# CHAPTER 4

## OUTLOOK 2002–2032

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## VISUALISING THE FUTURE

Chapter 2 describes the current state of the environment in Africa, outlining its physical attributes in terms of: the atmosphere; land; biodiversity; forests; freshwater, marine and coastal areas; and the urban environment. The chapter demonstrates that the African environment is under constant pressure, primarily from people and from nature. Given the rate at which natural resources are currently being degraded in the region, it is easy to conclude that the African environment is a highly threatened environment, and one in which the future seems mostly uncertain. And so it is not only desirable, but pertinent, that Africans should create a sustainable environment for their current and future needs. It is necessary, therefore, to redefine sustainable development, actively focusing on the reconciliation of the environmental and socioeconomic objectives of development with an adequate consideration of the needs of present and future generations.

An equally pressing issue, addressed in Chapter 3, concerns the fact that vast proportions of the population in various African countries are vulnerable to disasters resulting from the use of the environment and from social tensions which often develop when multitudes of people live together. There is a general belief that it is the poorest people who are most susceptible to these disasters. The poor are also unable to cope with the misfortunes that follow such disasters because coping mechanisms are generally poorly developed in many countries. The need to protect people who are vulnerable to disasters should be a critical component of decision-making processes.

The current state of the African environment, and the vulnerability of large populations in the region to environmental and human-induced disasters, pose an additional challenge to studies of the environment. Much of the challenge relates to the creation and maintenance of a sustainable environment whilst, at the same time, recognizing the need to develop the economic and social resources of nations. The creation of a sustainable development strategy requires insight both into the present and into the future. Since the future is, by definition, unknown, there is a need to develop mechanisms and methodologies which facilitate an understanding of the future.

This chapter will explore, compare and contrast different scenarios regarding the development of the African environment in the future. It will show which of these scenarios has the greatest promise for the region over the next 30 years.

## AMCEN'S MANDATE AND SUB-REGIONAL SCENARIO DEVELOPMENT

The African Environment Outlook (AEO) is an initiative of the African Ministerial Conference on the Environment (AMCEN), with technical support from the Division of Early Warning and Assessment (DEWA) of the United Nations Environment Programme (UNEP). AMCEN was established in 1985 as an environmental intergovernmental body in Africa, with a mandate to provide policy guidance, and to identify priorities for the implementation of environmental treaties and goals at national and sub regional levels. One of AMCEN's goals is to ensure that the quality of the environment is maintained, and that Africans derive quality of life

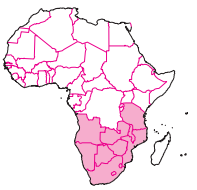
through the environment's provision of food, shelter and natural resources, which are needed to generate employment. AMCEN has made considerable progress in imparting environmental awareness to African governments. It has also facilitated the establishment of ministries of environment in many countries, as well as the enactment of environmental acts and bills which are being implemented in many countries.

AMCEN's eighth session, held in Abuja, Nigeria in April 2000, marked a turning point for the organization as the conference adopted a medium-term programme which clearly spelled out the need to provide an AEO. An AEO was identified as one of the tools which could be used to respond to Africa's persistent and severe economic and environmental problems in a sustainable way. It will provide the opportunity for AMCEN to look into the future, and to assess the various environmental and sustainable development policy options for the next 30 years, and then to identify which steps can meaningfully be taken at national, sub-regional and regional levels. Such a task involves a clear conceptualization of what the future environment should be like. It also requires great vision to create these possible future scenarios, to outline their characteristics and to show in what areas preferences lie.

Few scenarios have been developed to evaluate the environmental sustainability of Africa as a whole. However, many scenarios have been devised at sub-regional levels, which provide some general perspectives regarding the future of the region. Recent reviews by *GEO-2000* (UNEP 2000) and Raskin (2000a) describe attempts to develop scenarios for different sub-regions of Africa by: the International Institute for Environment and Development (IIED 1997); the World Bank (WB 1996); the Southern African Research and Documentation Centre (SARDC 1994); *Club du Sahel* (OECD 1995); *Beyond Hunger Study* (Achebe and others, 1990); and *Blue Plan* (UNEP 1989). Figure 4.1 outlines these scenarios. In general, the timescales covered by these scenarios range from 18 years (IIED) to almost 70 years (*Beyond Hunger*).

At least two contrasting scenarios were proposed for each region by most of the review bodies. For example, the IIED proposed 'Doomsday' and 'Sustainable Future' scenarios. The WB proposed 'Current Trends' and 'Desired Future' scenarios, for environmentally sustainable development in sub-

**Figure 4.1 Six scenarios present a general outlook for the future of the sub-regions**

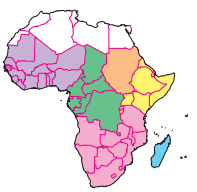


**Study: IIED 1997**

**Horizon: 2015**

**Scenarios:**

1. ***Doomsday scenario***
   Rapid population growth, economic stagnation, conflict and ineffective governance lead to deteriorating environmental conditions.
2. ***Building a sustainable future***
   New development approach based on sustainability principles and cooperation leads to improved socio-economic conditions, peace and a clean environment.
3. ***Real future***
   A compromise with elements of both of the above.



**Study: World Bank (1996)**

**Horizon: 2025**

**Scenario:**

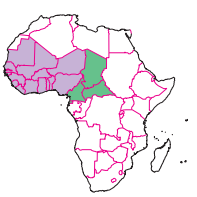
***Looking 30 years ahead***
Africa joins the information society, but land and food shortages cause population migration and shift environmental burdens to urban centres.

**Study: SARDC (1994)**

**Horizon: 2020**

**Scenarios:**

1. ***Current trends***
   Environmental conditions deteriorate in the context of economic stagnation.
2. ***Desired future***
   Policies mobilize the region's physical and human resources through vigorous research education and institution building.

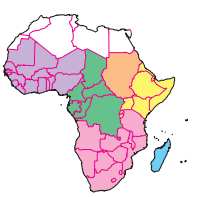


**Study: Club du Sahel (OECD 1995)**

**Horizon: 2020**

**Scenarios:**

1. ***Laissez faire***
   Trade continues to lead to cheap imports not economic diversification as social inequity rises, international support wanes, and social and political stability is threatened.
2. ***Orthodox growth***
   Good governance guides market towards development of new competitive sectors, international investments, and support.
3. ***Regional integration***
   Supports local development of small enterprises modest economic growth, but stronger regional ties and less tension and conflict.

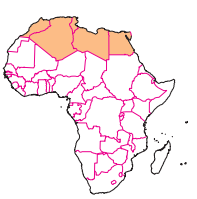


**Study: Beyond Hunger (Achee et al. 1990)**

**Horizon: 2057**

**Scenarios:**

1. ***Current perspective***
   Slow economic growth with increasing population leads to uncertain environmental conditions.
2. ***Big lift***
   .A distictively Afro-centric development process leads to economic independence and a clean environment.



**Study: Blue Plan (UNEP 1989)**

**Horizon: 2025**

1. ***Trend scenarios***
   Focus on macro-economic success and a laissez-faire policy towards population growth jeopardizes economic and social development and leads to environmental deterioration.
2. ***Alternative scenarios***
   Goal-oriented development policies focus on domestic objectives leading to a cleaner environment.

Saharan Africa. Club du Sahel proposed *'Laissez-faire'*, 'Orthodox Growth' and 'Regional Integration' scenarios. *Beyond Hunger* proposed 'Conventional Wisdom' and 'Big Lift' scenarios. *Blue Plan* proposed 'Trend Scenarios' and 'Alternative Scenarios'. In almost all cases, comparisons were made between pairs of scenarios.

The 'business as usual' scenario, which comprises scenarios such as *'Laissez-faire'*, 'Orthodox Growth' and 'Current Trends', is driven by demographic change, particularly population growth and migration, and by lacklustre economic development. The 'Doomsday' scenario provides the worst-case scenario, given a *laissez-faire* approach to environmental change. Some scenarios, such as the 'Current Trends' scenario and UNEP's *Blue Plan*, look at realistic futures for specific sub-regions of Africa, and *Blue Plan* attempts to chart a desirable course for African development. There are also discussions on alternative scenarios, which feature a desirable and sustainable vision for the region.

Perhaps the most positive of the scenarios is *Beyond Hunger* (Achebe and others, 1990). This provides a vision of Africa some 100 years after the independence of Ghana, which was the first colonial territory in Africa to become independent in 1957. *Beyond Hunger*, produced before South Africa imbibed multiracial politics in 1994, already envisioned an African state of Azania for South Africa. It also envisioned the institution of mechanisms that would lead Africa to an economic development strategy which emphasized autonomy or integration into global markets. *Beyond Hunger* can be said to constitute the roots of the 'African Renaissance'—the resurgence of African culture, human resource development, outreach programmes and public participation in the development process.

## METHODOLOGY: THE SCENARIO APPROACH

[This section and the next section contain text drawn from Paul Raskin (30 June 2000; 1 September 2000 (revised); 16 October 16 2000 (second revision)) and *GEO-3 Scenarios: Preliminary Framework*.]

AMCEN's mandate to assess long-range environmental issues poses significant methodological challenges. Because the time horizon expands from years to decades, the long-range future cannot be extrapolated or predicted due to three types of indeterminacy: ignorance, surprise and volition. First, insufficient information on both the current state of the system and on the forces governing its dynamics leads to a classical statistical dispersion over possible future scenarios. Second, even if precise information were available, complex systems are known to exhibit turbulent behaviour, extreme sensitivity to initial conditions and branching behaviours at various thresholds. Therefore, the possibilities for novelty, surprise and emergent phenomena make prediction impossible. Finally, the future is unknowable because it is subject to human choices that have not yet been made. In the face of such indeterminacy, scenarios offer a means for examining the forces shaping the world, the uncertainties that lie ahead and the implications for tomorrow of today's actions.

A scenario is a story, told in words and numbers, concerning the manner in which future events could unfold, and offering lessons on how to direct the flow of events towards sustainable pathways and away from unsustainable ones. Development scenarios are alternative stories about the future with a logical plot and narrative. Scenarios usually include images of the future—snapshots of the major features of interest at various points in time—and an account of the flow of events leading to such future conditions.

Scenarios draw both on science—on our understanding of historical patterns, current conditions, and physical and social processes—and on the imagination in order to conceive, articulate and evaluate alternative pathways of development and the environment. In so doing, scenarios can illuminate the links between issues, the relationship between global and regional development, and the role of human actions in shaping the future. It is this added insight—leading to more informed and rational action—that is the foremost goal of scenarios, rather than prediction of the future.

Although scenarios certainly can offer quantitative insight, they are not primarily modelling exercises. The qualitative scenario narrative plays a critical role in giving voice to key aspects such as cultural influences, values, behaviours and institutions, which are not quantifiable. Thus, scenarios can provide a broader perspective than model-based analyses, while at the same time making use of various quantitative tools, such as accounting frameworks and mathematical

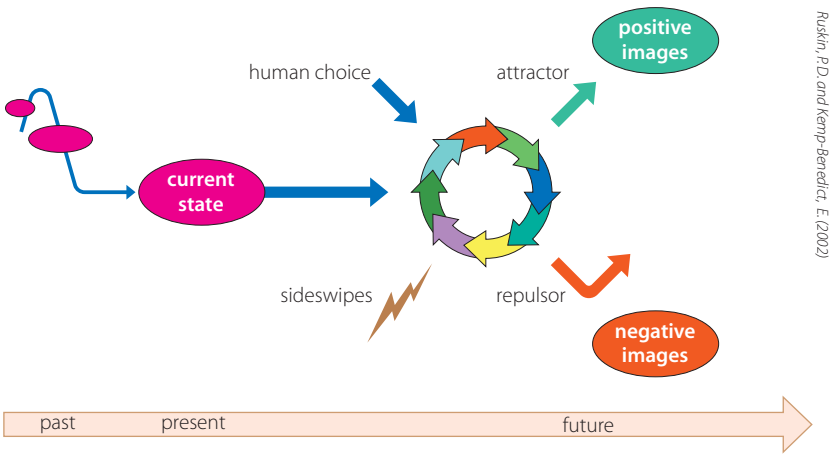
simulation models. Quantitative analysis offers a degree of structure, discipline and rigour. Scenarios can offer texture, richness and insight.

Figure 4.2 illustrates the major features that govern the dynamics of change associated with scenarios of combined human and environmental systems. The 'current state' of the system is the outcome of an historical process, which is driven forward by a set of 'driving forces'. Moreover, the capacity of human beings to imagine alternative futures and to act intentionally means that images of the future can act as 'attractive forces' and 'repulsive forces' in shaping a scenario. In addition, there is the possibility that surprising and extreme occurrences—called 'sideswipes'—could affect development. Many unexpected events could be involved (for example, a breakdown of the climate system, a world war, cheap fusion power, a major natural disaster or a rampant global epidemic such as HIV/AIDS), but probabilities cannot be assigned, nor can all the possibilities be imagined.

Some key issues to consider in the formulation of scenarios include: the boundary; the current state; the definition and determination of driving forces; the narrative, or storyline; and images of the future.

- The boundary of the scenario is specified in several senses: spatially (for example, global, regional, sub-regional, national or local); thematically (for example, coverage of sectors and issues); and temporally (the time horizon of the analysis).
- The current state covers a range of dimensions: economic, demographic, environmental, institutional and so on. In the Global Environmental Outlook (GEO), as well as in the AEO, the dimensions are land, atmosphere, forests, freshwater, coastal and marine resources, biodiversity and urban environment.
- The important driving forces are those which condition and change the system. These are described in the GEO and AEO as demographics, economics, social issues, culture, technology, environment and governance.
- The narrative, or storyline, provides the plot by which the scenario stories unfold (often, quantitative indicators are used to illuminate aspects of the scenarios).
- An image of the future paints a picture of conditions at one or more points in time.

**Figure 4.2 Scenario dynamics**




Raskin, P.D. and Kemp-Benedict, E. (2002)

## AFRICA REGIONAL FUTURES: SCENARIO DEVELOPMENT IN THE AEO

The development of scenarios in the AEO followed the pattern described in the GEO. As with the *GEO-3* report, scenarios are based on the work of the Global Scenarios Group (GSG) (Gallopin and others, 1997). The GSG uses a two-tier hierarchy, described as 'classes' and 'variants', to categorize scenarios. Classes are distinguished by fundamentally different social visions, while variants reflect a range of possible outcomes within each class. The three broad classes are 'Conventional Worlds', 'Barbarization' and 'Great Transitions'. These are characterized, respectively, by: essential continuity with today's evolving development patterns; fundamental, but undesirable, social change; and fundamental and favourable social transformations. For each of the three classes, two variants are defined, giving a total of six scenarios. Thus, in the 'Conventional Worlds' class, the two scenarios that are emerging are 'Conventional Development' and 'Policy Reform'. The two scenarios in the 'Barbarization' class are 'Breakdown' and the 'Fortress World'. In the 'Great Transitions' class, the two scenarios are 'Eco-communalism' and the 'New Sustainability Paradigm'.

The 'Conventional Worlds' class envisions the global system of the 21st century evolving without major surprises, sharp discontinuities or fundamental transformations in the basis for human civilization. The future is shaped by the continued evolution, expansion and globalization of the dominant values and

socioeconomic relationships of industrial society. In contrast, the 'Barbarization' and 'Great Transition' classes relax the notion of the long-term continuity of dominant values and institutional arrangements. Indeed, these scenarios envision profound historical transformations in the fundamental organizing principles of society over the next century, perhaps as significant as the transition to settled agriculture and the industrial revolution.

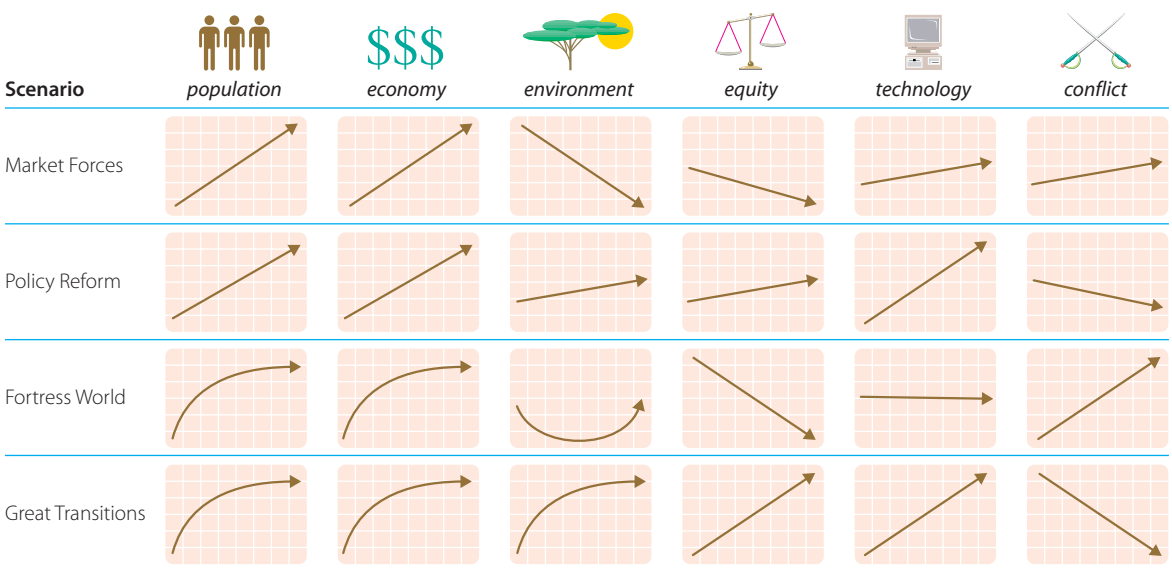
Within the 'Conventional Worlds' class, the 'Reference' variant incorporates mid-range population and development projections, and typical technological change assumptions. The 'Policy Reform' variant adds strong, comprehensive and coordinated government action, as called for in many policy-oriented discussions of sustainability, in order to achieve greater social equity and environmental protection. In this variant, the political will evolves for strengthening management systems and for the rapid diffusion of environmentally friendly technology. Whatever their differences, the two 'Conventional Worlds' variants share a number of premises: the continuity of institutions and values; the rapid growth of the world economy; and the convergence of global regions toward the norms set by highly industrialized countries. Environmental stress arising from global population and economic growth is left to the self-correcting logic of competitive markets. In the 'Policy Reform' variant, sustainability is pursued as a proactive strategic priority.

The 'Barbarization' variants envision the grim possibility that the social, economic and moral underpinnings of civilization deteriorate, as emerging problems overwhelm the coping capacity of both markets and policy reforms. The 'Breakdown' variant leads to unbridled conflict, institutional disintegration and economic collapse. The 'Fortress World' variant features an authoritarian response to the threat of breakdown. In this scenario, ensconced in protected enclaves, élites safeguard their privileges by controlling an impoverished majority and by managing critical natural resources while, outside the fortress, there is repression, environmental destruction and misery.

Further reflections indicate the need to reclassify these into four distinct categories. The four categories, adopted from the GEO, are: 'Conventional Development', later renamed 'Market Forces', 'Policy Reform', 'Fortress World' and the 'Great Transitions'. These are the four scenarios that are used in the AEO. Figure 4.3 shows the sketches of the behaviour over time for six descriptive variables on these four scenarios, namely: population growth; economic scale; environmental quality; social and economic equity; technological change; and the degree of social and geopolitical conflict. The curves are intended as rough illustrations only of the possible patterns of change.

The characteristics of the four scenarios may be

**Figure 4.3 Scenarios structure with illustrative patterns of change over time**



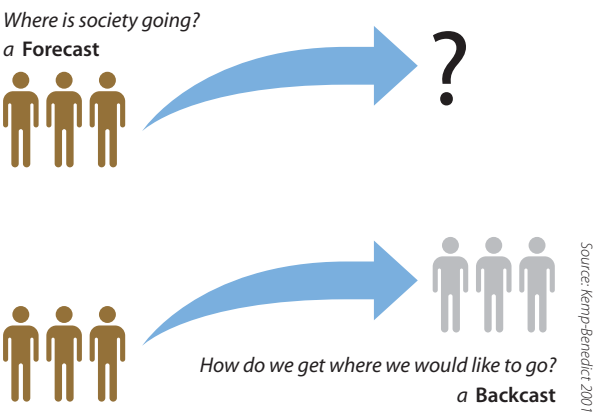

Gallopin, Hammond, A. H., Ruskin, P. D. and Swart, R. (1997)

summarized as follows:

- Market Forces scenario: market-driven global development leads to convergence toward dominant values and development patterns;
- Policy Reform scenario: incremental policy adjustments steer conventional development towards environmental and poverty-reduction goals;
- Fortress World scenario: as socioeconomic and environmental stresses mount, the world descends toward fragmentation, extreme inequality and widespread conflict; and
- Great Transitions scenario: a new development paradigm emerges in response to the challenge of sustainability, distinguished by pluralism, planetary solidarity, and new values and institutions.

Scenario development proceeds in one of two directions. In the first case, one begins with the current position and then proceeds to make projections into the future. Such a strategy may be described as 'forecasting'. On the other hand, one can begin with the desirable future, and seek to manipulate variables and resources to achieve this future. Such an approach is described as 'back-casting'(see Figure 4.4). Two of the scenarios described above (the Market Forces scenario and the Fortress World scenario) may be achieved by methods of forecasting, while the other two scenarios (the Policy Reform scenario and the Great Transitions scenario) are best achieved by methods of backcasting, a procedure adopted in this study.

**Figure 4.4 Forecast and backcast**




Source: Kemp-Benedict 2001

## QUANTITATIVE EXPRESSIONS OF THE SCENARIOS

The generation of quantitative expressions for the different scenarios requires the use of models, or input from experts. The applications described in this work were developed at the regional scale, and were organized with the help of the SEI's PoleStar software system. The goal of the PoleStar project is to give operational meaning to the notion of sustainable development, a challenging task which requires a broad view—across issues, over a range of spatial scales and over long timescales. The PoleStar software system has been applied at the global level by the SEI for UNEP's *GEO-3* report, and also for the scenarios of the GSG. Scenario development in the AEO benefited from the good assemblage of data undertaken by the SEI, but has been modified in different ways. Some of the major driving variables—Gross Domestic Product (GDP), population and urban population—differ from those of the *GEO-3* report or the GSG scenarios. In part, this reflects an update of the data for Africa, using more recent information published in Cities in a Globalizing World.

For illustrative purposes, six possible outputs are examined, which represent the four dimensions of: demographics; economy and society; agriculture and forestry; and environment. The demographic dimensions consist of the total population and the urban population figures for Africa, and for each of its sub-regions. The economy and society dimension consists of the GDP measured at the purchasing power parity rates, with 1995 as base. The third dimension, agriculture and forestry, consists of severely degraded cropland. The environment dimension consists of water use and urban household water pollution. The quantitative expressions of the scenarios for these variables are presented as Figures 4.5–4.10.

Populations grow at mid-range levels in the Market Forces scenario. The spread of education for women, poverty-reduction programmes and widespread use of birth-control methods leads to a significant slowing in population growth rates in the Policy Reform scenario, and there is a radical reduction in growth rates in the

**Figure 4.5 Populations in the Scenarios and by Sub-regions**

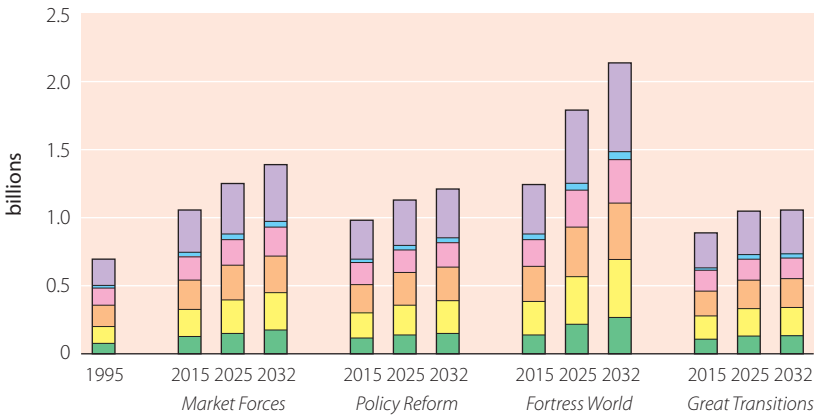



**Figure 4.6 Urban populations in the Scenarios and by Sub-regions**

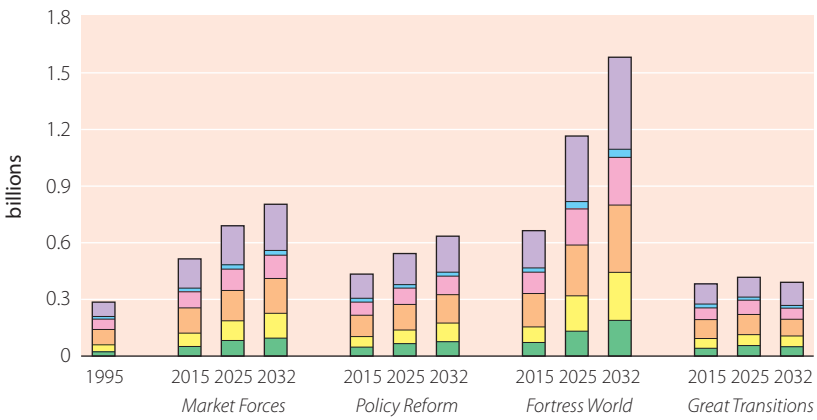
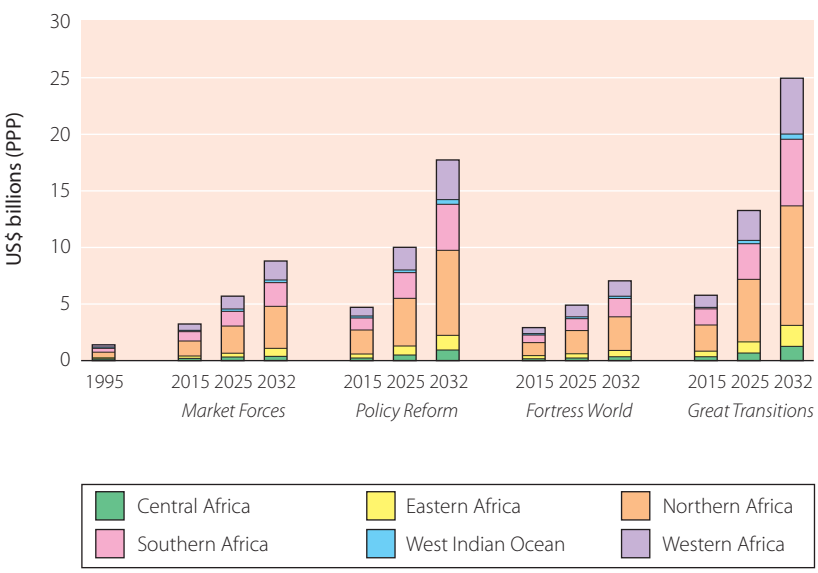



**Figure 4.7 GDP (Purchasing Power Parity (PPP)) in the Scenarios and by Sub-regions**

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Great Transitions scenario. In the Fortress World scenario, social collapse, poverty and the failure of educational systems precipitate a massive expansion of the population, reaching, in 2032, four times the population in 1995.

Urban populations follow similar trends to population as a whole. However, the differences between the Fortress World scenario and the Great Transitions scenario are even more pronounced. Widespread alternatives to urban and periurban settlement expansion in the Great Transitions scenario lead a barely perceptible growth in total urban population. In the Fortress World scenario, the loss of farmland to élite interests, land degradation and the collapse of urban markets for rural agricultural produce drives billions of people toward the already overcrowded cities.

Patterns of GDP growth are nearly the inverse of the patterns of population growth. Growth in the Market Forces scenario is rather robust compared to recent experience in the region, but it is slow compared to other developing regions as the new millennium begins to unfold. In the Policy Reform scenario, the gap is much smaller, because several African countries see rapid growth in GDP. The collapse in society, polity and infrastructure in the Fortress World scenario underlies very sluggish growth in per capita income, which grows just barely over the rate of population growth over the scenario period. In the Great Transition scenario, with an international environment that is focusing on equity through more vigorous connections with other southern regions and in a supportive domestic environment, output per person expands rapidly, reaching an average level for the region as a whole that is close to the average of the industrialized countries in 1995.

Cropland degradation rates are highest in the Market Forces scenario and the Fortress World scenario, and the amount of cropland degraded adds to the total that must be converted from other land-use types.

Water use grows under each of the scenarios, as populations expand and incomes grow. In the Policy Reform scenario and the Great Transitions scenario, especially, rising demand for water-intensive end uses is offset by greater efficiency. However, despite relatively greater improvements in water efficiency in the Great Transitions scenario compared to the Policy Reform scenario, the rapid economic growth in the Great

Transitions scenario leads to comparable levels of water withdrawals. At the same time, water-use intensity remains well below that of the industrialized regions. In the Fortress World scenario, relatively modest water withdrawals—below those of any of the other scenarios—hide a disturbing picture of collapsing water-delivery infrastructure and degraded water sources, leading to severe water shortages and declines in the population with access to clean water.

Total water pollution from urban households depends on both the size of the urban population and the water-treatment infrastructure. The high average incomes in the Policy Reform scenario and the Great Transitions scenario, combined with low urban populations, lead to very low total water pollution loadings. In the Great Transitions scenario, urban water pollution falls after 2015, as urban population levels off and treatment continues to improve. The poor infrastructure and rapid urban population growth in the Fortress World scenario leads to a massive increase in total water pollutant loadings from urban households.

## THE DRIVING FORCES OF THE SCENARIOS

Driving forces are the mechanisms that allow change to occur. They can be thought of as clusters of shifts within society so great that they cause other significant shifts to take place. Driving forces set the initial course for development, but the complex regional system can rapidly change direction at critical thresholds of extreme turbulence and instability. Understanding the nature and interplay of driving forces is essential to developing scenarios. Driving forces are the departure points for looking at the future. They may operate with different magnitudes and directions than those of the initial stage, and they may emerge or disappear as circumstances dictate.

Current trends, on the other hand, are reflected in Chapter 2 of this report. Although they are not inevitably persistent, but evolve over time, they certainly condition the initial direction of economic, social and environmental change, and they may strongly influence even the long-term future. The driving forces control trends which are themselves influenced by social, economic and environmental conditions (Gallopin and others, 1997).

**Figure 4.8 Severely degraded croplands in the Scenarios and by Sub-regions**

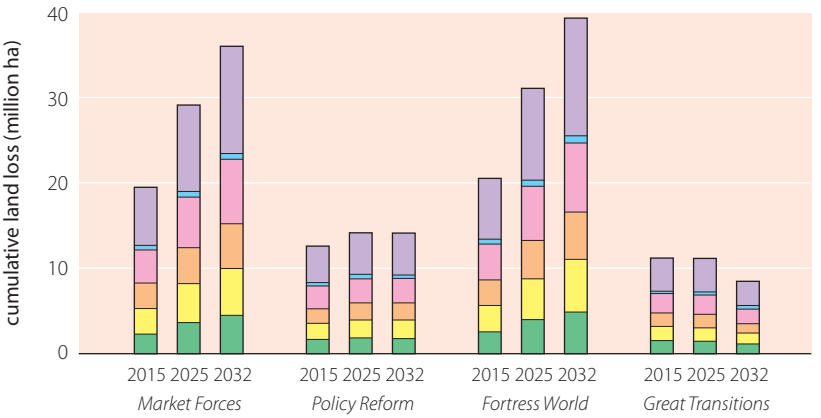



**Figure 4.9 Water use in the Scenarios and by Sub-regions**

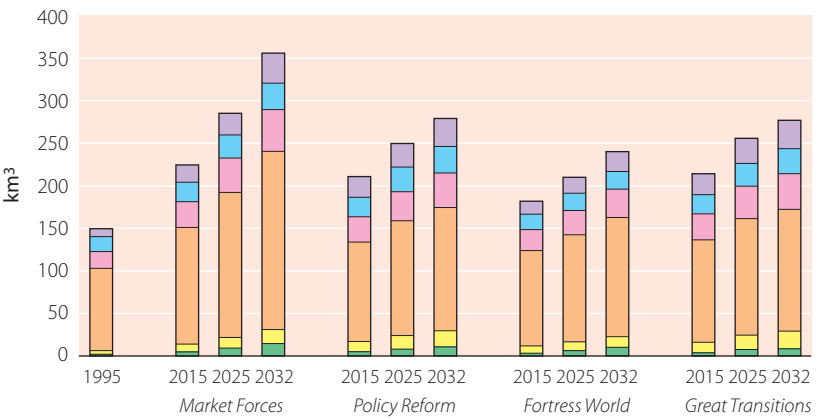
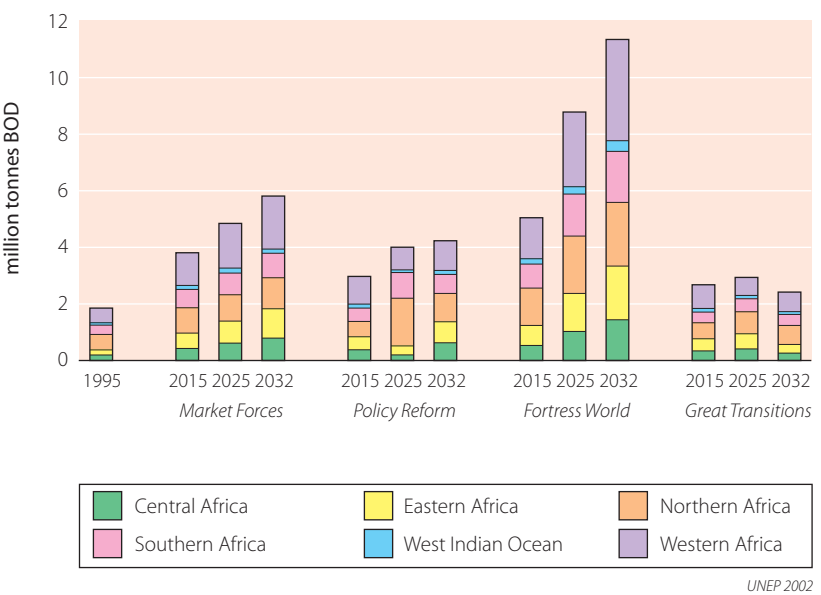



**Figure 4.10 Urban household water pollution in the Scenarios and by Sub-regions**

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## THE DRIVING FORCES

### Demographics

Africa witnessed dramatic population increase, from 221 million in 1950 to 785 million in 2000 (see Figure 4.11). Despite the fact that population growth rates have declined since the mid-1980s, Africa remains the world's fastest growing region, at an estimated 2.4 per cent per annum. However, future growth rates are expected to be lower. The region will attain an estimated population of 1 406 million by the year 2030 (UNDP 2000) (see also figure 4.11). Rapid urbanization is also a main driving force, which is causing stresses in many African economies. With an average annual growth rate of 3.71 per cent (see Figure 4.12), Africa is the fastest urbanizing region of the world. Nevertheless, Africa is still very largely rural and agricultural. In 2000, the urbanization level was only 37.9 per cent, and it is projected to reach 54.5 per cent by 2030. Urban population is expected to grow from 297 million in 2000 to 766 million in 2030 (UNPD 1999).

Nonetheless, the problem of population in Africa is not related only to the population size, because Africa remains underpopulated by world standards. Rapid population growth entails challenges for the African countries to improve standards of living and to provide essential social services, including housing, transport, sanitation, health, education, job opportunities and security. It also limits the capacity of African countries to deal with the problem of poverty. Furthermore, rapid population growth rates are leading to political and social conflicts among different ethnic, religious and social groups.

The population age structure is heavily skewed towards young people, which generates tremendous demographic momentum. About 43 per cent of the population is below the age of 15 years, about 52 per cent is between the ages of 15 and 60 years, and 5 per cent are aged 60 years or older (UNDP 2000). The 15–24 age group numbered 149 million in 1998, constituting about 20 per cent of the total African population. This workforce bulge can be the basis for more investment, greater labour productivity and rapid economic development (Makinwa-Adebusoye, 2001). With such high population momentum, reflected in the rather high fertility rates, and in improving health and medical situations, it can only be expected that the population of African countries will rise to phenomenal heights and will continue to impact the environment in significant ways. Left unattended, these trends lead to great strains and undesirable consequences on the environment.

However, the rate of population increase is not uniform. Some areas experience higher than average rates of population increase, due both to higher intrinsic rates of growth and to immigration from other areas

**Figure 4.11 Annual change in total, urban and rural populations, 1950–2030**

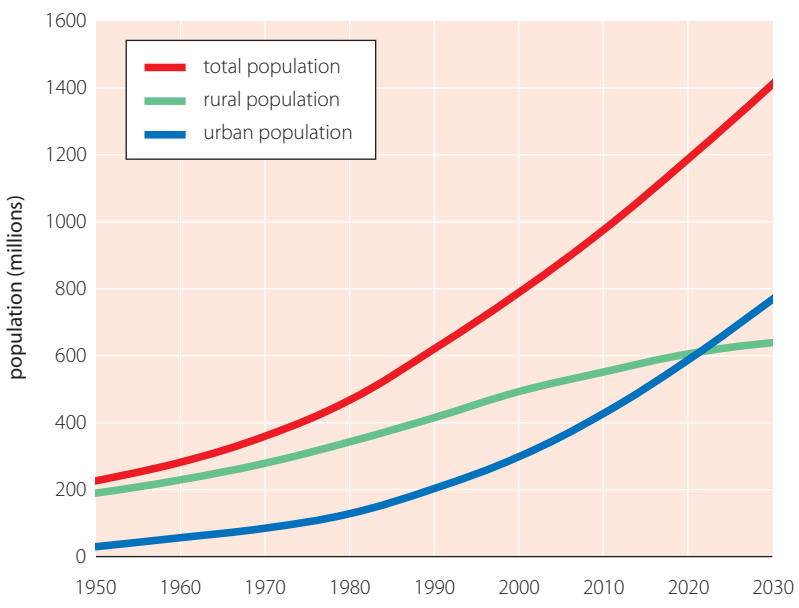
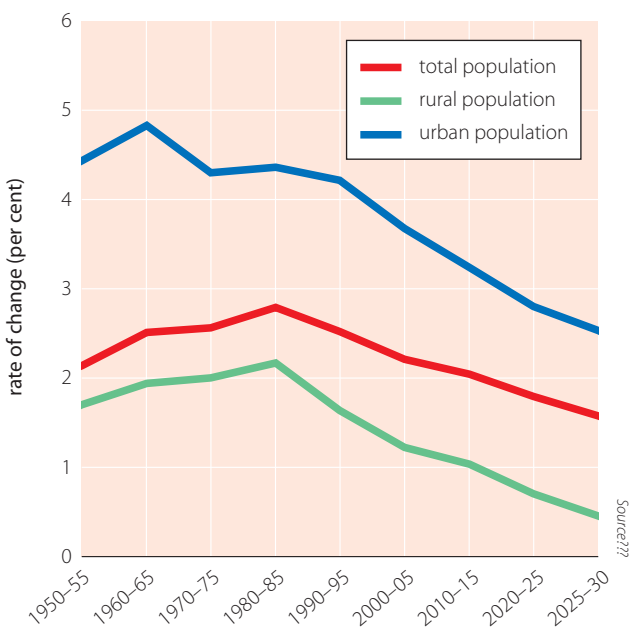



**Figure 4.12 Annual rate of change in total, rural and urban populations**



within a country, sub-region or the whole region. Such areas include town and cities, coastal regions, and the vicinity of lakes and rivers. Of these, the impact of population growth in urban areas is particularly important, because of the changes in lifestyle, consumption patterns and waste production that accompany urbanization. Conversely, some areas experience lower than average rates of population growth, due to below-average intrinsic rates of population increase and to emigration. Such areas include those in which there are conflicts or where there is severe environmental degradation.

### Economics

In relation to its size, population and relative abundance of natural resources, Africa is grossly underdeveloped, contributing, in 1999, only 1.1 per cent of global total GDP (WB 2000). Furthermore, the economies of most African countries show a marked dualism, with a relatively small commercial sector, based mostly on the extraction and export of natural resources (minerals, agriculture, other natural products and tourism), and a relatively large subsistence and informal economic sector. This dependence on the extraction and export of natural resources makes the economies of these countries particularly vulnerable to global economic fluctuations, especially in mineral and commodity prices.. The level of industrialization is low, and relatively little value is added within the region in the case of minerals and agricultural commodities. This means that industrial emissions of greenhouse gases is low, both overall and per capita, and emissions per unit of industrial and manufactured output are relatively high, because of the relatively old and inefficient equipment and technologies used by industry in Africa.

Nonetheless, over the past four decades, the economies of African countries have undergone considerable change, as they have moved from a colonial phase economy to a post-colonial economy. For instance, the development of modern, commercialized colonial agriculture was geared to the growth of cash crops for export. Although agriculture has remained a major economic sector, there have been key transformations, especially in the industrial sector, which has grown rapidly and on a large scale in some countries, to include heavy industries.

Nevertheless, the economic underdevelopment of African countries reflects, in part, their history of economic and political colonization and, partly, the economic and other policies adopted by governments following independence. These include: wage and price controls; widespread subsidies of basic commodities; a burgeoning civil service; fixed currency exchange rates, which lead to overvaluation of currencies; high tax rates; and disincentives for potential external investors. Many countries have had to accept economic Structural Adjustment Programmes (SAPs), often as a condition for being granted loans by the WB and the International Monetary Fund (IMF). The features of these programmes vary somewhat from country to country, but common elements include: strict controls on public expenditure; reforms of the structure and functioning of the civil service; reductions in barriers to trade; the removal of domestic subsidies; opening up of the economy to external investment; and allowing the value of the national currency to be determined by market forces. Nevertheless, these changes are proving to be socially disruptive and difficult to implement, with rising unemployment, sharply rising prices of even basic commodities and increasing inequity, among others.

For a long time, the promised benefits of SAPs have not been realized. Instead, these countries have drifted further away from development and their debt burdens have increased yearly (Vavi, 1999). Debt has been a stumbling block for many African nations, which have had to spend more on serving their debt than on providing basic social services. A combination of internal and external factors has precipitated Africa's debt problem. Africa's total debt stock stood at US$320 000 million in 1998, having increased by about 13 per cent from 1990.

Africa's share in the world trade is small and declining, and is being met with fierce competition from the other regions of the world that have faster and more sustained economic growth. Nevertheless, exports and imports have significant influence on the region's economy, with exports alone accounting for 25 per cent of the regional GDP, and imports providing 20 per cent of the domestic supply (ECA 1999). Africa has become severally marginalized in the global economy as it continues to face formidable barriers to northern markets. Most of the wealth generated by trade liberalization has flowed to developed countries. The rules governing world trade—set largely by the

*Africa's share in the world trade is small and declining, and is being met with fierce competition from the other regions of the world that have faster and more sustained economic growth.*

industrialized countries over the course of the 1986–94 Uruguay Round of agreements—have only contributed to Africa's economic woes.

Poverty remains endemic in Africa. In the late 1990s, more than 46 per cent of, or 290 million, people in sub-Saharan Africa lived on less than US$ 1 per day, up from 217 million people a decade earlier. Much of the poverty is based in rural areas and is, therefore, difficult to address, because of relative inaccessibility of much of the population and the limited economic opportunities for rapid development. This continuing poverty and associated vulnerability to all sorts of shocks, together with the inability of the relatively weak African economies to create conditions that would help to reduce poverty, has meant that countries in the region remain dependent on external aid.

### Social issues

Although improvements in social indicators have been sustained across the globe, Africa has lagged behind other world regions. Half of the population in Africa lacks access to health services. In rural Africa, about 65 per cent of the population are without access to adequate water supply, and 73 per cent are without access to adequate sanitation. In urban areas, about 25 per cent and 43 per cent of the population are without access to adequate water supply and sanitation, respectively (World Commission on Water 2000). The average adult illiteracy rate stands at 42 per cent. Life expectancy, which has steadily increased over the past decade to an average of 54 years, is expected to fall by 17 years as a result of the HIV/AIDS epidemic in many countries (ECA 2000). Health challenges are monumental in a region with the highest rates of fertility, maternal and childhood mortality, malnutrition, two-thirds of the world's known AIDS cases and 90 per cent of the world's annual malaria fatalities, and where half of the female population is illiterate.

Social development in African countries manifests in many dimensions, which cut across poverty and the declining standards of living, as well as issues of access to facilities and social security. On the one hand, there are issues of the provision and maintenance of basic human services and, on the other hand, issues of the consequences of the failure to do these successfully. When they became independent, most African countries inherited a system where government was absolutely responsible for providing these services and amenities, at almost no direct cost to consumers. Over the years, the ability of governments to meet the demands for providing basic services and utilities has decreased tremendously, and the effect has been one of aggravating social conditions in which nationals live. According to the latest UN figures, African nations rank, on average, lower than any other continent on the Human Development Index (HDI). Furthermore, more than 70 per cent of the countries in Africa rank 'low' on this index. In some cases, the HDI has suffered decreases, rather than improvements, over the years. Moreover, there are also great inequalities in the distribution of income, opportunity and social welfare.

Many countries have programmes which directly address these inequalities, while some have formulated development strategies designed to alleviate the problems of poverty and inequities. These inequalities remain today and, in some cases, manifest themselves in more serious forms than in the early days of independence. Compared with the rest of the world, social indicators show Africa as the least developed region, even though there are instances where improvements have been made, for example, in the areas of health, birth and deaths, fertility and educational development. In the area of educational development, the level of literacy has risen considerably in the region, and the quality of trained personnel has equally improved. African countries have witnessed the phenomenon of 'brain drain', whereby the best-trained of its manpower resources migrate into developed countries.

Poverty remains both a cause and an effect of environmenta1 degradation, and is the main social and economic challenge for Africa. Poverty can be reduced, either by increasing economic growth or by reducing inequity. For Africa to cut poverty in half by 2015, it will require an average annual GDP growth rate of 7 per cent. Although there has been significant progress in education in Africa over the past two decades, there is much to be done. Primary school enrollment in 16 countries is less than 60 per cent, and there are more children aged 6–11 years out of school than was the case in the 1990s.

Although African women have made tremendous progress over the past four decades, there is still a gap between rhetoric and action in order to maintain the momentum of this progress in Africa. Economic and legal

barriers, associated with social discrimination, continue to prevent women in Africa from improving their status and productivity, and from achieving their full potential.

### Culture

Culture and the natural environment are strongly linked. Cultural practices, values, norms and language often reflect the diversity of natural resources upon which people depend for their livelihoods, and the strategies they use to extract these resources. Africa holds many strongly traditional cultures. They can serve both as bulwarks against outside influences and as conduits through which new ideas are assimilated, through translation and representation in established idioms. Cultural norms and values shape people's perceptions, aspirations and attitudes and, thereby, their actions. Cultures often include mechanisms which regulate access to, and patterns of use and consumption of, natural resources. Most of all, culture strongly influences the choices that people make. Among the many elements comprising a culture, religious and linguistic elements, and ethnic groups living within that culture, can—and do, at times—cause changes in its total configuration. As in some other parts of the world, religion in Africa serves as a strong unifying force in some areas, and as a potentially divisive one in others. Ethnic tensions, driven by historical animosities—themselves often exacerbated by religious, economic and social tensions—are also potentially divisive and inhibitory to development. In contrast, religion can promote social coherence and support within communities, thereby encouraging self-reliance and development.

With a plurality of peoples and languages, Africa has a rich traditional culture. For many peoples of Africa, the systems of social governance, provision of services, maintenance of social cohesion and even economic development have been based on the norms that these cultures have allowed. The advent of other cultures in the region has led to some form of competition between cultures, and the assimilation of different cultures into a dominant culture. Traditional African cultures have been most affected, while the imported Islamic culture has merely suffered some damage. Today, traditional support systems, which served as social securities for all members of society, including the aged, the homeless, the sick and the poor, have more than crumbled and have not been replaced by efficient structures. Of course, traditional systems of governance have disappeared almost completely. They are being replaced by 'democratic ethics', which are being intermingled with tribal and ethnic sentiments and loyalties, and religious strives. Many Africans today are entangled in the influences of these cultures, but the influence of westernization has become very pervading.

Culture is not static, especially in this era of increasing globalization. People around the world are being exposed more and more to the norms and values of other cultures, sometimes creating tensions with their own culture and, in many instances, resulting in substantial modification or replacement of some of its elements. Consumption patterns in many parts of Africa are increasingly being modelled on a western-style consumer culture. This influences both trading and investment patterns, particularly by creating a demand for imported consumer goods while, at the same time, serving as an incentive for some of the multinational corporations to enter local markets directly through investment, partnerships or takeovers. A shift from self-sufficiency to a cash economy, and new patterns of accumulation of wealth, can bring unforeseen changes. This, in turn, can affect cultural values, as communities lose contact with the resources that were so important in determining many of their livelihoods and practices. These factors (changes in traditional patterns of access and management, as well as a diminishing natural resource base) can become sources of conflict, as well as culture change.

Western life styles are becoming increasingly commonplace. So, too, are western values, which continue to overshadow existing African cultures. However, dogmatic following of the consumer culture will reach a peak, and people will begin to see the difference between needs and wants. Effective utilization and channelling of these ideas and ideals will lead to healthier lifestyles and to the promotion of alternatives to traditional families ties, which are breaking down. The emphasis on meeting human needs rather than wants will lead to the elimination of religion and ethnicity as divisive forces in African development. The introduction of a culture of peace will bring lasting solutions to various forms of conflicts in Africa. This cultural revival will constitute a crucial fulcrum for the African renaissance, and its effects will soon become noticeable on the environment.

### Technology

Before the colonization of the region, African economies were able to survive large-scale environmental degradation, for a number of reasons. First, the population was small, and the demands on the economy were small. More importantly, the technology was appropriate and adequate, because the African people had learned over centuries to adapt systems of extraction of natural resources to be commensurate with the dictates of the environment. Things have since changed. Modern economic practices have introduced increased demand on human and natural resources, and so that technology has proved inadequate. For instance, attempts to improve agriculture has resulted in the importation of strange varieties of food crops, and the introduction of chemicals and additives to soils, plants and vegetation.

For a large part of the 20th century, Africa's role in the development of science and technology was marginalized. To a large extent, the colonial powers inhibited the development of indigenous technology in Africa, and destabilized some of the existing processes of technical growth. Indigenous manufacturing capability was deliberately undermined in order to facilitate European exports, and captive markets were created. In addition, colonial powers deprived Africa of its historical credit in contributing to advancements in science, technology and medicine (Emeagwali, 2000). Furthermore, Africa has not been only a user of technologies developed in the west, but has also been a dumping ground for obsolete technologies abandoned in the west. More recently, Africa has became a testing ground for biotechnology and genetically modified (GM) products.

African countries have also discovered that modern technology is needed to manufacture the goods and services that have become imperative to sustain modern life. Caught in this cycle, dependence on imported technology, with all its consequences, has increased, and the effects on the environment have become severe. Many African countries will readily offer their land to locate even the most obnoxious industries—despite their negative impacts on the people and the environment—provided they will bring in some monetary relief or economic growth.

The craving today is for modern information technology (IT), which is at the heart of so much development. And yet it can be said that Africa has not even begun to establish itself in this arena. Because of its poor economic base, the region has not succeeded in manufacturing computers, the basic hardware required for IT development. Other impediments include: the low number of currently installed telephone lines; the limited provision of facilities such as electricity; and the high levels of illiteracy in the region.

The emergence of micropower technologies begins to revolutionize the exploitation of alternative sources of energy to meet the ever-growing needs of the region. While African countries continue to see modern IT and industrialization as principal agents for economic development, they nonetheless recognize that the timing for the application and integration of IT into national development processes will vary from country to country. With the introduction of cleaner fuels, swift transition to renewable resources and greater concern for the environment, the impact of industrialization on the environment is reduced to the barest minimum.

The use of biotechnology in agriculture and in related primary production industries has the potential to influence food and fibre production, food security and management. There are both benefits and risks associated with the release of genetically modified organisms (GMOs). The search for new pharmaceuticals, based on chemical compounds found in plants, can serve as a stimulus to conserve biodiversity. It also has the potential, albeit possibly a minor one, to serve as a source of income for local people.

### Environment

The environment, as a key driving force for change, is interlinked with other driving forces, and is, at the same time, impacted by other driving forces. Africa faces a series of environmental threats, including: water scarcity; quality and water management issues; land degradation; loss of biodiversity; the rise of infectious diseases; solid waste; degradation of coastal areas; marine pollution; urban air pollution; and climate change. Poverty, as a cause and effect of environmental degradation, has captured significant attention in Africa.

Most basic human needs (food, water and shelter) are linked to the environment. The capacity of the environment to support the demand for food depends both on the intrinsic features of that environment

*The capacity of the environment to support the demand for food depends both on the intrinsic features of that environment (climate, soils and seasonality) and the extent to which natural constraints on production can be alleviated by management.*

(climate, soils and seasonality) and the extent to which natural constraints on production can be alleviated by management. Demand for food grows both in relation to increasing populations and to changes in lifestyles. Food production is influenced by: the introduction of improved varieties of crops; improved agricultural land management practices; and climate variability. Food security is compromised by droughts and floods, and by the degradation of agricultural lands (declines in fertility, soil loss and salinization) through unsustainable farming practices. Depletion and degradation of the natural resource base intensifies competition for land and natural resources, creating potential conflict and causing human migration to less stressed areas.

Competition for limited resources also arises as demand for those resources exceeds supply. Demand increases both as a result of more people and their domesticates needing access to that resource, and of changes in the patterns of consumption. For example, across much of Africa, water is an increasingly limited resource. This is the result of ongoing degradation of water sources, such as: siltation of dams and rivers; increased demand, due both to increasing numbers of people, and to progressive urbanization and more profligate use of water; and increased demand by the agricultural and emerging industrial sectors. Increased competition for limited water resources has the potential to fuel conflict within countries, among different user groups and between countries sharing a common major water source. Conflicts are also possible between upstream and downstream users in the same watershed.

The African environment has, for several reasons, been healthier than the environments of other continents. For instance, Africa has lower levels of air pollution by carbon dioxide ($CO_2$) than all the other continents, and the ozone layer above Africa is in a better state. Furthermore, there are greater levels of biodiversity in Africa than elsewhere. Nevertheless, there are more and more onslaughts on the environment as bushes are increasingly cleared for agricultural development, and as erosion worsens as a result of putting marginal lands to use for mining and agricultural development. African countries remain highly vulnerable to loss of biodiversity and environmental degradation.

**Governance**

It is impossible to achieve economic development without good governance. Since independence, African countries have been subjected to various forms of government, including: communism and socialism in Tanzania and Ghana; various forms of democracy in Côte d'Ivoire, Kenya and Nigeria; and quasi-military rule in many other countries. Chazan and others (1992) provided a six-fold classification, with the following categories of governance: administrative hegemonic; pluralist; party mobilizing; party centralist; personal coercive; and populist. Table 4.1 indicates the countries which fell into these groups. The 1960s, 1970s and early 1980s were periods of serious unrest in many African countries, and times when the role of governance was seriously called into question. The near-total breakdown of services, the increasing pauperization of the people, and the complete breakdown of law and order in some countries are continuing evidence of this unrest.

Post-colonial changes in government were achieved through military interventions and through various forms of elections, many of which were merely symbolic and not designed to effect serious changes in the structure of governance. Thus, some involved competitions for office within a single party, while others involved limited multi-party participation. Only in very rare cases were elections designed to provide a mechanism for the simultaneous turnover of both leaders and regime.

Military interventions in governance led to various forms of instability, and to the rise of insurgencies, riots, and ethnic rife and rivalries. Military expenditures increased, and accounted for significant per centages of the GDP of these countries (UNIDIR 1991). The lack of focus in governance led to a breakdown of many government institutions and to wasteful duplication of efforts in the development process.

The international community intervened in many ways, including attempts to sanitize national economies through suggestions and recommendations by the IMF and the WB. There was also the influence of multinational and transnational companies, some of which are financially stronger than many African national economies. The effects of these organizations were so pervading that, in some countries, they seemed to run parallel governments. There is no doubt today

**Table 4.1 Typology of Regimes in Africa 1951-90**

| | Regime Type | Examples |
|---|---|---|
| 1 | Administrative hegemonic | Kenya, Zaire, Togo, Côte d'Ivoire, Cameroon, Zambia, Malawi, Morocco, Nigeria |
| 2 | Pluralist | Botswana, Gambia, Mauritius, Senegal |
| 3 | Party mobilizing | Ghana (Nkrumah), Mali (Keita), Guinea (Sekou Toure), Zambia, Algeria (Boumedienne), Tanza-nia, Zimbabwe |
| 4 | Party centralist | Angola. Mozambique, Ethiopia, Guinea-Bissau, Congo, Benin |
| 5 | Personal coercive | Uganda (Amin). Central African Republic (Bokassa), Equatorial Guinea (Nguema) |
| 6 | Populist | Ghana (Rawlins), Libya (Qaddafi), Burkina Faso (Sankara) |

*Source: Chazan and others, 1992a*

that African economies need some streamlining or restructuring. What most people do not agree about is not if and when this will be done, but how and by whom it will be done.

Good governance in Africa is challenged by various issues, including the collapse of the state in countries where governance has already been weakened by strife, and where governments hardly have the capacity to govern and to maintain law and order. In spite of the fact that African leaders have adopted democracy as a key element of their agendas over the past decade, the democratic process remains challenged. Narrow political considerations, personalized power and corruption have undermined the process of democracy and responsive governance. Inequity in social, economic and political systems, including gender inequity, has been a barrier to achieving good governance. This has resulted in notably increasing disparities between rich and poor in terms of income and capabilities, and in the marginalizing of women in governance.

Poverty remains widely spread in Africa. As such, poverty alleviation represents the greatest challenge to good governance. There is also the challenge of how to manage effectively financial and natural resources, promoting decentralization based on trust, transparency, accountability and capacity.

Corruption and the theft of public funds are some of the problems which have blighted the region's governance record. Many Africans wonder how much of their stolen funds, hidden somewhere in western banks, could make a difference in terms of debt repayments and financing the region's renaissance. But, in the 1990s, the winds of change blew across the region, as the majority of people demanded greater accountability from their elected leaders. They called for transparency and respect for human rights.

Institutional reforms emerge as people begin to develop new forms of social consciousness and as they move to prevent the violation of human rights. When this happens, civil societies emerge in large numbers, and their influence increases and serves as a check on the excesses of national governments. Local participation in decision making also increases considerably. Efforts are made to reduce conflict—in countries where conflicts presently exist—by assisting with the provision of basic services and by breaking the poverty trap.

## SCENARIOS AND THEIR ENVIRONMENTAL IMPLICATIONS

### THE MARKET FORCES SCENARIO

#### Introduction

The Market Forces scenario assumes that world development evolves without major discontinuities, changes in values or other structural ruptures from the position as it existed at the end of the 20th century. However, in this scenario, the world becomes increasingly more integrated, both economically and culturally. Globalization of product and labour markets continues apace, catalysed by free trade agreements, unregulated

capital and financial flows, and information technology. A number of important initiatives pave the way. The World Trade Organization (WTO) provides the legal basis for the global trading system. Barriers to trade and capital movements gradually vanish, as protectionism becomes a thing of the past. New institutional instruments promote market openness and global competition. Virtually all national governments advance a package of policy adjustments, which include: modernization of financial systems; investment in education to create a workforce that is competitive in the emerging global market; privatization; reduced social safety nets; and, in general, reliance on market-based approaches.

In the context of Africa, the Market Forces scenario is based on the assumption that African countries will adopt, willingly or otherwise, the range of policy reforms promoted by the WB and the IMF since the late 1980s. These reforms aim to improve the economic performance of developing countries by encouraging them to restructure their economies through a combination of tight fiscal and monetary policies. The objective is to limit budget deficits and to allow market-determined interest rates, more free trade, capital flows and unencumbered foreign direct investment. The reforms also include: privatization of state enterprises; extension and consolidation of private property rights; and a shift in public expenditure away from subsidies and administration towards infrastructure development and support for sectors of the economy—such as primary health care and education—which are likely to provide ultimately greater economic returns and more equitable income distribution. From a trade perspective, the main outcomes of this strategy are: global integration of commodity markets; opening up of investment markets; more mobile labour markets; and the application of global standards and regulations.

The assumptions of the Market Forces scenario may be summarized as follows:

- The dominant western model of development prevails, with the spread of consumerism/materialism and individualism. The world economy converges to this mode.
- Policies promoted by international financial institutions are adopted, either willingly or otherwise, and they are found to have positive impacts on aggregate growth as the scenario progresses.
- The most effective poverty-reduction strategy is growth promotion. Growth will tend to be broad-based and will trickle down.
- Effective institutions will emerge and spread.
- Economic growth will automatically contribute to recover the environmental damage incurred as a result of development.
- An active policy-making environment is in place. However, although policies are implemented, they tend to be market-based.

### The narratives

In the Market Forces scenario, market forces are the main determinants of: economic and social relations; the distribution of welfare, goods and services; the pattern of investment; and the development of human resources and institutions. Barriers to trade and to the movement of capital gradually diminish. In the emerging free-market economy, markets for goods, services and labour become increasingly interconnected and more integrated; unfettered financial flows and free trade facilitate this. Competition for markets and private investment stimulate initiative and become the main engines of economic growth. To promote market openness and global competition, new institutional arrangements are forged. Consumerism, individualism and self-centredness spread. Inequalities in the distribution of, and access to, the benefits of globalization grow at all levels: among individuals, communities, regions and nations. Overall, these patterns largely continue the global trends that have shaped much of the world economy over the past few decades and more.

Social and environmental stresses are resolved largely through incremental market and policy adaptations. Economic growth is expected to pay for the maintenance and repair costs of environmental damage incurred in the course of economic development. As such, policy makers are not encouraged to design mutually supportive environmental and trade policies, with the result that there is little or no strategic planning of environmental policies to mitigate the negative and to enhance the positive effects of rapid economic development.

In the Market Forces scenario, as the economic and social patterns and behaviours of developing countries converge towards those of the industrialized countries,

no fundamental novel transformations, surprises or sharp discontinuities occur. Africa's future becomes increasingly shaped by the evolving patterns of globalization, and influenced by the dominant values, and social and economic relationships, of industrialized societies. Countries in Africa become increasingly integrated—nationally, regionally and internationally—as advances in communication systems, IT and the electronic media shorten both distance and time. Relations between people in different parts of Africa and across the world become more direct and immediate. Africa becomes part of the 'global village', connected through flows of knowledge and information, and stimulated by this to become more aware of, and active in, the global marketplace.

Despite increasing globalization, the nation state remains the dominant unit of governance, though national decision making is somewhat circumscribed by international treaties, agreements and obligations. Regional economic groupings emerge to pursue common development objectives. Examples are the establishment of economic trading blocks, such as: the Arab Magreb Union (AMU) in north Africa; the Economic Community of West African States (ECOWAS ) in west Africa; the Economic Community of Central African States (ECOAS) in central Africa; the South African Development Community (SADC) in southern Africa; the Indian Ocean Community for the West Indian Ocean Community (IOC); and the Common Market for Eastern and Southern Africa (COMESA). There are other economic groupings, such as the formation of the Southern African power pool.

The participation of people, the private sector and non-governmental organizations (NGOs) in development continues to increase, however, as governments are encouraged to become more open, transparent, tolerant and democratic. Most national governments advance policy packages, which include steps to modernize the economies and financial systems of their countries, and to increase investment in education, in order to develop human resources and to improve their competitiveness in the global markets.

Many governments also privatize state enterprises in order to improve efficiency productivity and to reduce public expenditure. Nevertheless, pockets of resistance to these changes remain, and are characterized by corruption, nepotism and economic failure. As the welfare of populations is increasingly determined by the extent of their integration into a liberalized global market, countries which fail to embrace these changes fall further behind, both economically and in other ways.

In the Market Forces scenario, pressures of a growing population are not just confined to land-based resources. The demand for water increases—a consequence both of more people overall, and greater demand for water for agricultural, industrial and urban domestic uses. In an attempt to meet these demands, more dams are built and more groundwater is extracted. This localizes the distribution of surface water, and increases the cost of provision and distribution. Groundwater levels decline, amplifying the cost of extraction. Water pricing is introduced in order to recoup the costs of supply and to establish a mechanism for the economically efficient allocation of a limited resource. As water becomes more valuable, water recycling is encouraged. Pollution of water bodies by agricultural, industrial and domestic effluents is gradually regulated, though this takes some time to work efficiently. Despite these advances, however, a majority of people in many of the drier regions of the region remain short of water.

Given the continued prevalence of poverty in Africa, both as a result of the slow spread of economic benefits of globalization and the continued growth in the number of people in the lower socioeconomic strata, many countries in Africa continue to rely on foreign aid and external economic assistance. Foreign debt continues to increase, creating more pressure for export-led economic development, based primarily on the extraction of natural resources. The prospect of debt relief encourages economic structural adjustment and increased democratization, but the sustainability of these changes remains an open question.

The close juxtaposition of an expanding global culture and the largely conservative, traditional cultures of the region heightens social stresses. This is particularly the case between the younger members of society, who are more exposed to global culture, and their elders, for whom such changes seem to be a threat. These stresses are somewhat exacerbated by the fact that authority within communities is exercised largely by the elders in circumstances of change which, unlike the young, they resist embracing. Changes in

social relationships within families, resulting from differences in education, lifestyle and location, cause the traditional support systems to break down.

## Environmental consequences

### *Atmosphere*

- *Africa*

Large areas of Africa are characterized by stable atmospheric conditions during the dry winter months. These result in marked thermal inversions, which trap emissions in the lower atmosphere. This natural phenomenon, coupled with a rise in emissions, results in a substantial decline in air quality. In the Market Forces scenario, despite the economic gains from urban and industrial development, most people on the region continue to rely on wood fuels for domestic energy. This is coupled with a rapid growth in industrial and vehicle emissions and, in some parts of the region, in the growth of emissions from coal-fired power stations. The result is an increase in greenhouse gas emissions and a marked decline in air quality especially, but not only, in urban areas. The incidence of acute respiratory infections and other diseases increases.

Although international environmental treaties and market forces create economic opportunities for African countries and industries, the region remains vulnerable to imperfections in the provisions of international treaties governing climate and other global changes. African countries act to protect the somewhat limited, but hard-won, gains in industrialization, because these fledgling industrialized sectors are considered essential to further economic and social development. Any abatement strategies which burden them in any way, or which increase their financial and operational risks, are considered unacceptable.

In the Market Forces scenario, the issue of tradeable permits also remains controversial. By investing in projects in developing countries that result either in the transfer of more energy-efficient technologies, or in some other initiative that reduces the level of emissions, developed countries or private sector firms could acquire carbon credits, while the developing countries are assumed to benefit economically from the investments. The underlying assumption is that the marginal cost of a unit reduction in $CO_2$ emissions is lower in developing countries than in developed countries, and that it is, therefore, more cost-effective to seek emission reductions by appropriate investments in developing countries. The uncertainties surrounding these interventions, particularly their downstream economic and social costs, and the risk that developed countries will only invest in the low-cost, high-gain options—leaving the more costly options to be adopted later by the developing countries alone as their economies mature—causes most countries to hold back from agreeing to these provisions.

Nevertheless, Africa remains vulnerable to the effects of climate change, notably to: the increased incidence of droughts and floods; adverse changes in rainfall patterns; and the spread of diseases, such as malaria, to new zones. Reductions in agricultural production as a result of adverse weather conditions—resulting in increased dependency on food aid, the need for food imports, and reduced revenue from exports—as well as the threats of loss of biodiversity loss, changes in land cover and increased land degradation, all emphasize the region's interest in the issue of global climate change.

The continued depletion of the ozone layer, at least for the first two decades covered by the Market Forces scenario, continues to cause health problems, especially in the southern third of Africa. Although the use of ozone-depleting gases is gradually phased out, in line with the Montreal Protocol, pockets still remain because old and polluting technologies are slow to be replaced. In some cases, efforts to ban the use of certain ozone-depleting substances, such as methyl bromide, which is widely used as a fumigant in agriculture, are resisted because of the lack of cheaper or more effective alternatives, and inadequate assistance to governments to encourage and enforce the change.

- *Central Africa*

In the Market Forces scenario, the countries of this sub-region continue to pollute less, but they suffer from the effects of pollution from the north. The effects of climatic variation become more pronounced, especially in the Sahelian areas and in urban centres. The desert continues to encroach.

Initiatives linked to ozone layer protection and to the reduction of greenhouse effect gas emissions increase at an international level. Monitoring systems of pollution impacts are established, but their results remain mitigated due to non-compliance by some countries in the sub-region.

*In the Market Forces scenario, despite the economic gains from urban and industrial development, most people on the region continue to rely on wood fuels for domestic energy.*

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• *Eastern Africa*

Initially, air quality deteriorates as urban centres expand and as more people, with increased incomes, are able to afford cars. However, measures (standards) are put in place to curb vehicular emissions. Increased tax on fossil fuels forces industries to revert to other alternatives, such as electricity or gas, which have lesser emissions. Climate variability, however, remains an issue, but its impact is reduced because the sector which is most directly impacted by climate variability (that is, agriculture) is adequately funded to offset the impacts through irrigation.

• *Northern Africa*

As the large cities grow larger, air pollution increases. Vehicles and industry remain the main sources of air pollution and emission of greenhouse gases. Nevertheless, as the problem reaches alarming levels, especially in urban and industrialized areas, the major air polluting industries—such as transportation, air conditioning and cement—take appropriate measures to reduce their environmental impacts. Vehicles, especially those used for mass transport, shift to using natural gas instead of fossil fuels. The use of chlorofluorocarbons (CFCs) and other ozone-depleting products in the air-conditioning industry is reduced.

• *Southern Africa*

While virtually all countries of this sub-region have laws to control air pollution, the state of air pollution is not well known. However, it is known that southern Africa's global contribution to air pollution is low, although the situation in South Africa is worrisome. In many countries, air pollution is treated as a health issue and not as an environmental issue, such that monitoring and enforcement are a problem due to different priorities, capacity and resources between health and environment institutions. Nevertheless, global initiatives on the impact of greenhouse gases raise the issue of atmospheric pollution on the sub-regional agenda. The trend is that atmospheric pollution continues to attract attention in the next 30 years, but financial and human resources limit the impact of monitoring and enforcement initiatives.

• *Western Africa*

While the market may tend, initially, to pay no attention to air quality, the nature of the competition forces the issue. All competitors—as a matter of marketing strategy, public relations and necessity—make 'clean air' an essential part of their activities. The scope of the 'clean air' programmes covers vehicles, agricultural equipment, electricity production generators, sewage and garbage disposals, and other threats to the atmosphere.

• *West Indian Ocean Islands*

Air pollution increases as forests and woodland are further depleted in order to provide fuel. Continued tolerence of older motor vehicles, with high carbon monoxide (CO) output, exacerbates the impact on urban areas. Port Louis and Antanoravino continue to close down frequently in the summer as a result of urban smog. The burning of baggage as an oil substitute for energy production further pollutes the air, and reduces the cost-effectiveness of solar power systems.

***Land***

• *Africa*

In the Market Forces scenario, the predominant trend to emerge is one whereby land is used in the most economically efficient way, especially in agriculture. In the drive to develop an export-led market economy, more agricultural land—and particularly the better quality land—is used for producing cash crops and agricultural commodities. Such agricultural production increasingly falls under the control of multinational companies, which have both financial resources and access to overseas markets in order to make these ventures viable. Decisions about agricultural production become increasingly determined by external forces. Agriculture becomes more vulnerable to the vicissitudes of global markets, especially fluctuating commodity prices.

With more of the better quality agricultural land being devoted to export agriculture, the growing numbers of rural poor will be forced to use more marginal lands for subsistence agriculture. Thus, those lands that would normally require substantial technological and other inputs in order to ensure sustainable use end up being used by those who are least able to supply the necessary inputs. The use of these lands is likely to be unsustainable unless efforts are made to provide technological and other support. Without this, soil erosion and nutrient losses are likely to occur, leading to a reduction in soil fertility, and an

increase in the siltation of rivers and dams.

The drive to increase the economic returns from land also leads to a diversification of land uses. Many countries in Africa rely increasingly on the development of tourism in order to acquire foreign currency and, therefore, land continues to be set aside and maintained for tourism (or tourism is included in the multiple land use developments). Pressures to offset carbon emissions by industrialized countries through developing carbon sinks in non-industrialized countries, including some in Africa, leads to increased investment in the protection of established forest lands and the reforestation or afforestation of non-forested lands. This displaces some traditional land use practices.

The prospect of employment also attracts increasing numbers of people to areas of tourism development, resulting in concentrated population pressures in attractive areas (that is, coastal resorts). For many immigrants, however, their lack of skills limits opportunities. Consequently, many of them resort to hawking, manufacturing crafts and curios, and other secondary activities. The oversupply of crafts and curios drives down prices, increasing the bargains for tourists, but also increasing their harassment, as hawkers become more relentless in their efforts to sell their goods. This gradually diminishes the attractiveness of some tourist locations.

With the growing economic activity, increasing numbers of people are drawn to urban areas in search of employment. Again, opportunities are limited, because the immigrants are generally unskilled and only qualify as manual labour. Because more people arrive than can immediately find employment, particularly in better-paid jobs, squatter settlements and hastily constructed high-density housing blocks are created. Even in the wealthier suburbs and surrounding areas, the rate of establishment of new houses and housing complexes overwhelms the capacity of town and city planners to coordinate and integrate these developments, leading to unplanned urbanization. The upgrading and expansion of infrastructure (roads, power, water and sanitation) lags behind these developments.

Migration away from rural areas tends to relieve pressure on land resources in some areas, but is more than offset by continued high population growth rates in others. This continues the trend towards unsustainable use of natural resources ,and increases the likelihood and extent of environmental degradation. Changes in lifestyles also affect land use. Increasing demand for meat, particularly among the more wealthy people in urban areas, encourages increased use of land for grazing or, where livestock production is intensified, for fodder and feed grain production.

- *Central Africa*

Overexploitation leads to the incidence of soil erosion. Access to land is reserved for people who hold the means of production, thus breeding the genesis of land tenure-based conflicts.

- *Eastern Africa*

The pressure on land is relieved by a thriving industrial sector, which creates employment and takes most people away from the land (farming). Commercial farming becomes more dominant, with measures taken to sustain productivity on the land. Such measures include soil erosion control and fertility enhancement. A functional land market makes it possible for individuals with capital to invest in land or to buy land from those unable to utilize it.

- *Northern Africa*

The pressure on land, and on other vital resources, mounts. Agricultural land is the most affected, because it gets taken up by urbanization, with increasing numbers of people migrating from rural to urban areas. As the pressure on agricu1tural land increases, in order to provide food for an increasing population, the land becomes overexploited, with all kinds of unsafe and unsustainable farming practices. Soil salinity, water logging, soil erosion and land pollution are some of the types of land degradation which emerge.

- *Southern Africa*

Soil erosion is probably the most important factor in the decline in agricultural productivity in southern Africa, degrading about 15 per cent of this sub-region's land. This trend is likely to continue over the next 30 years, due to population pressure, skewed land tenure systems and increasing demand for land. A more serious trend, resulting partly from soil erosion, and one that is reflected throughout the world, is the decline in per capita food production. Southern Africa has

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produced net food surpluses for many years, but in the Market Forces scenario, the drop in per capita food production leads to net food deficits well before 2032. This is despite the promise offered by new seed varieties and by improved agricultural technology, which are unlikely to catch up with population growth.

- *Western Africa*

There is intense competition for land for investment in agriculture and manufacturing. The good rainfall in most of the region makes large-scale farming and the building of agro-industry a profitable investment. Local subsistence farmers are adequately compensated, not only through direct purchases, but by employment options.

- *West Indian Ocean Islands*

Urban sprawl increases as subsistence agriculture replaces estate management, with a sharp decline in prices for sugar, tea, coffee and fruit. Disused factories from textiles and other small industries are taken over by squatters. Uncontrolled mineral exploitation in Madagascar degrades the surrounding land, and processing pollutes water in rivers, aquifers and coasts. Illegal farming of cannabis and poppy seed overtakes tobacco, as African and Asian influences in drug use permeate the local culture, funded with laundered money from Latin America. Town and country planning is undermined by weakness of government and extensive corruption of officials, promoting urban sprawl and the collapse of protected areas, which are converted into leisure centres and commercial game hunting parks. Remote areas are sold off for dumping imported hazardous waste.

***Biodiversity***

- *Africa*

In the Market Forces scenario, the dominant trend affecting terrestrial biodiversity continues to be the fragmentation and loss of habitats, resulting from land transformation. Not only does this reduce the populations of some species to below sustainable levels, but the associated disruption of ecosystem integrity and functioning alters the conditions necessary for the survival of others. Similar changes occur in aquatic ecosystems although, here, the changes are driven by impoundment, sedimentation, and prolonged isolation of water bodies. Coastal and marine ecosystems, and their biota, are likewise threatened by loss of habitat, pollution and overharvesting of biological resources. In all cases, the trends are driven by the ongoing growth of the human population and its increasing demands for land, water and natural resources.

Concern over the loss of biodiversity continues to stimulate both national and international conservation efforts but, given the magnitude of the countervailing forces, most of these prove to be inadequate. This is exacerbated by the widespread undervaluation of biodiversity, and differing perceptions within society of the economic, environmental and cultural values of biodiversity. Moreover, the assigned values are not just those of people living in Africa but, at a global level, are strongly influenced by outside interests, shaped by tourism and the media. This produces both benefits and drawbacks. People and organizations from outside Africa are willing to invest time and money promoting the conservation of African wildlife, but they also seek to dictate policies on how components of that diversity should be managed and used. For example, trade in wildlife and wildlife products remains a hotly contested issue, even though it can be argued that this would generate more resources for conservation.

Ecotourism continues to grow. Efforts to ensure that local communities benefit financially and in other ways are expanded, but benefits, in many cases, are relatively small. Nevertheless, the sense of empowerment and the prospect of improved benefits at a later date encourage many communities to remain engaged in the management and conservation of their natural resources. This concept of community-based management of natural resources is gradually extended to communities which rely on freshwater, coastal and inshore marine resources. Species are introduced, both deliberately and inadvertently. The spread of alien organisms increases pressure on indigenous species, and contributes to the gradual loss of biodiversity. Extensive cash-crop monocultures reduce on-farm agrobiodiversity. The resulting loss of natural predators, together with other disruptions to ecosystem integrity, create conditions for widespread outbreaks of pests and diseases.

Despite concerns in some quarters over the development and release of GMOs, and the resulting

risk of genetic pollution of indigenous species, these are overridden by commercial pressures. The release of GMOs threatens agricultural biodiversity in some areas, especially where farmers depend on maintaining a mix of species and races as a hedge against annual and seasonal variations in farming conditions. This is made worse by the eventual release of GMOs encoded with a terminator gene, which ensures that the seed produced is non-viable, thereby requiring farmers to purchase another batch of seed the following season, instead of retaining some of the seed for planting next year. The strict protection granted to GMO producers by Plant Breeders' Rights, along with the provisions of patents on terminator technology, allow plant breeders to collect revenues every year from the users.

The search for organisms with unique genetic and biochemical properties continues. Again, the shortage of technical knowledge and skills within Africa means that much of this bio-prospecting is carried out by scientists from overseas. Materials stored in gene banks overseas are largely inaccessible to African countries, including those from which the material originated. The benefits of conserving biodiversity are seen by many in Africa to be unfairly shared, with royalties accruing to multinationals rather than to the countries from which the material was derived. This becomes a source of tension and weakness. Africa resolves to continue conserving biodiversity and to cooperate with overseas organizations.

- *Central Africa*

The pressure on biodiversity increases because of the search for raw materials for industries. The pharmaceutical industries develop research on medicinal plants, which are later resold in big markets.

- *Eastern Africa*

Biodiversity takes centre stage as a fulcrum for tourism development. The private sector becomes interested in biodiversity conservation as all possible niches are explored for tourism consumption, for example, bird watching, ecotourism and sub-marine tourism. Government identifies the biodiversity hotspots which should be accorded maximum protection, and gazettes them as national parks or strict nature reserves. Deliberate efforts are directed towards rehabilitating degraded ecosystems and restoring species richness. Some ecosystems, however, are subjected to so much pressure that their credibility as areas of significant biodiversity importance is diminished, and is eventually overrun by industrial development or urban settlements. Where this involves protected areas, degazetting procedures are undertaken, involving Environmental Impact Assessment (EIA).

- *Northern Africa*

In the Market Forces scenario, biodiversity is under threat from population growth, urbanization, industrialization, and uncontrolled hunting and fishing. The concentration of new developments along the coasts of the Mediterranean Sea and the Red Sea has adverse impacts on fauna and flora. Desert tourism becomes a very popular theme in Northern Africa but, without careful regulation, it impacts the biota of this environment. Due to weak law enforcement, illegal trading in rare birds and animal species continues. Conflicts and wars in some countries are also another threat to biodiversity.

- *Southern Africa*

Biodiversity loss in Southern Africa has been a consequence of human development, as species-rich woodlands and forests have been converted to relatively species-poor farmlands and plantations. However, the number of threatened species could be higher, as the full extent of this sub-region's species diversity is not known. There is a serious lack of species inventories and other baseline data, which are useful for monitoring biodiversity trends. While overexploitation of biological resources is acknowledged in the sub-region, trends show that there is a greater commitment to conserve wildlife, particularly large mammals. The introduction of community-based natural resource management programmes (CBNRMs) in some countries in the sub-region (for example, CAMPFIRE, Peace Parks, Tchuma Tchato and ADMADE) has seen communities playing a role in the management of biological resources. According to the Market Forces scenario, such trends are certain to continue in the next 30 years, and will be strengthened as the CBNRMs expand their activities to other resources, such as forests and fish.

*The release of GMOs threatens agricultural biodiversity in some areas … This is made worse by the eventual release of GMOs encoded with a terminator gene, which ensures that the seed produced is non-viable, thereby requiring farmers to purchase another batch of seed the following season, instead of retaining some of the seed for planting next year.*

• *Western Africa*

Biodiversity remains a major attraction for tourists, and also protects the ecosystem. In an atmosphere where the market is determining progress, competing interests are allowed to promote biodiversity. A number of conservation measures are developed, and are functioning. The government and corporate entities are cooperating, although government has defined its role to one of guidance, whilst the businesses actually implement the measures. In this way, there is little room for destruction of biodiversity as a result of industrial growth.

• *West Indian Ocean Islands*

Progress and maintenance of existing projects are undermined. In the richer countries, some legitimate ecotourism underpins the more commercially appealing projects but, as the quality of tourism declines and as budgets fail, the protected projects become degraded into peep shows. Qualified technical staff migrate, and rare species die off through lack of adequate protection, recorded only on camera and in glass cases as a menagerie alongside the stuffed dodos from Mauritius. Foreign immigration brings with it more alien plant and animal species, which overrun the local delicately balanced ecology. The dying remnants of the rich endemic biodiversity of the region are still to be glimpsed at pre-hunt cocktails in the occasional private parks adjacent to the houses of the rich.

***Forests***

• *Africa*

The historical trend of deforestation and degradation of forest areas continues, as a result both of the need for more land for human settlement and agriculture, and of the drive to exploit forest resources (mainly timber) to boost export earnings. The rate of deforestation and land conversion, however, slows down, due to afforestation, decreasing forest exploitation in many parts of Africa and the gradual implementation of existing conventions to use forests in a sustainable manner. The increase in ecotourism provides additional incentives to conserve forests, though this is offset to some extent by the increase in land pressures. In order to secure the future of forested areas, as well as to spread the benefits of their conservation more widely, communities living in the forests and surrounding areas are encouraged to take part in their management, sustained use and conservation. This, too, contributes to slowing down the rate of deforestation.

• *Central Africa*

Trade liberalization, with appropriate technologies, improves the quality of logging. The industrial and artisan exploitation of wood increases the pressure on forest resources, and sparks off the potential of this sub-region for deforestation The strategies to protect the forest, and rational management of forest resources, are difficult to apply, in spite of the number of conventions and initiatives developed to this effect.

• *Eastern Africa*

The forest sector plays a major role, especially in the growing construction industry. Private-sector interest in forestry grows, and most of the plantations are privatized for proper management and profitability. The government focuses more on the protection of forests, where activities are strictly regulated, thus improving the quality of these forests.

• *Northern Africa*

Although the forests in Northern Africa are quite limited, the role they play in stabilizing the sand dunes and providing some quality products, such as gum arabic, cannot be neglected. Unfortunately, the high deforestation rate currently experienced in this sub-region continues, albeit at a slightly lower rate. On the one hand, as the population increases and demand for resources increases alongside it, forests continue to be used as a source of fuelwood and charcoal. On the other hand, natural disasters—such as fires and severe droughts—also take their toll on forests. Despite the acknowledgement of the deforestation problem by governments, the pressures mentioned above outweigh the afforestation and reforestation efforts.

• *Western Africa*

The threat to forests comes with huge commercial farming and massive agro-industrial complexes. The forests have already been experiencing losses, which were not adequately compensated through reforestation. In the Market Forces scenario, the competition of market forces rejuvenates interest in, and compels, reforestation and afforestation.

Environment-sensitive investment policies help competing investors to make concern about the forests part of their plans.

- *West Indian Ocean Islands*

Forests, including those currently protected, become decimated as the local commercial value of wood for fuel and other uses exceeds the political will to protect it. Another impact is that environmental NGOs get bought out by commercial interests, and dismantled by increasingly right-wing central governments.

### *Freshwater*

- *Africa*

As a consequence of the growing numbers of people in Africa, the availability of water, both absolutely and per capita, declines overall (although accessibility in urban areas increases whilst, in rural areas, it generally decreases). This population increase is coupled with greater urbanization (people in urban areas use more water per capita than those in rural areas), and greater demand for water for agricultural and industrial development. Demand for water increases across all sectors of the economy, leading to further water scarcity. There is more competition and conflict over available freshwater, both between economic sectors and, in some cases, between countries which share a common water source.

In an attempt to meet the rising demand for water, more dams are built and more boreholes are established. There is a marginal increase in the proportion of water that is recycled. The increased extraction of groundwater results in a decline in groundwater levels. Contamination of groundwater—caused by leaching of agricultural and industrial chemicals, and human and animal waste—causes deterioration in groundwater quality. The area of land under irrigation increases, supplied from both stored surface water and groundwater sources but, in some cases, inappropriate irrigation techniques result in salinization of the soil, eventually causing the land to be abandoned.

In the absence of sound environmental management, water pollution—generated through increased industrial and agricultural activity—leads to higher incidences of eutrophication and the spread of water weeds, such as water hyacinth (Eichornia crassipes) and water cabbage (Pistea stratiotes). Microbial contamination also increases, as does the incidence of waterborne diseases, particularly as more still and stagnant water bodies are created. Reductions in land cover result in more run-off, erosion and, eventually, sedimentation of rivers.

- *Central Africa*

The pressure on water resources increases with population growth. There is a rise in water demand for agricultural and industrial production, and for the urban population. The Sahelian areas are abandoned to desert encroachment. There are many conflicts, linked to water issues, between breeders and agriculturists.

- *Eastern Africa*

Freshwater supply remains the main focus of the governments of this sub-region. Measures are undertaken and investment is targeted to reduce the problems in the deficit areas of Ethiopia, Kenya, Somalia, Djibouti and Eritrea. Increased incomes from the industrial sector makes these investments possible. The concept of rainfall harvesting is actively promoted in the countries of Uganda, Rwanda, Burundi, Kenya and Ethiopia, where precipitation is adequate. This increases freshwater access in rural areas.

- *Northern Africa*

If a large increase in population is translated into higher demands for resources, water is one of the most directly affected resources. In the Market Forces scenario, competition for water between various sectors, especially the agricultural and industrial sectors, increases, as each sector tries to manage the very limited resources available. The problem of water scarcity in this sub-region only gets more acute. Unsafe exploitation of groundwater resources, due to over-abstraction and pollution, reaches its worst levels in 2032, especially in Egypt and Libya. Sea water intrusion along the coast of the Mediterranean Sea becomes a major water-quality problem, and a threat to the sustainability of shallow groundwater wells. Water reuse is on the increase, but the quality of the reused water poses serious risks to the environment. Water recycling is not yet widely implemented, due to the high cost of treating the water. The number of desalination plants along the long coasts increases, but the

technology is still only feasible for wealthy industries, such as tourism. Water, the scarcest resource in the sub-region, becomes one of the factors which limits further development. A serious review of the integrated water resources management programmes of the Northern African countries is called for, in order to rescue the badly hit vital resource.

- *Southern Africa*

The demand for water continues to rise in response to population growth and industrial development. Groundwater continues to be the dominant source of water for rural people. Due to the high demand for water, wetlands continue to be threatened, not only by human factors, but also by natural factors such as drought. The beginnings of a sub-regional water strategy is a positive trend, which sees growth in water-sharing arrangements between water-rich and water-poor countries. However, the water transfers and the increased use of water storage could have a negative impact on the environment. As more dams are built, there are fewer natural rivers, and a substantial loss of habitat. As such, the next 30 years sees: a drop in both river and dam water levels; damage to floodplains, due to loss of annual flooding; and disruption to estuaries, when the mix of fresh and salt water changes.

- *Western Africa*

Most of the countries of Western Africa have a fairly good supply of freshwater. Existing bodies of water are regularly supported by good annual rainfall. More sophisticated management techniques and measures ensure the all-year availability of freshwater in most of this sub-region. Of course, the countries that are being encroached upon by the Sahara Desert apply more resources, which are assessed from investments in the integrated economies of the sub-region.

- *West Indian Ocean Islands*

Freshwater quality declines in the middle-income countries, as investment in public sector services declines, and as the richer groups concentrate in safe water areas or have their own purification systems. Water in the poorer countries becomes a scarce commodity. Maintenance of water pumps is reduced, and the growing population creates more pollution of existing water sources.

***Coastal and marine environments***

- *Africa*

Coastal and marine environments are relatively rich, in terms of resources and economic opportunities. Consequently, in the Market Forces scenario, they come under greater pressure, as more people seek to take advantage of those opportunities. Environmental degradation—characterized by the loss of coastal barrier communities, such as: coral reefs, mangroves and other plants; coastal erosion; pollution; and the depletion of fish stocks—is widespread in areas where development is unregulated. In other areas, where careful coastal-zone planning is implemented and maintained, the high environmental qualities of these ecosystems are maintained, and sustainable benefits accrue. In particular, opportunities for properly managed tourism development create both the incentives and the money needed for managing these coastal and marine resources.

- *Central Africa*

The coastal and marine resources exploitation by the private sector increases erosion and the destruction of mangrove swamps.

- *Eastern Africa*

A rapidly growing tourism industry and affluence lead to extensive development of resorts on the beaches. Governments recognize the importance of coastal resources, and move in to strictly regulate the developments at the coast. Sensitive ecosystems at the coast are gazetted for protection. Discharge of effluents into these ecosystems is strictly controlled. There is the capacity and the institutional framework to monitor coastal development. Marine resources harvesting is regulated through licensing and policing procedures.

- *Northern Africa*

The growth in population numbers and densities along the coasts of the Mediterranean Sea increases marine pollution. Untreated wastewater is the main source of pollution, causing eutrophication in coastal waters. In addition to high pollution densities, other risks to the coastal zone and to marine life are: the oil mining industry; marine tourism; and the large increases in the numbers of ships visiting the ports, as the sub-region opens up to free trading with the global market. The

increased population puts more demand on fish, which is sometimes caught using illegal methods, such as using poisons.

- *Western Africa*

Some 13 of the 16 countries of this sub-region have access to the Atlantic Ocean. This may be both a blessing and a curse. The curse could be the temptation by unscrupulous elements to dump all manner of hazardous wastes at sea. However, in the Market Forces scenario, with vigilant governments of the sub-region working together and with the ensured participation of corporate bodies, the seaways are properly patrolled, and measures for cleaning up the coastlines are brought into operation. Fishing is controlled, whilst ensuring that the fishing business remains profitable for both the small fishermen and for corporate entities.

- *West Indian Ocean Islands*

Coastal waters become increasingly polluted and overfished. The coral lagoons become salt-water, dead-sand seas, devoid of aquatic life. Uncontrolled high-speed motor watersports dominate the scene, and add to the oil and noise pollution of the areas. Deep-sea fishing is industrialized and internationalized. The region fails to establish territorial command of the oceans to which it has legitimate claims, and the poorer countries sell their rights, thus undermining the potential for regional negotiations. Lack of international policing gives rise to commercial security protection and to violent piracy, with continual armed disputes, disrupting other sea trade.

### *Urban areas*

- *Africa*

In the Market Forces scenario, both the proportion of people living in urban areas and the rate of growth of urban populations increase, as does the number of cities in Africa with populations greater than one million people. The growth in urban populations is driven mainly by the migration of people from rural areas, who come to the towns in order to seek employment and opportunities for a life outside agriculture. A disproportionate number of immigrants are men—mostly young adults. The rate of urban population growth initially outstrips the capacity of the municipal and central government authorities to provide the necessary services and infrastructure, so that the number of slums and unplanned peri-urban settlements increases.

These changes have generally negative effects on the environment in the vicinity of towns, which provides fuelwood for the increasing numbers of urban poor. In terms of air, water and waste pollution, many urban environments become degraded, although environmental quality does improve in a few of the wealthier cities. The generally negative effects of urbanization are offset, to some extent, by some positive changes. As the cities grow, the proportion of the population with access to electricity, piped water and sanitation also increases, and water management services become more effective. Over time, these positive effects on the environment are further enhanced by a marginal decline in the proportion of the population living in poverty in slums and other unplanned settlements.

- *Central Africa*

The development of cities continues unabated as farmers continue to migrate from rural areas. The private sector occupies a vital place in the urban management process.

- *Eastern Africa*

There is steady urban growth, but this is planned and the quality of services for the urban dwellers is improved. Industrial emissions and discharges are controlled through regulations, and by industries being located away from major settlements and sensitive ecosystems. Urban authorities are given adequate capital through streamlined revenue collection systems, and are able to deliver improved services including, refuse collection and street lighting. There is more private sector involvement in the provision of services in urban areas.

- *Northern Africa*

In the Market Forces scenario, some of the largest cities in Northern Africa are expected to grow larger. The consequence of this is that many resources and services become very stretched to satisfy increasing demands. Large numbers of people are deprived of basic services, such as safe water, sanitation and power supply. Air pollution from the large numbers of vehicles in congested cities reaches alarming levels. However,

appropriate attention and good measures are taken to reduce the problem. The large volumes of solid waste generated in urban areas overburden the municipalities, which are responsible for managing such waste. Improper incineration of solid waste adds to the problem of air pollution.

- *Western Africa*

In the Market Forces scenario, the explosive rural-urban migration—which is associated with locating industries, educational and health facilities in the cities—is controlled. With huge commercial farms, cooperatives and agro-industrial plants situated in rural areas, pressures in the urban centres are reduced. Some industrial plants are actually relocated from major urban centres to locations formally considered to be 'countryside'. Urban authorities continue to encourage the cooperation of business and communities to clean up, repair or construct facilities to create a safer urban environment. Competition begins to show signs of renewal.

- *West Indian Ocean Islands*

Urban areas become the living quarters of the poor: overcrowded, polluted, and with ever fewer jobs and services—the seat of misery and disease. The richer classes move to the deserted countryside, living off foreign earnings and the sale of land to wealthy immigrants. Town planning and maintenance are restricted to the few multinational commercial areas, leaving the rest with poor water, sanitation, pollution, overcrowding, potholed roads, crime and destitution. Coastal areas and the countryside become the sought-after areas for commercial immigrants and retired people with fixed incomes from abroad. This forces up land prices and drives the indigenous population into the squatter areas of towns, whose infrastructure fails to keep pace with the growth of the population.

## THE POLICY REFORM SCENARIO

### Introduction

The beginning of the millennium saw a renewed commitment to address issues of sustainability and the environment. A consensus emerged on the urgent need to temper what had come to be called the Market Forces scenario, with policies to secure environmental resilience and to sharply reduce poverty. The Policy Reform scenario is not a radical deviation from the Conventional Development scenario. The emphasis on economic growth, trade liberalization, privatization and modernization endures. The integration of the global economy proceeds apace, as poorer regions converge very gradually toward the model of development of the rich countries. The values of individualism and consumerism persist, transnational corporations continue to dominate the global economy, and governments modernize their economies and social welfare structures. The defining feature of the Policy Reform scenario is the emergence of the political will to constrain market-driven growth with a comprehensive set of sustainability policies.

The Policy Reform scenario is based on a set of social and environmental goals adopted by the international community. These guidelines are adjusted periodically in light of new information. Social and environmental targets are set at global, regional and national levels, and include a mix of economic reform, regulatory instruments, voluntary actions, social programmes and technology development.

Unlike the Market Forces scenario, the Policy Reform scenario tempers market-driven prescriptions with strong social and environmental policies. It thrives on the harmony between different stakeholders and otherwise divergent policies. It is consistent with development which the Managing Director of the IMF, Michel Camdessus, said not only promotes liberalization of trade and capital movements, but also emphasizes transparency, accountability, democratic governance, fighting corruption, alleviating poverty, gender equality, increasing aid, debt relief and market access to developing countries (Raghavan 2000).

The assumptions of the Policy Reform scenario may be summarized as follows:

- It is similar in many ways to the Market Forces scenario.
- It is based on a set of social and environmental goals adopted by the international community, and set at global, regional and national levels.
- There is an emergence of the political will to constrain and to guide market-driven growth with a comprehensive set of sustainability policies.
- Policy initiatives for achieving goals are regionally differentiated, but include a mix of economic

reform, regulatory instruments, voluntary actions, social programmes and technological development.
- The 'western' model still prevails, and 'western' values still spread.
- There is less trust in automatic positive results from markets, and more emphasis on targeted policies.

### The narratives

The Policy Reform scenario is the Market Forces scenario with a human face. It not only embraces the market-driven prescriptions of the Breton Woods institutions—the IMF and the WB—but it is also strong on social and environmental policies. The Market Forces scenario is premised on the so-called Washington Consensus, which says that good economic performance requires liberalized trade, macroeconomic stability and getting prices right (Stiglitz 1998). The Washington Consensus supporters 'unreservedly promote free trade, financial liberalization and foreign investment incentives, business deregulation low taxes, fiscal austerity and privatization, and flexible labour markets' (Bond 2000; see also Box 4.1).

For Africa, the Policy Reform scenario offers an opportunity for the region to break with more than four decades of 'unfulfilled promises of global development strategies' (OAU 1980). For instance, in the years between decolonization, which began with Ghana in 1957, and the democratization of South Africa in 1994, the region has been 'unable to point to any significant growth rate, or satisfactory index of general well-being' (OAU 1980). Some of the important challenges facing Africa at the beginning of the 21st century, therefore, include: a population which is growing rapidly, at a rate which is faster than food production and which is beyond the capacity of some resources to satisfy such demand; growing poverty in both rural and urban areas; millions of refugees, due to wars in different sub-regions; growing urbanization, introducing new environmental issues; HIV/AIDS; land degradation, particularly desertification; deforestation; recurrent droughts; increasing demand on the finite water resources; water pollution; and biodiversity loss.

Since the Stockholm Conference on the Human Environment in 1972, Africa has participated in many conferences, such as: the 1990 World Conference on Education for All; the 1990 World Summit for Children; the 1992 United Nations Conference on Environment and Development; the 1993 World Conference on Human Rights; the 1994 International Conference on Population and Development; the 1995 United Nations Fourth Conference on Women; and the 2000 Millennium Summit. In addition to these international initiatives, African countries have also convened their own important meetings, which have set targets for economic and social development, and environmental management. Meetings under the auspices of the Organization of African Unity (OAU), which led to the adoption of the Lagos Plan of Action—the region's blueprint for economic development—in 1980 have helped to highlight the challenges facing the region. Under the Lagos Plan of Action, African leaders emphasized that 'Africa's huge resources must be applied principally to meet the needs and purposes of its people'. They also emphasized the need for Africa's virtually 'total reliance on the export of raw materials' to change, and for the need to mobilize the region's entire human and material resources for the development of Africa (OAU 1980).

**Box 4.1 Camdessus speaks at UNCTAD-X Interactive Sessions**

*'Now we know, it is not enough to increase the size of the cake. How the cake is shared is equally relevant to the dynamics of development… it is recognized that the market can have major failures, that growth alone is not enough or can even be destructive of the natural environment or precious social goods and cultural values.*

*'Only the pursuit of high quality growth is worth the effort – growth that can be sus-tained over time… growth that has the human person at its centre… growth based on continuous effort for more equity, poverty alleviation, and empowerment of poor people, and growth that promotes protection of the environment and respect by national cultural values… a striking and promising recognition of a convergence between a respect for fundamental ethical values and the search for efficiency…*

*'… the new emerging paradigm, rooted in fundamental human values, taken together with a better ability to prevent and manage the crises, is a distinct and positive chance of our times… a new perception of globalization is emerging… a call for common action to trans-form globalization into an effective instrument for development. Globalization can be seen in a positive light, not what some have portrayed it to be, a blind, potentially malevolent force that needs to be tamed… a logical exten-sion of the same basic principles of economic and human relations that have already brought prosperity to many countries…'*

Source: Raghavan 2000

The Lagos Plan of Action is one of many measures adopted by the region which set qualitative and/or quantitative targets that should have been met by the new millennium. Unfortunately, many of these targets remain unmet, largely because of errors of judgement, of both omission and commission. Nonetheless, the 21st century marks the beginning of a new dawn. The symphony created by an informed populace, fully familiar with its rights; the commitment by political leaders to serve their people rather than their egos; the development of strong legal and institutional frameworks; the willingness by all stakeholders to constantly keep their development plans under review; the development of a strong entrepreneurial base; and breakthroughs in science and technology see Africa claim its place as one of the leading regions in the world. Africa takes policy reform seriously, looking within for any shortcomings and enhancing its strengths.

## Environmental consequences

### *Atmosphere*

- *Africa*

In the Policy Reform scenario, the increased economic activity across Africa—spearheaded by Côte de Ivoire, Egypt, Nigeria and South Africa—sees the number of least developed countries in the region go down to just five, compared to 33 at the beginning of the century. Increased manufacturing leads to serious problems of air and water pollution. Governments introduce stringent measures to curb such pollution, including the polluter pays principle and trade-in pollution permits. The polluter pays principle is strictly enforced, and companies start to introduce self-policing measures. These measures subsequently see pollution gradually decrease as the permits increasingly become more expensive, thus making the products of polluters more costly and less competitive.

- *Central Africa*

The harmonization of regulations allows for pollution control, but the sub-region continues to suffer the consequences resulting from pollution from the north. The development of an air pollution observatory helps to intervene with regards to levels of pollution.

- *Eastern Africa*

The issue of atmospheric pollution takes centre stage as public health policies become strict and assertive. Vehicle emissions are strictly regulated and alternative sources of energy, such as solar power, is promoted. The Montreal Protocol on ozone-depleting substances (ODS) is enforced throughout the sub-region, with the customs departments strictly monitoring the illegal movement of such substances. The use of methyl bromide is phased out in the flower industry.

- *Northern Africa*

In the Policy Reform scenario, governments take good steps towards improving and preserving air quality in this sub-region. More people switch from using private cars to using better and reliable public transport services. Vehicles which run on natural gas are offered lower licensing fees. Solar energy is used in tourism and housing developments, because the units are manufactured locally and, hence, become affordable. The emission of greenhouse gases from industry, power generation and some agricultural activities is controlled through government-set regulations. The cooling and air-conditioning industries are banned from using CFCs and other environmentally harmful products. The overall improvement in air quality has positive effects on public health.

- *Southern Africa*

Improvements in early warning systems result in the sub-region being better prepared to handle climate variability. The impacts of climate variability become very much reduced, as a result of new technologies producing seed varieties which can withstand variable climatic conditions, and also as a result of better housing.

- *Western Africa*

In the Policy Reform scenario, as a result of years of scientific research and successes elsewhere, a 'clean air' policy is institutionalized—at the level of the home, workplace and community, and across national borders—through education, broad consultation and encouragement, led by government. All major environmentally harmful products which cause air pollution are banned or controlled. Vehicle, aircraft and air conditioning gases, gases for home use and other gases are controlled. Industrial pollution remains at current levels of manageability. The major oil producing country, Nigeria, leads the 'clean air' campaign by putting adequate measures in place. Major petroleum

refineries in the sub-region are modernized, and use processing methods which have very few pollutants.

- *West Indian Ocean Islands*

Pollution levels are reduced in intensity, but careful monitoring shows that they are now extending into more urban areas as the use of motor vehicles increases.

***Land***

- *Central Africa*

In the Policy Reform scenario, modern law and traditional law, in terms of land use management, are harmonized. This harmonization entails the reduction of conflicts linked to land use. The procedures of acquiring land occupancy papers are simplified, and the costs reduced. The ongoing population pressure remains controllable, and is managed according to the areas with a greater population density.

- *Eastern Africa*

Land reform programmes are supplemented by comprehensive land use policies. All major land use programmes undergo EIAs to identify mainstream environmental considerations. Universal primary education policies increase literacy, and have a ripple effect in contraceptive prevalence and family planning. There is a subsequent reduction in the population growth rate, thus relieving pressure on land. Urban migration is reduced, because there are deliberate policies to increase land-based employment opportunities in rural areas.

- *Northern Africa*

The relative slowing down in the population growth rates eases demand on land. The pressure on resources is further relieved as governments give more emphasis on the planning and implementation of land use plans. The reduction in the numbers of migrants from rural to urban areas helps to reduce the rapid unplanned expansion of urban areas. Due care is given to the problem of the loss of good agricultural land due to soil salinization in agriculture, and organic fertilizers are employed.

- *Southern Africa*

Land reforms in Southern Africa are guided by principles of good governance and a taxation system in order to maximize productivity and profitability, leading to equitable land distribution. Cash farming becomes a predominant activity, with the sub-region engaging itself in farming activities in which it has comparative advantages. Food security is achieved through trade.

- *Western Africa*

In the Policy Reform scenario, there are successful land reform policies, which depart from both colonial land holding laws and traditional holdings laws. The new policies result from an evolutionary strategy under which landed city dwellers and traditional chiefs in rural areas allow the government to mediate arrangements for both industries and communities to become beneficiaries. Ferocious competition becomes a thing of the past, and conflicts are, therefore, minimized.. There is an acceptance that the reforms are benefitting the greater society. The resulting development, though slow, is planned and peaceful.

- *West Indian Ocean Islands*

In the Policy Reform scenario, urbanization continues, whilst forest and woodland areas remain protected and extended. Agriculture in Madagascar gives way to new exploitation of mineral resources in controlled and well-managed developments, respecting environmental standards. Ecotourism promotes protection for the remoter parts of the region, serving as a model for the re-examination of western practices in countryside planning. Sugar kibbutz estates are developed by small planters, using manual methods and traditional animals for power. Traditional sailing boat flotilla holidays become well established. These two developments reinforce traditional land use under model conditions, and revive slackening parts of the economy and culture. Populations of giant tortoises are reestablished as new tourist attractions in Rodrigues and Bird Island.

***Biodiversity***

- *Africa*

A technology levy on all tourism receipts generates revenue to undertake comprehensive research on Africa's biodiversity, leading to the identification of numerous species—both fauna and flora—which had not been recorded before. This research adds tremendously to the global understanding of the region's biodiversity, and also generates further tourism interest in Africa.

• *Central Africa*

The harmonization of legislation relating to conservation helps to exploit natural resources better. Ongoing processes of decentralization continue, and lead to the involvement of various stakeholders in the management of biodiversity. Practical and realistic laws define the frameworks for the conservation of natural resources, by defining the right to natural resources use by the sub-region's populations. The populations see their recognition and participate in the conservation of natural resources. The laws define conditions necessary for further laboratory research in, and commercial exploitation of, non-wood forestry products.

• *Eastern Africa*

Biodiversity is the most important asset of this sub-region, because it forms the basis of the growing tourism industry. In the Policy Reform scenario, tourism continues to make a significant contribution to the sub-region's GDP and foreign exchange earnings. Policies to protect sites with unique biodiversity are established and enforced. Deliberate efforts are directed towards curbing illegal activities, such as poaching and insecurity, in the protected areas. International and regional conventions and agreements on biodiversity resources are actively implemented, and external donor assistance is sought to enhance institutional capacity building for those institutions charged with the responsibility of conserving biodiversity resources.

• *Northern Africa*

Despite the relative increase in population numbers, planned urbanization and industrialization ensure that measures are taken to protect the natural environment. Industrial activities near protected areas are totally banned. Industries that seriously affect biodiversity through harmful waste products are forced to comply with environmental laws or pay heavy fines. The limited areas of wetlands, where a wide variety of fauna and flora live, are all declared protected areas. International technical and financial assistance is sought in order to restore the unique ecosystems of those areas.

• *Western Africa*

In the Policy Reform scenario, a large number of areas throughout this sub-region have been declared protected areas, in the interest of biodiversity. As a result, a great deal and variety of fauna and flora are alive. Harmful activities, including the dumping of hazardous substances, are banned, and public education is paying off. Self-regulatory bodies and communities are functioning properly in order to protect the environment.

• *West Indian Ocean Islands*

The region builds strongly on the lead already established in species protection. However, it fails to maintain its momentum because of the inability to attract sufficient local scientists, brain drain and the failure in the reform of civil service to offer market rates for this scarce international resource. This means that much of the world leadership is lost. Many species fail to be saved from extinction, including various species of molluscs in Madagascar, turtles from the Comoros and the pink pigeon from Mauritius, after Round Island becomes the regional headquarters for ecotourism, upsetting the birds' habitat.

***Forests***

• *Africa*

In the Policy Reform scenario, dependence on biomass, the traditional fuel in Africa—which supplied 52 per cent of all energy requirements in the region in the 20th century (WRI 1994)—is reduced, because people have more energy choices. Both public and private power utilities compete to provide electricity to both urban and rural areas, making such services more reliable. The result is that the rate of deforestation, due to fuelwood demand and charcoal production, is reduced considerably.

• *Central Africa*

The legal framework clarifies the involvement of the local population and defines, with their participation, the conditions of their involvement. Local populations participate in the conservation of forest resources. The industries exploit forests within a revamped legal framework. New technologies are developed and are introduced in logging. The research works continue, with the involvement of research programmes in forest planning through the use of modern technologies.

• *Eastern Africa*

This sub-region has 11.4 per cent of the total forest cover in Africa, making forests one of the key resources

in the region. Realizing the great economic and social value of the resource, and the sub-region's comparative advantage in the Africa region, measures—including policy reviews—are undertaken to increase the level of conservation and to increase forest cover. Private investment is attracted to the sector, initially in the area of forest exploitation, but gradually moving into private plantations. The sub-region becomes a major supplier of timber products to the neighbouring sub-regions of Southern and Northern Africa. The role played by forests in catchment protection for the Nile waters is acknowledged, and bilateral agreements are reached to increase investment in catchment forestry, with significant contribution from the lower riparian states. Carbon trading becomes an active commercial transaction for the countries of Uganda, Rwanda, Ethiopia and Kenya, all of which have significant forest coverage and are willing to maintain the forests for carbon sequestration. Forests also continue to be the major source of energy, especially for the poor segments of the population, and governments take deliberate steps to promote agroforestry in their poverty eradication action plans.

- *Northern Africa*

The governments realize that, despite the fact that forests only occupy very small areas of this sub-region, their environmental and economic values are much bigger. The long issued legislations regarding forests are reviewed and strengthened. More importantly, they are strictly enforced in order to achieve their goals. The impact of the forest protection and restoration efforts does not show up quickly, but certainly became identifiable by 2032. Nevertheless, nature still plays its role, and accounts for losing some forest areas. As the sub-region understands how to deal with such disasters, their impacts are reduced. Forests remain the primary source of cheap energy for poor people, but their use is on such a limited scale that it does not adversely affect the resources.

- *Southern Africa*

New technologies are found through the channelling of more funds into research and development in microenergy sources, resulting in lower levels of deforestation. However, use of the abundant fossil fuels (coal) grows, but using technologies that are less polluting.

- *Western Africa*

In the Policy Reform scenario, the priority in dealing with forests in this sub-region is forestation in the countries that are being encroached upon by the Sahara Desert, and reforestation in previously forested countries. Evidence abounds about the successes of these policies. Because of the successes, a good balance is struck between reconstruction and other activities which require forest products, and maintaining a healthy environment.

- *West Indian Ocean Islands*

Reforestation gathers momentum and exotic tree varieties are reduced, remaining largely in private gardens, with minimal influence on ecosystems. Mango swamps, however, suffer continual degradation as beach areas are opened up for tourism.

***Freshwater***

- *Africa*

In the Policy Reform scenario, although an increasing population exerts pressure, particularly on water and land resources, the introduction of integrated water resources management ensures that the needs of the people are adequately met, even though the resources available are much reduced compared to the beginning of this century.

Water distribution networks are upgraded in order to minimize water losses. Appropriate technology enables local authorities and the private sector to monitor water distribution 24 hours day, ensuring that burst pipes are repaired as soon as leakages occur. The technology also helps to reduce water piracy along distribution lines. A complete mapping of urban groundwater supplies, using the latest technology in geographic information systems, enables authorities to monitor excessive abstraction of water and to enforce punitive tariffs.

Irrigation equipment is improved in order to reduce water losses due to seepage and evaporation. The revolutionary technology enables Africa to intensify agricultural production throughout the year. Dependency on rainfed agriculture, particularly commercial farming, is reduced, lowering food insecurity at different levels, including at the family level.

• *Central Africa*

The optimal management of financial resources helps to ensure the provision of potable water in cities and rural areas, through specific programmes. For the Sahelian areas, the problem of desertification continues, but the development of water management policies and 'Green Sahel' programmes helps to ensure the replanting of wood in arid areas. The practice of irrigated agriculture develops, and ensures an export-oriented agricultural production, which earns foreign currency.

• *Eastern Africa*

Government policies to promote industrial development and to increase access to safe drinking water to majority of the population make freshwater a focal issue in government strategies. The private sector becomes a key player in the water sector, as realistic values are attached to freshwater. As its value increases, appropriate measures are undertaken to protect and tap this valuable resource. Ambitious projects are initiated to take water to deficit areas where the demand and price are attractive, for example, the lowlands of Ethiopia or urban centres such as Nairobi, which suffer from periodic shortages. Appropriate water pricing reduces wastage and promotes the conservative use of water in the sub-region. Social development programmes are designed and implemented by governments, focusing on the supply of freshwater to the poorer segment of the population.

• *Northern Africa*

In the Policy Reform scenario, water resources remain the main focus of governments, because of their extreme importance to development. Many countries still suffer from water scarcity in 2032, due to limited renewable resources and an arid climate, in spite of the reductions in the rate of population growth. Water master plans are drawn, and integrated water resources management frameworks are formulated and implemented, under appropriate institutional frameworks.

Egypt and the Sudan seek to increase their supplies of water from the River Nile by integrating their development projects and becoming closely involved with the rest of the riparian countries when formulating their water policies. Egypt and Tunisia adopt groundwater-recharging schemes while, in Morocco, a drought management plan is drawn up. New laws are passed through the legislative system, which sets strong penalties for quantitative and qualitative water misuse. Extensive public campaigns are launched to educate the people about the water resources problem.

• *Southern Africa*

Proper accounting and economic valuation of water results in its efficient usage. The effects of water scarcity are less prominent as consumers, especially large ones such as irrigation agriculture, can no longer afford to be wasteful of the resource, which is charged in economic terms.

• *Western Africa*

Every country in Western Africa gets a degree of rainfall. It ranges from as little as 0.1 millimetres in some parts of Mauritania, Mali and Niger to an annual average of more than 4000 millimetres in some parts of Liberia, Sierra Leone and Guinea. The heavy rainfall in most of the sixteen Western African countries closest to the coast assures these countries many bodies of water. In the Policy reform scenario, management of these bodies of water is transformed, thereby guaranteeing supplies of freshwater all year round. The countries that are less endowed within the context of the successful economic integration policies of ECOWAS also derive benefits.

*West Indian Ocean Islands*

In the Policy reform scenario, some profound damage to aquifers proves irreversible in the medium term. Continual problems arise as a result of the heavy use of water for irrigation by agriculture and by tourism, which is reluctant to opt for recycled water and is able to pay higher tariffs for metered use.

***Marine and coastal environment***

• *Central Africa*

In the Policy Reform scenario, flexible laws allow for the involvement of new economic operators in coastal areas. The pressure on coastal and marine resources increases, although their exploitation has real economic impacts.

• *Eastern Africa*

The Policy Reform scenario redirects the focus in this sub-region regarding the issue of marine pollution. The countries of Kenya, Somalia, Djibouti and Eritrea

develop stringent pollution control regulations in order to deal with effluent discharge and agricultural run-offs. The coastal towns are obliged to put in place pre-treatment facilities for industrial and domestic sewers.

International laws concerning territorial rights in the sea are enforced, in order to eliminate piracy and illegal fishing. Marine productivity gradually increases, making it the top contributor to the GDP of the four countries of this sub-region.

- *Northern Africa*

The success of the Policy Reform scenario in redistributing the large populations of Northern Africa, such that population densities do not increase or are sometimes lowered, shows its benefits on coastal areas. The countries of Northern Africa take necessary measures for reducing marine pollution, by developing infrastructure for treating wastewater before it is disposed of in the sea. Laws and regulation are issued or revised in order to protect the coastal areas and water bodies from unplanned development and the associated environmental impacts. EIAs are mandatory for projects with potential impact on coastal and marine resources. Field inspection by specialized government agencies ensures that such projects follow the mitigation measures proposed in their EIAs. Many new coastal areas and inland water bodies are declared as protectorates, with emphasis on the ecosystem in the Red Sea.

- *Western Africa*

In the Policy Reform scenario, the notoriety about Western African beaches being used for dumping wastes is now a thing of the past. With increased sanitation, and proper rubbish disposal policies and programmes, the beaches have become places for pleasure. Massive tourist enterprises, interspersed with coastal and marine industries, can be seen along the coast. International conventions opposed to the dumping of hazardous wastes are respected.

- *West Indian Ocean Islands*

Erosion protection schemes reduce overall levels of loss of coastline from natural processes, but littoral urban development and ever-expanding tourism affect the natural terrain and its ecology. Reestablishing in-shore fishing proves more protracted than envisaged, because of continual infringement of closed season rules, and the use of fine nets for coastal fishing in small boats. Deep-sea protection arrangements prove satisfactory, but the sub-region is slow to respond to opportunities, with continual haggling over the internal division of territory, and the sharing of protection and development costs.

***Urban areas***

- *Africa*

In the Policy Reform scenario, clean water and sanitation has become virtually equally available in rural and urban areas, as a result of improvements in infrastructure. Most rural residents have access to piped water. Tax and other incentives encourage entrepreneurs to invest in both urban and rural areas, thus reducing rural-urban migration, and lowering pressures on services and the environment in urban areas. The investment in rural areas also helps to diversify the agrarian economy, which is dominant in many parts of the region. The diversification of the rural economy helps to eliminate the conversion of fragile ecosystems into agricultural land, a problem which had begun to manifest itself increasingly in the last decade of the 20th century.

- *Central Africa*

The Policy Reform scenario fosters better management of the cities, with the involvement of various parties in defining blueprints for urban planning and land occupancy plans. The parties include, among others, territorial and local authorities, and civil society organizations. The issue of satellite urbanization is better controlled, with private companies, regional and local authorities, and civil society organizations in charge of urban regional development all playing a role. Social welfare departments are mostly privatized, thus increasing the cost of access to quality services. The poverty gap widens between the richest and the poorest, but a good standard of living remains within the reach of middle-class citizens. The problem of sanitation (waste management) remains an issue.

- *Eastern Africa*

More planned and less congested urban centres emerge as land use planning policies are implemented. The majority of urban dwellers have access to clean

water and sanitation. Solid waste management problems are tackled with the involvement of the private sector. Crime rates are reduced as better investment policies result in a vibrant private sector, which is able to create youth employment.

- *Northern Africa*

In the Policy Reform scenario, efforts to reduce population densities in large cities, and well-planned urban development, improve the urban environment. Safe drinking water, sanitation, transportation and power supply are all available to old, as well as to new, cities. As public transport improves, more people use it in place of using private vehicles, thus reducing the air quality problem. A proper system for solid waste management is adopted, and better education sees people care more about their sensitive urban environment. Industries located within urban areas are forced to control their gas emissions and waste, in order to minimize their impact on the environment.

- *Southern Africa*

Provision of social services is totally privatized, resulting in proper waste disposal in urban areas and the reuse of all recyclable waste. However, the pace of urbanization remains high, and the problem of waste disposal in informal settlements remains an issue.

- *Western Africa*

In the Policy Reform scenario, the success of rural development programmes stem rural-urban migration. Self-managing communities are in charge of all social services. Very small management units cooperate where necessary to provide services. Urban planning has become far more advanced, with equal access to services being central.

- *West Indian Ocean Islands*

Urban areas continue to expand in all parts of the region, with insufficient attention to urban planning. Mismanagement, and political corruption in granting unwarranted permissions, also greatly affect development and lead to abuse of the urban environment.

## THE FORTRESS WORLD SCENARIO

### Introduction

In the Fortress World scenario, the failure of the world to heed the need for strong policy reforms on the environment leads to a state of complacency, with governments retreating from social concerns and responsibilities. In such a situation, development declines as poverty rises. Environmental conditions deteriorate as pollution, climate change, land change and ecosystem degradation interact to amplify the crisis. Environmental degradation, food insecurity and emergent diseases foster a vast health crisis. Free market values are unable to constrain environmental externalities. The affluent minority is alarmed by rampant migration, terrorism and disease, and reacts with sufficient cohesion and strength to impose an authoritarian 'Fortress World', where they flourish in protected enclaves in rich nations and also in strongholds in poor nations. The fortresses are bubbles of privilege amidst oceans of misery. The élite halts barbarism at its gates, and enforces a kind of environmental sustainability.

At the African regional level, at the turn of the 21st century, there was optimism about the future of Africa. The region's countries have made significant economic, social and political progress over the past decade and, particularly, over the past four years. However, such optimism, and the improvements made, are fragile. Great challenges haunt the African future, and the threat of reversal of any progress made is, in many cases, real. Among the challenges threatening the sustainability of progress in Africa are:

- fast population growth, and rampant migration and urbanization;
- the spread of poverty (about 50 per cent of the population in sub-Saharan Africa, and 20 per cent in North Africa, reside in absolute poverty);
- vulnerability to adverse external shocks, such as the 1997–98 Asian crisis;
- failure to recapitalize Africa;
- policy reversal;
- weak overall governance, and conflicts;
- the spread of diseases, including HIV/AIDS and malaria; and
- foreign and domestic debt, and debt servicing.

With these challenges, African countries are led to the emergence of a Fortress World scenario, in which

African societies are split into two groups: a small group of élite and public officials, who live in a relatively prosperous conditions, but in a highly protected world; and a poor majority, deprived of basic services and rights. The irony of a fortress world crisis is the suffering, hardship and impoverishment incurred by the vast majority of people at a time when a minority of élites live modern, prosperous lives. The fortress world is a grim outlook for the future, in which social and environmental problems lead increasingly to the authoritarian 'solutions' of a minority of affluent people. Under such circumstances, members of the élite organize themselves to live in protected enclaves, while the poor majority outside of this fortress have few options and resources. A fortress world in Africa could eventually lead to the complete breakdown of society, and also to the emergence of new paradigms for a brighter future.

The assumptions of the Fortress World scenario may be summarized as follows:

- Increasing social and environmental problems lead to authoritarian 'solutions'.
- Members of the élite live in protected enclaves. These may or may not involve a physical wall, and they may be within a country or between countries.
- Those in the fortresses reap the benefits of globalization. Those outside the fortresses have few options and few resources, and are excluded from the privileges of the élite.
- Components of the environment may actually improve under this scenario, because valuable environmental resources are controlled by the élite.
- This improvement is not necessary unsustainable, but it may not be feasible to maintain it for an indefinite time.

### The narratives

The fortress world is not an invention of today, but a historic norm. Looking into human history, there are many examples of the élite living in prosperity in protected fortresses, while the majority of the public are poor, working mainly for the benefit of that élite. In some cases, the élite imposed taxes and fines—a reflection of the breakdown and failure of policy reforms undertaken by governments, and of the loss of coping capacity to meet the challenges and evolving world trends of globalization and trade liberalization.

In the Fortress World scenario, before the complete breakdown of the whole society, the élite perceive and comprehend the dangers of falling into complete anarchy and chaos, and organize themselves into enclaves or strongholds to protect their interests, families, businesses and assets. They create strong alliances amongst themselves at national and regional levels, through networks across continents. Furthermore, these alliances are well connected to global systems, and are driven by the interests and mechanisms of such systems, especially through the multinational companies which operate within the élite strongholds or fortresses. With the increase and dominance of cynical attitudes amongst these alliances, economic and social welfare in the region are not directed at improving the general well-being of the public majority, but at protecting the privileges of the rich and powerful élite. This situation paves the way to increasing tensions and disputes over issues of wealth and power between individuals, institutions, governments, factions and ethnic groups. Increasing tension outside the fortress produces a siege mentality within the élite, who feel their security threatened. This leads to high investment in security.

A combined effect of interacting driving forces has led to the rapid impoverishment of the African region: SAPs have failed to realize the economic reform they were set to achieve; unfavourable international trade terms have marginalized Africa in the global economy; and servicing and repayment of foreign debt have paralysed economic advancement in Africa. A number of external shock waves have led to a major crisis in the region. These include: the collapse of international commodity prices; world economic recession, for example, the Asian crisis of 1997–98; deterioration in governance; several regional conflicts; and the spread of epidemic diseases, such as AIDS.

In the Fortress World scenario, there is a general decline in the capacity of the state to perform adequate developmental tasks, including even routine administration functions, outside of the fortress. The state thus fails to meet the basic needs of the people, leading to erosion of legitimacy, and the breakdown of peace and security. The accountability and transparency of the government and public officials

erode or vanish. The security and protection of the élite and government officials become a top priority issue. To safeguard their interests, they mobilize all possible security resources, from the public to the private, including police, armed forces, militia and even mercenaries. The regional system, in turn, is well connected to an updated system of global apartheid, dominated by a minority of rich-country élite. Therefore, the enclaves of urban-based élite get control of wealth and power, while the poor majority have no privilege to exercise any leverage on public policy or budgetary choices.

The economy and the structural systems of the élite are strongly influenced, if not completely driven or controlled, by multinational corporations. Their systems and laws override and impose on the local, weakened state systems. Nevertheless, the informal sector starts to play a key role in the local economy of the poor groups, but primarily caters to its own needs and demands (food, housing and transport).

Corruption in all forms spreads at all levels, within and between countries, and at the interface between the public and private sectors. This is not only in the form of money or in-kind payment but, more widely in the African context, in the form of favouritism (nepotism) towards relatives and friends. The spread of corruption has its toll on society: losses in economic efficiency; disintegration of the work ethic; damage to the moral fabric of society; the distortion of incentives and distribution; and loss of political legitimacy.

Two variants of the Fortress World scenario could unfold in Africa. One variant is a self-generated fortress world, driven mainly by African issues—such as those that have been haunting the region for the past 50 years—while most of the rest of the world remain unaffected and possibly prosperous. The other variant is a global fortress world, in which the world economic, social and political systems collapse, with severe manifestations reflected in Africa, which is the most vulnerable region to such global failure.

The tides of geopolitics surge across Africa, with regional alliances influenced by external forces. The western world, in general, prefers to deal with Africa as sub-Saharan Africa. Europe, specifically since the colonial era, has dealt with Northern Africa in the Mediterranean context. More recently, there is even greater interest in this Mediterranean context, with the European perception of Northern Africa and the Middle East as an intimate geographic extension that has economical, political and cultural dimensions which have a direct impact on Europe. The 'Euro-med' partnership is a manifestation of such interest. In the Fortress World scenario, this background has implications for regional alliances between the élite of Northern Africa and Europe. Such external views of a divided Africa go against the true African view—originating from within the region—of one united Africa. This African view was the driving force for the creation of the OAU, which works to unite and strengthen the integration of all the African countries. The alliances in a fortress world, driven by individuals and special groups interests, are likely to weaken the trend of African unity and integration.

At the turn of 21st century, it is no surprise to see many aspects and elements of the fortress world manifesting themselves in all societies, in all countries. Examples of fenced, highly secured residential complexes, and segregated private schools and clubs for the élite, are common in most world societies. In many countries, businesses are concentrated in the hands of a small group of élite, with strong barriers to prevent outsiders breaking into their systems and obtaining any business opportunities. With the current economic, social, political and environmental conditions in Africa, some people argue—with mounting evidence—that the fortress world is already dominating many African countries and even sub-regions, from Western to Central to Eastern Africa.

### Environmental consequences

#### *Atmosphere*

- *Africa*

In the Fortress World scenario, the African environment has been negatively impacted, except in some protected or isolated areas away from human pressure, where limited improvement can be seen. Poor economic performance has driven Africa into fierce competition over ever-dwindling natural resources. Atmospheric emissions remain modest and the region remains more vulnerable to the imperfections of the provisions of international treaties related to climate change. For example, emissions trading could result in Africa losing cheap credits and having to pay more later per unit of

emission reduction. Africa is also more vulnerable to the effects of climate change; for example, malaria extends to new zones. Urban air quality declines in most urban areas, and effects are felt in other areas, because of the failure of mitigation measures, and an increase in urbanization and polluting industries. This leads to incidents of respiratory diseases, such as asthma. In some areas, the quality of air remains the same. Africa is pressured to adapt afforestation and reafforestation programmes, for the good of the polluting west. However, access to large forest areas becomes controlled by the élite. Under continued international pressure, Africa bans totally the use of ozone-depleting substances, such as methyl bromide, with inadequate assistance in the changeover to alternatives, which may be more expensive.

- *Central Africa*

In the Fortress World scenario, this sub-region continues to pollute less, but it suffers the consequences of pollution brought about by industries in the north. The consequences are observed through variations and changes in climate, producing some effects on seasonal patterns and agricultural production. International protection conventions, such as the 1971 Ramsar Convention on Wetlands and the 1992 Kyoto Protocol, force countries not to continue exploiting forest resources any longer, in order to preserve the natural resources of the Congo Basin for carbon sequestration.

- *Eastern Africa*

The impact of climate variability is more devastating, especially for the vulnerable poor, who are eking out a living outside the fortress. Measures to control emissions are not implemented, because people, including those in the fortress, are more concerned with personal security and survival. Air quality deteriorates both within and outside the fortress, making the environment unattractive for investment.

- *Northern Africa*

The air quality in many parts of Northern Africa sees some improvement, due to the interest of the élite in improving it. However, there are differences in the air pollution levels in the rich and poor areas, because of the concentration of industries in poor areas. The élite protect their fortresses against potential climatic changes such as floods, while the poor are left vulnerable to such elements.

- *Southern Africa*

Southern Africa continues to suffer the effects of climate change. At the same time, the sub-region is forced to exploit its forest resources due to demands for firewood. Unfortunately, this activity decimates an important carbon sink. On the other hand, developed countries, particularly the USA, take their time in ratifying important multilateral environmental agreements, such as the 1992 Kyoto Protocol, because they want to protect their industries, as well as to maintain their lifestyles.

- *Western Africa*

In the Fortress World scenario, élites consider their farms to be environmentally friendly places, free from the pollution of the cities. They protect large stretches of the countryside from environmental abuse. Because some of these farmers may themselves be in government, or have influence over those who occupy key positions in government, they ensure legislation to protect their farmlands and, thus, the environment. However, the landed aristocrats have no interest in the barren lands and, therefore, condemn them for dumping, irrespective of who lives there.

*West Indian Ocean Islands*

The atmosphere in this sub-region is surprisingly little affected by events, except in Madagascar, where the absence of the advantages of sea winds, enjoyed by the smaller islands, results in worsening air quality. Nevertheless, Port Louis, Antananarivo and Victoria have periods of closure due to urban smog, and seek technical advice.

***Land***

- *Africa*

With stagnant to declining economic growth, Africa remains essentially a subsistence economy. Land resources, however, have been subjected to increasing pressure, as a result of population increase and climate change. There is declining productivity in grazing and agricultural lands, due to a combination of: inequitable land distribution; poor farming methods and

unfavourable land tenure; ownership systems; and inefficient irrigation systems. The rapidly increasing populations of humans and animals translate into overexploitation of water, land, forest and pasture resources, through overcultivation, overgrazing, deforestation and poor irrigation practices.

In the Fortress World scenario, indigenous African farming systems and cultivation techniques –adapted to local ecological conditions and sensitive to the preservation of fragile natural resources—collapse, except in pockets here and there. Meanwhile, agriculture practices that are not adapted to the fragile African soils significantly degrade the land and reduce its productivity. The rapid impoverishment of rural traditional systems results in the abandonment of relatively benign methods of exploitation of nature, and in their replacement with aggressive methods, which assume that natural resources are limitless. With stringent economic conditions, and denied access to land, poor peasants cultivate marginal land, leading to declining productivity. Resilience to environmental and social changes deteriorates outside of the fortresses, contrary to the situation inside the enclaves.

The pressure on land, vegetation and water supplies has made Africa increasingly prone to food security crises. Dramatic increases in populations, combined with increased land degradation, has resulted in the decline of per capita food production. Annual population growth has exceeded increases in food production, creating a chronic food crisis for the poor, and widening the food gap. In the bubbles of élite, the situation is the reverse. Food production exceeds the needs of the small élite population. In the Fortress World scenario, a positive survival practice of urban poor is the increasing practice of urban agriculture—the production of food and non-food crops, and animal husbandry, in built-up areas. However, most urban agriculture remains largely unrecognized and unassisted, if not outlawed or harassed.

In the Fortress World scenario, environmental refugees and conflict-displaced people migrate to areas of greater food availability—mainly where they can receive food aid. However, with emergency aid decreasing, it becomes inevitable for rural people to migrate to towns or cities, considerably swelling the numbers of the urban poor. In general, the élite become the class of resource-extractors, driven by the global market economy, and impoverishing both the environment and subsistence resources for rural people.

The chaos and weakness of systems of governance precipitate insecure land tenure as the norm for those outside the fortress, thus providing no incentive for sustainable land management. In contrast, the élite secure land tenure for their land. Thus, their land is preserved and properly managed, using modern and enhanced agriculture systems.

- *Central Africa*

Dualism (modern law and traditional law) in the area of land management increases the pressure on land, and leads to land use conflicts in the cities as well as in the countryside. The long and expensive procedures to obtain certificates of occupancy for land induce real estate to drift into illegality. In high-density localities, there is mass movement of people to settle elsewhere, thus sparking off conflicts with the other ethnic groups. The élites increasingly invest in the development of farms, in order to combat food insufficiency resulting from these movements.

- *Eastern Africa*

In the Fortress World scenario, land degradation outside the fortress is rampant, due to overcrowding and insecure land tenure. Investment in land improvement, especially outside the fortress, is very limited. Soil erosion accounts for more than 90 per cent of environmental degradation in this sub-region by 2020 (in 2002, it accounts for about 80 per cent).

The land reform programmes which five countries in sub-region—namely, Uganda, Kenya, Rwanda, Ethiopia and Eritrea—were pursuing are abandoned. The poor are driven off the prime land into more fragile areas, such as wetlands, steep slopes and semi-arid zones. Conflicts over resource use and access increases, particularly in the Horn of Africa (Ethiopia, Eritrea, Somalia and Northern Kenya).

- *Northern Africa*

Land is overexploited and, eventually, degraded by the poor sectors of society. The élite-controlled governments focus on those resources that are vital to their success and well-being, with land being left mainly to the poor. With the exception of relatively small areas that are well preserved by and for the élite, most of the

land resources are degraded, due to unsustainable practices. Land use planning has become almost non-existent, and ad hoc development spreads. Allocation and access to land becomes grossly inequitable.

- *Southern Africa*

In the Fortress World scenario, in southern Africa, where land reforms are either being implemented or contemplated, radical change in land ownership occurs. Previously disadvantaged members of society are given the opportunity to own land, but they have limited knowledge of farm operations and a lack of resources to acquire inputs. As a result, land is degraded further, as a result of inappropriate farm practices, while food production declines because of lack of necessary inputs. On the other hand, the politically élite are better resourced, but their focus is on cash farming, and this has serious implications for food security.

- *Western Africa*

The landed class acquires more and more land for commercial farming. In the process, the peasant or subsistent farmers are displaced, and are forced to become farm workers. The big farm owners and their families barricade themselves in their luxury farm homes, protected by security guards and dogs.

- *Western Indian Ocean Islands*

Land is devastated by warfare, civil strife, and reversion to subsistence agriculture. Soil erosion continues to be a major problem, as a result of massive deforestation in all areas. Some 80 per cent of the urban settlement areas of the Seychelles are lost through sea level rises of two metres. Millions of hectares in Madagascar are flooded by a devastating cyclone (*Indira*), and much of the land falls out of use through civil war. Vast unplotted areas of land are thought to have been laid with mines.

### *Biodiversity*

- *Africa*

In the Fortress World scenario, biodiversity and its ecosystems come under severe pressure, with natural ecosystems reduced to small pockets of protected areas with limited access, mainly to the élite. National and international conservation and protection efforts decline, as a result of: lack of biodiversity conservation frameworks; strategic and financial resources; and unfair activities which cause significant habitat destruction, resulting in a greater number of extinctions and species under threat. Furthermore, as ethics and cultural values degrade, trade regulatory mechanisms completely break down, legitimizing trade in endangered species. Loss of biodiversity and invasion by alien/exotic species are increasingly widespread, causing increased outbreaks of pests and disease, resulting from a lack of natural predators and ecosystem destabilization.

Unfair sharing of the benefits of biodiversity continues, with royalties accruing to multinationals rather than African source countries. Gene banks are mostly located in the west, and are inaccessible to poor African countries, which are among the main source of the gene materials. The long undervalued biodiversity becomes valued, but is overshadowed by inequity and market forces. Biodiversity comes under use in ecotourism, which is controlled and managed by the élite, who also reap much of the benefits.

Patenting of GMOs continues to discriminate against African countries, and to threaten agricultural biodiversity, especially of wild species. For example, there is narrowing of gene biodiversity through the introduction of terminator genes, and genetic pollution of indigenous species. In addition, Africa faces new weed and pest problems, arising from GMOs.

- *Central Africa*

Lack of technological development does not allow for developing and enhancing local knowledge, especially as far as medicinal plants are concerned. Natural resources continue to be exploited by the laboratories from the north, who develop research projects in this sub-region. The risk of specific species disappearing is on the increase. The practice of (traditional, commercial and sporting) hunting and fishing increases the pressure on the species which, in turn, are subject to disappearance, in spite of conservation programmes. The development of ecotourism is spearheaded by private companies, which do not bring about notable impacts on local economies.

- *Eastern Africa*

Critical ecosystems and forests are more strictly protected, and the governments in this sub-region strengthen the policing functions of the relevant

agencies. However, as the Fortress World scenario persists, the cost of protecting large numbers of sites increases, and the focus shifts to prime sites—including national parks, such as Bwindi, Mgahinga, Tsavo, Masa, Maara and Budongo, and so on—which have a high potential of attracting income from tourism. Areas with very high protection costs—such as Lake Mburu in Uganda, and Lakes Nakuru and Naivasha in Kenya, and so on—are degazetted.

- *Northern Africa*

The impact of the Fortress World scenario on biodiversity is similar to the impact on coastal and marine areas. The élite minority put some areas under their control, where industrial, recreational and tourism developments take place. Only in those developments where biodiversity has a significant value is it well protected. In industrial developments, preserving the natural environment is very low on the list of priorities. On the other hand, the rapid urbanization of the poor minority causes serious damage to biodiversity. Some people seek to make a quick profit by illegally selling rare species, either to the élite or abroad.

- *Southern Africa*

Due to lack of knowledge of the whole range of their biological resources, most Southern African countries continue to have important genetic resources pirated from the region. At the same time, high costs for medical treatment and increasing rates of AIDS infection turn many to traditional medicine, and this results in the overharvesting of certain species.

- *Western Africa*

In the Fortress World scenario, the élite are consumed by the insatiable desire for making money. They realize that, by protecting the fauna and flora, they attract ecotourists, and earn huge profits on investment in the tourist industry. Therefore, there are numerous sites which promote biodiversity, although such sites are always almost linked to some investment in tourism. Traditional forms of promoting biodiversity are undermined as people are displaced. Survival becomes the paramount concern for the displaced who, quite often, prey on rare species, either by selling to visitors or by using some as food, where applicable. The landed class in the fortress world realizes that huge commercial farming affects forest resources and, therefore, engages in some reforestation. They feel the effect of climate change, which also has an impact on agricultural output. Efforts to diversify into the construction industry are hindered by low forest resources and increased demand for wood, and the élites push seriously for conservation of the remaining forests.

- *West Indian Ocean Islands*

Biodiversity declines steeply during this period, with serious loss of marine and bird life, and with no large mammal survivals, apart from humans. Invasions of vultures and other birds of prey are reported in Madagascar, and sightings made in the Comoros.

***Forests***

- *Africa*

In the Fortress World scenario, deforestation and degradation of forest areas continue at higher rates, except in some areas, where they might be recovered. The élite, tempted by the high demand for forest products in the global market, act as resource extractors, and overexploit the forest resources. Ironically, they safeguard some forest areas under international pressure. Some of the remote forest areas, away from population pressure, are also saved, such as parts of the rainforests of the Congo Basin. Poor people fall back on extensive use of the forest resources which they have access to, as a source of energy, food and shelter. Commercial exploitation of medicinal plants contributes to accelerated deforestation. Forest wood is also used commercially, for the production of crafts for trade. The introduction of alien species and forest plantation play a significant role in modifying the structural composition of forests.

- *Central Africa*

The increase in the poverty of peasant farmers, and the fall in prices of agricultural produce, lead to more pressure on the forests, which are the primary sources of revenue. 'Unbridled' logging is witnessed. The industries which are involved in logging do not take the regulations into account and, thus, engage in illegal logging activities. The export of logs limits the economic impact of logging in the local and national economies. Non-wood forestry products experience a boost in their development, with greater pressure brought to bear on

them. This is also true of medicinal plants and forestry products for domestic use. The consequences of deforestation and desert encroachment are disastrous for the Sahelian areas (Northern Cameroon, Central African Republic and Chad).

- *Northern Africa*

In the Fortress World scenario, the future of forests in Northern Africa is largely determined by the way they are seen by the élite. Because forests in this sub-region do not have much significant value as a source of raw material for industry—apart from the production of gum arabic—the élite do not give them much attention. Forests are left to be overexploited by the poor majority as a cheap source of fuelwood, charcoal and wood for small shelters. Unfortunately, the poor, who struggle to satisfy their basic needs before they start to worry about the environment, do not see the environmental values of the forests.

- *Southern Africa*

Deforestation worsens, especially in places surrounding urban areas, due to increased poverty. High population growth rates imply that demand for forest resources, especially firewood, grows. Tree types that produce a lot of heat and less smoke are selectively felled, resulting in changes in the structure and composition of forests.

- *West Indian Ocean Islands*

Forest and woodland areas are reduced by 75 per cent throughout the region, as a result of warfare, subsistence farming and loss of other sources of energy, and through neglect.

***Freshwater***

- *Africa*

Water resources have become inadequate in quantity and quality in Africa, mainly because of poor management resulting from chaotic circumstances dominating the region. Although there is abundant water supply in Africa, there are sub-regions and countries which have water scarcity. Water inadequacy results in poor health, low productivity and food insecurity, and constrains economic growth. In the Fortress World scenario, the vast majority of African countries fail to conserve and protect water as a valuable, but vulnerable, resource.

As a result of increased poverty, access to water and sanitation has been in increasing decline in Africa. This, in turn, causes high incidents of communicable diseases, which diminish and hinder economic development. The result is less investment in developing water resources which, in turn, leads to reduced water availability—a vicious spiral between cause and effect. With the crises of endemic poverty and pervasive underdevelopment, water in Africa has been subject to inefficient, inequitable and unsustainable use. The élite ensured abundant share of available water resources to meet their specific needs, while the poor majority continued to suffer even while playing a central role in managing and safeguarding these water resources. Water continues to be underused in energy generation as the hydropower generation infrastructure collapses, due to poor maintenance and lack of resources for modernization.

In the Fortress World scenario, the infrastructure for the management of water resources deteriorates, with inadequate institutional and financial arrangements, lack of data and weak human capacity. Problems with water and land further aggravate food problems. Groundwater, especially in shallow aquifers, is highly degraded and depleted, a situation which becomes severe in Northern Africa, where there are very few renewable water resources. Water interdependency is high in Africa. Nevertheless, regional cooperation on transboundary water issues is not only weakened further, but is strained by escalating tensions and conflicts, as openness and transparency are eroded.

- *Central Africa*

Certain rural areas (northern Cameroon, northern Central Africa, Chad) are already suffering from lack of access to potable water and water supply. In the Fortress World scenario, this phenomenon becomes more pronounced, with the advent of desert encroachment due to deforestation. As far as agriculture is concerned, production is reduced and conflicts worsen due to water resource issues, with conflicts between breeders and agriculturists, and between élites and indigenous populations (who either own the resources or who do not have access to adequate means of production). In view of the lack of sewage water recycling, high population growth and an obsolete hydraulic (sewage water) system, urban areas

experience shortages in potable water, and there is an upsurge in water-borne diseases.

- *Northern Africa*

If the unequitable allocation of natural resources per capita is the symptom of the Fortress World scenario, it is specifically apparent in the case of valuable resources, such as land and water. The industry-driven élite control most of the freshwater resources, whilst leaving marginal water resources to the poor majority. Being industry-driven, the élite allocate more water to the industrial sector, depriving irrigated agriculture of a much-needed vital input. However, the improper management of water with different qualities has an impact, with increased pollution and degradation of many sources of surface water and groundwater. The élite are not concerned with the problem, because they use desalinated water for supplying their domestic needs.

- *Southern Africa*

In the Fortress World scenario, the water supply situation continues to be precarious for most countries in this sub-region. The situation is particularly bad for South Africa, Zimbabwe and Malawi, resulting in drastically reduced agricultural outputs. Even with transboundary initiatives, water demand management and water recycling, supply does not meet demand. Conflicts between water users emerge, with disadvantaged groups, such as women and the elderly, being the losers in the competition for the resource. Water-borne diseases, which had hitherto been under control, emerge once more.

- *Western Africa*

Concerned only about their individual and family comfort, the élites in the fortress world appear to be satisfied with meeting their direct freshwater needs. Once these needs are met, they pay little heed to problems affecting the rest of society. Only when an epidemic breaks out, which denies them the labour of their farmworkers, do they develop ways and means of managing freshwater resources.

- *West Indian Ocean Islands*

In the Fortress World scenario, pollution, and the destruction of dams and smaller water storage systems, pipes and pumps in civil strife, create continual water shortages and drought throughout this sub-region, with a devastating impact on animal and human life.

***Coastal and marine resources***

- *Africa*

In the Fortress World scenario, urbanization and population movement to coastal areas continue at higher rates. The demand for marine resources for food and shelter increases. The élite utilize Africa's unique coastal and marine resources for tourism, and aggressively market them globally, through multinational companies. An increase in eco-tourism opportunities contributes to sustainable management of resources, such as forests, coastal and marine resources. However, fulfilling the needs of locals and tourists results in overfishing.

Marine pollution increases locally as water treatment of sewage declines. In some poorer areas, there are no sanitation systems and no sewage treatment. Valuable coral reefs and mangrove forests become increasingly vulnerable, and threatened with human activities. However, some areas improve as a result of stagnant development activities and protection by the élite.

- *Central Africa*

In spite of laws in force in this sub-region, the exploitation of coastal areas continues, leading to an increase in coastal erosion. Coastal and marine pollution continues unabated, because of population pressure resulting from housing development The insular countries of the sub-region run the risk of disappearing as polar ice cools, creating an upsurge of ocean water levels.

- *Northern Africa*

In the Fortress World scenario, the environment along the coastal and marine areas remains quite diversified. The population and densities of people in old developments along the Mediterranean coast suffer from further congestion. The rate of infrastructure development is much slower than the rate of population increase, leading to severe pollution of the coasts and seawater. On the other hand, the élite develop new areas along the coasts of the Mediterranean Sea and the Red Sea for recreation and water tourism. Every care is taken to minimize the environmental impacts of

those new developments. Nevertheless, the élite overexploit the soil along the coasts, neglecting the serious damage this causes to coastal waters and marine life. Many rare marine species are threatened or totally destroyed. Unsafe abstraction of groundwater within the coastal zone of the Mediterranean Sea causes seawater intrusion and, hence, renders many wells unusable.

- *Southern Africa*

Uncontrolled development in coastal areas accelerates coastal erosion, at the same time polluting the seas, due to lack of adequate facilities to collect and properly dispose of rubbish. Growth in population in coastal areas, such as Maputo, Dar es Salaam and Durban, exacerbates the overexploitation of marine resources, including mangroves, fish and prawns.

- *Western Africa*

In the Fortress World scenario, while the élite begin spending most of their time on the large, environmentally friendly farms, they maintain their showcase or dream houses in the cities—quite often in close proximity to the Atlantic Ocean or the big rivers. Although, initially, each family was concerned only about its immediate environs, or the piece of land adjoining the beaches and waterfronts, they realize that they are unable to enjoy their prized places if the waters are polluted. Thus, they participate in the exercise of cleaning the beaches and waterways. Their representatives in government put in place appropriate policies and laws to protect coastal and marine areas. The élite are, however, very uncooperative when policies tend to restrict the exploitation of coastal and marine resources in a way that affects their investments in the fishing industry.

- *West Indian Ocean Islands*

Coastal and marine areas are seriously affected by military operations, piracy and overfishing, using fine nets, gelignite and seabed trawling. Oil pollution from major tanker spills, following naval action in pirate wars in the 2020s, scars coastlines and causes irretrievable damage to marine stocks. Sea mines laid in the same period remain a hazard to all regional marine traffic, causing continual loss of shipping and life, and diverting away most trade from other regions.

***Urban areas***

- *Africa*

In the Fortress World scenario, rapid urban growth exerts pressure for housing and infrastructure investments, in order to accommodate the rapidly growing population. However, the system of urban governance is responsive to the needs of the élite, and not to the needs of the poor majority. This situation leads to the mushrooming of informal housing and slum areas, which account for the majority of African urban dwellers. These informal settlements are not provided with adequate transport, water, sanitation, electricity and health services. People living in these areas are exposed to various health hazardous. Housing finance systems are non-existent, or are limited to élite bubbles.

The deterioration of the urban economy and environment leads to widespread urban poverty, beyond known historical norms. As a consequence, crime becomes a major problem in most African cities, and worsens with increased poverty and deteriorating living conditions. The streets of most cities become completely unsafe, even in daylight.

The élite, who live in enclaves, produce much higher municipal waste, per capita, than those outside of the enclaves. This waste is dumped, without regard for costly hygiene measure, in sites outside of the gated cities inhabited by the poor. This exacerbates land and water degradation, leading to the spread of disease.

The African region is the cradle of many of the world's oldest civilizations and cities, and it traditionally attracted a significant share of worldwide tourism. In the Fortress World scenario, instead of revitalizing and preserving these assets to empower communities and to strengthen their economic base, these assets become threatened by neglect and environmental degradation. The élite, using authoritarian solutions, succeed in protecting some of the cultural heritage, but their incentive is to reap the benefits and to project a civilized image to the international community.

- *Central Africa*

This sub-region continues to witness an increased concentration of populations in urban areas. The Fortress World scenario is characterized by uncontrolled urban growth, outdated urban settlement planning and increased poverty in cities. The high population pressure affects the consumption of natural

resources, and is linked to the poverty of city-dwellers. Uncontrolled urbanization leads to the emergence of places in which no provision is made for green spaces and, where such provision is made, it is not respected. Because of lack of solid and liquid waste planning and management programmes, the issue of sanitation becomes more acute, and impacts the health of the population through frequent outbreaks of new diseases.

- *Eastern Africa*

In the Fortress World scenario, proliferation of slums is rampant, as more people are displaced from prime agricultural land by landlords and forced to move into the cities to look for other opportunities. The infrastructure in the low-income, urban areas deteriorates rapidly as the city authorities become unable to cope with the rate of influx of people. While, in 2002, only 3 per cent of Addis Ababa is planned, and 28 per cent and 40 per cent of Kampala and Nairobi respectively, these percentages decline as the planning fails to keep pace with the rate of development and expansion.

Crime rates increase, especially in the informal settlements, and this spills over to the high-class residential areas, forcing those living in these areas to increase expenditure on security measures, such as high walls, electric fences and armed security guards. As the situation persists, middle-class and high-class residents move out of the cities, and create their own secure settlements in peri-urban areas, such as Mukono in Kampala, Ngong in Nairobi and Debra Berhane in Addis Ababa.

- *Northern Africa*

There are large differences between the environments in the élite fortresses and in poor areas. The élites being much fewer in numbers, richer and better educated, the environments of the fortresses are well protected. Basic services are not only available, but also very much more reliable than they are in the poor areas. The environment is still rich, and is sustained by measures for environmental protection. Careful planning of the fortresses ensures that air quality remains high, because of low population densities and sufficient green areas. No significant industrial waste is produced inside the fortresses, because industries are concentrated outside the fortresses, where the poor labourers live. Nevertheless, sewage water is not treated before disposal, because it is disposed of in the areas of the poor. The picture in poor areas is totally different, with air pollution, unsafe drinking water, poor sanitation and solid waste accumulation being the main elements.

- *Southern Africa*

The concentration of populations in well-resourced areas implies that, in the Fortress World sceanrio, the Southern African countries continue to witness phenomenal urban growth, with inadequate provision of basic services, such as water and sanitation. Informal peri-urban settlements proliferate, resulting in disease, destitution and moral decay, which further worsens the spread of HIV/AIDS. The areas with high population concentrations witness further land degradation, water pollution, habitat destruction and deforestation.

- *Western Africa*

There is nowhere more expressive than this sub-region of the dichotomy between the élites in the fortresses and the poor in the shanties. Well laid-out and year-round green areas in urban centres are occupied by the rich and powerful. There are first-class, efficient rubbish disposal systems, proper sanitation, effective sewage systems, and good roads and waterways. The poor work to maintain the comforts of the élite. At the end of the day, the workers return to a totally different life—one of filth, unsafe water, non-existent rubbish disposal systems, poor sanitation and non-functioning sewage systems.

- *West Indian Ocean Islands*

In the Fortress World scenario, urban areas expand as populations flee from the devastated countryside, making existing settlements unsustainable, deprived of adequate water, sanitation, power and services. Many are scenes of continual pillage, violent crime and misery. A few have been converted to religious retreats by fundamentalist groups of all persuasions, prepared to fight to death for the preservation of their rights.

## THE GREAT TRANSITIONS SCENARIO

### Introduction

The vision of the Great Transitions scenario stems from developments at the start of the new millennium. These include a conviction regarding the need to embrace a new sustainability paradigm—one which transcends the dictates of both the Market Forces scenario and the Policy Reform scenario and one which, at the same time, prevents the occurrence of the ills associated with the Fortress World scenario. Associated with these is a philosophical dimension, at both personal and group levels, which holds that an end must be put to consumerism as way of life, and that a search must be made for issues that can provide a renewed sense of meaning and purpose to life. Consequently, the values of simplicity, tranquillity and community begin to displace the values of consumerism, competition and individualism. Voluntary reduction in work hours frees time for study, art and hobbies.

In the Great Transitions scenario, lifestyles become simpler, in a material sense, and richer, in a qualitative sense, as the old obsession with possessions gives way to intellectual and artistic pursuits. In the new sustainability paradigm, markets remain critical, in terms of achieving efficiency in the production and allocation of goods, but well-designed policies constrain the level and structure of economic activity, so it remains compatible with social, cultural and environmental goals. A variety of mechanisms enforce these principles, including regulation, international negotiation and market signals, such as revised tax systems which discourage the production of environmental 'bads', and which reward restorative practices. Environmental, economic and social indicators track real progress at all scales—business, regional, national and global—giving the public an informed basis for seeking change.

The assumptions of the Great Transitions Scenario may be summarized as follows:

- Neither the Market Forces scenario nor the Policy Reform scenario possesses strategies that are adequate for addressing the ills of the assault on the environment.
- Furthermore, given current trends in the adoption and effectuation of treaties on environmental issues, policies alone cannot be sufficiently effective against social inequities and environmental uncertainty.
- While market forces are not abandoned as a policy tool, social, cultural and environmental goals take precedence in thinking about development.
- For Africa (and perhaps for the whole world), notions of sustainability fundamentally change the values and lifestyles of peoples (an African Renaissance).
- In general, there is a cultural renaissance, which is not only critical of past behaviour and effects on the environment, but which also outlines new ways of thinking, and which fosters environmental goals.
- The affluent, having become disillusioned with consumerism, other ills of society and the negative impacts of development on the environment, undertake steps to develop new values and value systems. These are gradually introduced, and promote a new set of ethics in society.
- A new generation of thinkers, leaders and activists join and shape national and global dialogue towards environmental sustainability.

The Great Transitions scenario represents a very optimistic view of the development of the environment in Africa, as well as all over the world. Nevertheless, it is not as utopian as it looks at first examination, because its tenets are perfectly achievable, given the right atmosphere. As mentioned in Box 4.2, and discussed extensively in Beyond Hunger, Africa needs a

**Box 4.2 The twin challenge: the challenge of Africa and the challenge of the future**

*'Thus, Africa today needs both new questions and smaller errors. The project is primarily concerned with the former. The assumption being that they are a prerequisite for adequately tackling the latter. There is sufficient scientific competence available in Africa today for new knowledge to be increasingly generated from within, as it were, through the realignment of research agenda away from the 'short term' and 'applied' towards the longer term and more basic questions affecting the continent's future …*

*'A first step in this direction is to examine critically the conventional wisdom as expressed in dominant policy documents related to Africa's present and future … The second step is the development of alternative future scenarios for Africa that challenge the 'surprise free' projections of the current perspectives.'*

*Source: Achebe and others 1990*

resurgence at many dimensions. The beginning of the millennium is a good time to start such an exercise. Africa must ask new questions, and must challenge the conventional wisdom that has tied the region down for too long. Africa must be ready for a surprise, rich future.

### The narratives

The major strategies through which the Great Transitions scenario will evolve are not difficult to imagine. Achebe and others (1990) have argued that these are new sets of strategies, which differ from current approaches to thinking about development at conceptual, methodological, institutional, operational and financial levels. For example, while this African Renaissance vision of development is conceptually dialectic and beyond crisis, it is unlike conventional wisdom regarding development, which is unilinear and crisis-oriented. Furthermore, the African Renaissance vision is methodologically 'surprise-rich, inductive and retroductive', as against conventional wisdom, which is 'surprise-free, deductive and predictive'. Operationally, the strategy: is locally owned and initiated; is supportive, nurturing and people-intensive; has views which depart from the donor-fed and controlled, directive and preemptive; and has capital-intensive visions of conventional wisdom. The institutional set-up was state-centred, concentrated and monopolistic while, in the African Renaissance vision, it is 'grassroots oriented, multiple, dispersed and pluralizing' (Achebe and others, 1990).

The attributes of an African Renaissance are based on visions of a desirable and environmentally sustainable future. These, indeed, are similar to the attributes of the Great Transitions scenario. The beauty of a Great Transitions scenario for Africa is that there are already bodies of ideas among great thinkers in the region, as well as within government circles, regarding the processes that lead to the so-called Big Lift scenario (see below). Current moves by the leaders of African countries to create the Africa Union to replace the OAU, and in the development of the 2001 Omega Plan for Africa and the 2001 Millennium Africa Recover Plan (MAP) (see Chapter 1), are steps in the right direction. So, too, is the evolution of the New Partnership for Africa's Development (NEPAD) (see Chapters 1 and 5). These ideas will continue to crystallize, and will become major issues, as other regions of the world begin to see the wisdom of the Great Transitions scenario.

In the monumental work produced by Achebe and others in 1990, attempts were made to compare the current situation with the expectations of the African Renaissance vision. The scenario described as the Big Lift produced comforting levels of development. For instance, where current projections could put the population of Africa at some 2 200 million in 2057, with growth rates as high as 2.5 per cent per year, the Big Lift scenario would put it at 2 500 million, but with only a 1.5 per cent per year growth rate. In the Big Lift scenario, with a projected time-frame of 2057, the literacy level would have risen to 95 per cent. More important, however, is that life expectancy would have increased to 80 years, while GDP per capita would have risen to US$7 800. Food production and capital goods production would have risen considerably, and the environment would have started to recover. Forest areas would have reverted to sizes that were in existence in 1957. Arable land would have increased four times over what it was in 1957, while electricity use would have multiplied by a factor of more than 200 (see Table 4.2).

(The arguments of the Big Lift scenario, which are similar to those of the Great Transitions scenario, are that we need new paradigms to deal with development and with the creation of a sustainable environment. We have hitherto used 'the evolutionary paradigm, the gradual incremental unfolding of the world system in a manner that can be described by surprise-free models with parameters derived from a combination of time-series and cross-sectional analyses of the existing system' (Achebe and others, 1990).

Of course, the Great Transitions scenario is expected to usher in better educational facilities, greater empowerment of all people, and especially women, and absolute reductions in poverty levels, through enlightened policy reforms. It is also expected to engender greater political consciousness and commitments at local, national, regional and international levels, through visionary leadership, the eradication of corruption and improved economic performance.

The Great Transitions scenario can, therefore, be seen as involving situations where a new emphasis would be placed on issues including: the content and structure of education and training; culture; governance; and the creation of effective organs and

**Table 4.2 The African Renaissance and the Big Lift scenario**

| | Actual | Actual | Projection | Big Lift |
|---|---|---|---|---|
| *Demography* | *1957* | *1987* | *2057* | *2057* |
| Total population (million) | 277 | 599 | 2,200 | 2,500 |
| Population growth rate (per cent/year) | 2.3 | 3.1 | 2.5 | 1.5 |
| Infant mortality (per 1000 births) | 182 | 181 | 10 | 8 |
| Life expectancy at birth (years) | 40 | 53 | 77 | 80 |
| Economy and agriculture | | | | |
| GDP per capita (1980 US$) | 450 | 815 | 3,800 | 7,600 |
| Capital goods production (million 1975 US$) | 127 | 1,273 | 75,800 | 115,000 |
| Agricultural production (FAO in-dex) | 63 | 115 | 1,000 | 2,000 |
| Food supply per capita (calories) | 2,060 | 2,094 | 3,200 | 6,000 |
| Human resources | | | | |
| Literacy rate (per cent) | 16 | 53 | 80 | 95 |
| Scientists and technologists | | | | |
| (per million inhabitants) | 15 | 103 | 270 | 1,000 |
| Natural resources and environment | | | | |
| Arable land (million ha) | 177 | 221 | 365 | 500 |
| Energy consumption per capita (kg coal equivalent) | 180 | 451 | 2,000 | 3,600 |
| Forested areas (million ha) | 1,580 | 1,315 | 920 | 1,500 |

*Source: Achebe and others, 1990*

institutions, working in harmony to create the desired future. The Great Transitions scenario also involves increased regional cooperation on environmental issues, such as water and food availability, mineral resources exploitation, and wildlife management. The goals of a desired and sustainable future require much more imagination than is available in the Policy Reform scenario but, as in this scenario, 'backcasting' is a major tool of analysis.

### Environmental consequences

#### *Atmosphere*

- *Africa*

In the Great Transitions scenario, the atmosphere has been eliminated of most unwanted substances, as technology to clean up the atmosphere has been developed and used in Africa. Some gases still persist in the atmosphere, but technology to clean them is available. Furthermore, emission levels have been reduced, as a result of cleaner production and transport technologies. Urban air quality and energy use efficiency improves tremendously, due to improved awareness and technology, and changes in attitudes. African countries phase out the use of ozone-depleting substances within the context of a co-partnership in industrial development as opposed to recipient of industrial finished goods.

- *Central Africa*

The next 30 years witness a slight change in climate. The treaties on reducing the production of greenhouse-effect gases are applied by all countries in this sub-region, in order to reduce air pollution.

• *Northern Africa*

In the Great Transitions scenario, the redistribution of the population between urban and rural areas helps to alleviate congestion and its associated air pollution. Air quality, particularly in large urban areas, significantly improves, due to the wide replacement of fossil fuels with natural gas and solar energy. Strict environmental laws stop the depletion of the environment and improve air quality. The emphasis on increasing green areas and on maintaining forests helps the other measures adopted for improving the air quality.

• *Southern Africa*

The next 30 years see little change in climate variability, because it is a natural phenomenon that takes a long time to evolve. However, non-polluting industrial and domestic technologies result in greatly reduced atmospheric and indoor pollution.

• *Western Africa*

The need for clean air, and clearer and pollution-free skies, is central to policies at all levels. Appropriate legislation is respected, and has widespread public support.

*West Indian Ocean Islands*

Following the priority given to environmental rejuvenation, prospects improve for clearer skies and a cleaner environment within the first decades of the new century.

***Land***

• *Africa*

In the Great Transitions scenario, there is increased equitable access to land. Furthermore, conflicts over land-based resources are reduced, and there is amicable resolution of any conflicts that do arise. Major rehabilitation of marginal and degraded lands have taken place, and there is planned development and rational land use—within countries and within the region. Land markets open up (including purchasing land in any country), rural-urban disparity decreases and there is greater incentive for sustainable land use. Opportunity costs for environmentally benign use of the land are recompensed. Environmental management is applied to ecosystems (that is, watersheds) within the regions, and is not restricted by national political considerations. National boundaries become less significant –nomadic and pastoralist communities are allowed greater movement across borders (returning to traditional practices) without any hindrances whatever.

• *Central Africa*

Land tenures are improved and facilitated by simple and cheaper procedures. Regional development plans are drawn up, updated and applied. Agricultural production is better improved, both qualitatively and quantitatively, for domestic and foreign markets.

• *Eastern Africa*

Implementation of land reform policies and the emergence of a land market see more value being attached to land and a significant decrease in land degradation, as individuals take deliberate measures to maintain productivity of their land parcels. The emergence of an active land market, however, means that the poor segment of society is pushed off the prime land into marginal areas, or to seek employment on land owned by the rich. Increased productivity on the sustainably utilized land, however, ensures food security in the sub-region, and an increase in land-based income means that more people—even those without land, but with employment—are able to afford food.

• *Northern Africa*

In the Great Transitions scenario, the diversification of the economies lowers the high demand on specific natural resources, including land. As the role which industry plays in the economy increases, the demand on agricultural land is significantly reduced. In addition, the traditional role that agriculture used to play changes, as farmers switch to growing cash crops. The adoption of modern irrigation techniques, replacing chemical fertilizers and pesticides with organic types, economizing on water use and using better-quality water all help to maintain the sustainability of agricultural land. Due attention is given to the problems of drought and soil erosion, and new land stabilization techniques are introduced.

• *Southern Africa*

Issues of inappropriate land tenure, inequitable access to land, and land degradation remain dominant in Southern Africa in the Great Transitions scenario. However, growth in the adoption of democratic systems

of governance may result in a more secure system of land tenure, resulting in the creation of a sense of ownership, and in a decrease in levels of land degradation. On the other hand, improvements in agricultural technologies, and the provision of adequate extension services, result in higher agricultural yields—and a step towards achieving food security. Emphasis is also given to agricultural practices which have the greatest possible potential, implying that total sub-regional food security is achieved through trade.

- *Western Africa*

In the Great Transitions scenario, after years of 'trial and error' practices based on traditional and colonial legacies, a major transition towards modern land use policy has begun. Land belongs to the people. Appropriate governing structures are put into place, in which governments, investors and the people consult and reach agreements on the uses to which a given piece of land are put. All sides benefit and, therefore, do everything to protect the land as partners. This reduces conflicts in the sub-region.

*West Indian Ocean Islands*

The new wave of government policies on land are warmly greeted by the international community, and the sub-region is duly rewarded for its about turn on conservation.

***Biodiversity***

- *Africa*

Biodiversity, ecosystems and habitats receive adequate national and international protection, as result of policies and practices. The value of biodiversity, ecosystems and habitats is recognised globally and nationally, with a fair share of benefits from sustainable use accruing to local communities and national governments. Trade in rare species is fairly regulated, and is driven by ethics and moral values. Incremental loss of biodiversity due to human activity is reduced to zero, and there are no endangered species.

- *Central Africa*

In the Great Transitions scenario, there is active collaboration between modern conservation powers and methods and traditional conservation powers and methods, in order to end biodiversity loss. Greater sub-regional cooperation is developed, in terms of biodiversity conservation, with regard to transborder reserves (present-day situation in Cameroon, Gabon, Congo and Central Africa). There is also development and strengthening of sub-regional programmes, such as the Regional Programme for the Management of Environmental Information (ECOFAC), which put data on the state of the environment at the disposal of decision makers, and which ensure the conservation of Protected Areas Resources. The biodiversity protection of class A species of the Convention on International Trade in Endangered Species (CITES) and other endangered species is ensured by all countries in the sub-region. The conservation programmes, and access to environmental information developed within the sub-region, are sustained by international financial backers and cooperation funds.

- *Eastern Africa*

Pressure from global stakeholders focuses the attention of national governments on biodiversity management. More national resources are channelled into the implementation of relevant conventions. National laws are enacted or reviewed, to bring them in tandem with these conventions. The countries of the sub-region promote new products and processes which enhance the potential biodiversity resource, including medicinal plants. This elevates the profile of biodiversity resources and the need to protect them.

- *Northern Africa*

In the Great Transitions scenario, biodiversity in this sub-region benefits from the overall improvement in environmental conditions. One key factor causing serious damage to biodiversity and to the ecosystems of water bodies was the disposal of very low-quality wastewater. As the quality of wastewater greatly improves, so does the health of biodiversity. The whole ecosystem shows symptoms of recovery, after long deterioration. Public awareness and better education help the governments to preserve biodiversity, as people take an active role in the process.

- *Southern Africa*

Collaborative conservation efforts between traditional practices and modern research methods result in a slowdown in the loss of biological diversity, while

widespread EIAs reduce loss of habitat. Cooperation in the management of migratory species, and the use of international instruments, such CITES, also result in the conservation of biodiversity.

- *Western Africa*

In the Great Transitions scenario, comprehensive policies and appropriate legislation are in force to protect special species of flora and fauna. Large tracts of lands, including wetlands, are under protection, to ensure that biodiversity is not destroyed by development activities. These successes are promoting ecotourism.

- *West Indian Ocean Islands*

No large mammals in this sub-region survived the previous era, apart from humans, and the region suffered serious loss of marine and bird life. However, in the Great Transitions scenario, institutions gather mating pairs of marine, land species and birds and—either by cloning from deep-frozen DNA or through natural breading programmes—achieve remarkable species survival. Following the establishment of a new regional government, there follows a re-transfer of pools of regenerated species. The pink pigeon becomes a regional icon, alongside the dodo. The invasions of vultures and other birds of prey, which created problems in Madagascar and the Comoros in the past, are dispersed, with the introduction of sparrow hawks and eagles. These also serve to provide natural control of the growing problem of urban pigeons, which are a hazard to humans and aircraft alike.

***Forests***

- *Africa*

In the Great Transitions scenario, real recognition is given to sustainable uses of forest resources for medicinal and other purposes. Consequently, sensitive and important habitats are protected. Communities are environmentally aware, and are empowered to care for the earth. Areas of forests increase and forest quality improves, as a result of the realization of the true value of forest resources, and improved forest management. Integrated and sustainable development management ensures minimal degradation of the human-environment system. Human and environmental vulnerability are minimized. The capacity of NGOs and civil societies is ennhaced, and they are empowered to play a more significant role in environmental management. Higher protection of the environment and of fragile ecosystems is the order of the day.

- *Central Africa*

This sub-region continues with the development and use of light technology by trained people, in order to make rational use of forest resources. The existence of centres and research institutes, and training in forestry (wood-based occupations), makes Central Africa a specialist in forestry training and research.

- *Eastern Africa*

The pressure on forestry resources in this sub-region is sustained and, in some areas, increased by events triggered by the Great Transitions scenario. Increased liberalization opens up the forest sector to both national and foreign direct investment for high quality logs. With the existing net deficit, increased investment in wood conversion tips the deforestation scale. However, the situation ameliorates in the latter parts of the second decade of the scenario, as private sector investment in the afforestation programme starts to yield some harvests. The emergence of regional blocks, such as the East African Cooperation (EAC) and the Inter-Governmental Authority on Development (IGAD), and associated free trade policies, also increase the movement of forest products from resource-rich member states to those with deficits, ranging from Uganda to Kenya, and Ethiopia to Eritrea. A lucrative trade with favourable tax incentives is the most likely to lead to mining of the resource. This is further exacerbated by the improvement in transport technology and systems, enabling faster movement of goods in the sub-region.

Technology development, however, negates some adverse impacts. Improved technology expands the scope of species utilized, and improves wood processing through recycling and the use of small-dimension timber and so on. Tree improvement biotechnology leads to high productivity plantations.

- *Northern Africa*

In the Great Transitions scenario, the rate of deforestation is greatly reduced, as governments of this sub-region strengthen and enforce legislation governing

the exploitation of forests. Better education and public awareness programmes—albeit relatively limited—teach people the importance of forest resources. Droughts and shortage of water resources seem to be the only factors hindering afforestation and reforestation efforts. Because the Northern African countries are able effectively to apply integrated water resources management techniques, they manage to restore the natural forests, or to grow human-made ones. In the Sudan, the value of gum arabic is not overlooked by the forest protection policy, as careful planning ensures the double benefit of producing the gum and preserving the forests.

- *Southern Africa*

Cheap micropower technologies gain prominence, reducing the pressure on forests for energy. There is significant growth in technologies, such as solar power, which do not need wood, and efficient wood stoves, such the 'tso-tso' stove, which requires very little fuelwood. The use of better fuels, and the adoption of better heating and cooking technologies, reduce both indoor and outdoor pollution, while concerted efforts by the developed world to reduce greenhouse gas emissions ameliorate the effects of climate change.

- *Western Africa*

As a matter of policy, every tree which is destroyed is replaced by two new trees. Not only is there reforestation, there is active afforestation. The benefits are felt throughout the sub-region, especially in the Sahel parts of Western Africa, where Burkina Faso, Mali, Niger, Mauritania and Senegal lead the way.

*West Indian Ocean Islands*

Massive reforestation is in hand, with the target of planting ten trees per person per year in the region over the next decade (2025–35). This ends the devastating decade (2015–25) of barbaric depletion of forests and woodlands.

***Freshwater***

- *Africa*

In the Great Transitions scenario, water remains vital to both the agricultural and the industrial development process. Unfortunately, a large proportion of the region is semi-arid, with very low annual rainfall. Droughts have, therefore, become a major feature of weather and climate all over Africa, and the effects have been difficult to contain. In many countries, there is uneven distribution of water and land suitable for agriculture, and this affects the potential of agricultural production. Serious stress on water occurs in countries such as Djibouti, Mauritania, Somalia, Algeria and Sudan, and in many countries in Western Africa, Southern Africa and Eastern Africa (Chenje and Johnson 1996). The problem of water shortages are carefully addressed and eliminated.

- *Eastern Africa*

Localized freshwater availability continues to be a problem, especially in the semi-arid parts of the sub-region (Somalia, Eritrea, Djibouti and north-eastern Kenya). In the Great Transitions scenario, investment in large-scale water redistribution schemes is likely to take place in the next 30 years, particularly focusing on the water of the Blue Nile and its tributaries. Large-scale irrigation schemes may be developed in the Ethiopian lowlands. Concerted diplomatic moves are witnessed in the direction of shared water resources, in order to increase equitable distribution in the sub-region. Sub-regional groupings around the shared water resources, such as the Nile Basin Organization (NBO), become stronger and more influential in driving economic development in the sub-region.

- *Northern Africa*

In the Great Transitions scenario, the existing water scarcity problem absorbs the full attention and consideration of governments in the sub-region. The sub-region takes sufficient measures to ease the problem, through careful and sustainable management of conventional water resources. Furthermore, the management of non-conventional resources—such as rainfall harvesting, desalination and water recycling—are implemented and adapted to the local conditions. The industrial revolution experienced in the sub-region helps to lower the cost of these new techniques, to the extent that they become affordable to many sectors. In addition, all the countries adopt integrated water resources management programmes to effectively manage all available water resources. In Egypt and the Sudan, the concept of integrated water resources management is extended across the boundaries of each country, to include the rest of the Nile riparian countries. The experience gained whilst implementing

integrated water resources management procedures is exchanged by experts during regular meetings organized at the sub-regional level.

- *Southern Africa*

Water scarcity is a big issue in Southern Africa, and may continue to be dominant during the next 30 years. In the Great Transitions scenario, for the sake of human sustainability, small-scale water-harvesting technologies may become prominent in the sub-region. Wasteful water consumption patterns, such as inappropriate irrigation practices, may slowly be replaced with more efficient systems, such as drip or micro-jet irrigation, as well as proper economic accounting and costing of water.

- *Western Africa*

With advanced water management and protection skills, there are freshwater supplies all year round, and they are available in all parts of the region. The net benefits are shared throughout the sub-region under the ECOWAS agreements and protocols.

- *West Indian Ocean Islands*

In the Great Transitions scenario, the hitherto lack of enforcement of public health legislation on water protection becomes a thing of the past. Governments call for community service orders to enlist communities in environmentally clean projects, as an alternative to custodial care.

***Coastal and marine resources***

- *Africa*

In the Great Transitions scenario, there is less pressure on coastal zones and lagoons. Effective integrated management leads to the sustainable use of coastal and marine resources, and the sustainable use and management of marine resources.

- *Central Africa*

The issue of coastal and marine erosion is reduced, as a result of to national and regional policies. However, the reconstruction of damaged areas requires some time.

- *Northern Africa*

The coastal and marine environments are very valuable resources to Northern Africa, and are well protected and managed. In the Great Transitions scenario, laws regulating coastal areas are issued, and are strictly enforced. New developments in sensitive areas are totally banned, and tight control is imposed on developments in other areas. Protection measures include: the prohibition of any direct disposal of all types of waste in the sea; rejecting licenses for projects which cause sedimentation or erosion of shorelines; and issuing guidelines to boats, divers and fishermen regarding safe practices in territorial waters and the protection of marine life. Despite the fact that water tourism is encouraged, strict guidelines for the development and management of tourism establishments in coastal areas, issued in order to minimize their impacts on the coastal environment, are willingly enforced.

- *Southern Africa*

In the Great Transitions scenario, the rates of coastal erosion are greatly reduced, thanks to effective national, regional and global policies. Greater environmental awareness results in the sustainable harvesting of marine resources, although more time is required to replenish stocks.

- *Western Africa*

A sub-regional policy is enforced, which provides that landlocked countries are as entitled to the Atlantic coast as are those actually adjoining the coast. Under this policy, there is a collective responsibility: to protect the ocean and waterways; to police the high sea for vessels which carry and dump hazardous waste; to control fishing; to build environmentally friendly harbors; and to keep beaches clean for tourism.

- *West Indian Ocean Islands*

In the Great Transitions scenario, a regional integration movement is revived to save the marine and coastal livelihoods of in-shore fisherman. There is a reawakening of interest in the development of deep-sea fishing, with the inauguration of the regional shoal world integrated satellite monitoring system (SWIMS), promoting fisheries and protecting endangered fish species. Equipment for detecting shoal size, species mix, age and edibility has the capacity to filter metal and plastic from the sea floor. This transforms coastal areas which were unregulated dumping grounds for domestic and industrial waste in the sub-region.

***Urban areas***

- *Africa*

In the Great Transitions scenario, the proportion of people living in urban environments increases. However, there are also marked increases in access to water and sanitation. There is a marked decrease in people living below the poverty line, and in people living in urban slums and unplanned settlements. There is also a greater control of waste management.

- *Central Africa*

Urban areas continue to grow, albeit under much greater control. The involvement of non-governmental actors is important, and improves urban management (access to land use, housing and social infrastructure dispositions). The system of revamping this sector functions, and reduces its effects on health.

- *Eastern Africa*

Nearly 50 per cent of the population in this sub-region are living in urban areas, attracted by increased employment opportunities and availability of services. The social infrastructure is overstretched for the next 30 years, as investment in infrastructure development continues to lag behind the population increase. The housing shortfall currently stands at about 35 per cent but, in the Great Transitions scenario, this certainly reduces, with more involvement of the private sector in the housing industry, despite the influx of people to urban centres.

- *Northern Africa*

In the Great Transitions scenario, the equitable distribution of public expenditure amongst urban areas, and the emphasis on underdeveloped areas, brings them to the same status. As the economic situation improves and many services become privatized, more people have access to and can afford the services. Unleaded petrol and natural gas widely replace other fossil fuels, as polluting industries are moved out of urban areas to newly and specially developed areas, where planning has taken environmental issues into consideration. Advancement in technology means that environmentally harmful equipment, such as air conditioning units, are replaced with new, safer technologies.

- *Southern Africa*

Urban growth continues, but in a more planned fashion, as more people become aware of the human risks and environmental dangers of shanty settlements. This awareness is supported by growth in incomes, which enable many to afford decent housing.

- *Western Africa*

Balanced and planned development activities and programmes in both urban and rural areas stem urban migration. Pressure on urban services is reduced. Rural areas experience a flow of former urbanites, especially retirees and young professionals, who are gainfully employed or re-employed in their own localities and communities.

- *West Indian Ocean Islands*

Urban regeneration programmes enrol groups of people in public works programmes. These lead to social education which transforms destructive tendencies to productive avenues for urban governance and the provision of services. Religious retreats—established in earlier years by fundamentalist groups of all persuasions, who were prepared to fight to the death for the preservation of rights—are transformed into business, educational and development retreats for reflection and social development projects.

## DISCUSSIONS AND SYNTHESIS

### Introduction

Humankind has, through the ages, employed various methods and devices to seek to know what the future holds. Indeed, there is a school of thought that humanity's concern with knowing the future, and the impulse to propitiate the future in order to avoid catastrophes and to produce blessings, may well have been part of the drive for knowledge. Be that as it may, any explorations about the future remain a major undertaking, and one which is designed to elucidate and educate. It is even more challenging when the subject of study concerns humanity in its domain, and humanity's ability to ensure self-preservation.

In our endeavour to chart a new course for the development of the African environment, we have made

recourse to all the tools available at our disposal. For instance, as Achebe and others (1990) wrote in Beyond Hunger, 'thinking about the future requires faith and vision, mixed with philosophical detachment, a rich emotional life and creative fantasy as well as the rigorous and orderly tools of science'. Consequently, in looking at the future of Africa from 2002 to 2032, we have combined all these efforts to produce quantitative descriptions and rich narratives of the various scenarios, which we believe will assist in the major steps that must be taken in the new millennium.

AMCEN's concern with developing an AEO represents a significant landmark in the region's development process. It should also constitute a threshold in the way in which we relate to the environment. It is this understanding that constitutes the framework for the analysis described in this chapter. The four scenarios—the Market Forces scenario, the Policy Reform scenario, the Fortress World scenario and the Great Transitions scenario—were developed to facilitate the discussions on the future of our environment. The scenarios are simple conceptualizations of how the environment might develop in the next 30 years. The truth is that this categorization is convenient, and is not meant to indicate some compartmentalization of the processes of change. As we have shown in the narratives, it is possible, even within countries, to find aspects of each scenario occurring. The Fortress World scenario—though a doomsday scenario, which is heralded by apathy and the neglect of issues of sustainability—has many features that are present today in the socioeconomic systems of many African countries.

Nevertheless, writing about the future can be one of the most dangerous undertakings, because the future is essentially unknown and uncertain. It can also be a very challenging task, because it can be full of suspense and surprises. This is our understanding. What we have provided in this work, therefore, is both the quantitative and qualitative evaluation of the future of our region, in the hope that the minds of people in positions of authority, who can make and execute policies, are drawn to the crucial issues raised regarding desirable and undesirable trends. In this final section, we shall attempt a recapitulation of the findings.

## THE SCENARIOS

We can draw some general conclusions from the scenarios about the state of the environment not only in Africa as a region, but also in its sub-regions. Some of these are:

- While some climatic change may be inevitable in Africa, the scenarios will differ mainly in the ability of different sub-regions to put into operation adequate strategies for coping with these consequences. African countries are very vulnerable to all forms of hazards and disasters.
- Tourism of all kinds may become a major force, promoting environmental change. However, the effects of tourism could be either positive or negative, depending on how its development is handled, as well as how equitably the benefits of tourism are shared.
- The land issue remains critical, as the need to ensure effective and acceptable land reform becomes crucial not only for rural areas, but also for urban land development.
- Water pollution is likely to emerge as a serious problem, in addition to water inadequacies in some regions. Consequently, controlling water pollution could have numerous advantages and benefits. For instance, limiting water pollution could offer opportunities for cost-sharing, as different groups might benefit.
- Associated with the land issue are the issues of deforestation and desertification, which have already become major problems in many parts of the region. Compounded by sourcing fuels through tree cutting and wood burning, the state of the environment remains one to be watched most carefully.

Nevertheless, the scenarios described in this work all have one thing in common. They are forms of peeping into the future from a current situation: the state of the environment. In other words, they are humanity's attempts to conceive the future for the purpose of evolving a society which benefits humankind, not only in our present circumstances, but also in all future endeavours. For this reason, the scenarios are greatly influenced by our current situation, and by the operating driving forces of the world economic system. In the context of Africa, the major driving forces are globalization and the

unsustainable level of the world environment system. While these represent major uncertainties, as we progress through the new millennium, they remain important considerations in the way in which they impact the environment at global, regional, sub-regional, national and local levels.

The Market Forces scenario is predicated on the assumption that existing strong linkages with international financial institutions, multinational corporations and global markets will continue to drive the world economic system which, in turn, will impact the African regional environmental system with its catalogue of goods and bads. Furthermore, there will be effective mechanisms through which environmental bads are processed and converted into forms that ensure the sustainability of the African environment. Even at the beginning of the 21st century, this assumption has become more theoretical than practical, both in its interpretation of the development process and in its attempts to order the impacts on the environment. In the African situation, market forces have brought more socioeconomic problems than were experienced in earlier decades, and people have neglected to consider the negative impacts of their activities on the environment. The peculiar position of Africa as the backwater of the advanced countries, coupled with the almost obliterating levels of poverty in the region, make consideration of environmental sustainability secondary. Market forces, consisting of economic principles of development, have always played themselves out to the detriment of African people. Africa and Africans continue to remain vulnerable to unrestrained economic exploitation of resources, and this trend leads not only to unsustainable patterns of living, but also to unsustainable assaults on the environment (see Figure 4.13).

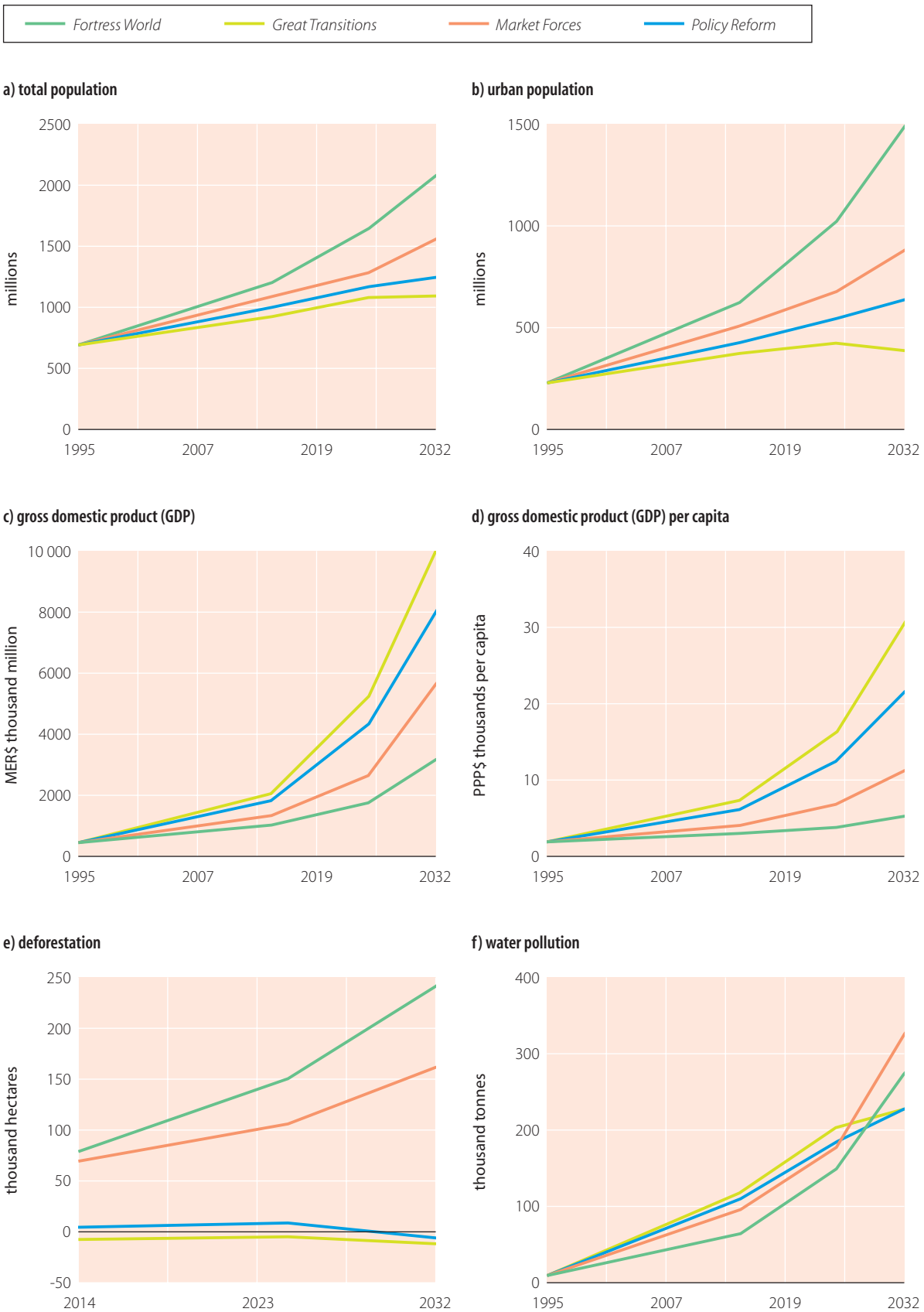
The Policy Reform scenario is a natural reaction towards seeking a balance between socioeconomic development and environmental sustainability. Current threats to the environment—as seen in rising levels of $CO_2$ in the air; the inability to manage all forms of solid and liquid waste, especially in the cities; the continued destruction of forests and biodiversity; and the decreasing levels of environmental health—are indications of the inability of market forces to order reactions to environmental sustainability. The Policy Reform scenario, therefore, proposes to achieve a balance in sustainable economic and social development while, at the same time, respecting many environmental issues. Under these conditions, targets are set by regional organizations, such as the OAU and AMCEN, and serious efforts are made to adopt Multilateral Environmental Agreements (MEAs) and protocols, and to make these operational. We are all witness to the fact that the ratification of these treaties is a far cry form their actualization in individual countries. Consequently, the problem remains of managing the environment in a sustainable manner through the mechanism of MEAs and policies (see Figure 4.13).

A major problem of the Policy Reform scenario lies in its inability to go all the way in outlining requirements for sustainable social and environmental development, partly because of the strong interplay of market forces in the scenario. There are also other political and national considerations in the implementation of MEAs. Furthermore, the danger also remains that inadequate and inappropriate attention to environmental issues, in the short term and in the long term, may lead to the breakdown of law and order. Many of the current tensions and disturbances in Africa may be traced to one form or other of the numerous environmental pressures in the region.

Of course, the movement to a Fortress World scenario is much closer than is usually envisaged. Wealth is distributed in a lopsided manner—between people, between urban and rural areas, and between regions—and it is difficult to introduce policies that can reasonable alter these distributions of wealth. Within any of these units, there are enough tensions to lead to a breakdown of law and order. And so the wealthy have already learned how to protect themselves. The crime levels in cities, and the fact that these are perpetuated openly, are indicative of a gradual breakdown of law and order, which could be a reaction against the society and those who manage it. It is, as yet, an unorganized reaction, but it is already a dangerous trend. Coupled with other forms of tensions—such as those which could arise from religion, and from political alliances which the wealthy have managed to exploit for selfish reasons—a Fortress World scenario is very much just around the corner.

The Fortress World scenario has the potential to destroy the environment and, possibly, the whole of humankind (see Figure 4.13). Since there will be no

**Figure 4.13 The Scenarios compared**



coordinated efforts to ensure environmental sustainability, the situation regarding most resources is one of overexploitation, either to meet the needs of the élite or to ensure the basic survival of the poor. Environmental conditions, therefore, deteriorate, as pollution, climate change, land change and ecosystem degradation interact to amplify the crisis. Environmental degradation, food insecurity and emergent diseases foster a vast health crisis, as both free market values and reformist tendencies become incapable of handling environmental externalities. The affluent minority, alarmed by rampant migration, terrorism and disease, reacts with sufficient cohesion and strength to impose an authoritarian Fortress World, where they flourish in protected enclaves. The fortresses are bubbles of privilege amidst oceans of misery.

The Great Transitions scenario, on the other hand, may arise from two totally unrelated considerations. Given that a Fortress World scenario is destructive to the environment and to humanity, it could be a harbinger of the urgent need for all humankind, including Africans, to seek alternative ways of managing the environment. Depending on the level of destruction that people's activities would have wrought on the environment by the time this need arises, a Great Transitions scenario may or may not be sustainable (see Figure 4.13).

On the other hand, the seeds of change are already being germinated all over Africa, and governments and NGOs are already aware of the need to evolve a new course and a new perspective on environmental and development issues. The intellectual community, too, as shown in various aspects of the description of the Great Transition scenario, are already clamouring for a new dictum on development. The honest ones among the developed countries already accept the fact that they have misled the developing world for too long (Gotlieb 1996). Africa's democratically elected leaders have also become more responsible and humane, and are anxious to subscribe to the issue of environmental sustainability. They, however, need to be convinced of the inability of the Market Forces scenario and the Policy Reform scenario to lead Africa to the promised land (see Box 4.3). Everybody detests the idea of a Fortress World scenario evolving and playing itself out in Africa.

Given the current trend in Africa and all over the world, it may be surmised that a Market Forces scenario may only be plausible within a short time—say, ten years—at about which point probabilities are high that a number of branching points will start to emerge. Possible branching points may include:

- Increasing social pressures for government reform, and more concerted attention to environmental and social issues. It is this that may lead to a full blown Policy Reform scenario.
- Increasing concentration of wealth and power. When posited with existing levels of corruption, there will be a breakdown in civil society and a rise in political anarchy. It is this that may lead to lead to the Fortress World scenario.
- Of course, widespread rejection of the 'IMF Dream', coupled with the development and adoption of new technologies, approaches and visions. This is what may lead to the Great Transition Scenario.

Nonetheless, the point being made is that the environment is so valuable and the inhabitants so precious that the future need not be left to chance or to some curious form of evolution. The scenarios described in this report have shown the unacceptability of a business-as-usual approach to environmental issues. It has also shown the inadequacy of an acceptance of a Policy Reform scenario. Something that has not worked in the past is not likely to work now or in the future unless the constraints that made it non-functional in the first instance are removed. Certain forces that militate against the removal of these constraints dominate the world political and economic system.

Africa has been very vulnerable to many events happening all over the world or within the region itself. For instance, the consequences of environmental disasters, such as floods and drought, continue to haunt the inhabitants of many countries, and remain one of the great challenges to governments. Of course, the problem of hunger is mostly felt in Africa, where more than 75 per cent of the population live below the poverty line. Many of these aspects of vulnerability have been discussed and described in Chapter 4, and need not be repeated here. But the lesson is that, unless concrete steps are taken in the way we use the environment, the sufferings and problems of the 20th century will be child's play compared to what lies in store. Wherein, then, lies our future in Africa?

For some time, the Great Transitions scenario may remain an enigma to both policy and practice. Yet

**Box 4.3 Disenchantment**

*'Development theory has undergone constant revision and has been informed by a broad spectrum of approaches. One can conclude that the problems of development are larger than the highly heterogeneous policies, plans and programmes undertaken by the full spectrum of economic approaches. It is increasingly evident that our understanding of the reasons why one-fifth of humanity enjoys unprecedented wealth while the other four-fifths live in various states of poverty and privation is incomplete. Clearly, conventional analyses of socio-economic, cultural, ecological and political phenomena are limited in their ability to elucidate the multiple problems we now encounter globally.*

*'The thesis presented here is that development itself, or at least the concepts we use to define it, are deficient. We can speak of a global problematic embodying three broad sets of phenomena; trenchant poverty, environmental degradation and socio-political unrest. Related to this problematic is existential malaise, particularly in those societies considered the most "developed". This global problematic is not transient. It speaks to profound issues about who we are that have become repressed in our individual and social consciousness.'*

Source: Gotlieb 1996

therein lies the hope for Africa and the African environment. It will remain an enigma for many reasons. First, it is going to be difficult to convince the peoples of Africa that the future of humankind lies in the Great Transitions scenario. Secondly, African countries are not all at the same level of awareness and socioeconomic development, so the idea of a Great Transitions scenario could still look like a dream to some. Furthermore, the expectations in the Great Transitions are things that take time to mature. Take, for instance, the issue of good governance, which democracy represents, and its almost universal acceptance as the best form of government to promote development. In recent times and in many countries, including some Indian Ocean Islands, there have been reports of military takeover of governments. It is, therefore, possible to expect that, even when there could be a belief in the principles of the Great Transitions scenario, the playing field in Africa is far from level. There is a need to emphasize the need for this awareness. Wherein lies the future of Africa?

In order to answer this question meaningfully, we like to draw on the relationship between the Policy Reform scenario and the Great Transitions scenario. Both scenarios are forms of 'backcasting' (see Figure 4.4), whereby desirable futures, and device mechanisms for manipulating the system to meet targets, are defined. The future of the African environment lies in the ability of governments and ministers of the environment to appreciate that current policies and practices remain grossly inadequate when it comes to meeting the demands of a sustainable environment. There are many MEAs currently in operation. These agreements and protocols were designed to assist Africans to cultivate some respect for the environment. We have shown that current rates of population growth, and the demand on resources, render these efforts inadequate. Of course, many of them are a distant cry from what is required to move towards a Great Transitions pattern of environmental sustainability. As a first step, governments should review these MEAs, and create mechanisms in order to ensure their compliance by differ-ent countries in the region. Governments should:

- devise systems for identifying requirements for a sustainable environment;
- set new targets based on the requirements of a Great Transitions pattern of environmental growth (see narratives);
- design mechanisms to steer national, sub-regional and regional poli-cies towards meeting these new targets (this could imply the institution of new memorandums of understanding, based on the new environmental standards); and
- encourage governments in different countries to manage their environments conscientiously, in line with these new standards and targets.

## CONCLUSION

The goals of sustainable development are summarized in *Our Common Future*, or the Brundtland Report, which states that we must meet 'the needs of the present gen-eration without compromising the ability of future generations to meet their own needs'. These needs could be economic, political, socio-cultural and ecological. Thus, the management of the environment has always presented people with many problems and

challenges, largely because of its complex nature, and of the com-plex interactions and relation-ships within it. Furthermore, since environmental management value-laden, there is usually more than one way of conceptualizing and expressing the value of the envi-ronment and its resources. The result is that environmental management normally requires that we deal with several elements of the envi-ronment, and with several perspectives reflecting the different concepts and perceptions held by dif-ferent societies, belief systems and interests.

We have constructed scenarios from: our understanding of current conditions and driving forces; a vision of the future; and a coherent story of a process of change, leading to that future. We have used both imagination and science as ingredients for generating effective scenarios, and we have made quantitative assumptions across a range of dimensions: eco-nomic growth and struc-ture, popula-tion, technology, resources and the environment. We have used the scenarios to take the inherent uncertainty in future development as the point of departure, and to seek to formulate plausible stories about alternative possibilities that can emerge from current conditions and driving forces.

As a first step in scenario development, we need to be able to calibrate relationships between the more dis-cerning vari-ables or driving forces with what occurs in real-life situations. While data currently preclude a full investigation along these lines, they are undoubtedly necessary for the future development of scenarios. However, for studies which link vulnerability to scenario development, we need to be able to define the stress variables, such as people under stress for water or people living within a certain distance of a potentially dangerous hazard.

Nevertheless, there seems to be no time more opportune than now to discuss issues that affect the sustainability of the African environment. The reasons are many, but perhaps most important is that there is a unity of purpose in the minds of African leaders on the urgent need to eradicate poverty from the region and to give development a much-needed direction. For instance, NEPAD seeks 'to build on and celebrate the achievements of the past, as well as reflect on the lessons learned through painful experience, so as to establish a partnership that is both credible and capable of implementation. Africa must not be the wards of benevolent guardians; rather they must be the architects of their own sustained upliftment' (authors' emphasis). Furthermore, NEPAD centres around African ownership and management, issues that were considered germane to development of a Great Transitions scenario.

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