouse gas emissions are more than 20 tonnes of carbon dioxide equivalent in many highly industrialized countries including Australia, Canada and the United States. At the opposite end of the scale, emissions from many sub-Saharan African countries including Burkina Faso, Malawi and Tanzania are less than 0.2 tonnes per capita per year – a more than 100-fold difference. The fact that urban residents in these countries are likely to be the worst affected means that supporting climate change adaptation is a vital environmental justice issue for the 21st century. In his address to the United Nations Summit on Climate Change in September 2009, IPCC Chairman Rajendra K. Pachauri spelt out what this could mean: "In Africa, by 2020, between 75 and 250 million people are projected to be exposed to water stress due to climate change, and in some countries yields from rainfed agriculture could be reduced by up to 50%. The impacts of climate change would be disproportionately severe on some of the poorest regions and communities of the world. My own analysis suggests that at least 12 countries are likely to tend towards becoming failed states and communities in several other states would show potential for serious conflict due to scarcity of food, water stress and soil degradation."

Complex inter-linkages exist between the effects of climate change and the process of urbanization. It is likely that extreme events and gradual changes alike will, in many cases, contribute to increasing levels of mobility. In most of these cases, mobility (along with income diversification) will be an important strategy for households and communities to reduce vulnerability to environmental and non-environmental risks and thereby to cope with climate change. At the same time, however, high urban densities can increase vulnerability to climate change-related disasters – particularly because inadequate institutions and lack of infrastructure are often concentrated in areas where there are also high population densities of low-income urban residents. In particular, rural–urban migrants often have no choice but to settle on land that is already densely populated or in relatively vacant sections that are particularly prone to disasters. Cities can also concentrate adaptive capacities: economic resources, diversified food sources, a wide range of income-generating opportunities, transmission mechanisms for early warning systems and efficiencies of scale for emergency responses are capacities that have the potential to be much stronger in urban areas.

The geographical distribution of climate change risk

The types of information used to assess the potential threats from climatic hazards are past records of exposure to extreme weather events such as tropical storms, likely

International Federation
of Red Cross and Red Crescent Societies

impacts of changing precipitation patterns and susceptibility to sea-level rise and storm surges. However, exposure to risk is not the same as vulnerability. A 2009 WWF report on the risks of climate change in ten Asian cities concluded that Manila, Ho Chi Minh City, Shanghai and Dhaka were all highly exposed to climatic threats. Some cities that are also highly exposed – including Kuala Lumpur, Hong Kong and Singapore – were identified as being much less vulnerable, because they possess the adaptive capacity to manage threats. The most vulnerable cities, such as Dhaka, Jakarta and Manila, are both highly exposed and have relatively low levels of adaptive capacity.

Urban areas located in coastal areas are particularly exposed to sea-level rise. The low-elevation coastal zone – the contiguous area along the world's coastlines that is less than 10 metres above sea level – covers just 2 per cent of the world's land area but contains 13 per cent of the world's urban population. By 2007, Africa had 37 cities with more than 1 million inhabitants and half of them are within – or have parts within – the low-elevation coastal zone. In Cotonou, Benin, coastal erosion is already affecting residential areas, fishing communities and the city's industrial and tourism sectors. A sea-level rise of 50cm would lead to over 2 million people in Alexandria, Egypt, needing to abandon their homes and would cause financial losses associated with land, property and tourism income of over US$ 35 billion. Much of Lagos, Nigeria is also low-lying, and the low-income urban population there faces a worsening situation as floods become more severe from the combination of increasing frequency of storm surges, heavy rainfall of long duration or high intensity and inadequate drainage systems.

The East African coast is also expected to be affected by sea-level rise, resulting in potential adaptation costs of up to 10 per cent of gross domestic product. In Dar es Salaam, Tanzania, coastal erosion is affecting the area of Kunduchi Beach to the north of the city. Other activities – such as the dynamiting of coral reefs for fishing, sand extraction for construction and the removal of mangroves – will worsen the impacts of sea-level rise in this area. In Asia, large sections of Dhaka and Shanghai are only one to five metres above mean sea level, while much of Mumbai is built on landfill and is likely to suffer from more serious storm surges and increased frequency and intensity of extreme weather as a result of climate change. Perhaps not surprisingly, in all of these cases, it is mostly low-income households living in informal or illegal settlements that face the greatest risks from flooding. Salinization of drinking water and groundwater is also a concern, as many coastal cities derive water from just above salt fronts. As sea levels rise, so too does the likelihood of drawing in saline water for municipal water supply systems.

Another geographically specific aspect of climate risk is an increase in water scarcity, which will particularly affect cities located in semi-arid regions. As South American glaciers retreat, many cities in the Andes will face water shortages during the dry season. A study from the central Andes of Peru suggests that the largest city in the region, Huancayo, with a population of approximately 325,000, is already experiencing water

shortages. Retaining walls and small dams have been constructed on nearby lagoons, but now these interventions are being called into question as they may have contributed to water shortages, along with the increased demands that come with population growth, land-use changes and deforestation. The city of Quito will also face water shortages, as glacial retreat is exacerbated by increased sedimentation of waterways, land-use modification and increases in water use due to higher temperatures. Food insecurity in urban areas is also influenced by climate change impacts on agriculture as a consequence of water scarcity and other weather impacts on crop production.

Box 6.2 Cooperating on flood risk in Saint-Louis, Senegal

Saint-Louis is Senegal's former capital and it had 180,000 inhabitants in 2002. The city is situated on three islands cut off from each other by the Senegal River, its tributaries and the Atlantic Ocean. Some areas of the city are less than 2.5 metres above mean sea level. The city has experienced recurrent flooding since 1990, caused by the rains and peak flows in the Senegal River. The rising river level is the result of the silting-up of the river bed, the dumping of household waste, the reduced area available for flood-water irrigation (as unplanned urbanization means these areas are now covered by houses) and a shallow water table that rises to the surface when the river swells and drains poorly during the winter season.

Who is affected by flooding?

Flooding in Saint-Louis generally affects areas inhabited by the lowest-income groups. The household economy of those most at risk from flooding is very fragile; after each flood, their poverty is increased. Schools generally take in the flood victims and two or three families may find themselves living in a single classroom and the school year may be reduced by several months. Economic activity also slows down as workplaces are under water.

The extent of the floods that occurred during the 2009 winter season led the Senegalese

authorities to initiate the national disaster response plan to address the situation. Stagnant rainwater in the flooded areas, combined with a lack of clean water, inadequate drainage and wastewater and solid waste management (only 30 per cent of households have a regular solid waste collection and less than 10 per cent sewer connections) brings serious health impacts. Risks are further compounded by the proliferation of disease vectors (flies, mosquitoes, cockroaches, rats, mice, etc.), poor hygiene and high levels of overcrowding.

Responding to vulnerability

The strategy of the Senegalese non-governmental organization (NGO) Enda-Tiers Monde in response to flooding in Saint-Louis has been based not on building infrastructure but on strengthening local governance. Stakeholders come together to engage in dialogue and exchange views in order to find solutions to problems that are beyond their individual skills or capacities. An action plan has been developed and is managed by a steering committee, which ensures that the programme's information, education and communication activities are implemented smoothly. Plays, exhibitions, media broadcasts, teatime 'chats', interviews, photo exhibitions, intensive awareness-raising campaigns, open-air conferences and public

feedback have all been used to help change behaviour.

Activities focus primarily on:
- digging paths to evacuate stagnant water
- regular maintenance of drainage channels
- disinfecting stagnant water, in association with the national hygiene department
- placing sandbags to help inhabitants get about within the neighbourhood itself.

The authorities use local labour for some drainage works and women's groups are involved in awareness-raising activities to combat diarrhoea and measures to be taken to prevent malaria and other diseases. NGOs work closely with the state's decentralized structures (health and sanitation departments, fire brigade, etc.) to raise awareness and change the population's behaviour. ■

The social distribution of climate change risk

Social factors account for a large proportion of the variability in vulnerability to climate change impacts. Firstly, poverty and marginality are key contributors to vulnerability. Exposure to climate risk is particularly evident for households and communities living in sites that are exposed to storm surges, flooding and landslides and which lack the resources and options to modify these effectively. Low-income urban residents are particularly vulnerable to climate change for a variety of reasons, including:
- greater exposure to hazards (e.g., through living in makeshift housing on unsafe sites)
- lack of hazard-reducing infrastructure (e.g., roads allowing emergency vehicle access)
- less adaptive capacity (e.g., inability to move to less dangerous sites or access savings or insurance)
- less state provision of assistance
- less legal and financial protection.

Secondly, climate change is expected to exacerbate pre-existing gender dimensions of vulnerability. On top of the well-documented and disproportionate impact of disasters on women's morbidity and mortality, climate change will impact women's livelihoods by reducing economic opportunities and will increase the burden of reproductive labour, for example, through a growing burden of child disease (see Table 6.2).

Thirdly, age greatly shapes vulnerability to the consequences of climate change. Children have higher susceptibility to diseases caused by poor sanitation or spread by vectors. Climate change may reduce availability of potable water, both through absolute scarcity and through increased spread of bacterial diseases, and vectors such as mosquitoes may expand their range due to rising temperatures. In addition, very young children have less capacity to cope with high temperatures and less ability or knowledge to respond rapidly to disaster events, and can suffer long-term damage to their cognitive

Table 6.2 Gender and climate vulnerability

Aspect of vulnerability	Contribution to urban vulnerability	Contribution to climate vulnerability
Gendered division of labour and 'poverty of time'	Women have prime responsibility for 'reproductive' labour; lack of time to engage in 'productive' labour	Limited financial assets to build resilience and to cope with disaster events
Gender-ascribed social responsibilities	Women have prime responsibility for 'reproductive' labour; lack of time to engage in 'productive' labour	Additional domestic responsibilities when access to food, water and sanitation are disrupted; additional time required to care for young, sick and elderly
Cultural expectations of gender norms	Constraints on women's mobility and involvement in certain activities	Higher mortality from disaster events due to lack of skills and knowledge
Unequal entitlements to land and property	Limited access to productive resources	Limited ability to invest in more resilient land or shelter
Higher representation of women in informal sector	Lower wages and lack of financial security	Damage to homes and neighbourhoods affects women's incomes more severely as income-earning activities are often undertaken at home
Safety and security in public spaces	Limited freedom to use public space	Particular problem in temporary accommodation/relocation sites; high rates of sexual abuse and violence
Limited engagement of women in planning processes	Urban plans fail to meet particular needs of women and children	Climate adaptation plans fail to meet needs of women and children; failure to incorporate women's perspectives may result in higher levels of risk being accepted

and social development as a result of early experiences. Heatwaves particularly affect elderly residents of temperate cities where the building stock is not suited to continuous high temperatures – the 2003 European heatwave was associated with more than 70,000 additional deaths across the continent.

Finally, in addition to morbidity and mortality as a result of one-off events, climate change will also result in qualitatively different patterns of health burdens on urban populations. Weather and climate also influence air pollution-related mortality and morbidity, the prevalence of mosquito- and tick-borne diseases and the spread of water- and food-borne diseases, e.g., through survival of bacterial pathogens and the transportation of disease organisms into water supplies. In northern Mexico, heatwaves have been correlated with increases in mortality rates; 10 per cent of summer deaths are associated with heat strain in Buenos Aires, Argentina; and records show increased cases of diarrhoea in Peru.

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Addressing the causes of climate change: The role of cities in climate change mitigation

Ultimately, reducing the risk of climate change requires global strategies to limit the atmospheric concentration of greenhouse gases. Without substantial coordinated efforts to reduce emissions, vast areas of the earth's surface – including many large urban centres – will be affected by catastrophic changes in their climate. For instance, the IPCC's *Fourth Assessment Report* noted the possibility of global warming causing a partial de-glaciation of the Greenland ice sheet and the West Antarctic ice sheet, which would contribute to a sea-level rise of several metres that would imply major changes in coastlines and inundation of low-lying areas. But the time frame for this is uncertain and this change could be prevented if governments follow IPCC recommendations for emissions reduction.

In this regard, climate change mitigation can be seen as the most effective form of climate change-related disaster risk reduction, and is an area in which cities can play a key role. As stated previously, most of the earth's population has made a minimal contribution to climate change and the burdens of mitigation ought not to be borne by these societies. In high- and many middle-income nations, however, urban areas need to be at the forefront of taking responsibility for climate change and reducing their emissions accordingly. Although the contribution of urban areas to global greenhouse gas emissions cannot be accurately quantified, the consumption behaviour of wealthy urban residents is a significant contributor to this. Similarly, various mitigation activities can also yield substantial public health benefits, including greater levels of physical activity and lower levels of air pollution.

A range of urban activities and sectors contribute considerably to greenhouse gas emissions. These include energy supply (direct and through electricity generation from thermal power stations), transportation, industry and waste. Urban authorities are able to contribute to emissions reductions in different ways, for example, by providing improved public transportation options or by providing incentives for homeowners to fit more energy-efficient appliances. Cities such as New York and London demonstrate that large and dense urban settlements offer opportunities for reducing carbon footprints – the average resident of New York generates just 30 per cent of the emissions of the average American and the average London resident generates just 55 per cent of the emissions of the average UK resident. Indeed, long-term planning to reshape urban form and structure may result in much more efficient public transportation infrastructure that meets both environmental and social needs. However, efforts to reduce emissions also need to take a 'consumption-based' approach, recognizing that many of the goods and services consumed by urban residents (particularly in more affluent countries) – including food, energy and consumer goods – are associated with emissions from outside the urban area itself and frequently from other countries.

CHAPTER 6

Several initiatives – including the C40 Climate Leadership Group and Cities for Climate Protection, sponsored by ICLEI-Local Governments for Sustainability – help share knowledge and good practices between cities involved in reducing their greenhouse gas emissions. Urban authorities in low- and middle-income nations have also begun to exploit opportunities to generate 'carbon credits' through reducing emissions from solid waste management and other activities. At the same time, however, it must be ensured that these efforts do not divert attention from the strong adaptation needs that face many residents of these cities.

Box 6.3 Urban flooding in Ireland

Much of urban Ireland was thrown into chaos by widespread flooding in the same week in November 2009 that the Irish Academy of Engineering (IAE) published a landmark report *Ireland At Risk – Critical Infrastructure and Climate Change* which warned that storm surges combined with a sea-level rise of 50cm would mean that a one-in-100-year flood could happen as often as every five years.

Rainfall totals were the highest on record for November in many places and river levels reached record heights as the Irish Red Cross deployed volunteers and ambulances to assist in evacuations and to ensure that vital health personnel were able to report to work.

Months later the island nation, whose major cities all lie on the coast, was still counting the cost. In County Cork alone, it was estimated that flood damage ran to 100 million euros as a dam equipped with a new 50-metre-wide spillway designed to cope with an extreme flood, failed to cope. The River Lee burst its banks and flooded the centre of Cork, Ireland's second largest city.

"Failure to act now will put our society at an unacceptable risk," said the IAE's president, Michael Hayden. "You've only to think of Hurricane Katrina for an example of how climate change coupled with poor planning and zoning decisions can lead to social and economic disaster."

In a week when the country's major rivers burst their banks, the academy warned that homes in coastal cities could become uninsurable unless urgent measures were taken and cited Benjamin Franklin's adage: "An ounce of prevention is worth a pound of cure."

The IAE further predicted that unless urgent action was taken to strengthen critical infrastructure the following would happen: changing rainfall patterns would affect water supplies; rising sea levels would inundate coastal cities and towns; severe weather incidents would damage energy installations, hospitals, telecommunications, railways and other critical infrastructure, and contaminate water supplies.

The Irish *Sunday Tribune* newspaper noted in an editorial other factors that played a role in the November flooding which saw thousands of people evacuated from their homes: "The legacy of the past decade has been one of appalling and corrupt planning decisions which have allowed building on flood plains; building regulations that allowed uninsulated, energy-inefficient homes to be thrown up anyhow, anywhere; inadequate flood management schemes which at times have been poorly managed; and now last week, the failure to have a fully working flood emergency plan in operation should the worst happen has added to the misery of tens of thousands of people."

Reducing the effects of climate change: Local planning for adaptation and disaster risk reduction

Much recent climate change policy has stressed the 'co-benefits' of mitigation strategies: the ways in which reducing greenhouse gas emissions can meet broader goals of increased energy independence, lower costs and higher quality of life. However, for a large proportion of the world's urban population, this is of limited value as their emissions are already extremely low but there are many strong co-benefits between climate change adaptation and development. This includes disaster risk reduction but also addresses slow-onset changes such as the salinization of groundwater which affect the accumulation of risk over time.

For practical purposes such as policy design, the distinction between natural variability (including extreme events) and incremental variability due to climate change is trivial – the key is to recognize and address underlying factors causing vulnerability. A starting point for reducing climate risk, therefore, is a better understanding of the particular hazards and vulnerability faced by urban centres. This is a context-specific process but there are several underlying principles that can be followed. Firstly, projected climate scenarios and their potential impacts need to be understood but their limitations also need to be known. Future projections contain a wide range of uncertainties in relation to both the absolute extent of climate change and the ways in which this will be experienced at the geographical scale of the city. Secondly, a detailed analysis needs to be undertaken to identify the most vulnerable groups, areas, sectors and how they may be affected – a process that has much in common with assessing vulnerability to disasters. Thirdly, the combined impacts of direct and indirect factors need to be taken into account – recognizing both the effects of climate change and the implications for urban residents of policies formulated to address these. Finally, existing capacities to respond and adapt must be assessed. With the exception of the climate projection component, this is already good practice in identifying vulnerability to a range of extreme events.

Climate change adaptation and disaster risk reduction that meet the needs of the urban poor

Urban governance is increasingly accepted as a multifaceted process involving a range of stakeholders, including civil society organizations, the private sector, the academic and research community, and the formal mechanisms of local government. Building

Box 6.4 After the storm

After the storm a tentative blackbird chorus,
silent throughout it, started cheeping again.
The city, for fear of a worse overflow,
had unlocked dams, so water levels rose
at an alarming rate; the rivers burst
their banks, swamping fields in a sea of rain,
and flooded low-lying districts in one go,
the waters sparing neither man nor beast.
Square miles shrank as a sudden deluge rushed
from the rain-sodden hills. *Ye nymphes of Bandon,*
where were you when the great south-facing windows
of heaven were opened and it bucketed down
on quiet Munster? No one had imagined
embankments would give way under the surge,
the river Lee engulfing market towns'
water mains, drains and residential lanes.
It struck in late November, so by and large
no ripening crops suffered, no standing grain,
but haylofts were awash and much of the hard
work of the summer proved to be in vain.
Reservoirs, lakes poured down in a tide of mud
submerging farms. An astonishing six inches
fell in a single night from inky cloud.
Not much distinction now between sea and land:
some sat in dinghies rowing where they'd sown,
navigating their own depth-refracted ground
and scaring rainbow trout among the branches.
Global warming, of course, but more like war
as if dam-busting bombers had been here:
aerial photographs of the worst-hit areas
showed roads, bridges, basic infrastructure
devastated, the sort of thing you expect
in China or Louisiana but not in Cork.
Detritus of the years, carpet and car,
computers and a wide range of expensive
gadgetry went spinning down the river
with furniture and linen, crockery, shoes
and clothes, until it finally gave over;
not everyone had full insurance cover.

The inquiry dealt only with technical issues,
avoiding larger questions. Telephone
lines down, 'boil water' notices in force,
drainage schemes overwhelmed and of no use,
authorities hinted that it could've been worse.
(There would be building work for months to come,
developers would have no cause to complain.)
A general cleaning-up operation began;
houses, garages, skips gleamed with the slime
deposited everywhere like a disease.
We will get over it though we're not sure how.
The country sighed in the calm after the storm,
emergency services set themselves to the grim
sequel as drowned townlands emerged at last,
the earth increasing as the flow decreased.
The birds, crowing and piping with relief,
announced a partial return to normal life
and light shone in the cloud until next time.
It's snow and black ice we've to contend with now.

'After the storm' by Derek Mahon,
from *An Autumn Wind* (2010)
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resilience to disasters and climate change requires the involvement of all these actors. However, it is important that responses take into account the particular circumstances of the urban poor who are generally the most vulnerable both to extreme events and to slow-onset changes. There are several specific ways in which adaptation to climate change and disaster risk reduction can take this into account:

Ensure that infrastructure works for the poor. New infrastructure – particularly for the provision of water, sanitation and drainage – is an important aspect of urban adaptation to climate change and to building broader resilience. Yet too often, existing infrastructure is poorly maintained. Often it is poor maintenance of storm and surface drains that contributes so much to flooding – for instance, for many cities, the need to de-silt them and clear them of garbage before the monsoon rains come. Improving waste collection services from low-income communities can reduce flooding at times of heavy rain and can improve child health through reducing exposure to disease. Effective transportation systems can enable low-income groups to live in safer physical surroundings while still being able to access employment and livelihood opportunities.

Support slum and squatter upgrading. Where large numbers of people live in poor-quality housing in informal settlements, improving housing and getting basic infrastructure in place is a priority for adaptation. However, it is important to make sure that these new houses and infrastructure are constructed in such a way that they can withstand likely future changes in climate. In association with this, it is important to address related social issues: people and communities who are healthier, better educated and with secure tenure are more able to deal effectively with a wide range of shocks and stresses, including one-off extreme events and climate change. Ongoing action to improve the provision of public services can provide households with a firmer base from which to face the challenges of climate change. Urban planning, management and governance are all now firmly on the IPCC agenda.

Reconsider zoning, planning and building regulations. Zoning and planning controls have often served to exclude a large proportion of the urban population in low- and middle-income nations from legal land markets. The identification of 'vulnerable' land in preparing for climate change should not be used in the same way. Instead, these controls can be used to help provide appropriate and safe locations for low-income households while reducing their exposure to the risks of flooding, slope failure and other disasters. The application of building standards that are appropriate to local contexts, including affordability, and used in ways that support incremental improvements can make housing resistant to extreme weather, while still enabling poor residents living in self-built or artisan-built constructions to upgrade at an appropriate pace and cost.

Rainfall totals for November 2009 in Ireland were the highest on record, and large parts of the city of Cork and surrounding areas were flooded when the River Lee burst its banks.

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Ensuring climate and disaster preparedness in key urban sectors

Engaging with a wide range of stakeholders is key to ensuring that adaptation and disaster risk reduction actions meet the needs of a broad cross-section of urban residents. This approach has been used by several major stakeholders and projects as the means of engaging in climate change adaptation in urban areas. Both the Asian Cities Climate Change Resilience Network and UN-Habitat's Cities in Climate Change Initiative use multi-stakeholder engagement processes to support urban adaptation. However, many specific actions need to be taken at a sectoral level. As Table 6.3 shows, many of these specific actions in water supply provision, storm and flood-water management, public health, energy and transportation meet both climate change and disaster risk reduction objectives.

Table 6.3 Examples of climate change and disaster preparedness goals and actions

Priority planning area	Preparedness goal	Preparedness actions
Water supply	Expand and diversify water supply	■ Develop new groundwater sources ■ Construct new surface water reservoirs ■ Enhance existing groundwater supplies through aquifer storage and recovery ■ Develop advanced wastewater treatment capacity for water re-use
	Reduce demand / improve efficiency	■ Increase billing rates for water ■ Change building codes to require low-flow plumbing fixtures ■ Provide incentives (e.g., tax breaks, rebates) for switching to more water-efficient processes
	Increase drought preparedness	■ Update drought management plans to recognize changing conditions
	Increase public awareness about impacts on water supplies	■ Provide information on climate change impacts to water supplies and how residents can reduce water use in utility inserts, newsletters, web sites, local newspapers
Storm- and flood-water management	Increase capacity to manage storm water	■ Increase capacity of storm-water collection systems ■ Modify urban landscaping requirements to reduce storm-water runoff ■ Preserve ecological buffers (e.g., wetlands)
	Reduce property damage from flooding	■ Move or abandon infrastructure in hazardous areas ■ Change zoning to discourage development in flood hazard areas ■ Update building codes to require more flood-resistant structures in floodplains
	Improve information to manage storm and flood events	■ Increase the use of climate and weather information in managing risk and events ■ Update flood maps to reflect change risk associated with climate change

Public health	Reduce impacts of extreme heat events	■ Improved early warning systems for extreme heat events ■ Open additional cooling centres during extreme heat events ■ Increase use of shade trees to reduce urban temperatures
	Improve disease surveillance and protection	■ Increase monitoring of known diseases and potential diseases moving into the area ■ Increase public education on disease prevention for vector-borne illnesses that could increase as a result of climate change
Energy	Ensure consistency of energy supplies while expanding to low-income groups	■ Strengthening of overhead transmission and distribution infrastructure ■ Underground cabling for utilities ■ Reduced dependence on single sources of energy
	Reduce greenhouse gas emissions associated with energy use	■ Energy efficiency ■ Use of renewable sources
Transportation	Ensure that transportation network functions despite changes in temperature and precipitation	■ Realignment or relocation of transport infrastructure ■ Improved design standards and planning for roads, rail and other infrastructure
	Ensure that transportation system facilitates rapid emergency responses	■ Effective emergency plans for utilizing transportation networks for evacuations, etc.

Source: Adapted from ICLEI (2007) and IPCC (2007)

Financing urban adaptation

Meeting the challenges of climate change will require considerable investment in infrastructure and services – particularly in low- and middle-income nations. However, many of the existing assessments of adaptation costs have been based on present investment in infrastructure and have not taken into account the infrastructure deficit (the current shortfall in infrastructure provision for cities under existing climatic conditions) present in many cities in low- and middle-income nations. Any realistic measure of the costs of adaptation in urban areas therefore needs to be informed by an analysis of current disaster risks and the required investment in housing, early warning systems and rapid and effective post-event responses including temporary accommodation, restoring access to services, supporting rapid return to damaged settlements and supporting rebuilding.

However, new funding pathways are currently being developed that are intended to support investment in adaptation to climate change. Some of these fall under the banner of traditional overseas development assistance. Others are coordinated under the UNFCCC, although their precise nature is the focus of ongoing UNFCCC

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negotiations. However, there are no clear mechanisms through which international climate change adaptation funds can be transferred to local governments (including city authorities) and many urban interventions, including financing for large-scale infrastructural projects, fail to assess the likely impacts of climate change.

Towards urban resilience

The ultimate objective of disaster risk reduction and climate change adaptation is to produce resilient cities. Rather than focusing on anticipating specific hazards – whether these are short-term disaster risks or longer-term changes in climate – city stakeholders, particularly in low- and middle-income nations, ought to take a broader, integrated approach that addresses both current and future development needs. Resilience therefore takes into account the economic, social, psychological, physical and environmental factors that are necessary for humans to survive and to thrive. Locally rooted strategies to build resilience need to incorporate a strong focus on both disaster risk reduction and climate change adaptation and need to be embedded within a city's institutional and organizational framework.

Many aspects of resilience are closely associated with a holistic approach to development. Individuals and households that have access to adequate food, clean water, healthcare and education will inevitably be better prepared to deal with a variety of shocks and stresses – including those arising due to climate change.

Box 6.5 Building resilience as a strategy for climate change adaptation and disaster risk reduction

Resilient towns and cities are able to withstand a variety of challenges. As well as helping to manage the challenge of climate change, increasing resilience generates a wide range of additional advantages. The Resilience Alliance and the Asian Cities Climate Change Resilience Network suggest that urban resilience involves the following components:

■ **Redundancy.** When one system is disrupted, another system can provide similar services. For example, if individuals are trained in basic health and emergency responses, they are able to provide immediate support if transportation and communication systems are disrupted following an extreme event.

■ **Flexibility.** The failure of a single system causes a minimal impact to other systems. For example, a city with a diversified economic base will avoid catastrophic failure if a single industry fails due to economic change or environmental disaster.

■ **Capacity to reorganize.** Climate change will result in changing conditions – and resilient cities are able to introduce new structures, organizations and land-use measures in response to this.

■ **Capacity to learn.** This ensures that future decisions are made on the basis of relevant information and appropriate forethought.

Source: ISET, 2009

Integrated actions and multi-stakeholder approaches

Creating more resilient towns and cities that are able to cope with disaster risks and climate change requires action by a range of stakeholders. These can include those who are (or are likely to be) affected, those who have technical expertise, those who have financial resources and those with authority for decision-making. These stakeholders can then come together as steering committees or working groups to address particular issues. As the Saint-Louis case study shows, the combined knowledge, skill and political influence of groups working together is able to generate more effective results than individual organizations working on their own. Development and humanitarian organizations can also modify their programmes, policies and practices to address climate change in urban areas more effectively. These organizations can also facilitate a range of household coping strategies through their actions.

Conclusion

Work got under way in earnest this year on the IPCC's *Fifth Assessment Report* which will look closely at urbanization processes and is due for delivery in 2014. This is just one year prior to the ultimate date, 2015, set by the IPCC for global emissions

Creating resilient towns is not only a question of improved infrastructure, but also of raising communities' awareness of the hazards they may face. In Samoa, residents learn how to map out disaster and health risks.

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to peak if the planet is to have a chance of limiting temperature increase to between 2 and 2.4 degrees Celsius. The general acceptance by the G8 of a 2 degrees Celsius ceiling may still be too much for many coastal cities' defences and this needs to be recognized sooner rather than later when it comes to investment in disaster risk reduction. Entrenched dichotomies between climate change adaptation and disaster risk reduction need to be dismantled long before then to enable a focus on building urban resilience. The International Federation of Red Cross and Red Crescent Societies for example, in its Strategy 2020, addresses climate change adaptation "through scaling up disaster risk reduction measures and strengthening traditional methods of coping with disasters that are relevant in particular environmental contexts".

Climate change will have both a quantitative and a qualitative impact on the risks facing urban areas in coming decades. In particular, the inability to predict future emissions scenarios and the lack of precise knowledge about the impacts that these will have on the global climatic system means that urban residents and authorities will have to deal with an increasing level of uncertainty around the frequency and intensity of extreme weather events. Many countries still have some way to go in order to catch up with reality: a WMO survey in 2006 showed that more than 60 per cent of its 189 members are inadequately equipped to warn populations against hazards, particularly in most vulnerable countries. It seems remarkable that it was only in April 2010 that 30 ministers in charge of meteorology in Africa met for the first time under the auspices of WMO and the African Union, given that Africa is so poorly equipped to deal with climate change at both urban and rural levels.

When combined with increasing levels of urbanization and ongoing social and environmental problems in towns and cities, risk and vulnerability for many urban residents are likely to be exacerbated. The impacts of climate change will be distributed unevenly within urban populations, with low-income groups being particularly vulnerable due to their greater exposure to hazards and their lower levels of adaptive capacity. A focus on building resilience to cope with uncertainty, rather than applying solutions based on specific scenarios, is therefore the best way of protecting the lives and livelihoods of urban residents.

The actions taken by urban authorities, civil society organizations and humanitarian agencies in urban areas can make a substantial difference to the ability of towns and cities – and their residents – to respond to disasters and climate change. For city dwellers in low-income and many middle-income countries, the biggest single issue is the infrastructure deficit – the inability of urban systems to deal with current climate variability. Many of the hazards and risks facing cities as a result of climate change are modifications to existing hazards and risks – and cities that are unable to deal with the challenges of today will be unable to deal with the new climate challenges of the future. Improved planning for disaster risks, including better short-term forecasting of shocks, is therefore also a key component for responding to climate change. At the

same time, the development of sound responses to existing patterns of risk will form a solid basis with which to deal with those that are genuinely new. These measures need to be considered within an overall framework of a global transition to a low-carbon economy in order to minimize the risk of dangerous climate change taking place in the coming decades.

Chapter 6 and Box 6.1 were written by David Dodman, Senior Researcher, Human Settlements and Climate Change Groups at the International Institute for Environment and Development, London. Box 6.2 was written by Khady Diagne from the NGO, Enda-Tiers Monde; Box 6.3 was written by Denis McClean, World Disasters Report *editor; Box 6.4 is a contribution from poet Derek Mahon; and Box 6.5 was written by the Institute for Social and Environmental Transition (ISET).*
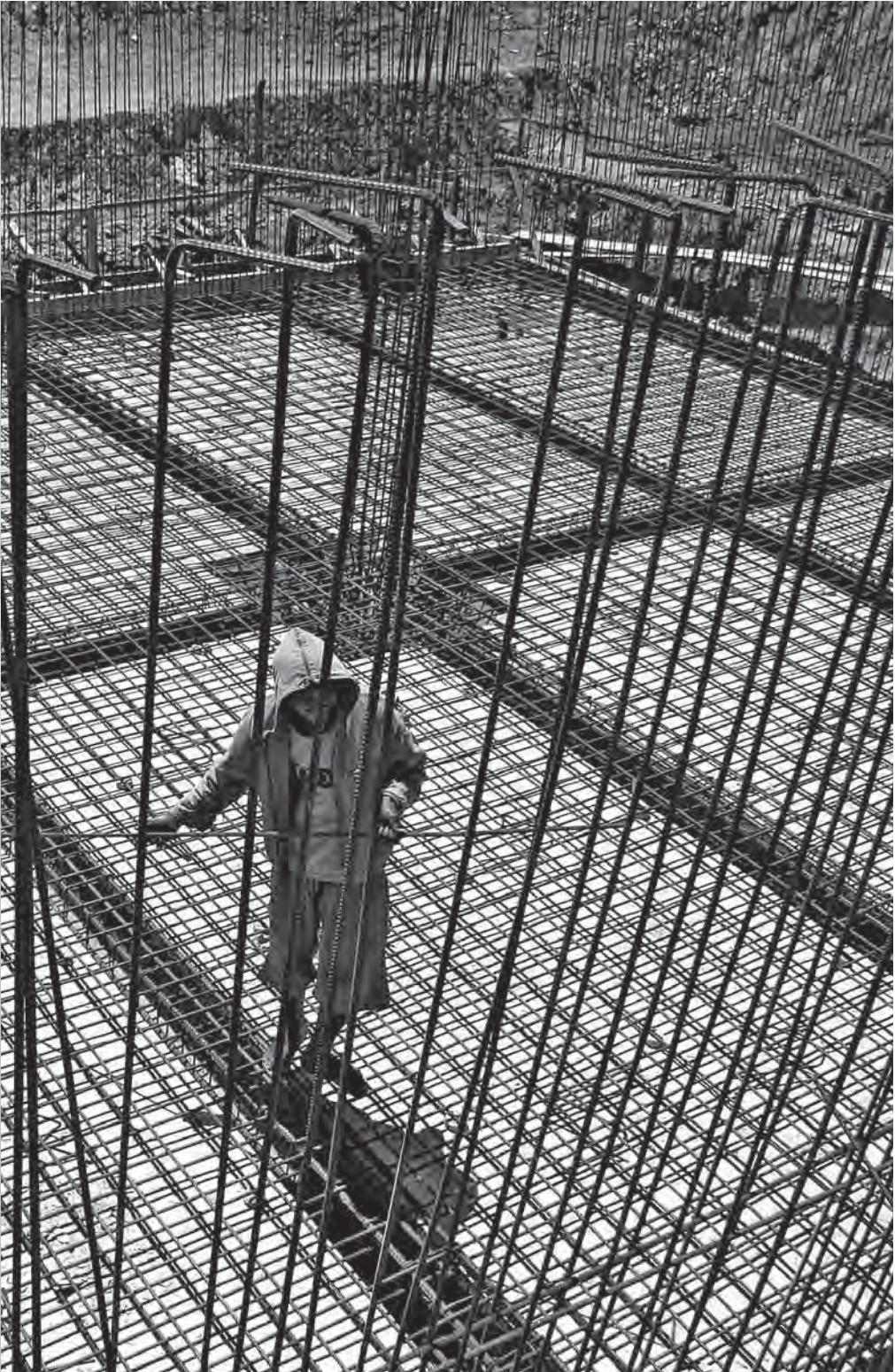
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CHAPTER 6

Urban governance and disaster risk reduction

This year sees an unprecedented level of attention on urban governance and sustainable urban development, not least in the new campaign being launched by the United Nations International Strategy for Disaster Reduction (UNISDR), *Making Cities Resilient,* which seeks the commitment of mayors, city leaders and local governments to concrete measures to reduce disaster risk, and to work on their implementation with community organizations, the private sector and national governments.

According to the United Nations Human Settlements Programme (UN-Habitat), the Millennium Development Goal 'slum target' has been reached, improving the lives of 227 million people, particularly in China and India, but the population of slum dwellers around the world continues to grow at around 10 per cent annually. Lessons clearly need to be learned from this about how good urban management practices in some parts of the world can facilitate learning and help reduce risk in other parts where little progress is being made, particularly among the urban populations of sub-Saharan Africa and west Asia.

The quality and capacity of local government in a city have an enormous influence on the level of risk that its population faces from disasters and, in particular, on whether risk-reducing infrastructure serves everyone including those living in low-income areas. Local or municipal governments also influence whether provision has been made to remove or reduce disaster risk from events such as floods and large-scale fires or to build into the city the capacity to withstand potential disaster events such as earthquakes. The quality and capacity of local government also have an enormous influence on the levels of risk from everyday hazards that can contribute much to mortality, injury or illness but that are not considered disasters, such as vector-borne diseases and traffic accidents. These risks are not an inherent characteristic of cities but the result of the limitations of their governments in meeting their responsibilities and, more broadly, of limitations of governance including the quality of their relations with the inhabitants and civil society organizations.

Most of what local governments do, or should be doing, is about reducing risks for their populations through ensuring services such as good provision for water, sanitation, drainage, solid waste collection, healthcare, all-weather access roads, electricity, emergency services and provision for transport and traffic management. They should also ensure health and safety standards are met. Even if provision for some of these are contracted to private enterprises or provided by higher levels of government, it is usually the responsibility of local government to coordinate or oversee their provision. Local governments that support meeting development needs reduce disaster risk. In

Photo opposite page: In Aceh, Indonesia, builders work in difficult conditions under a very hot sun to construct a large water reservoir, built with support from the Indonesian and American Red Cross Societies.

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addition to key roles in pre-disaster damage limitation they also have an important role in post-disaster response and rebuilding.

The concentration of people and enterprises in cities is often seen as increasing risk and exposure but it also means economies of scale and proximity for most forms of infrastructure, including roads, electricity, water and sanitation, and services such as public transport, communications, education, healthcare or good waste collection systems – all of which can contribute greatly to the reduction of risk. In a well-governed city, much of the disaster risk in terms of death and serious injury is enormously reduced by good-quality buildings and infrastructure. If these interventions do not prevent disasters, they can dramatically cut the death and injury tolls and should limit the economic impacts. This applies not just in cases of extreme weather or earthquakes but also for industrial accidents and fires. In the past, fires devastated many of the world's wealthiest cities. Indeed, the city of Venice pushed its glass-making industries to a separate island, Murano, in the 13th century to reduce the risk of fire. In more recent times, fire risk reduction was built into building regulations and controls over enterprises and into rapid response capacity from emergency services. Unfortunately, such risk reduction is not present for most cities in low- and middle-income nations, or at least for their low-income districts.

Chapter 1 described the web of institutions that help reduce or remove disaster risk in urban areas. In addition, a combination of land-use planning and management and the application of building standards should ensure that this continues even in a rapidly expanding city. In disaster situations, it may be easier to offer emergency assistance and care to concentrated populations because the health infrastructure, road networks, airports, ports and communications systems are all in place. However, in most cities in low- and middle-income nations, a high proportion of the population is not served by any of the risk reduction measures noted above. If cities are not well governed and thus pay little or no attention to the measures that reduce disaster risk, the consequences of a disaster can be drastic. The recent earthquake that devastated Port-au-Prince and its surrounds in Haiti is an example of how dangerous a city can be if it is externally dependent and poorly governed with little institutional capacity, no emergency plans and little capacity or will to address the structural causes of vulnerability.

A mismatch between the city's population growth and the capacity to keep down risks, support good-quality housing and provide infrastructure and services is often blamed on population growth or on 'uncontrolled urbanization'. Usually though, it is an institutional failure to keep up with economic developments which attract migrants. Much of what contributes to reducing disaster risk is the same as what is needed to satisfy everyday needs.

However, even in well-governed cities, it is a challenge to get disaster risk reduction embedded in all the relevant sectors and agencies, as Box 7.1 on Durban shows. Here,

the city government has developed a municipal climate protection programme that is working in partnership with its disaster management branch but it is difficult for both to get buy-in from key sectors and support for disaster risk reduction when the city faces many pressing development needs and its budget is constrained by the recession. The uncertainty around levels of risk for many potential catalysts of disasters makes it difficult to provide the needed economic rationale for preventive measures.

Box 7.1 Disaster preparedness and climate change adaptation in Durban, South Africa

Durban is one of the few cities worldwide that has a municipal government which has developed a locally rooted climate change adaptation strategy. Developing this strategy has also made evident the need to strengthen the city's disaster management capacity – disaster risk reduction needs to be embedded in the city's sectoral departments and investment programmes.

Durban is the largest port and city on the east coast of Africa and has around 3.7 million inhabitants. The municipal climate protection programme was initiated in 2004 with an impact analysis to identify the range and severity of climate change-related risks and the needed adaptation responses. It was difficult to get most sectors of government to act because of high workloads, extensive development challenges, the perception of climate change as a distant threat and a shortage of skills and funds, so it was decided to develop sector-specific adaptation plans that could be integrated into existing business plans and funding. The health and water sectors were selected as pilots because of their high-risk profile and political importance.

The risk analysis showed that adaptation in these two key sectors could not eliminate disaster risks so there was a need for both disaster risk reduction and disaster preparedness. A disaster management municipal adaptation plan (MAP) was developed. This highlighted how disaster management in the city was focused on short-term relief, such as handing out food and blankets, rather than proactively addressing strategic

planning issues focused on disaster prevention. Disaster management also lacked the staff and 'institutional muscle' to ensure all municipal departments engage in risk assessment, monitoring and response. The disaster management MAP identified five priorities:

1. Implementing the disaster risk management framework. This identifies the prerequisites for effective disaster management within the city, i.e., integrated institutional capacity, disaster risk assessment, disaster risk reduction, response and recovery, information management and communication, education, training, public awareness and research, and funding. This framework was submitted to the council but implementing it is likely to be a lengthy procedure given that it involves institutional change.

2. Comprehensive city-wide risk assessment. This is being developed through a partnership between the environmental planning and climate protection department and the disaster management branch.

3. Strengthen the disaster management branch. Although much needed, it is difficult to secure the support given the constraints on the city budget.

4. Revision of contingency plans for key risk areas. There is an immediate need to update existing contingency plans (particularly for priority risk areas). These should include considerations such as the need to establish emergency operation centres linked to an early warning system and regular rehearsal exercises.

The management of the major hazard installation regulations (which govern the notification, risk assessment and emergency planning required of new and existing hazardous installations) also needs improvement.

5. Hosting a disaster management summit. To help raise the profile and awareness of the disaster management MAP including disaster risk reduction.

What has emerged from the development of the disaster management MAP is the sobering realization that despite the serious risks posed by climate change, basic institutional and resource challenges within local government are delaying appropriate planning and responses. These challenges will have to be met but they inevitably depend on political will and the ability to access additional funding. ■

Land-use management and disaster risk

For almost all urban centres, it falls to local government to manage land use and this should ensure that dangerous sites, such as flood plains, are not built on, that there is adequate provision for schools and other services, that open space for parks and playgrounds is protected and that watersheds and natural coastal protective defences, such as mangroves and dunes, are preserved in an ecological manner. Land-use management also has to ensure that sufficient land with infrastructure is available for housing and enterprises. Local regulations on site development and buildings should ensure that new buildings meet health and safety standards. All this helps to reduce risks from everyday hazards and from disasters, especially when combined with the provision of essential infrastructure and services. Indeed, they help stop extreme weather events becoming disasters. They should also be the means by which risks from earthquakes are much reduced. However, it is hard for any politician to gain votes by pointing to a disaster that did not happen and it is difficult, or even impossible, for the agencies concerned with disaster response to get attention paid to these deficiencies.

Informal settlements in a city are a reflection of governance failures – especially in land-use management. They reflect a failure of local authorities to ensure sufficient land with infrastructure is available for new housing in appropriate locations. Very often this is linked to the lack of power and resources available to city governments and the disinterest of national government and international agencies in addressing city problems. The results are visible in almost all cities in low-income nations and most cities in middle-income nations: urban expansion is haphazard, determined by where different households, residential areas, enterprises and public sector activities locate and build, legally or illegally. There is no plan to guide this process or if there is, it is ignored. There are usually many regulations to prevent this but these are avoided or bypassed by politicians and real estate interests.

As cities expand in an unplanned patchwork of high and low density, this greatly increases the costs of providing risk-reducing infrastructure and services. It also means the segregation of low-income groups in illegal settlements on the most hazardous sites such as those affected by periodic floods, sea surges, seasonal storms and land subsidence.

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For many cities, including those mentioned in Box 7.2, disasters are not new. They have a record of disasters at different scales. The cases mentioned highlight institutional incapacity to address urbanization issues from different angles. When combined with lack of accountability to citizens and little scope for citizen participation, this means little action to reduce risks in urban areas, especially where low-income groups live. For much urban expansion, the 'solution' to the lack of institutional capacity to manage land use has been to be outside the legal framework of building codes and land-use regulations, and outside the scope of officially recorded and legally sanctioned land transactions. In many cities, some high- and middle-income groups also occupy dangerous land sites but the possibility to reduce risk and receive emergency assistance and insurance coverage is much greater. City and municipal governments can thus be key players in disaster risk creation and amplification or in disaster risk reduction. This has been acknowledged for some time by the development and disaster response community, and several governments at national and regional levels have designed structures to support local governments.

Box 7.2 Latin American cities expand over high-risk areas

Much of the housing in Caracas, Venezuela, is built on slopes crossed by gorges that lead to the Guaire, the city's main river. Low-income groups have settled on unstable land and in gorges, where their houses often act as barriers to natural water run-off. In December 1999, Venezuela experienced one-in-100-year rainfall and this caused massive landslides and floods that killed hundreds of people.

After the floods in the city of Santa Fe, Argentina, in 2003 and again in 2007, city authorities recognized that for the last 50 years there had been no urban land policy and that people settled where and how they could, prioritizing proximity to workplaces or social networks.

Managua, Nicaragua, is located on a strip of land where there are 18 active faults and a chain of volcanoes. In this city of 1.4 million people, 79 per cent of the houses are of bad or mediocre construction quality and 18 per cent need complete renovation. About 45,000 families live in 274 informal settlements, which lack access to water, sanitation and electricity. It is estimated that each year in Managua 3,000 homes are built without authorization and thus with no oversight of the quality of construction.

During Hurricane Mitch in 1998, the cities of Tegucigalpa and Comayaguela in Honduras were seriously affected. Most damage was concentrated around the four rivers that cross these cities. Inadequate city infrastructure, especially water, sanitation and drainage, lack of zoning codes, the concentration of services and infrastructure in only a few areas, lack of official prevention and mitigation strategies, together with an inappropriate management of river basins contributed to the vulnerability of these areas. ■

The local nature of disaster risk

It is at the local level that disasters materialize: lives and livelihoods are lost, houses and infrastructure damaged and destroyed, health and education compromised. This is also

where the lack of attention to disaster risk reduction by local governments becomes evident – even as politicians and civil servants hide behind the term 'natural disaster' or find fault with their predecessors. But it is also at the local level that risk management becomes possible. Vulnerability and hazards interact generating specific risk conditions, which are socially and geographically specific, dynamic and in constant flux. It is at the local level that civil society can interact with government and together plan for disaster risk reduction within a local development framework.

The 1990s – the International Decade for Disaster Risk Reduction – brought a shift in the way disasters are understood with much more attention being paid to the links between development, disasters and environmental degradation. From this came a widespread consensus that risks are a social construction and that risk reduction should be implemented locally and with local actors. For Latin America, two key factors contributed to this: decentralization processes and state reforms in many countries; and the occurrence of several major disasters in the region which affected large population centres. Several countries enacted new legislation or are in the process of making amendments so as to meet the challenges of development and disaster risk reduction; in many cases this includes the transformation of emergency response agencies into national risk reduction systems.

Governments – many at the local level – have assumed new roles and responsibilities, including modifying their approach to risk management, integrating different actors into the process and implementing risk management within development planning. But these remain the exception and a wide gap exists between rhetoric and practice. Many governments at different levels continue to focus only on emergency and reconstruction efforts and the latter often fail to incorporate long-term actions that would reduce risk and vulnerability to disasters. Disaster risk reduction is not a one-off activity but a continuous process.

What makes cities and municipal governments address disaster risk reduction?

Some city governments have shown how to incorporate disaster risk reduction into development, i.e., to go beyond provisions for disaster preparedness. They have implemented the development initiatives and associated controls, regulatory frameworks and governance mechanisms that are essential to reducing risks. These have included upgrading programmes for informal settlements, urban land-use management with associated zoning and building codes, housing improvements and expanding coverage of city-wide infrastructure and services. Most examples of this come from nations or cities where popular pressure and political reforms have made local governments more accountable and responsive to their citizens. Obviously, this has to include local governments which develop relations with those who live in informal settlements and develop the capacity to govern with, and for, them. One of the most important innovations in

Photo opposite page: On 27 May 2006, an earthquake caused widespread destruction around the city of Yogyakarta on Java, Indonesia, killing some 6,000 people. The Indonesian Red Cross Society, backed by the IFRC, launched a massive relief operation to help the injured and those who were displaced by the quake.

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many such cities is participatory budgeting, where the inhabitants of each district in the city are able to influence priorities for public investments and details of the city's budget are published and made much more transparent. In the 1980s the Brazilian city of Porto Alegre pioneered participatory budgeting and in 2004, the city introduced the Local Solidarity Programme which allows residents in the city's 17 municipal divisions to participate in forums where projects for the next city budget are proposed and prioritized. More than 70 cities worldwide have adopted participatory budgeting.

This shift by local governments to disaster risk reduction has been driven by different factors. In some nations, it is driven by stronger local democracies (for instance, a shift to elected mayors and city councils) and decentralization so city governments have a stronger financial base. Sometimes the trigger has been a particular disaster, such as Hurricane Mitch in Central America, or a sequence of disaster events, such as the Armero and Popayan earthquakes and other disasters in Colombia, which helps drive countries and their city and municipal governments to adopt new approaches for disaster risk reduction.

After Hurricane Mitch, governments in Central America finally realized that the best way to respond to disaster risk was to reduce it. They made efforts at legal reform in order to transform traditional emergency response frameworks into risk

reduction systems that were multi-sectoral and inter-institutional. In each country, a national commission for risk management and disaster prevention was set up. For instance, in Nicaragua, the *Sistema Nacional para la Prevención, Mitigación y Atención de Desastres* (national system for disaster prevention, mitigation and response, now known as SINAPRED) was created in 2000 to work with local governments to strengthen the country's institutional capacity for disaster preparedness and management, integrating disaster mitigation and risk reduction into local development processes. Local governments are responsible for activities related to prevention, mitigation, preparation, response, rehabilitation and reconstruction within their territories, based on risk assessments. Several municipalities have incorporated preventive planning especially in regard to approving building licences and land use, and different sectors including health, education and planning share disaster risk information. The system operates with a national disaster fund. Most of these national systems are, however, relatively new and need time to consolidate. Another concern is that local governments may be allocated responsibilities for which they lack the capacity and resources.

Addressing the limits in disaster risk reduction by municipal and city governments

While local government engagement is essential for disaster risk reduction, many disaster risks need coordinated action across a range of local governments. For instance, many large cities are composed of different municipalities (local governments) and disaster risks are often concentrated in particular municipalities. For example, São Paulo is made up of a central city with about 11 million inhabitants and 38 separate municipalities, while Buenos Aires consists of a central city of some 3 million inhabitants and 26 municipalities. The municipalities with the highest disaster risks are often among the weakest financially and have the largest concentrations of low-income groups living in informal settlements. They therefore have the largest deficits in provision for the infrastructure and services that underpin risk reduction.

Most flood problems in urban areas require a river basin management approach but for large cities, this can require investments and coordination among many different local government units – often including local governments controlled by opposing political parties. Or extreme weather events can simply overwhelm the capacity of a local government or require actions outside its boundaries and competence.

In December 2009, several small and medium-sized cities in Argentina, including Salto, Pergamino, Arrecifes, Carmen de Areco and San Antonio de Areco, were flooded after torrential rains led to local rivers overflowing their banks. San Antonio de Areco, a town of more than 21,000 inhabitants, was hit particularly hard and 3,000 people had to be evacuated. The city government could not address the causes of the flooding. In part this was linked to rainfall in the whole region being greater than normal,

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due to El Niño. Many other factors contributed to the floods, however, including a lack of control within the Areco river basin, for example, narrow sections of the river were not dredged, bridges and highways impeded water flow, changes in land use had increased the speed of run-off, and increased run-off caused by local drainage channels constructed by property owners in an uncoordinated manner.

However, there are examples of coordinated actions among neighbouring local governments. In San Salvador, El Salvador, mayors of the metropolitan area formed a committee to work together, with the support of the city planning unit, on certain issues such as water provision, solid waste treatment, environmental protection and city infrastructure. After the earthquakes in 2001, the planning unit started work on micro-zoning of risk in the Ilopango Lake basin, which also called for the involvement of other municipalities within the basin that were outside the metropolitan area.

Perhaps the main barrier to risk reduction is translating what is known into what is done. Many city and municipal governments, if asked, know that they should have a long-term development plan for their city that includes disaster risk reduction. Many also know that this is important for climate change adaptation. The issue, therefore, is why this is not done. Obviously for many urban centres, it is because they have no development plan or if they do, it is not adhered to. But, as Box 7.1 illustrated, even for city governments that are able to implement their development plans, getting local disaster risk reduction included in the plans needs trained government staff in key positions and political support. It also needs local governments with funding capacity. It comes as no surprise that most of the innovations described so far in this chapter come from cities in middle-income nations where local governments have been strengthened. Disaster risk reduction needs long-term plans and support, especially where the backlogs in key infrastructure and services are largest – which brings us back to the very large mismatch between what needs to be done and local capacities.

Civil society groups including local non-governmental organizations (NGOs) and grass-roots organizations have key roles in emergency responses after disasters but they struggle to influence physical reconstruction. In addition, the channels and vehicles for participation – necessary to allow them to influence disaster risk reduction – are often absent. The effectiveness of disaster risk reduction is not just what a local government does but also what it encourages and supports.

Support from higher levels of government and budgetary constraints

Very few city governments in Africa, Asia and Latin America have the financial resources to invest in disaster risk reduction without support from provincial or national government. That support may not be forthcoming if, for example, the city government's political orientation differs from that at provincial or national level.

As large cities have grown without the necessary infrastructure, so the gap between what is needed and what is affordable can widen to an almost impossible degree (see Chapter 2). More than 50 per cent of the population of many large cities in Africa and Asia live in settlements without basic infrastructure. The haphazard spatial expansion of a city and the concentration of many low-income settlements on flood plains, steep slopes or other sites at risk add to the costs. The capacity of municipal governments in most cities in low-income nations to invest in necessary infrastructure remains limited, however, even if they have been able to modernize tax collection systems or have better cost-recovery for services such as water supplies. And this is not helped by the reluctance of most bilateral aid agencies to support urban development.

Infrastructure to prevent disaster risks is often costly to both build and maintain. The devastating floods that affected Santa Fe, Argentina, in 2003 and 2007 were in part due to incomplete or unmaintained infrastructure. The city has increasingly expanded on to the Río Salado flood plain. To protect itself from floods, it had to create embankments and dykes, but the infrastructure to protect certain city areas was supposed to be in place shortly after 1998 but was never completed due to lack of resources. In addition, the pumps and drainage systems installed to evacuate water in protected areas did not work because of vandalism and lack of maintenance.

Box 7.3 Good governance and disaster risk reduction in Aceh

According to the Centre for Research on the Epidemiology of Disasters, more than 19 million of Indonesia's 210 million people have been affected by 309 disasters in the last two decades. Aceh, the westernmost province of Indonesia, is inhabited by some 4 million people. On 26 December 2004, Aceh was struck by an earthquake measuring 9.0 on the Richter scale and the subsequent tsunami left 130,000 people dead, 37,000 missing and an additional 500,000 people displaced. Damage and losses were estimated at US$ 4.8 billion. Aceh was also suffering from a 30-year conflict that had claimed the lives of 15,000 people by the time a peace agreement was signed in August 2005.

The international and national shift in paradigm from focusing on disaster response to enhancing disaster risk reduction underpins the reform process in Indonesia. Collaboration between the government, civil society organizations and international agencies led to a disaster management law, which was enacted in 2007. The law authorizes the creation of a National Disaster Management Agency (BNPB), which reports directly to the president of Indonesia and has a mandate to coordinate all contingency, preparedness, mitigation, prevention, disaster management training and disaster risk reduction activities (i.e., risk assessment and mapping). The law also addresses and regulates the development and application of disaster management and disaster risk reduction plans at national and local levels. Following passage of the law, the president issued Presidential Regulation 8/2008, which formally established the BNPB. Soon afterwards, the minister of home affairs issued Decree No. 46/2008 mandating the establishment of local disaster management agencies in

all provinces by the end of 2009. The law has been further clarified with additional governmental regulations regarding the participation of international and non-government actors in all phases of the disaster management cycle.

The Aceh provincial government now includes disaster risk reduction as one of the province's seven development priorities, and has introduced measures to mainstream disaster risk reduction into all development sectors, including policy framework, setting up a local disaster management agency, developing a local action plan and standard operating procedures, and increasing partnerships with civil society organizations. The provincial government has also pursued other initiatives, such as implementing the Aceh Green Program (mangrove plantation, reforestation), improving spatial planning and building codes, introducing disaster risk reduction into school curricula, and constructing or improving infrastructure with disaster mitigation functions (such as river and coastal embankments, drainage and access to evacuation buildings).

Promoting disaster risk reduction initiatives in Banda Aceh

The city of Banda Aceh is the capital of Aceh province and inhabited by some 219,619 people. It was among the most severely affected municipalities during the 2004 earthquake and tsunami.

In line with the disaster risk reduction framework at national and provincial levels, the Banda Aceh city government has also integrated disaster risk reduction into its development plan, which includes the city's spatial planning. While a city disaster management agency has not yet been set up, the city government has already developed a contingency plan and standard operating procedures for disaster response, both of which have been tested through several simulations (including the

Indian Ocean wave exercise drill in December 2009). The drills involved all stakeholders including government, civil society organizations and community members.

In addition, the Banda Aceh government has worked closely with civil society groups, including the Red Cross and Red Crescent, to promote community awareness on disaster risks. It has also instituted various measures to mitigate disaster risks, including the integrated community-based disaster preparedness and school-based disaster preparedness programmes implemented by the Indonesian Red Cross Society (PMI), improved access to evacuation buildings and fire brigades trained and equipped to take action at any time. The city's mayor and deputy mayor have demonstrated their support and commitment by attending several disaster risk reduction-related activities. Finally, the city government has established a strong partnership with PMI, which has trained and equipped disaster response teams (known as SATGANA), which are ready to respond to any emergencies.

With financial and technical assistance from the American Red Cross' tsunami recovery programme, the PMI is implementing its integrated community-based risk reduction programme in Banda Aceh. The programme, which seeks to enhance the capacity of vulnerable communities to reduce the risk and minimize the impact of disasters, has four objectives:

1. Build disaster preparedness and response capacity of targeted communities
2. Develop disaster management capacity of targeted schools by conducting disaster preparedness and response sessions for students
3. Enhance PMI's disaster management capacity at national, provincial and district/sub-district levels
4. Strengthen the capacity of the local government's disaster management and research in disaster risk reduction.

The programme helps communities to identify potential risks and hazards in their villages by establishing community disaster management committees and disaster response teams, which are trained in disaster risk reduction issues and disaster response skills. It also supports communities with mitigation activities, contingency funds and disaster drills and works to improve their awareness of disaster risk reduction issues. In addition to schools and communities, the programme works closely with local government and civil society organizations to strengthen government disaster management capacity. ■

Disaster risk reduction and urban development

Much disaster risk reduction is implemented as part of local governments' conventional responsibility to provide or improve infrastructure and services, and support improvements in housing. Perhaps the most important of these are programmes to upgrade slums, which improve the quality of housing and the provision of housing-related infrastructure and services (including water, sanitation and drainage) to settlements that are considered (or officially designated) as slums, including those that developed illegally. In cases where these programmes are done well and in consultation with the inhabitants, they can transform the quality of low-income neighbourhoods and reduce or remove disaster risks. Upgrading programmes have been carried out for 40 years, and in countries such as Argentina, Colombia, Dominican Republic, Egypt, Indonesia, Morocco and Thailand, they have reached a significant proportion of the urban population, reducing slum incidence in the best cases by nearly 50 per cent.

How well-governed a city is, is also shown in the way its government responds to disasters. In Tegucigalpa, four years after Hurricane Mitch, bridges linking poor areas to the city centre had still not been rebuilt. In Caracas, eight months after the floods and landslides of 1999, many poor city dwellers were still living in emergency shelters in very difficult conditions. At that time, the government was criticized for prioritizing actions that benefited certain economic interests (rebuilding roads and economic infrastructure) at the expense of addressing social issues. Again, the importance for risk reduction of good relations between local governments and their lower-income citizens is illustrated.

City and municipal governments are often among the main providers of healthcare and emergency services. The quality of these services and the extent of their coverage will obviously influence their effectiveness in disaster response. In well-governed cities, such services are also active in promoting disaster risk reduction and, where needed, in making early warning systems work. However, for much of the urban population in low- and middle-income nations, especially those living in informal settlements, there is no public healthcare or emergency service, or if there is, it is of poor quality and difficult to access. Ironically, it may be that private healthcare is more important

Photo opposite page: Nairobi, Kenya: A girl empties the contents of her bucket into a small stream that runs through Kibera, one of Africa's largest slums. With more than 600,000 people living within one square mile, Kibera's lack of basic sanitation facilities makes its population vulnerable to a wide range of infectious diseases.

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in informal settlements than in the rest of the city although its quality and coverage are always limited by what local inhabitants can afford.

Disasters also provide obvious challenges for services: not only do they have to respond to the emergency but they also have to restore healthcare for displaced people and those with chronic diseases who need regular treatment and medicines. After the January 2010 earthquake in Haiti, there was much concern about the disruption to treatment for people living with HIV/AIDS and tuberculosis. Another problem that occurs when settlements need to be evacuated is assisting people who need help to move. The provision of efficient emergency services is an essential role of city and municipal governments in furthering disaster risk reduction.

Many city and municipal governments do risk management at the local level but not local risk management. They support projects that contribute to aspects of risk reduction (local organization for prevention and mitigation, reforestation, building codes, land-use norms, physical protection works and early warning systems) but these do not as yet contribute to, or become embedded in, local development. Similarly, most national systems and the international community support some elements of locally implemented risk reduction but do not address the social vulnerability which defines levels of disaster risk and which is often associated with prevailing chronic or everyday risk conditions. Local risk reduction will be a priority for local actors according to how

much they contribute to reducing everyday risks and to their understanding of how vulnerability factors are embedded in the local development process.

In Latin America, over the last 20 years, a network of academics and practitioners from different countries and institutions has promoted new approaches to disaster risk management which stressed disaster risk reduction, local action and local government responsibility, and worked with vulnerable groups to understand and address disaster risk. Much of this work has been promoted directly or indirectly by *La Red de Estudios Sociales en Prevención de Desastres en America Latina* (Network of social studies in disaster prevention in Latin America).

Many nations in Latin America now have well-established institutional structures to support disaster risk reduction. In addition to the Colombian and Nicaraguan systems mentioned above, other nations have focused on broadening national emergency systems. For example, Peru's national system and its civil protection committee, both of which are emergency response structures, focus on capacity building, training and awareness-raising. In El Salvador, many associations of municipalities or micro-regions exist, for example, the association for land-use planning in the Jiboa Valley.

Associations and networks of local governments have also been created to unite efforts in addressing risk reduction. After Hurricane Mitch in Honduras, the municipalities of La Masica, Arizona, Esparta, San Francisco and El Porvenir established an association, MAMUCA (Community of central Atlántida municipalities), to unite efforts and create a platform for dialogue and cooperation in preparing for extreme events and coordinating local response. This helped shift national disaster management systems to community level. It involved participatory diagnosis and planning, awareness-raising, prioritizing strategic reconstruction activities and participating in local decision-making through public meetings. MAMUCA also became involved in the national and regional disaster risk management systems, which helped improve evacuations during storms, through community-based disaster reduction practices, and encouraged the formation of local emergency committees integrated with municipal, regional and national emergency committees. The municipal emergency committees are chaired by the mayors and include representatives of the local council and local institutions, such as the police, the fire department and the Red Cross.

It is still difficult to get national programmes and networks to support local action and encourage coordination between local governments. Risk reduction needs to be promoted and supported in most sectors of local government and coordinated between them – no easy task institutionally. Reviews on the actions, programmes and structures set up after Hurricane Mitch show mixed results in terms of how they managed to embed disaster risk within local development and thus address the structural causes of vulnerability.

Conclusion

As we pointed out at the beginning of this chapter, disaster risk can be greatly reduced or removed by 'good' local governance and support for better-quality housing and infrastructure, and service provision. This is especially true for cities that are exposed to extreme weather or earthquakes. Special provision also needs to be made for identifying and acting on disaster risk reduction. For local governments, it should be easier to get involved in local risk management when the process is embedded within the local development process and when it is clear that actions that can reduce disaster risk also work to reduce everyday risks and contribute to local development. Of course, this also depends on higher levels of government allowing local governments the financial and institutional capacity to act.

For the international agencies that fund risk reduction or development, there is a need to support local-level institutional changes which engage local governments with civil society organizations. Local governments are often bypassed as external funding goes to national governments or through international NGOs. Institutional change often requires long-term support. It may also require more staff, presenting problems for international agencies that face strong pressures to keep down their staff costs. But most international agencies feel more comfortable funding projects not processes. Despite a commitment to 'good governance', local ownership and coordinated approaches, most agencies still monitor and evaluate their work with traditional frameworks, measuring advances and results for quantifiable and visible products and short-term objectives. There are also still too many disaster risk reduction programmes designed by outside experts with no real ownership or assimilation by local stakeholders from local government, community organizations and the private sector. This has to change.

CHAPTER 7

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Disclaimer

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Forewarned is forearmed. Volunteers from National Societies help communities become more resilient to disaster risks through activities such as hazard mapping and disaster preparedness.

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Disaster data

According to the Centre for Research on the Epidemiology of Disasters (CRED), 351 natural disasters and 225 technological disasters were reported worldwide in 2009. These two figures are both the lowest of the decade, in relation to casualties (natural disasters: 10,551; technological disasters: 6,707) and to the number of persons affected (natural disasters: 142 million; technological disasters: 33,000).

The deadliest disaster in 2009 was an earthquake in southern Sumatra (Indonesia), which resulted in 1,117 deaths, a figure far below the major catastrophes of the decade, such as the Indian Ocean tsunami in 2004 (226,408 deaths), Cyclone Nargis in Myanmar in 2008 (138,366 deaths) or the 2008 Sichuan earthquake in China (87,476 deaths). Nevertheless, the Sumatra earthquake appears in 36th place in a ranking of disasters based on the number of persons killed. The technological disaster that resulted in the highest number of deaths was the shipwreck of the ferry *Teratai Prima* in Indonesia, with 247 people considered dead or missing.

The disaster that resulted in the largest number of affected persons (almost 40 million people affected) in 2009 was a flood in July in China. Droughts in north-eastern and eastern Africa (Ethiopia, Sudan, Kenya, Somalia, Uganda, Djibouti, Burundi) affected almost 20 million people. Typhoon Morakot affected more than 13 million people in China, Taiwan and the Philippines in August, and a local storm affected 10 million people in China in November. In May, Cyclone Aila affected 9 million people in India and Bangladesh, and in September, Tropical Storm Ondoy (or Ketsana) affected nearly 8 million people in the Philippines, Viet Nam, Lao People's Democratic Republic and Cambodia. Twelve other major natural disasters affected between 1 and 6 million people each; nine of these events occurred in Asia, two in the Americas and one in Africa. All of these major disasters accounted for 90 per cent of the total number of people affected by natural disasters. By comparison, technological disasters affect few people. An explosion in an ammunitions camp in Tanzania in April was the technological disaster that affected the most people (19,366) in 2009.

Natural disaster costs (US$ 41.5 billion) were the third lowest of the decade – after the lowest values of 2001 (US$ 35.5 billion) and 2006 (US$ 36.3 billion) – and represent less than one-fifth of the record of 2005, when Hurricane Katrina caused damages amounting to almost US$ 137 billion.

In 2009, the costliest disaster was winter storm Klaus, which caused damages totalling US$ 5.1 billion in France and Spain. Damages from the Aquila earthquake in Italy cost US$ 2.5 billion. Three tornadoes in the United States cost a total of US$ 6.2 billion; the earthquake in southern Sumatra caused damages amounting to US$ 2.2 billion and a flood in India in September also cost US$ 2.2 billion. Eleven other disasters

(eight windstorms, one flood, one wild fire and one extreme temperature) cost more than US$ 1 billion. These disasters accounted for 73 per cent of the total reported damages. By comparison, the most costly technological disaster was an explosion in an oil storage facility, which led to damages for a total amount of US$ 6.4 million in Puerto Rico.

EM-DAT: A specialized disaster database

Tables 1–13 on natural and technological disasters and their human impact over the last decade were drawn from CRED's EM-DAT. Established in 1973 as a non-profit institution, CRED is based at the School of Public Health of the Catholic University of Louvain in Belgium and became a World Health Organization collaborating centre in 1980. Although CRED's main focus is on public health, the centre also studies the socio-economic and long-term effects of large-scale disasters.

Since 1988, with the sponsorship of the United States Agency for International Development's Office of Foreign Disaster Assistance (OFDA), CRED has maintained EM-DAT, a worldwide database on disasters. It contains essential core data on the occurrence and effects of more than 17,000 disasters in the world from 1900 to the present. The database is compiled from various sources, including United Nations (UN) agencies, non-governmental organizations, insurance companies, research institutes and press agencies.

Priority is given to data from UN agencies, followed by OFDA, governments and the International Federation of Red Cross and Red Crescent Societies. This prioritization is not a reflection of the quality or value of the data but the recognition that most reporting sources do not cover all disasters or may have political limitations that could affect the figures. The entries are constantly reviewed for redundancies, inconsistencies and the completion of missing data. CRED consolidates and updates data on a daily basis. A further check is made at monthly intervals. Revisions are made annually at the end of the calendar year. The database's main objectives are to assist humanitarian action at both national and international levels; to rationalize decision-making for disaster preparedness; and to provide an objective basis for vulnerability assessment and priority setting.

Data definitions and methodology

CRED defines a disaster as "a situation or event, which overwhelms local capacity, necessitating a request to national or international level for external assistance (definition considered in EM-DAT); an unforeseen and often sudden event that causes great damage, destruction and human suffering". For a disaster to be entered into the database, at least one of the following criteria must be fulfilled:
- Ten or more people reported killed
- 100 people or more reported affected

- Declaration of a state of emergency
- Call for international assistance.

The number of people killed includes people confirmed as dead and people missing and presumed dead. People affected are those requiring immediate assistance during a period of emergency (i.e., requiring basic survival needs such as food, water, shelter, sanitation and immediate medical assistance). People reported injured or homeless are aggregated with those reported affected to produce a 'total number of people affected'.

The economic impact of a disaster usually consists of direct consequences on the local economy (e.g., damage to infrastructure, crops, housing) and indirect consequences (e.g., loss of revenues, unemployment, market destabilization). In EM-DAT, the registered figure corresponds to the damage value at the moment of the event and usually only to the direct damage, expressed in US dollars (2009 prices).

In 2007, a new natural disaster category classification was introduced in EM-DAT. This new classification was initiated by CRED and Munich Re and brought together CRED, Munich Re, Swiss Re, the Asian Disaster Reduction Center (ADRC) and the UN Development Programme (UNDP). The goals were to create and agree on a common hierarchy and terminology for all global and regional databases on natural disasters and to establish a common and agreed definition of sub-events that is simple and self-explanatory.

This classification is a first step in the development of a standardized international classification of disasters. It distinguishes two generic categories for disasters (natural and technological), the natural disasters category being divided into five sub-groups, which in turn cover 12 disaster types and more than 32 sub-types. The five sub-groups and 12 types are as follows:

- **Biological disasters:** Insect infestations, epidemics and animal attacks (the last two categories are not included in the *World Disasters Report*)
- **Geophysical disasters:** Earthquakes and tsunamis, volcanic eruptions, dry mass movements (avalanches, landslides, rockfalls and subsidence of geophysical origin)
- **Climatological disasters:** Droughts (with associated food insecurities), extreme temperatures and wildfires
- **Hydrological disasters:** Floods (including waves and surges), wet mass movements (avalanches, landslides, rockfalls and subsidence of hydrological origin)
- **Meteorological disasters:** Storms (divided into nine sub-categories).

The technological disasters remain unchanged and comprise three groups:

- **Industrial accidents:** Chemical spills; collapse of industrial infrastructure; explosions; fires; gas leaks; poisoning; radiation
- **Transport accidents:** Transportation by air, rail, road or water

- **Miscellaneous accidents:** Collapse of domestic/non-industrial structures; explosions; fires.

In Tables 1–13, 'disasters' refer to disasters with a natural or a technological trigger only, and do not include wars, conflict-related famines, diseases or epidemics. The classification of countries as 'very high', 'high', 'medium' or 'low human development' is based on UNDP's 2009 Human Development Index (HDI). For a small number of countries, which do not appear in the HDI, the World Bank's classification of economies by the countries' level of income is used as reference ('high', 'upper middle' 'lower middle' and 'low').

In both EM-DAT and the tables in this annex, data are considered at country level for many reasons, including the fact that it is at this level that they are reported most of the time and also due to issues regarding possible aggregation and disaggregation of data. For droughts or food insecurities, which are often multi-year events, their impact over time is taken into account.

Bearing in mind that data on deaths and economic damage from drought are infrequently reported, CRED has adopted the following rules regarding data for droughts:
- The total number of deaths reported for a drought is divided by the number of years for which the drought persists. The resulting number is registered for each year of the drought's duration.
- The same calculation is done for the reported economic damages.
- For the total number of people reported to be affected, CRED considers that the same number is affected each year that the disaster persists.

Some disasters begin at the end of a year and may last some weeks or months into the following year. In such case, CRED has adopted the following rules:
- With regard to the number of people reported affected, the total number is recorded for both the start year and the end year.
- For the number of people reported killed, CRED distinguishes between sudden-onset disasters (earthquakes, flash floods, landslides, etc.) and slow-onset disasters (wildfires, some floods, extreme temperatures, etc.) as follows:
  – Sudden-onset disasters – all those killed are registered according to the start year of the disaster
  – Slow-onset disasters – the total of all those killed is divided by two and a half is attributed to each year of persistence.
- Reported economic damages are always attributed to the end year of the disaster. This is because damage is related to both the strength of a disaster and its duration.

By using these rules, some data bias correction is attempted. However, they are far from perfect and CRED will try to improve them, as well as the database as a whole, in the future.

Caveats

Key problems with disaster data include the lack of standardized collection method-ologies and definitions. The original information, collected from a variety of public sources, is not specifically gathered for statistical purposes. So, even when the compila-tion applies strict definitions for disaster events and parameters, the original suppliers of information may not. Moreover, data are not always complete for each disaster. The quality of completion may vary according to the type of disaster (for example, the number of people affected by transport accidents is rarely reported) or its country of occurrence.

Data on deaths are usually available because they are an immediate proxy for the sever-ity of the disaster. However, the numbers put forward immediately after a disaster may sometimes be seriously revised, occasionally several months later.

Data on the number of people affected by a disaster can provide some of the most potentially useful figures, for planning both disaster preparedness and response, but they are sometimes poorly reported. Moreover, the definition of people affected remains open to interpretation, political or otherwise. Even in the absence of manipu-lation, data may be extrapolated from old census information, with assumptions being made about percentages of an area's population affected.

Data can also be skewed because of the rationale behind data gathering. Reinsurance companies, for instance, systematically gather data on disaster occurrence in order to assess insurance risk, but with a priority in areas of the world where disaster insurance is widespread. Their data may therefore miss out poor, disaster-affected regions where insurance is unaffordable or unavailable.

For natural disasters over the last decade, data on deaths are missing for around one-tenth of reported disasters; data on people affected are missing for around one-fifth of disasters; and data on economic damages are missing for 67 per cent of disasters. The figures should therefore be regarded as indicative. Relative changes and trends are more useful to look at than absolute, isolated figures.

Dates can be a source of ambiguity. For example, a declared date for a famine is both necessary and meaningless – a famine does not occur on a single day. In such cases, the date the appropriate body declares an official emergency has been used. Changes in national boundaries cause ambiguities in the data and may make long-term trend analysis more complicated.

However, in some cases, available data may differ greatly according to sources, be more or less documented estimations and/or subject to controversies. In these cases, CRED always compiles all available data or analysis to try to make its own documented esti-mation, which can be revised when more accurate data are provided.

Information systems have improved vastly in the last 25 years and statistical data are now more easily available, intensified by an increasing sensitivity to disaster occurrence and consequences. Nevertheless there are still discrepancies. An analysis of the quality and accuracy of disaster data, performed by CRED in 2002, showed that occasionally, for the same disaster, differences of more than 20 per cent may exist between the quantitative data reported by the three major databases – EM-DAT (CRED), NatCat (Munich Re) and Sigma (Swiss Re).

Despite efforts to verify and review data, the quality of disaster databases can only be as good as the reporting system. This, combined with the different aims of the three major disaster databases (risk and economic risk analysis for reinsurance companies, development agenda for CRED), may explain differences between data provided for some disasters. However, in spite of these differences, the overall trends indicated by the three databases remain similar.

The lack of systematization and standardization of data collection is a major weakness when it comes to long-term planning. Fortunately, due to increased pressures for accountability from various sources, many donors and development agencies have started paying attention to data collection and its methodologies.

Part of the solution to this data problem lies in retrospective analysis. Data are most often publicly quoted and reported during a disaster event, but it is only long after the event, once the relief operation is over, that estimates of damage and death can be verified. Some data gatherers, like CRED, revisit the data; this accounts for retrospective annual disaster figures changing one, two and sometimes even three years after the event.

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ANNEX 1

Table 1 Total number of reported disasters,[1] by continent, by year and by level of human development (2000 to 2009)

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	Total[2]
Africa	202	184	197	170	164	170	200	181	168	146	1,782
Americas	151	134	156	126	137	139	103	133	144	111	1,334
Asia	303	295	310	294	318	359	304	257	238	225	2,903
Europe	130	96	115	96	98	127	98	104	57	75	996
Oceania	13	18	19	20	22	16	18	11	13	19	169
Very high human development	131	114	132	115	106	111	98	95	85	78	1,065
High human development	156	125	143	124	149	145	109	132	99	107	1,289
Medium human development	454	415	450	399	422	468	420	365	362	318	4,073
Low human development	58	73	72	68	62	87	96	94	74	73	757
Total	**799**	**727**	**797**	**706**	**739**	**811**	**723**	**686**	**620**	**576**	**7,184**

Source: EM-DAT, CRED, University of Louvain, Belgium

[1] In Tables 1–13, 'disasters' refer to those with a natural and/or technological trigger only, and do not include wars, conflict-related famines, diseases or epidemics.
[2] Since slow-onset disasters can affect the same country over a number of years, it is best to use figures on total numbers to calculate annual averages over a decade rather than as absolute totals (see the methodology chapter of this annex).
See note on UNDP's Human Development Index country status in the section on disaster definitions in the introduction to this annex.
With 576 disasters, 2009 is the year with the lowest number of disasters of the decade, far below the peaks of 2000, 2002 and 2005.

Among continents, Africa and Asia experienced their smallest number of disasters of the decade. In the Americas and in Europe, this number was the second lowest of the last ten years.
In 2009, the number of disasters for Oceania was the third highest of the decade.
Numbers of disasters were at their lowest level in 2009 in countries with very high human development and medium human development, and near their lowest level in countries with high human development. On the other hand, this number remained proportionally high in countries with low human development. With 39 per cent of all disasters, Asia remains the most frequently hit continent and is, in 2009, just below its decade's average of 40 per cent.

Table 2 Total number of people reported killed, by continent, by year and by level of human development (2000 to 2009)

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	Total
Africa	5,392	4,520	7,639	6,160	4,246	3,184	5,789	3,695	3,039	3,142	46,806
Americas	2,066	3,077	2,108	2,082	8,437	5,438	1,558	2,921	2,730	2,160	32,577
Asia	88,056	105,960	89,427	39,030	238,404	90,796	20,634	15,581	235,618	9,744	933,250
Europe	1,622	2,338	1,810	73,373	1,259	1,044	5,837	1,665	787	1,319	91,054
Oceania	205	9	91	64	35	46	24	273	25	893	1,665
Very high human development	1,518	1,433	1,431	72,889	1,102	2,925	4,152	1,017	883	2,090	89,440
High human development	2,478	2,905	2,843	2,983	2,572	1,961	2,707	3,182	1,589	2,804	26,024
Medium human development	15,049	33,643	16,085	43,446	247,165	93,414	24,318	17,391	237,373	11,000	738,884
Low human development	78,296	77,923	80,716	1,391	1,542	2,208	2,665	2,545	2,354	1,364	251,004
Total	**97,341**	**115,904**	**101,075**	**120,709**	**252,381**	**100,508**	**33,842**	**24,135**	**242,199**	**17,258**	**1,105,352**

Source: EM-DAT, CRED, University of Louvain, Belgium

See note on UNDP's Human Development Index country status in the section on disaster definitions in the introduction to this annex.
In 2009 the number of people reported killed was the lowest of the decade, far below the decade's average of 110,535.
On the other hand, in Oceania, the number of people killed largely surpassed its peaks of 2000 and 2007.
In 2009, 56 per cent of people killed by disasters lived in Asia, far below the decade's average of 84 per cent.
Inversely the proportions of people killed in Africa (18 per cent), in the Americas (13 per cent) and in Oceania (5 per cent) were significantly higher than their decade's average (4, 3 and 0.2 per cent, respectively).

The number of people reported dead was also the lowest of the decade in countries of medium and low human development.
The deadliest disaster in 2009 was an earthquake in southern Sumatra (Indonesia), which caused 1,117 deaths. This figure is far below the death tolls caused by the Indian Ocean tsunami in 2004 (226,408 deaths), Cyclone Nargis in Myanmar in 2008 (138,366 deaths) and earthquakes in Sichuan, China in 2008 (87,476 deaths), Kashmir in 2005 (73,338 deaths) Bam, Iran in 2003 (26,796 deaths) and Gujurat, India in 2001 (20,005 deaths).

Table 3 Total number of people reported affected, by continent, by year and by level of human development (2000 to 2009), in thousands

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	Total[1]
Africa	46,000	45,545	44,601	29,266	36,902	22,856	22,965	12,526	21,465	24,468	306,595
Americas	975	10,913	2,517	3,995	9,698	8,308	1,450	9,119	20,410	5,776	73,161
Asia	206,644	186,203	663,070	235,689	132,290	129,716	119,660	192,185	182,465	111,793	2,159,715
Europe	2,929	787	1,493	1,546	538	527	260	1,651	268	146	10,144
Oceania	7	31	41	38	119	28	38	172	105	77	658
Very high human development	781	1,238	1,006	575	5,560	1,176	142	1,176	13,489	2,470	27,613
High human development	911	8,162	2,675	4,633	4,024	6,878	1,400	8,037	5,495	2,591	44,806
Medium human development	228,503	206,084	680,839	242,503	155,556	135,414	122,889	195,814	190,231	123,149	2,280,981
Low human development	26,361	27,996	27,203	22,822	14,406	17,968	19,942	10,625	15,499	14,050	196,872
Total	**256,556**	**243,480**	**711,722**	**270,533**	**179,546**	**161,436**	**144,373**	**215,652**	**224,714**	**142,260**	**2,550,272**

Source: EM-DAT, CRED, University of Louvain, Belgium

[1] Since slow-onset disasters can affect the same people a number of years, it is best to use figures on total numbers affected to calculate annual averages over a decade rather than as absolute totals.

See note on UNDP's Human Development Index country status in the section on disaster definitions in the introduction to this annex.

In 2009, the number of 142 million people affected by disasters was the lowest of the decade, far below the annual average of 255 million people affected.

In Asia and Europe, the number of people affected was, in 2009, the lowest of the decade.

In 2009, the number of people affected living in countries of low human development and of medium human development was the second lowest of the decade.

Three major disasters, affecting more than 10 million people, occurred in China: floods in July (almost 40 million people affected) and two windstorms in August and November (11 and 10 million people affected, respectively).

Table 4 Total amount of disaster estimated damage, by continent, by year and by level of human development (2000 to 2009) – in millions of US dollars (2009 prices)

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	Total
Africa	1,243	805	436	6,455	1,908	38	244	782	863	173	12,947
Americas	6,800	15,946	15,386	25,085	74,679	189,370	7,226	16,625	64,162	13,337	428,616
Asia	27,108	15,687	15,855	27,630	75,332	30,494	24,873	35,747	117,927	15,449	386,102
Europe	22,176	2,395	40,283	21,415	2,072	17,261	2,584	22,796	4,644	10,789	146,414
Oceania	668	696	2,601	691	627	241	1,368	1,488	2,506	1,726	12,612
Very high human development	39,272	16,087	60,332	50,959	122,083	192,144	11,694	46,461	64,178	24,655	627,865
High human development	2,259	3,952	3,328	2,907	7,058	14,607	2,041	11,564	6,360	2,412	56,488
Medium human development	8,370	15,421	10,842	27,178	24,878	30,641	22,557	18,922	119,537	14,234	292,579
Low human development	8,094	69	60	233	600	12	3	489	27	173	9,760
Total	**57,995**	**35,528**	**74,561**	**81,277**	**154,619**	**237,404**	**36,295**	**77,436**	**190,102**	**41,474**	**986,691**

Source: EM-DAT, CRED, University of Louvain, Belgium

See note on UNDP's Human Development Index country status in the section on disaster definitions in the introduction to this annex.
As mentioned in the introduction, damage assessment is frequently unreliable. Even for the existing data, the methodologies are not standardized and the financial coverage can vary significantly.
Depending on where the disaster occurs and who reports it, estimations may vary from zero to billions of US dollars. The total amount of damage reported in 2009 was the third lowest of the decade, after 2001 and 2006.
Inversely, in Oceania, the amount of damages was the third highest of the decade, after 2002 and 2008.

In 2009, Europe accounted for 26 per cent of damage, above its 15 per cent average of the decade.
Very high human development countries experienced 59 per cent of damage in 2009, compared to 64 per cent for the entire decade.
Inversely, the contribution of medium human development countries to the total amount of damages climbed to 34 per cent, up from 30 per cent for the decade.
Windstorm Klaus, in France, was the costliest disaster in 2009 (more than US$ 3 billion reported damages), but it appears only at the 51st place in the ranking of the most expensive disasters.

Table 5 Total number of reported disasters, by type of phenomenon and by year (2000 to 2009)

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	Total[1]
Droughts/food insecurity	43	43	40	23	19	28	20	14	20	23	273
Earthquakes/tsunamis	31	25	37	40	42	25	24	21	23	22	290
Extreme temperatures	31	23	15	26	19	29	32	25	11	26	237
Floods[2]	158	157	171	160	132	195	229	218	169	150	1,739
Forest/scrub fires	30	14	22	14	8	13	9	18	5	9	142
Insect infestation	2	2	n.d.r.	n.d.r.	12	n.d.r.	n.d.r.	n.d.r.	n.d.r.	1	17
Mass movement: dry[3]	1	n.d.r.	1	n.d.r.	1	n.d.r.	1	n.d.r.	3	1	8
Mass movement: wet[4]	28	24	20	21	15	12	20	10	12	31	193
Volcanic eruptions	5	6	7	2	5	8	12	6	7	3	61
Windstorms	102	108	124	86	127	130	76	105	111	85	1,054
Subtotal climato-, hydro- & meteorological disasters	*394*	*371*	*392*	*330*	*332*	*407*	*386*	*390*	*328*	*325*	*3,655*
Subtotal geophysical disasters	*37*	*31*	*45*	*42*	*48*	*33*	*37*	*27*	*33*	*26*	*359*
Total natural disasters	**431**	**402**	**437**	**372**	**380**	**440**	**423**	**417**	**361**	**351**	**4,014**
Industrial accidents	51	54	48	52	81	76	62	52	38	43	557
Miscellaneous accidents	58	50	52	45	62	66	33	43	30	27	466
Transport accidents	259	221	260	237	216	229	205	174	191	155	2,147
Total technological disasters	**368**	**325**	**360**	**334**	**359**	**371**	**300**	**269**	**259**	**225**	**3,170**
Total	**799**	**727**	**797**	**706**	**739**	**811**	**723**	**686**	**620**	**576**	**7,184**

[1] Since slow-onset disasters can affect the same country over a number of years, it is best to use figures on total numbers to calculate annual averages over a decade rather than as absolute totals (see the methodology chapter of this annex).

[2] Includes waves and surges.

[3] Landslides, rockfalls, subsidence of geophysical origin.

[4] Landslides, avalanches, subsidence of hydrological origin.

Note: 'n.d.r.' denotes 'no disaster reported'.

In 2009, the number of both natural and technological disasters was the lowest of the decade, far below their peak of 2005.

Among natural disasters, the most frequent were floods (43 per cent), in a proportion equal to the decade's average (also 43 per cent). Extreme temperatures (7 per cent) and mass movements of hydrological origin (9 per cent) surpassed their decade's average (6 and 5 per cent, respectively). All other natural disasters were slightly below their decade's average. Among technological disasters, transport accidents were the most frequent, but their number was the lowest of the decade. The number of miscellaneous accidents was also the lowest of the decade.

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Table 6 Total number of people reported killed, by type of phenomenon and by year (2000 to 2009)

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	Total
Droughts/food insecurity	76,379	76,476	76,903	38	80	88	208	n.a.	6	3	230,181
Earthquakes/tsunamis	216	21,348	1,636	29,617	227,290	76,241	6,692	780	87,918	1,815	453,553
Extreme temperatures	941	1,787	3,019	74,748	556	814	5,104	1,044	1,608	1,122	90,743
Floods[1]	6,025	5,014	4,236	3,772	7,100	5,764	5,863	8,565	4,037	3,419	53,795
Forest/scrub fires	47	33	6	47	14	50	13	150	86	190	636
Insect infestation	n.a.	n.a.	n.d.r.	n.d.r.	n.a.	n.d.r.	n.d.r.	n.d.r.	n.d.r.	n.a.	n.a.
Mass movement: dry[2]	11	n.d.r.	60	n.d.r.	44	n.d.r.	11	n.d.r.	120	36	282
Mass movement: wet[3]	1,012	786	1,089	706	313	646	1,638	271	504	658	7,623
Volcanic eruptions	n.a.	n.a.	200	n.a.	2	3	5	11	9	n.a.	230
Windstorms	1,354	1,914	1,475	1,031	6,653	5,250	4,329	6,035	140,985	3,308	172,334
Subtotal climato-, hydro- & meteorological disasters	85,758	86,010	86,728	80,342	14,716	12,612	17,155	16,065	147,226	8,700	555,312
Subtotal geophysical disasters	227	21,348	1,896	29,617	227,336	76,244	6,708	791	88,047	1,851	454,065
Total natural disasters	**85,985**	**107,358**	**88,624**	**109,959**	**242,052**	**88,856**	**23,863**	**16,856**	**235,273**	**10,551**	**1,009,377**
Industrial accidents	1,807	1,279	1,112	1,444	1,797	2,281	1,832	1,656	776	933	14,917
Miscellaneous accidents	1,341	1,341	2,013	1,438	2,115	2,669	1,126	909	895	916	14,763
Transport accidents	8,208	5,926	9,326	7,868	6,417	6,702	7,021	4,714	5,255	4,858	66,295
Total technological disasters	**11,356**	**8,546**	**12,451**	**10,750**	**10,329**	**11,652**	**9,979**	**7,279**	**6,926**	**6,707**	**95,975**
Total	**97,341**	**115,904**	**101,075**	**120,709**	**252,381**	**100,508**	**33,842**	**24,135**	**242,199**	**17,258**	**1,105,352**

Source: EM-DAT, CRED, University of Louvain, Belgium

[1] Includes waves and surges.
[2] Landslides, rockfalls, subsidence of geophysical origin.
[3] Landslides, avalanches, subsidence of hydrological origin.
Note: 'n.a.' denotes 'no data available'; 'n.d.r.' signifies 'no disaster reported'.
For more information, see section on caveats in introductory text.
In 2009, deaths from both natural and technological disasters were at their lowest level for the entire decade.
Among natural disasters, the number of deaths from floods is the lowest of the decade, but in proportion (32 per cent), it surpasses its 5 per cent decennial average.

Conversely, forest/scrub fires resulted in the highest number and proportion of deaths.
Deaths from industrial and transport accidents were the second lowest of the decade; deaths from miscellaneous accidents, the third lowest.
Most reported deaths caused by droughts and food insecurity during the decade were attributable to the famine in the Democratic People's Republic of Korea, although the estimates provided are disputed (see caveats in the introductory text).

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Table 7 Total number of people reported affected, by type of phenomenon and by year (2000 to 2009), in thousands

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	Total[1]
Droughts/food insecurity	164,579	166,772	428,879	81,842	35,272	30,643	41,971	9,578	36,411	29,498	1,025,446
Earthquakes/tsunamis	2,479	9,711	851	4,194	3,147	6,187	3,859	1,382	47,580	3,221	82,612
Extreme temperatures	28	213	104	1,890	2,140	2	63	988	79,172	1,050	85,651
Floods[2]	73,905	34,552	167,769	169,515	117,212	75,028	30,383	177,836	45,660	57,253	949,112
Forest/scrub fires	39	6	26	184	21	7	2	1,785	59	12	2,140
Insect infestation	n.a.	n.a.	n.d.r.	n.d.r.	n.a.	n.d.r.	n.d.r.	n.d.r.	n.d.r.	500	500
Mass movement: dry[3]	n.a.	n.d.r.	n.a.	n.d.r.	n.a.	n.d.r.	n.a.	n.d.r.	1	3	4
Mass movement: wet[4]	215	71	305	459	12	10	432	9	5	52	1,570
Volcanic eruptions	127	110	278	25	53	341	379	51	136	57	1,556
Windstorms	15,137	31,991	113,441	11,758	21,383	49,117	67,109	23,974	15,651	50,583	400,144
Subtotal climato-, hydro- & meteorological disasters	253,902	233,605	710,524	265,647	176,039	154,808	139,960	214,170	176,958	138,947	2,464,562
Subtotal geophysical disasters	2,605	9,822	1,130	4,219	3,200	6,528	4,237	1,433	47,717	3,280	84,172
Total natural disasters	**256,508**	**243,426**	**711,654**	**269,867**	**179,239**	**161,336**	**144,198**	**215,604**	**224,675**	**142,227**	**2,548,734**
Industrial accidents	17	19	2	646	157	16	137	3	14	6	1,017
Miscellaneous accidents	24	31	61	15	102	77	35	41	21	23	430
Transport accidents	7	3	6	5	48	6	4	4	4	4	91
Total technological disasters	**48**	**53**	**68**	**667**	**307**	**100**	**175**	**48**	**39**	**33**	**1,538**
Total	**256,556**	**243,480**	**711,722**	**270,533**	**179,546**	**161,436**	**144,373**	**215,652**	**224,714**	**142,260**	**2,550,272**

Source: EM-DAT, CRED, University of Louvain, Belgium

[1] Since slow-onset disasters can affect the same people over a number of years, it is best to use figures on total numbers affected to calculate annual averages over a decade rather than as absolute totals.
[2] Includes waves and surges.
[3] Landslides, rockfalls, subsidence of geophysical origin.
[4] Landslides, avalanches, subsidence of hydrological origin.
Note: 'n.a.' denotes 'no data available'; 'n.d.r.' denotes 'no disaster reported'.
For more information, see section on caveats in introductory text.

In 2009, for both natural and technological disasters, the numbers of people affected were at their lowest level for the decade.
Disasters which affected the most people in 2009 were floods (57 million people affected: 40 per cent of those affected by disasters).
Windstorms (50 million people affected) accounted for 36 per cent of those affected by disasters, far above their annual average (16 per cent).
In Liberia, 500,000 people were affected by an insect infestation.

Table 8 Total amount of disaster estimated damage, by type of phenomenon and by year (2000 to 2009) – in millions of US dollars (2009 prices)

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	Total
Droughts/food insecurity	5,107	2,787	9,884	863	1,700	2,149	3,337	524	216	245	26,811
Earthquakes/tsunamis	514	8,920	2,466	9,622	43,844	7,366	3,652	15,492	85,491	6,059	183,425
Extreme temperatures	461	242	n.a.	14,598	n.a.	439	1,064	n.a.	21,862	1,131	39,798
Floods[1]	32,148	5,757	31,990	24,152	11,965	19,707	8,307	25,181	19,655	7,723	186,584
Forest/scrub fires	3,188	109	432	7,107	3	4,226	893	4,757	2,421	1,515	24,651
Insect infestation	150	n.a.	n.d.r.	n.d.r.	n.a.	n.d.r.	n.d.r.	n.d.r.	n.d.r.	n.a.	150
Mass movement: dry[2]	n.a.	n.d.r.	n.a.	n.d.r.	n.a.	n.d.r.	n.a.	n.d.r.	n.a.	n.a.	n.a.
Mass movement: wet[3]	576	86	230	61	4	60	43	n.a.	n.a.	154	1,212
Volcanic eruptions	3	20	11	n.a.	n.a.	n.a.	160	n.a.	n.a.	n.a.	193
Windstorms	15,523	17,589	17,597	24,874	95,616	202,996	18,839	30,584	60,457	24,641	508,717
Subtotal climato-, hydro- & meteorological disasters	57,152	26,570	60,132	71,655	109,289	229,577	32,482	61,045	104,612	35,409	787,923
Subtotal geophysical disasters	517	8,940	2,477	9,622	43,844	7,366	3,811	15,492	85,491	6,059	183,618
Total natural disasters	**57,669**	**35,510**	**62,609**	**81,277**	**153,133**	**236,943**	**36,293**	**76,537**	**190,102**	**41,468**	**971,541**
Industrial accidents	n.a.	12	11,878	n.a.	1,022	450	n.a.	899	n.a.	6	14,268
Miscellaneous accidents	326	6	74	n.a.	n.a.	11	1	n.a.	n.a.	n.a.	418
Transport accidents	n.a.	n.a.	n.a.	n.a.	463	n.a.	n.a.	n.a.	n.a.	n.a.	463
Total technological disasters	**326**	**18**	**11,952**	**n.a.**	**1,486**	**462**	**1**	**899**	**n.a.**	**6**	**15,150**
Total	**57,995**	**35,528**	**74,561**	**81,277**	**154,619**	**237,404**	**36,295**	**77,436**	**190,102**	**41,474**	**986,691**

Source: EM-DAT, CRED, University of Louvain, Belgium

[1] Includes waves and surges.
[2] Landslides, rockfalls, subsidence of geophysical origin.
[3] Landslides, avalanches, subsidence of hydrological origin.
Note: 'n.a.' denotes 'no data available'; 'n.d.r.' denotes 'no disaster reported'.
For more information, see section on caveats in introductory text.
Estimates of disaster damage must be treated with caution, as the financial value attached to infrastructures in developed countries is much higher than in developing countries. While reporting is better for large disasters, the low reporting rates of direct damage make analysis difficult.

The costliest disasters of the decade were windstorms (51.6 per cent), floods (19 per cent) and earthquakes/tsunamis (18.5 per cent).
In 2009, hydrometeorological disasters accounted for 85 per cent of reported damages, with windstorms accounting for 59 per cent.
Damages reported for droughts and floods were the second lowest of the decade.
The proportion of damages attributable, in 2009, to windstorms (59 per cent of reported damages) was higher than their decennial average (52 per cent).

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Table 9 Total number of reported disasters, by type of phenomenon, by continent and by level of human development[1] (2000 to 2009)

	Africa	Americas	Asia	Europe	Oceania	VHHD	HHD	MHD	LHD	Total
Droughts/food insecurity	126	57	73	15	2	15	29	154	75	273
Earthquakes/tsunamis	24	43	173	39	11	38	55	177	20	290
Extreme temperatures	5	40	60	130	2	72	91	70	4	237
Floods[2]	421	356	655	259	48	236	372	870	261	1,739
Forest/scrub fires	13	53	14	52	10	77	37	23	5	142
Insect infestation	12	1	1	1	2	2	2	6	7	17
Mass movement: dry[3]	1	3	3	n.d.r.	1	n.d.r.	2	6	n.d.r.	8
Mass movement: wet[4]	13	38	122	14	6	8	40	137	8	193
Volcanic eruptions	7	23	19	1	11	4	18	35	4	61
Windstorms	94	329	416	150	65	366	159	489	40	1,054
Subtotal climato-, hydro- & meteorological disasters	*684*	*874*	*1,341*	*621*	*135*	*776*	*730*	*1,749*	*400*	*3,655*
Subtotal geophysical disasters	*32*	*69*	*195*	*40*	*23*	*42*	*75*	*218*	*24*	*359*
Total natural disasters	**716**	**943**	**1,536**	**661**	**158**	**818**	**805**	**1,967**	**424**	**4,014**
Industrial accidents	68	23	414	52	n.d.r.	22	51	454	30	557
Miscellaneous accidents	114	66	212	72	2	56	91	283	36	466
Transport accidents	884	302	741	211	9	169	342	1,369	267	2,147
Total technological disasters	**1,066**	**391**	**1,367**	**335**	**11**	**247**	**484**	**2,106**	**333**	**3,170**
Total	**1,782**	**1,334**	**2,903**	**996**	**169**	**1,065**	**1,289**	**4,073**	**757**	**7,184**

Source: EM-DAT, CRED, University of Louvain, Belgium

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During the decade:

Asia accounted for 40 per cent of the total number of disasters but for 74 per cent of industrial accidents, 63 per cent of mass movements of hydrological origin, 60 per cent of earthquakes/tsunamis and 45 per cent of miscellaneous accidents.

Africa accounted for 25 per cent of the total number of disasters but for 71 per cent of insect infestations, 46 per cent of droughts/food insecurity events and 41 per cent of transport accidents.

Americas accounted for 19 per cent of the total number of disasters but for 38 per cent of volcanic eruptions 37 per cent of wild fires and 31 per cent of windstorms.

Europe accounted for 14 per cent of the total number of disasters but for 55 per cent of extreme temperatures and for 37 per cent of wild fires.

Oceania accounted for 2 per cent of the total number of disasters but for 18 per cent of volcanic eruptions, 7 per cent of wild fires and 6 per cent of windstorms.

[1] VHHD stands for very high human development, HHD stands for high human development, MHD for medium human development and LHD for low human development.

See note on UNDP's Human Development Index country status in the section on disaster definitions in the introduction to this annex.

[2] Includes waves and surges.

[3] Landslides, rockfalls, subsidence of geophysical origin.

[4] Landslides, avalanches, subsidence of hydrological origin.

Note: 'n.a.' signifies 'no data available'; 'n.d.r.' signifies 'no disaster reported'. For more information, see section on caveats in introductory text.

Table 10 Total number of people reported killed, by type of phenomenon, by continent and by level of human development[1] (2000 to 2009)

	Africa	Americas	Asia	Europe	Oceania	VHHD	HHD	MHD	LHD	Total
Droughts/food insecurity	1,069	54	229,056	2	n.a.	n.a.	n.a.	728	229,453	230,181
Earthquakes/tsunamis	3,335	2,047	447,320	601	250	420	1,252	450,244	1,637	453,553
Extreme temperatures	125	1,406	8,738	80,127	347	75,801	5,278	7,999	1,665	90,743
Floods[2]	7,934	7,662	36,856	1,250	93	1,017	4,250	42,341	6,187	53,795
Forest/scrub fires	154	73	3	200	206	424	50	112	50	636
Insect infestation	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Mass movement: dry[3]	98	108	66	n.d.r.	10	n.d.r.	72	210	n.d.r.	282
Mass movement: wet[4]	202	1,041	6,068	229	83	96	981	6,436	110	7,623
Volcanic eruptions	206	16	8	n.a.	n.a.	n.a.	14	11	205	230
Windstorms	1,273	9,998	160,242	521	300	5,758	788	165,240	548	172,334
Subtotal climato-, hydro- & meteorological disasters	10,757	20,234	440,963	82,329	1,029	83,096	11,347	222,856	238,013	555,312
Subtotal geophysical disasters	3,639	2,171	447,394	601	260	420	1,338	450,465	1,842	454,065
Total natural disasters	**14,396**	**22,405**	**888,357**	**82,930**	**1,289**	**83,516**	**12,685**	**673,321**	**239,855**	**1,009,377**
Industrial accidents	2,576	382	10,915	1,044	n.d.r.	177	1,021	12,807	912	14,917
Miscellaneous accidents	3,361	2,302	7,524	1,540	36	1,205	3,199	9,679	680	14,763
Transport accidents	26,473	7,488	26,454	5,540	340	4,542	9,119	43,077	9,557	66,295
Total technological disasters	**32,410**	**10,172**	**44,893**	**8,124**	**376**	**5,924**	**13,339**	**65,563**	**11,149**	**95,975**
Total	**46,806**	**32,577**	**933,250**	**91,054**	**1,665**	**89,440**	**26,024**	**738,884**	**251,004**	**1,105,352**

Source: EM-DAT, CRED, University of Louvain, Belgium

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During the decade:

Medium human development countries accounted for 67 per cent of the total number of reported deaths but for almost all deaths from earthquakes, 96 per cent of deaths due to windstorms, 86 per cent of those caused by industrial accidents and 79 per cent of deaths from floods.

Low human development countries accounted for 23 per cent of the total number of reported deaths but almost all deaths were caused by droughts/food insecurity and 89 per cent of deaths following a volcanic eruption.

Very high human development countries accounted for 8 per cent of the total number of reported deaths, but for 67 per cent of deaths from wild fires.

High human development countries accounted for 2 per cent of the total number of reported deaths but for 22 per cent of deaths from miscellaneous accidents and for 14 per cent of those from transport accidents.

[1] VHHD stands for very high human development, HHD stands for high human development, MHD for medium human development and LHD for low human development.

See note on UNDP's Human Development Index country status in the section on disaster definitions in the introduction to this chapter annex.

[2] Includes waves and surges.

[3] Landslides, rockfalls, subsidence of geophysical origin.

[4] Landslides, avalanches, subsidence of hydrological origin.

Note: 'n.a.' signifies 'no data available'; 'n.d.r.' signifies 'no disaster reported'. For more information, see section on caveats in introductory text.

ANNEX 1

Table 11 Total number of people reported affected, by type of phenomenon, by continent and by level of human development[1] (2000 to 2009), in thousands

	Africa	Americas	Asia	Europe	Oceania	VHHD	HHD	MHD	LHD	Total
Droughts/food insecurity	276,890	7,308	739,975	1,273	n.a.	n.a.	3,260	846,128	176,059	1,025,446
Earthquakes/tsunamis	387	3,092	78,380	731	23	296	2,093	79,969	255	82,612
Extreme temperatures	n.a.	4,944	80,596	107	2	6	4,964	80,309	371	85,650
Floods[2]	23,596	29,245	892,535	3,570	167	13,330	16,561	901,380	17,841	949,112
Forest/scrub fires	11	942	6	1,163	18	981	1,004	151	5	2,140
Insect infestation	500	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	500	500
Mass movement: dry[3]	1	3	n.a.	n.d.r.	n.a.	n.d.r.	n.a.	4	n.d.r.	4
Mass movement: wet[4]	16	187	1,352	3	11	2	178	1,076	313	1,570
Volcanic eruptions	405	691	391	n.a.	69	16	688	730	121	1,556
Windstorms	4,455	26,162	365,913	3,247	368	12,914	15,480	370,505	1,245	400,144
Subtotal climato-, hydro- & meteorological disasters	*305,467*	*68,787*	*2,080,378*	*9,364*	*566*	*27,233*	*41,446*	*2,199,549*	*196,333*	*2,464,561*
Subtotal geophysical disasters	*793*	*3,786*	*78,771*	*731*	*92*	*312*	*2,781*	*80,703*	*376*	*84,172*
Total natural disasters	**306,259**	**72,573**	**2,159,149**	**10,094**	**657**	**27,545**	**44,227**	**2,280,252**	**196,710**	**2,548,733**
Industrial accidents	104	566	325	23	n.d.r.	49	553	319	96	1,017
Miscellaneous accidents	215	12	179	24	n.a.	10	20	382	18	430
Transport accidents	16	10	61	4	n.a.	8	6	28	49	91
Total technological disasters	**335**	**587**	**566**	**50**	**n.a.**	**68**	**579**	**729**	**162**	**1,538**
Total	**306,595**	**73,161**	**2159715**	**10,144**	**658**	**27,613**	**44,806**	**2,280,981**	**196,872**	**2,550,272**

Source: EM-DAT, CRED, University of Louvain, Belgium

International Federation
of Red Cross and Red Crescent Societies

[1] VHHD stands for very high human development, HHD stands for high human development, MHD for medium human development and LHD for low human development.

See note on UNDP's Human Development Index country status in the section on disaster definitions in the introduction to this annex.

[2] Includes waves and surges.

[3] Landslides, rockfalls, subsidence of geophysical origin.

[4] Landslides, avalanches, subsidence of hydrological origin.

Note: 'n.a.' signifies 'no data available'; 'n.d.r.' signifies 'no disaster reported'. For more information, see section on caveats in introductory text.

During the decade:
Medium human development countries accounted for almost 89 per cent of the total number of people reported affected by disasters but for 97 per cent of those affected by earthquakes/tsunamis, 95 per cent of people affected by floods, 94 per cent of those affected by extreme temperature and 93 per cent of those affected by windstorms.

Low human development countries accounted for almost 8 per cent of the total number of people reported affected by disasters but for 54 per cent of those affected by transport accidents and 21 per cent of people affected by droughts/food insecurities.

High human development countries for 2 per cent of the total number of people reported affected by disasters but for 54 per cent of those affected by industrial accidents, 47 per cent of those affected by wild fires and 44 per cent of people affected by volcanic eruptions.

Very high human development countries countries for 1 per cent of the total number of people reported affected by disasters but for 46 per cent of those affected by wild fires.

ANNEX 1

Table 12 Total amount of disaster estimated damage, by type of phenomenon, by continent and by level of human development¹ (2000 to 2009) – in millions of US dollars (2009 prices)

	Africa	Americas	Asia	Europe	Oceania	VHHD	HHD	MHD	LHD	Total
Droughts/food insecurity	737	8,113	11,937	3,639	2,385	9,458	4,180	13,173	n.a.	26,811
Earthquakes/tsunamis	6,574	6,656	164,456	5,579	160	56,018	2,818	124,468	121	183,425
Extreme temperatures	1	1,112	22,359	16,083	242	15,742	1,590	22,466	n.a.	39,798
Floods²	3,474	28,159	85,477	64,601	4,873	91,067	17,880	75,982	1,655	186,584
Forest/scrub fires	441	13,420	15	8,810	1,966	23,982	182	487	n.a.	24,651
Insect infestation	n.a.	n.a.	n.a.	n.a.	150	150	n.a.	n.a.	n.a.	150
Mass movement: dry³	n.a.	n.a.	n.a.	n.d.r.	n.a.	n.d.r.	n.a.	n.a.	n.d.r.	n.a.
Mass movement: wet⁴	n.a.	122	465	626	n.a.	626	122	465	n.a.	1,212
Volcanic eruptions	11	173	6	4	n.a.	4	173	6	11	193
Windstorms	785	370,779	100,451	33,864	2,837	418,509	29,460	53,241	7,507	508,717
Subtotal climato-, hydro- & meteorological disasters	*5,438*	*421,704*	*220,704*	*127,624*	*12,452*	*559,533*	*53,414*	*165,814*	*9,162*	*787,923*
Subtotal geophysical disasters	*6,585*	*6,829*	*164,461*	*5,583*	*160*	*56,021*	*2,991*	*124,474*	*131*	*183,618*
Total natural disasters	**12,023**	**428,533**	**385,166**	**133,207**	**12,612**	**615,554**	**56,405**	**290,289**	**9,293**	**971,541**
Industrial accidents	921	6	452	12,889	n.d.r.	11,992	6	2,270	n.a.	14,268
Miscellaneous accidents	3	77	20	319	n.a.	319	77	20	3	418
Transport accidents	n.a.	n.a.	463	n.a.	n.a.	n.a.	n.a.	n.a.	463	463
Total technological disasters	**923**	**83**	**936**	**13,208**	**n.a.**	**12,311**	**83**	**2,290**	**466**	**15,150**
Total	**12,947**	**428,616**	**386,102**	**146,414**	**12,612**	**627,865**	**56,488**	**292,579**	**9,760**	**986,691**

Source: EM-DAT, CRED, University of Louvain, Belgium

International Federation
of Red Cross and Red Crescent Societies

[1] VHHD stands for very high human development, HHD stands for high human development, MHD for medium human development and LHD for low human development.

See note on UNDP's Human Development Index country status in the section on disaster definitions in the introduction to this annex.

[2] Includes waves and surges.

[3] Landslides, rockfalls, subsidence of geophysical origin.

[4] Landslides, avalanches, subsidence of hydrological origin.

Note: 'n.a.' signifies 'no data available'; 'n.d.r.' signifies 'no disaster reported'. For more information, see section on caveats in introductory text.

Estimates of disaster damage must be treated with caution, as the financial value attached to infrastructures in developed countries is much higher than in developing countries. While reporting is better for large disasters, the low reporting rates of direct damage make analysis difficult.

During the decade:
Americas accounted for 43 per cent of the reported damages but for 89 per cent of costs related to volcanic eruptions and 73 per cent of those related to windstorms.

Asia accounted for 39 per cent of the reported damages but for 100 per cent of those caused by transport accidents, 90 per cent of costs related to earthquakes/tsunamis, 56 per cent of those caused by extreme temperatures and 46 per cent of those caused by floods.

Europe accounted for 15 per cent of the reported damages but for 90 per cent of those caused by industrial accidents, 76 per cent of those related to miscellaneous accidents, 40 per cent of those caused by extreme temperatures, 36 per cent of those caused by wild fires and 35 per cent of those caused by floods.

Africa accounted for 1 per cent of the reported damages but for 6 per cent of those caused by industrial accidents and 6 per cent of those caused by volcanic eruptions.

Oceania accounted also for 1 per cent of the reported damages but for 9 per cent of those caused by droughts and 8 per cent of those caused by wild fires.

Very high human development countries accounted for 64 per cent of all reported damages and low human development countries for less than 1 per cent.

	Total number of people reported killed (1990–1999)	Total number of people reported affected (1990–1999)	Total number of people reported killed (2000–2009)	Total number of people reported affected (2000–2009)	Total number of people reported killed (2009)	Total number of people reported affected (2009)
Africa	**27,913**	**180,081,852**	**46,806**	**306,594,733**	**3,142**	**24,468,380**
Algeria	469	68,389	4,200	411,903	103	2,628
Angola	864	210,197	1,113	866,704	94	225,105
Benin	37	834,196	385	290,774	60	120,449
Botswana	20	105,500	3	148,792	0	5,056
Burkina Faso	28	2,839,940	369	314,528	49	150,541
Burundi	2	680,810	481	8,037,581	45	270,549
Cameroon	555	378,164	764	37,916	36	305
Cape Verde	18	16,306	60	30,001	3	n.a.
Central African Republic	7	76,618	294	73,279	4	23,972
Chad	41	911,206	260	1,176,338	6	12,915
Comoros	240	200	342	286,855	184	2,512
Congo	665	78,500	138	139,668	n.d.r.	n.d.r.
Congo, Democratic Republic of the	1,049	141,867	3,493	270,721	463	5,638
Côte d'Ivoire	178	268	357	107,633	27	10,006
Djibouti	145	240,775	197	1,223,173	13	340,024
Egypt	2,561	261,830	3,257	7,147	83	73
Equatorial Guinea	n.d.r.	n.d.r.	105	5,050	n.d.r.	n.d.r.
Eritrea[1]	133	3,915,725	56	10,907,043	n.d.r.	n.d.r.
Ethiopia[1]	836	6,788,247	1,717	49,334,051	n.a.	6,400,000
Gabon	102	n.a.	94	811	n.a.	800
Gambia	153	37,000	62	32,035	5	16,608
Ghana	436	3,024,611	747	696,784	58	159,545
Guinea	488	6,091	478	287,082	15	40,000
Guinea Bissau	217	5,222	117	134,164	73	3
Kenya	1,610	34,911,866	2,058	87,149,813	298	3,846,674
Lesotho	22	994,750	41	1,956,561	n.d.r.	n.d.r.
Liberia	10	1,007,000	63	521,424	2	500,584
Libya	252	n.a.	492	102	221	23
Madagascar	501	1,510,056	1,116	5,905,799	27	130,799
Malawi	494	31,368,500	854	15,035,023	26	37,134
Mali	84	310,666	300	2,180,922	25	20,406
Mauritania	147	514,194	187	3,132,763	1	9,000
Mauritius	5	10,800	5	1,050	n.d.r.	n.d.r.
Mayotte (F)	n.d.r.	n.d.r.	21	12	n.d.r.	n.d.r.
Morocco	1,390	373,365	1,574	622,116	29	9,520

	Total number of people reported killed (1990–1999)	Total number of people reported affected (1990–1999)	Total number of people reported killed (2000–2009)	Total number of people reported affected (2000–2009)	Total number of people reported killed (2009)	Total number of people reported affected (2009)
Mozambique	647	9,824,663	1,609	11,317,161	31	14,057
Namibia	20	876,400	167	1,164,309	92	350,000
Niger	117	3,383,387	153	13,439,751	3	79,129
Nigeria	3,763	805,377	8,662	596,449	273	150,072
Reunion (F)	59	n.a.	4	3,790	n.d.r.	n.d.r.
Rwanda	160	1,058,682	280	5,944,806	n.d.r.	n.d.r.
Saint Helena (UK)	n.d.r.	n.d.r.	n.a.	300	n.d.r.	n.d.r.
Sao Tome and Principe	n.d.r.	n.d.r.	33	34	n.d.r.	n.d.r.
Senegal	356	418,807	1,558	815,801	6	264,000
Seychelles	5	1,237	3	11,630	n.d.r.	n.d.r.
Sierra Leone	815	200,025	662	21,046	257	1,477
Somalia	2,656	1,240,610	1,060	10,251,843	15	3,301,753
South Africa	1,705	366,742	1,544	15,255,780	94	20,300
Sudan	1,031	22,078,538	1,074	9,927,696	31	4,411,455
Swaziland	n.a.	1,500,000	55	4,573,744	n.d.r.	n.d.r.
Tanzania	1,886	14,011,208	1,357	7,180,971	157	70,048
Togo	3	341,905	96	188,167	19	n.a.
Tunisia	78	152,089	546	33,851	110	217
Uganda	477	1,170,737	1,222	5,649,666	11	750,000
Zambia	163	5,973,455	385	4,260,442	31	614,964
Zimbabwe	213	25,055,131	536	24,631,878	62	2,100,039
Americas	**77,918**	**52,474,486**	**32,577**	**73,160,749**	**2,160**	**5,775,652**
Anguilla (UK)	n.a.	150	n.d.r.	n.d.r.	n.d.r.	n.d.r.
Antigua and Barbuda	6	11,684	n.a.	25,800	n.d.r.	n.d.r.
Argentina	452	571,831	575	754,421	23	45,534
Aruba (NL)	n.d.r.	n.d.r.	n.d.r.	n.d.r.	n.d.r.	n.d.r.
Bahamas	5	1,700	68	20,578	n.d.r.	n.d.r.
Barbados	n.a.	n.a.	1	2,881	n.d.r.	n.d.r.
Belize	31	62,600	55	150,570	n.d.r.	n.d.r.
Bermuda	n.d.r.	n.d.r.	22	n.a.	n.d.r.	n.d.r.
Bolivia	513	754,886	911	2,204,254	19	90,523
Brazil	2,057	20,345,253	2,664	7,370,878	n.d.r.	1,871,486
Canada	510	82,765	76	34,756	18	204
Cayman Islands (UK)	n.d.r.	n.d.r.	2	300	n.d.r.	n.d.r.
Chile	447	335,550	247	765,071	24	3
Colombia	2,919	1,926,254	1,988	4,693,859	83	31,850
Costa Rica	163	1,023,851	139	469,336	31	128,618
Cuba	818	2,536,690	201	9,839,475	14	30
Dominica	13	5,716	5	7,805	n.d.r.	n.d.r.
Dominican Republic	843	1,024,425	1,237	300,467	7	14,565
Ecuador	999	463,815	559	1,039,275	3	119,307

	Total number of people reported killed (1990–1999)	Total number of people reported affected (1990–1999)	Total number of people reported killed (2000–2009)	Total number of people reported affected (2000–2009)	Total number of people reported killed (2009)	Total number of people reported affected (2009)
El Salvador	674	101,480	1,754	2,182,807	275	90,000
Falkland Islands (UK)	n.d.r.	n.d.r.	n.d.r.	n.d.r.	n.d.r.	n.d.r.
French Guiana (F)	n.a.	70,000	n.d.r.	n.d.r.	n.d.r.	n.d.r.
Greenland (DK)	n.d.r.	n.d.r.	n.d.r.	n.d.r.	n.d.r.	n.d.r.
Grenada	n.a.	1,210	40	61,650	n.d.r.	n.d.r.
Guadeloupe (F)	4	899	21	153	n.d.r.	n.d.r.
Guatemala	830	150,703	2,251	3,422,077	36	2,513,828
Guyana	n.a.	1,252,600	44	409,774	n.d.r.	n.d.r.
Haiti	4,112	2,604,514	6,936	1,191,958	88	12,787
Honduras	15,276	2,860,970	434	1,849,813	7	300,136
Jamaica	28	556,512	55	429,410	n.d.r.	n.d.r.
Martinique (F)	10	5,110	2	106	n.d.r.	n.d.r.
Mexico	4,136	2,420,218	1,598	6,792,601	121	252,299
Montserrat (UK)	32	13,000	n.a.	200	n.d.r.	n.d.r.
Netherlands Antilles (NL)	2	40,000	15	4	n.d.r.	n.d.r.
Nicaragua	3,690	1,919,740	335	569,807	n.a.	26,782
Panama	147	49,102	143	100,671	22	4,258
Paraguay	114	470,654	456	591,955	n.a.	212,735
Peru	2,909	5,577,770	3,586	6,678,647	641	25,775
Puerto Rico (USA)	67	156,005	113	16,999	n.a.	1,500
Saint Kitts and Nevis	5	12,980	n.d.r.	n.d.r.	n.d.r.	n.d.r.
Saint Lucia	4	1,125	1	n.a.	n.d.r.	n.d.r.
Saint Pierre et Miquelon (F)	n.d.r.	n.d.r.	n.d.r.	n.d.r.	n.d.r.	n.d.r.
Saint Vincent and The Grenadines	3	300	4	1,534	n.d.r.	n.d.r.
Suriname	n.d.r.	n.d.r.	35	31,548	n.d.r.	n.d.r.
Trinidad and Tobago	5	1,627	3	1,760	n.d.r.	n.d.r.
Turks and Caicos Islands (UK)	43	n.a.	89	1,818	85	118
United States	5,283	4,407,989	5,198	20,850,645	215	11,314
Uruguay	110	19,087	41	158,712	12	22,000
Venezuela	30,648	623,718	673	136,374	18	n.a.
Virgin Islands (UK)	n.a.	3	n.d.r.	n.d.r.	n.d.r.	n.d.r.
Virgin Islands (US)	10	10,000	n.a.	n.a.	n.d.r.	n.d.r.
Asia	**756,124**	**1,894,409,821**	**933,250**	**2,159,714,852**	**9,744**	**111,793,234**
Afghanistan	10,796	536,177	5,043	10,882,311	140	65,883
Armenia[2]	106	7,022,954	1	297,000	n.d.r.	n.d.r.
Azerbaijan[2]	561	2,443,312	142	39,819	n.a.	5,000
Bahrain	10	n.a.	212	60	n.d.r.	n.d.r.
Bangladesh	149,430	81,879,521	13,430	72,415,045	433	4,568,000
Bhutan	39	65,600	223	1,012	23	12

	Total number of people reported killed (1990–1999)	Total number of people reported affected (1990–1999)	Total number of people reported killed (2000–2009)	Total number of people reported affected (2000–2009)	Total number of people reported killed (2009)	Total number of people reported affected (2009)
Brunei Darussalam	n.a.	n.a.	n.d.r.	n.d.r.	n.d.r.	n.d.r.
Cambodia	816	18,789,379	526	8,392,339	36	178,104
China's People Republic[3]	36,381	1,258,680,092	111,768	1,126,067,999	1,152	72,464,797
Georgia[2]	379	4,665	89	1,422,552	n.a.	7,306
Hong Kong (China)[3]	350	8,795	60	4,466	n.a.	350
India	59,846	315,125,127	64,478	659,134,721	2,044	8,997,490
Indonesia	8,705	7,065,982	182,999	11,668,855	1,946	2,876,919
Iran, Islamic Republic	45,067	38,941,198	31,412	76,359,370	234	336
Iraq	118	500	1,508	72,547	13	3,005
Israel	156	1,343	49	885	n.d.r.	n.d.r.
Japan	6,602	1,441,107	1,128	1,654,816	89	32,848
Jordan	59	198,340	145	150,322	n.d.r.	n.d.r.
Kazakhstan[2]	244	638,036	212	81,177	63	43
Korea, Democratic People's Republic[4]	381,865	49,554,203	230,313	26,402,902	n.d.r.	n.d.r.
Korea, Republic	2,451	446,138	1,355	521,840	17	14
Kuwait	2	200	43	76	43	76
Kyrgyzstan[2]	255	205,464	323	29,570	n.d.r.	n.d.r.
Lao People's Democratic Republic	180	2,860,862	77	1,386,082	26	128,887
Lebanon	70	104,075	93	17,609	44	39
Macau (China)[3]	n.a.	3,986	n.a.	133	n.d.r.	n.d.r.
Malaysia	890	49,574	287	460,282	n.a.	10,875
Maldives	10	23,849	133	28,963	n.d.r.	n.d.r.
Mongolia	280	105,061	165	4,841,665	29	910,007
Myanmar	775	684,323	138,962	2,752,674	24	1,351
Nepal	3,446	865,442	2,946	2,574,231	203	175,104
Oman	n.d.r.	n.d.r.	192	20,115	n.d.r.	n.d.r.
Pakistan	9,318	20,514,524	78,779	26,319,733	244	75,183
Palestine (West Bank and Gaza)[5]	14	20	5	765	n.d.r.	n.d.r.
Philippines	15,965	38,820,297	11,705	50,230,127	1,409	13,353,441
Qatar	n.d.r.	n.d.r.	30	n.a.	30	n.a.
Saudi Arabia	2,550	1,936	1,369	24,530	161	10,000
Singapore	3	1,437	n.d.r.	n.d.r.	n.d.r.	n.d.r.
Sri Lanka	635	3,325,964	35,892	7,241,738	3	380,000
Syrian Arab Republic	145	329,091	363	5539676	22	1,300,007
Taiwan (China)	3,189	531,221	1,519	2,981,258	630	2,307,523
Tajikistan[2]	1,868	379,584	202	9,306,479	22	22,836
Thailand	2,705	22,079,796	9,913	28,220,118	96	200,286
Timor-Leste[6]	n.d.r.	n.d.r.	5	13,685	n.d.r.	n.d.r.

	Total number of people reported killed (1990–1999)	Total number of people reported affected (1990–1999)	Total number of people reported killed (2000–2009)	Total number of people reported affected (2000–2009)	Total number of people reported killed (2009)	Total number of people reported affected (2009)
Turkmenistan[2]	40	420	11	n.a.	n.d.r.	n.d.r.
United Arab Emirates	97	101	97	46	n.d.r.	n.d.r.
Uzbekistan[2]	141	74,388	60	1,205,030	n.d.r.	n.d.r.
Viet Nam	8,603	20,247,866	4,015	20,918,620	410	3,717,512
Yemen[7]	962	357,871	971	31,609	158	n.a.
Europe	**35,503**	**52,351,392**	**91,054**	**10,144,275**	**1,319**	**145,660**
Albania	75	48,600	68	616,584	n.a.	11,150
Austria	124	10,212	553	61,733	3	n.a.
Azores (P)	74	1,215	n.d.r.	n.d.r.	n.d.r.	n.d.r.
Belarus[2]	61	63,468	36	1,851	n.d.r.	n.d.r.
Belgium	99	3,040	2,161	2,779	1	n.a.
Bosnia and Herzegovina[8]	12	1,090	66	366,819	1	13,730
Bulgaria	31	6,792	118	14,062	17	19
Canary Islands (SP)	n.a.	n.a.	168	1,280	22	6
Croatia[8]	96	2,025	873	2,306	n.d.r.	n.d.r.
Cyprus	54	2,657	40	448	n.d.r.	n.d.r.
Czech Republic[9]	54	102,171	511	218,915	15	14,462
Czechoslovakia[9]	41	n.a.	n.d.r.	n.d.r.	n.d.r.	n.d.r.
Denmark	8	100	6	2,072	n.d.r.	n.d.r.
Estonia[2]	912	140	25	130	n.d.r.	n.d.r.
Finland	11	33	24	415	n.d.r.	n.d.r.
France	770	3,530,410	21,353	80,017	18	200
Germany[10]	392	237,574	9,643	333,212	9	n.a.
Gibraltar (UK)	n.d.r.	n.d.r.	n.d.r.	n.d.r.	n.d.r.	n.d.r.
Greece	430	152,195	551	24,405	12	1,040
Hungary	106	133,774	757	46,660	n.d.r.	n.d.r.
Iceland	34	83	n.a.	199	n.d.r.	n.d.r.
Ireland	46	4,200	1	500	n.a.	n.a.
Isle of Man (UK)	n.d.r.	n.d.r.	n.d.r.	n.d.r.	n.d.r.	n.d.r.
Italy	852	74,270	21,017	129,377	364	61,147
Latvia[2]	6	n.a.	76	n.a.	n.d.r.	n.d.r.
Lithuania[2]	50	780,000	45	n.a.	n.d.r.	n.d.r.
Luxembourg	n.a.	n.a.	190	n.a.	n.d.r.	n.d.r.
Macedonia, FYR[8]	198	11,515	59	1,110,149	15	38
Malta	295	n.a.	112	31	n.d.r.	n.d.r.
Moldova[2]	59	54,537	19	2,821,394	n.d.r.	n.d.r.
Montenegro[11]	n.d.r.	n.d.r.	n.a.	1,536	n.a.	450
Netherlands	204	265,170	2,021	3,196	n.d.r.	n.d.r.
Norway	411	4,000	37	2,242	n.d.r.	n.d.r.
Poland	462	226,006	1,158	21,245	199	274

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	Total number of people reported killed (1990–1999)	Total number of people reported affected (1990–1999)	Total number of people reported killed (2000–2009)	Total number of people reported affected (2000–2009)	Total number of people reported killed (2009)	Total number of people reported affected (2009)
Portugal	136	3,377	2,891	150,897	n.a.	0
Romania	472	177,801	607	217,266	78	27
Russian Federation[2]	5,301	2,090,161	4,461	1,974,446	363	85
Serbia[11]	n.d.r.	n.d.r.	n.a.	16,080	n.a.	3,710
Serbia-Montenegro[8][11]	115	77,103	77	49,182	n.d.r.	n.d.r.
Slovakia[9]	67	48,015	67	10,787	32	20
Slovenia[8]	n.a.	700	309	1,655	n.d.r.	n.d.r.
Soviet Union[2]	784	346,384				
Spain	541	36,068,625	15,797	9,666	20	n.a.
Sweden	79	184	8	n.a.	n.d.r.	n.d.r.
Switzerland	119	5,211	1,125	7,400	n.a.	n.a.
Turkey	20,958	5,286,686	1,864	773,348	81	35,137
Ukraine[2]	364	2,060,758	1,713	661,098	45	38
United Kingdom	423	470,990	447	408,893	24	4,127
Yugoslavia[8]	177	120				
Oceania	**3,562**	**39,073,198**	**1,665**	**657,658**	**893**	**76,966**
American Samoa (USA)	n.d.r.	n.d.r.	40	25,563	34	2,500
Australia	320	36,649,932	831	98,218	560	36,569
Cook Islands (NZ)	20	900	n.a.	1,352	n.d.r.	n.d.r.
Fiji	76	436,730	70	51,362	14	14,401
French Polynesia (F)	13	511	20	n.a.	n.d.r.	n.d.r.
Guam (USA)	229	12,033	5	15,644	n.d.r.	n.d.r.
Kiribati	n.a.	84,000	n.a.	85	n.d.r.	n.d.r.
Marshall Islands	n.a.	6,000	n.a.	600	n.d.r.	n.d.r.
Micronesia Federated States	n.a.	28,800	48	8,631	n.d.r.	n.d.r.
Nauru	n.d.r.	n.d.r.	n.d.r.	n.d.r.	n.d.r.	n.d.r.
New Caledonia (F)	n.a.	n.a.	2	1,100	n.d.r.	n.d.r.
New Zealand	4	3,365	24	7,650	n.d.r.	n.d.r.
Niue (NZ)	n.a.	200	1	702	n.d.r.	n.d.r.
Northern Mariana Is	n.d.r.	n.d.r.	n.a.	300	n.d.r.	n.d.r.
Palau	1	12,004	n.d.r.	n.d.r.	n.d.r.	n.d.r.
Papua New Guinea	2,685	1,426,506	287	325,198	32	n.a.
Samoa	21	283,000	158	5,585	148	5,585
Solomon Islands	37	88,904	73	10,919	21	7,000
Tokelau (NZ)	n.a.	102	0	26	n.d.r.	n.d.r.
Tonga	1	9,674	84	17,061	84	561
Tuvalu	n.a.	850	18	n.a.	n.d.r.	n.d.r.
Vanuatu	150	29,667	4	87,662	n.a.	10,350
Wallis and Futuna (F)	5	20	n.d.r.	n.d.r.	n.d.r.	n.d.r.
World	**901,020**	**2,218,390,749**	**1,105,352**	**2,550,272,267**	**17,258**	**142,259,892**

Note: 'n.a.' denotes 'no data available'; 'n.d.r.' signifies 'no disaster reported'. For more information, see section on caveats in introductory text.

[1] Prior to 1993, Ethiopia was considered one country, after this date it was separated into Eritrea and Ethiopia.

[2] Prior to 1991 the Soviet Union was considered one country, after this date it became separate countries. The western former republics of the USSR (Belarus, Estonia, Latvia, Lithuania, Moldova, Russian Federation, Ukraine) are included in Europe; the southern former republics (Armenia, Azerbaijan, Georgia, Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, Uzbekistan) are included in Asia.

[3] Hong Kong became part of China in July 1997; Macau became part of China in December 1999.

[4] The estimates provided are disputed. See the caveats in the introductory pages of the statistical data for further information.

[5] Since September 1993 and the Israel-PLO Declaration of Principles, the Gaza Strip and the West Bank have a Palestinian self-government. Direct negotiations to determine the permanent status of these territories began in September 1999 but are far from a permanent agreement.

[6] Since May 2002, East Timor has been an independent country: Timor-Leste.

[7] Prior to May 1990, Yemen was divided into Arab and People's Democratic Republics; after this date it is considered one country.

[8] Prior to 1992 Yugoslavia was considered one country, after this date it became separate countries: Bosnia and Herzegovina, Croatia, Serbia, Slovenia, Former Yugoslav Republic of Macedonia.

[9] Prior to 1993, Czechoslovakia was considered one country, after this date it was divided into separate countries: Czech Republic and Slovakia.

[10] Prior to October 1990, Germany was divided into the Federal and Democratic Republics. After this date it was considered as one country.

[11] Between 1992 and 2006, Serbia and Montenegro were considered one country. In 2006 they became two independent countries.

Over the last decade, the highest numbers of deaths per continent were reported in Nigeria (Africa), Haiti (Americas), the Democratic People's Republic of Korea (Asia) (see note 4 above), France (Europe) and Australia (Oceania).

The highest numbers of people affected by disaster, by continent, were reported in Kenya (Africa), United States of America (Americas), People's Republic of China (Asia), Moldova (Europe) and Papua New Guinea (Oceania).

Compared to 1990–1999, the past decade has seen disaster deaths rise by 23 per cent and the numbers affected by disasters rise by 15 per cent.

The number of deaths has risen by 68 per cent in Africa, 23 per cent in Asia and 156 per cent in Europe. It has decreased by 58 per cent in Americas and by 53 per cent in Oceania.

The number of people affected by disasters has risen of 70 per cent in Africa, 39 per cent in Americas and 14 per cent in Asia. It has decreased by 81 per cent in Europe and by 98 per cent in Oceania.

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Making cities resilient:
A ten-point checklist for local governments

Cities and local governments need to get ready, reduce the risks and become resilient to disasters. For the next two years and beyond, the United Nations International Strategy for Disaster Reduction (UNISDR) will campaign together with its partners for this to happen.

Making cities resilient, the 2010–2011 World Disaster Reduction campaign, addresses issues of local governance and urban risk while drawing upon previous UNISDR campaigns for safer schools and hospitals, as well as on the sustainable urbanizations principles developed in the United Nations Human Settlements Programme (UN-Habitat) World Urban Campaign 2009–2013.

Overall, the campaign seeks to raise awareness and effect change by urging local governments to take immediate action and to build multi-stakeholder partnerships to achieve the implementation of the Hyogo Framework for Action at the local level. The following ten-point checklist of 'essentials' for making cities resilient, which builds on the priorities identified in *Hyogo Framework for Action 2005–2015: Building the resilience of nations and communities to disasters* (available online: www.unisdr.org/hfa), will serve as a guide for commitment during the campaign.

Ten essentials for making cities resilient

1. Put in place **organization and coordination** to understand and reduce disaster risk, based on participation of citizen groups and civil society. Build local alliances. Ensure that all departments understand their role in disaster risk reduction and preparedness.

2. **Assign a budget** for disaster risk reduction and provide incentives for homeowners, low-income families, communities, businesses and the public sector to invest in reducing the risks they face.

3. Maintain up-to-date data on hazards and vulnerabilities, **prepare risk assessments** and use these as the basis for urban development plans and decisions. Ensure that this information and the plans for your city's resilience are readily available to the public and fully discussed with them.

Photo opposite page: Cities need to be able to respond to the needs of both inhabitants and visitors. Not an easy task in cities attracting large numbers of visitors, such as Mecca, which is visited by millions of people during the annual Hajj pilgrimage, the world's largest gathering.

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4. Invest in and maintain **critical infrastructure that reduces risk**, such as flood drainage, adjusted where needed to cope with climate change.

5. Assess the **safety of all schools and health facilities** and upgrade these as necessary.

6. Apply and enforce **realistic, risk-compliant building regulations and land-use planning principles.** Identify safe land for low-income citizens and develop upgrading of informal settlements, wherever feasible.

7. Ensure **education programmes and training** on disaster risk reduction are in place in schools and local communities.

8. **Protect ecosystems and natural buffers** to mitigate floods, storm surges and other hazards to which your city may be vulnerable. Adapt to climate change by building on good risk reduction practices.

9. Install **early warning systems and emergency management** capacities in your city and hold regular public preparedness drills.

10. After any disaster, ensure that the **needs of the survivors are placed at the centre of reconstruction** with support for them and their community organizations to design and help implement responses, including rebuilding homes and livelihoods.

Case studies

The selected case studies illustrate how resilience can be put into practice by focusing on the ten essentials for making cities resilient. These case studies cover a number of different areas, ranging from risk assessment to risk communication, as well as different government levels and types of hazard.

Essential 1
Empowering local government as leaders in disaster reduction and recovery
Municipal governments of Chincha, Pisco, Cañete and Ica, Peru
(From UNISDR, *Local Governments and Disaster Risk Reduction – Good practices and lessons learned,* Geneva, April 2010.)

After the 2007 earthquake in Peru, reconstruction and recovery in the affected regions were typically fragmented and not well integrated into overall development and risk reduction work. Local government institutions, which were themselves affected by the quake, were cast into a passive role. A United Nations Development Programme (UNDP) project partnered with municipal governments to help them enhance their roles as leaders and coordinators of local development and recovery.

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The UNDP Country Office intervention provided technical disaster risk reduction and recovery assistance to municipal governments. Although the project is a UNDP initiative, it relied on the unique position of local governments to identify local priorities to reduce disaster risk. The municipal governments prioritized four areas, to which UNDP provided close and permanent guidance: local governance; housing and territorial management; economic reactivation; and information management.

Results include the initiation of a process for updating and redesigning the municipalities' development plans (ten years) and annual plans for promoting sustained recovery and risk reduction as well as the inclusion of development and capacity-building issues into the reconstruction, such as livelihoods, gender, information management and institutional strengthening. Furthermore, the municipal governments' regular tools and methods, such as their public investments system and information systems for monitoring and disseminating information, were improved. Land-use plans were revised and made risk-sensitive. The comprehensive range of results has been an indication of what can be achieved by local governments with the right support.

Essential 2
Changing standards for land-for-housing in Namibia
Windhoek, Namibia
(From International Institute for Environment and Development (IIED), *Urban Development and Intensive and Extensive Risk,* Contribution to the Global Assessment Report on Disaster Risk Reduction, 2009.)

The city authorities in Windhoek recognized that to reach low-income households, they had to cut unit costs in their government-funded serviced-site programme. This programme had to recover the costs of developing land (both for housing and with infrastructure to official standards), but this made it too expensive for low-income groups. This example from Namibia is interesting in that it shows how a change in approach by the city government greatly increased the possibilities for low-income households to be able to get their own housing.

A new government policy, developed with the Shack Dwellers Federation of Namibia (a federation of savings groups formed mostly by low-income women), showed a willingness to overturn conventional approaches to standards and regulations, for instance in plot sizes and in infrastructure standards, to make their serviced sites more affordable to low-income households. Plots can be rented, group purchased or leased. Significantly, families are allowed to upgrade services as they can afford to make the investments, extending sewerage and water lines from mains provision into their homes. Groups that belong to the Shack Dwellers Federation have access to their own loan fund from which they can borrow for such service improvements, and around 1,000 groups have taken such loans at an average household cost of US$ 150. However, this underestimates the number of improvements, because once households have

a system they can respond to, many can afford to make the improvements using their own resources without the need to use loan finance.

Essential 3
Hazard identification and risk assessment at the provincial level
Ontario, Canada
(From UNISDR, *Local Governments and Disaster Risk Reduction – Good practices and lessons learned,* Geneva, April 2010.)

Ontario passed its provincial Emergency Management and Civil Protection Act in 2003. The act required all provincial ministries and municipal governments to identify and rank all known and suspected emerging hazards and risks to community safety. This included carrying out a Hazard Identification and Risk Assessment (HIRA) process to assess risk, identify vulnerabilities and plan for comprehensive disaster risk reduction. The Ontario provincial government tasked Emergency Management Ontario with the implementation of the province-wide HIRA report and methodology, on which the ministry and municipal assessments would be based.

Emergency Management Ontario produced an initial HIRA in 2003 which identified 37 main risks for the province. All provincial government ministries are now working on assessments based on this. A specialist officer in Emergency Management Ontario is currently reviewing the 37 hazards, identifying emerging hazards and developing a methodology to make the HIRA process even more effective and accurate. Emergency Management Ontario continues to provide comprehensive guidelines and technical support for this risk assessment process.

As a result, the provincial HIRA has improved the Ontario government's ability to anticipate and mitigate the potential effects of hazards, throughout all ministry sectors. It is already helping to guide the creation of effective exercises, public awareness campaigns and training programmes focused on the most likely and dangerous hazards. This will improve disaster prevention, preparedness, mitigation, response and recovery.

Essential 4
A city government in a highly vulnerable flood-prone area develops a climate change plan with comprehensive disaster management measures
Pune, India
(From UNISDR, *Adaptation to climate change by reducing disaster risks: country practices and lessons,* Briefing Note 2, Geneva, November 2009.)

The city of Pune in Maharashtra State, India, has a population of nearly 5 million people and is located at the confluence of the Mutha, Mula and Pavana rivers. It has been affected by several severe floods over the last six decades, the most significant of

which was the 1961 flood that involved a major dam failure. Anticipating an increased frequency of floods due to climate change, a number of programmes have been put in place to build capacity, assess hazards and vulnerability, construct dams, dykes and seawalls, establish early warning systems, as well as projects concerning land-use planning, environmental protection and community education and resilience.

A systematic city-wide plan of practical action to reduce flooding was implemented. A first step was to assess the flood risks by analysing hourly rainfall intensity and examining the likely changes in impacts in low-lying areas and places where natural drainage was blocked by the construction of houses or by roads without adequate bridges. A detailed city drainage map was developed. The plan introduced structural and planning measures for restoring natural drainage, widening streams, extending bridges and applying natural soil infiltration methodologies. Watershed conservation techniques, such as afforestation and building small earthen check dams, were undertaken in the hill zone. Property tax incentives were provided to encourage households to recycle wastewater or use rainwater harvesting by storing run-off from their roofs for domestic use. These efforts were complemented by improvements in flood monitoring and warning systems and social protection for affected families. The initiative was driven jointly by the elected municipal government, the municipal commissioner and Alert (active citizen groups), and involves many different city departments. It demonstrates that local governments can prepare for climate change by reducing and managing the local factors that lead to disasters.

Essential 5
Making all healthcare facilities safer
Cayman Islands
(From UNISDR, *2008–2009 World Disaster Reduction Campaign – Hospitals Safe from Disasters,* Geneva, January 2008.)

The Cayman Islands, which is made up of three islands, has experienced the largest number of hurricane strikes in the Atlantic basin. In September 2004, the biggest island, Grand Cayman, was hit by Hurricane Ivan, the islands' worst hurricane in 86 years. Ivan destroyed or damaged 90 per cent of buildings. Power, water and communications were disrupted for months in some areas. But the island began a major rebuilding process, including in the health sector.

The Cayman Islands adopted a National Strategic Framework for Disaster Risk Reduction. Within this framework, the Health Services Authority, as the islands' primary provider of healthcare, implemented several activities to make all its facilities safer. These activities address structural, non-structural, functional and workforce issues. For instance, at the structural level, the 124-bed Cayman Islands Hospital (the territory's principal healthcare facility) was built to Category 5 hurricane standards. Older facilities were upgraded to new local and international building codes and protocols for healthcare facilities, and seismic risk reduction elements were introduced in the

design of health facilities. The anticipated damage and recovery time was reduced and the continuity of operations improved. The Cayman Islands Hospital, for instance, remained functional during and after Hurricane Ivan in 2004 while providing an impromptu shelter to more than 1,000 people.

Essential 6
National policy with national government, local government and community funding
Thailand
(From IIED, *Urban Development and Intensive and Extensive Risk,* Contribution to the Global Assessment Report on Disaster Risk Reduction, 2009.)

The Thai government is implementing one of the most ambitious 'slum' and squatter upgrading initiatives currently under way. Managed by the government's Community Organizations Development Institute (CODI), the *Baan Mankong* (secure housing) programme channels funds in the form of infrastructure subsidies and housing loans direct to community organizations formed by low-income inhabitants in informal settlements. It is also significant in that it draws almost entirely from domestic resources – a combination of national government, local government and community contributions.

Each community organization develops the solution that works best for them in regard to land. Within this national programme, there are a variety of means by which those in illegal settlements can get legal land tenure, for instance, by the inhabitants purchasing the land from the landowner (supported by a government loan), negotiating a community lease, agreeing to move to another location provided by the government agency on whose land they are squatting, or agreeing with the landowner to move to part of the site they are occupying in return for tenure of that site (land sharing).

CODI also provides loans to community organizations to 'on-lend' to their members to help build or improve their homes. It also supports city governments in taking the initiative to collaborate with urban poor organizations, for instance, providing a site on which those living in various 'mini' squatter settlements in their jurisdiction could relocate, with the land provided on a 30-year lease.

Essential 7
Watch and learn: Children and communities study mountain and urban risks
Saijo City, Japan
(From UNISDR, *Local Governments and Disaster Risk Reduction – Good practices and lessons learned,* Geneva, April 2010.)

In 2004, Saijo City in Shikoku island's Ehime Prefecture was hit by record typhoons that led to flooding in its urban areas and landslides in the mountains. A small city

with semi-rural mountainous areas, Saijo City faces unique challenges in disaster risk reduction. First, Japan's ageing population represents a particular problem. Young able-bodied people are very important to community systems of mutual aid and emergency preparedness. And as young people tend to move away to bigger cities, smaller towns in Japan have an even older population than the already imbalanced national average. Second, smaller cities like Saijo City are often spread over a mix of geographic terrains – an urban plain, semi-rural and isolated villages on hills and mountains, and a coastal area.

To meet these challenges, the Saijo City government instigated in 2005 a risk-awareness programme targeting schoolchildren. Focusing on the city's various physical environments, the 'mountain-watching' and 'town-watching' project takes 12-year-olds, accompanied by teachers, local residents, forest workers and municipal officials, on risk education field trips. The young urban dwellers meet with the elderly in the mountains to learn together about the risks Saijo City faces and to remember the lessons learned of the 2004 typhoons. Meanwhile, a 'mountain- and town-watching' handbook has been developed, and a teachers' association for disaster education, a children's disaster prevention club and a disaster prevention forum, also for children, have been set up. The initiative serves as an excellent example of a local government leading a multi-stakeholder and community-based disaster risk awareness initiative that then becomes self-sustaining.

Essential 8
A rapidly growing municipality addresses the increasing risk of droughts by implementing a water resource management programme
Overstrand, South Africa
(From UNISDR, *Local Governments and Disaster Risk Reduction – Good practices and lessons learned,* Geneva, April 2010.)

The Overstrand municipality, located along the coast of Western Cape Province in South Africa, has been faced with rapid and seasonal population growth and projected shortages of water supply in the district of Hermanus. In addition, there has been a decline in rainfall since 1997 and climate change threatens to bring more variable rainfall and more extreme temperatures to the Western Cape region. In response, the municipality adopted a comprehensive water resource management and development programme, which draws on the national policy and legislative platform developed by the South African National Department of Water Affairs and Forestry.

The municipality strived to implement a longer-term, multi-stakeholder programme with growing public recognition of drought risk. The programme employed two main strategies: better water demand management and finding additional, sustainable sources of water. The municipality conducted comprehensive water demand management measures including clearing invasive alien plants, a public awareness campaign and a programme of leak detection and repair.

In order to find local water sources, groundwater drilling was initiated after careful analysis of various options. The permanent coordinating role of the local government was vital in conducting such a long-term, multi-stakeholder programme involving national and provincial water agencies, a regional biodiversity conservation institute and a group of community-based organizations. Uncertainty and scepticism among stakeholders regarding extracting groundwater was overcome by establishing a participatory monitoring committee and preparing relevant sets of baseline data.

Essential 9
Many partners, one system: An integrated flood early warning system for Jakarta
Jakarta, Indonesia
(From UNISDR, *Local Governments and Disaster Risk Reduction – Good practices and lessons learned,* Geneva, April 2010.)

Jakarta, the capital of Indonesia, has a high flood risk – it is a coastal city and is the exit point of 13 rivers. Some 40 per cent of Jakarta lies below sea level and the provincial authority area includes 110 islands. Hydrometeorological hazards have inflicted much damage in coastal areas and on residential areas near the river banks. During the annual and five-yearly floods, Jakarta has lost billions of dollars' worth of investment in building and infrastructure.

Integrating improvements into the flood early warning system for Jakarta has been a true multi-stakeholder process, involving a huge range of local authorities and partners. By managing everyone's interests and roles and improving coordination, the early warning system was upgraded from top to bottom. Technical improvements mean that earlier flood warnings are now possible. But more importantly, preparedness capacity has been built and streamlined. Key coordination hubs and standard operating procedures have been established and tested with comprehensive drills, so that institutions and communities are now more ready to act on warnings.

Essential 10
Institution building and capacity building for local governments
Pakistan
(From UNISDR, *Local Governments and Disaster Risk Reduction – Good practices and lessons learned,* Geneva, April 2010.)

The earthquake that struck the northern border area of Pakistan on 8 October 2005 was the nation's most devastating disaster ever. It claimed more than 73,000 lives, injured more than 128,000 people, rendered 2.8 million people homeless and affected 3.5 million people in an area of 30,000 square kilometres. The response from the government, civil society and international donors was swift. The government established

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a Federal Relief Commission and an Earthquake Rehabilitation and Reconstruction Authority (ERRA) to support medium- to long-term recovery and reconstruction efforts.

Since its founding in October 2005, ERRA has integrated disaster risk reduction in all its reconstruction work and has initiated a disaster risk management programme for community preparedness in the affected districts. In its reconstruction work, ERRA has followed a disaster risk management approach of risk reduction, risk avoidance, risk transfer and risk management. ERRA has also worked on strengthening community-based disaster preparedness in line with the Hyogo Framework for Action. This authority has worked directly with local governments to build institutional and community preparedness through new union council disaster management committees and union council emergency response teams.

Overall, this initiative has yielded concrete results such as a guidebook for mainstreaming disaster risk reduction into development, hazard indication maps for the districts of Mansehra and Muzaffarabad, and disaster management committees and emergency response teams being established in 112 union councils across the two districts.

Michele Cocchiglia, programme officer with the UNISDR Secretariat, contributed this text.

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The Fundamental Principles of the International Red Cross and Red Crescent Movement

Humanity
The International Red Cross and Red Crescent Movement, born of a desire to bring assistance without discrimination to the wounded on the battlefield, endeavours, in its international and national capacity, to prevent and alleviate human suffering wherever it may be found. Its purpose is to protect life and health and to ensure respect for the human being. It promotes mutual understanding, friendship, cooperation and lasting peace among all peoples.

Impartiality
It makes no discrimination as to nationality, race, religious beliefs, class or political opinions. It endeavours to relieve the suffering of individuals, being guided solely by their needs, and to give priority to the most urgent cases of distress.

Neutrality
In order to continue to enjoy the confidence of all, the Movement may not take sides in hostilities or engage at any time in controversies of a political, racial, religious or ideological nature.

Independence
The Movement is independent. The National Societies, while auxiliaries in the humanitarian services of their governments and subject to the laws of their respective countries, must always maintain their autonomy so that they may be able at all times to act in accordance with the principles of the Movement.

Voluntary service
It is a voluntary relief movement not prompted in any manner by desire for gain.

Unity
There can be only one Red Cross or Red Crescent Society in any one country. It must be open to all. It must carry on its humanitarian work throughout its territory.

Universality
The International Red Cross and Red Crescent Movement, in which all societies have equal status and share equal responsibilities and duties in helping each other, is worldwide.

"When our house flooded, I sometimes woke up at midnight to find my feet in water, cockroaches and rats fighting over space, and various objects floating around the living room, so I had to get up in the middle of the night. Our biggest concern was preventing the furniture from getting ruined. Not that we had much to get ruined… Every time it rained, we used to nail another piece of wood across the doorframe, and dump another truckload of earth to reinforce the barricade. But every time it rained the water level rose further. And the authorities never did anything."

– President Lula da Silva, Brazil

World Disasters Report 2010
Focus on urban risk

This year's *World Disasters Report* takes an in-depth look at the consequences for humanitarian action of the dramatic surge in the numbers of people living in cities and towns which will be the hallmark of the 21st century. It examines the issues around this irreversible trend as the world comes to terms with the fact that more people now live in cities and towns than in the countryside for the first time in human history.

Has development aid kept pace with this dramatic shift? Why are almost a billion people worldwide still living in slums? How can vulnerable cities protect themselves from climate change? What are the emerging health issues of rapid urbanization? Can anything be done to turn back the tide of violence sweeping many inner cities and ghettos?

The *World Disasters Report 2010* features:
- Avoiding the urbanization of disasters
- Urban disaster trends
- Starting over: Community rights and post-disaster response
- Urban violence
- Urban risk to health
- Urbanization and climate change risk
- Urban governance and disaster risk reduction

Plus: photos, tables, graphics and index

Published annually since 1993, the *World Disasters Report* brings together the latest trends, facts and analysis of contemporary crises – whether 'natural' or man-made, quick onset or chronic.