



CHAPTER 8

INTERLINKAGES: THE ENVIRONMENT AND POLICY WEB

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“Environment and development are not separate challenges; they are inexorably linked. Development cannot subsist upon a deteriorating environmental resource base; the environment cannot be protected when growth leaves out of account the costs of environmental destruction.”

WORLD COMMISSION ON ENVIRONMENT AND DEVELOPMENT (WCED 1987)

INTRODUCTION

Understanding the big picture of the human-environment nexus, with its complex interactions in and across ecosystems as well as in and across human systems, is essential if policy and action responses are to contribute to the goals of sustainable development and improved human well-being.

The need to focus on interlinkages and interdependencies in environmental problem solving and in defining opportunities moved to the centre of policy concerns with the 1987 report of the World Commission on Environment and Development (WCED) (also known as the Brundtland Commission) *Our Common Future*. The Brundtland report emphasizes that Africa, along with all other regions of the world, does not face separate challenges: “An environmental crisis, a development crisis, an energy crisis. They are all one” (WCED 1987).

These links, between challenges in different sectors, are the basis of an interlinkages approach. In making the case for such an approach nearly two decades ago, and long before the term came into vogue, the Brundtland Commission’s visionary and agenda-setting report, identified the relationship between different sectors and the need for planning, decision making and policy frameworks that take account of these links:

“These problems cannot be treated separately by fragmented institutions and policies. They are linked in a complex system of cause and effect.”

and

“Economics and ecology must be completely integrated in decision making and law making processes not just to protect the environment, but also to protect and promote development.”

Environmental problems are never strictly linear, even though some cause-and-effect relationships can be shown, but are a part of a complex web of interactions. This chapter highlights some of the challenges facing Africa which have strong links to the environment. Some of these challenges are analysed sectorally or thematically, but they are all interlinked. Finding opportunities for improved environmental management, as well as for human development, almost always goes beyond any given sector, demanding that new levels of cooperation and collaboration are found in governance, in policy responses, and in environmental management.

Deforestation, for example, is not just about trees but about changing forest landscapes and ecosystems which have implications for biodiversity and water catchment management. Deforestation may increase

Chapter 8 • Interlinkages: The Environment and Policy Web

run-off, thus accelerating soil erosion and siltation of rivers and lakes (WCED 1987); it may also affect soil fertility. In addition to these biophysical interactions, there are also links between forest changes and human society. Deforestation may be the product of multiple and interlinked changes in human society, including the lack of livelihood options, new pressures brought about by demographic changes, an economic environment that does not support value-adding activities and thus results in ever higher levels of harvesting, and so on. It may also affect human well-being by closing some opportunities, threatening cultures and knowledge systems closely related to forest resources, undercutting agricultural and livestock productivity, and increasing poor health as access to medicinal plants, wild meat and wild fruits that supplement local diets are lost.

By adopting an interlinkages approach to the challenges facing Africa, policy may maximize the opportunities across a number of domains.

BUILDING INTERLINKAGES

An interlinkages approach recognizes the complexities inherent in ecosystem dynamics and their interface with the equally complex social, economic and political dynamics inherent in human development and governance, particularly policies, laws and institutions. Its value lies in the dynamic understanding and problem solving opportunities it brings to addressing complex cross-sectoral issues. The interlinkages concept stresses the importance of coordination of action across the relevant dimensions of sustainable development including environmental, social and economic issues.

Developing an interlinkages approach requires addressing the complexity of environmental challenges. Box 1 defines interlinkages.

In each situation, policymakers and resource managers will need to determine the appropriate level of interlinkages to address any particular problem. This will need to take into account the multiple scales of interaction, the high incidence of non-linear trajectories, uncertainty, time lags, and the common and conflicting interests of multiple stakeholders (Sayer and Campbell 2004). Successful approaches involve considering, among other things, that:

- Trade and investment, research and development, science and technology, and health and poverty are all important interlinked drivers of environmental change with both positive and negative impacts.

- Green environmental issues are linked to brown environmental issues, such as pollution and solid wastes, both impacting on the environment and on development opportunities.
- Processes which improve cooperation between science, policy making, practice and management can create robust and dynamic response systems that provide for better understanding of the issues and more effective responses (Keeley and Scoones 2003).
- In any given situation, there may be multiple knowledge systems related to environmental management; different stakeholders may have different interests and values, indicating a need for processes that not only recognize, but also mediate and make trade-offs between these interests.
- An added challenge is that institutions – laws and policies – operate at multiple scales. The reach and jurisdiction of organizations also vary considerably and thus interlinkages in governance are important.
- Opportunities for improved participation and the recognition of public values, concerns and priorities in shaping policies are necessary to create linkages between these diverse levels, and to build collaborative and sustainable governance and management systems. These responses should include creating opportunities for participation in regional and sub-regional processes as well as creating more effective decentralization and devolution policies at the national level.
- The complexity of environmental problems – and thus the identification of opportunities – needs to be

Box 1: Interlinkages defined

The United Nations University (UNU) has defined interlinkages as:

“A strategic approach to managing sustainable development that seeks to promote greater connectivity between ecosystems and societal actions.”

Practically, this requires a greater level of cohesiveness among institutional, and environment and development responses to the challenges of sustainable development. Additionally, linkages between international, regional and national mechanisms need to be made. The key to developing a strong interlinked approach to sustainable development is the identification of the inherent synergies that exist between different aspects of the environment and an exploration of the potential for more effective coordination between sustainable development issues and their responses.

Source: Malabed 2001

addressed through, among other things, analysing the interlinkages between and among the biophysical aspects of the environment and existing policy responses, including sub-regional, regional and international multilateral environmental agreements (MEAs), and institutions in the different sectors and at different levels, and how these affect the sustainability of the environment-human complex.

- Variations in temporal and spatial scales between different changes within the environment-human complex will need to be identified. Focusing on a

single scale may obscure processes that only become obvious at finer or broader scales (Lovell and others 2003). Changes within natural systems and human systems occur at different temporal and spatial scales; for example, environmental shocks are episodic, rainy seasons are cyclic and droughts are stochastic. Stochastic events are those having a random probability distribution or pattern that can be analysed statistically but not predicted precisely. The spatial range of impact of these phenomena may vary. The multiple links between local

Box 2: Interlinkages in progress towards eradicating Guinea-worm disease

Guinea-worm disease is a debilitating and painful infection caused by a large nematode (roundworm), *Dracunculus medinensis*. It is a parasite and people are the only known host.

In the 1950s there were about 50 million cases. However, as a result of concerted efforts by the international community and the endemic countries, the number of cases of Guinea-worm disease was reduced to about 96 000 by 1999. In 2005, Guinea-worm disease was prevalent in only 13 countries in Africa including Sudan, Nigeria, Ghana, Burkina Faso, Niger, Togo and Côte d'Ivoire. A small number of cases have also been reported in Uganda, Benin, Mali, Mauritania, Ethiopia and Chad. Sudan has about 73 per cent of all reported cases. Efforts to eradicate Guinea-worm in Sudan have been affected by prolonged civil war.

The disease begins with a blister and close to the time of its eruption, the infected person may experience itching, fever, swelling and burning sensations. Infected people commonly try to relieve the pain by immersing the infected part in water, usually open water sources such as ponds and shallow wells. This stimulates the worm to emerge and release thousands of larvae into the water, which are ingested by water fleas, where they develop and become infective in two weeks. When a person drinks the water, the water flea is dissolved by the acidity of the stomach, and the larva is activated and penetrates the gut wall. It develops and migrates through the subcutaneous tissue. After about one year, a blister forms and the mature worm, 1 m long, tries to emerge through the skin, thus repeating the life cycle.

For people with no access to medical care, healing of the ulcers can take several weeks. The disease can result in bacterial infection, stiff joints, arthritis and permanent



Village-based volunteers demonstrating the use of a cloth filter on a clay pot to filter drinking water.

Source: WHO

debilitating contractures of the limbs. It has serious adverse effects on health, agricultural production and school attendance. People in endemic villages are often incapacitated during peak agricultural activities; this affects agricultural production and the availability of household food, and consequently the nutritional status of their family, particularly young children.

The World Health Organization (WHO), in collaboration with other international organizations, non-governmental organizations and national governments, has adopted an eradication strategy, based on community surveillance in every known endemic village. Specific interventions include health education, case containment, community-based surveillance systems and provision of safe water, including the use of filtering devices and chemical treatment of water sources. This requires a multipronged interlinkages approach.

Chapter 8 • Interlinkages: The Environment and Policy Web

livelihood sustainability and global climate change indicate the complex and multilevel interactions and interlinkages between human and environmental systems.

The interlinkages concept promotes building cooperation across institutional boundaries and between different interests at and across multiple scales. It can, for example, be used to establish links and build synergies between departments of meteorology, water and agriculture in addressing issues related to water availability, distribution, allocation and use. In some circumstances, institutional links between institutions and organizations operating at different spatial scales will be required. Water basins, for example, cut across national boundaries and there are multiple users and stakeholders. The progress made in eradicating *Dracunculus medinensis*, Guinea worm, lies in the strong interlinkages approach taken between different sectors, such as health, education and water management, and across countries, as shown in Box 2.

A key objective of the interlinkages approach is to demonstrate the importance of the environment and its sound management to other sectors, and thus to ensure that holistic approaches are taken to problem solving so that advancements can be made in human well-being, human vulnerability to environmental change can be minimized, and the environmental base can be sustained. Box 3 emphasizes the environment-economy-human well-being interlinkage identified by the Brundtland Commission, which has since gained wide recognition in many global, regional and national policies and strategies.

Various global and regional policy responses, such as the New Partnership for Africa's Development (NEPAD) framework, the Millennium Development Goals (MDGs), and the World Summit on Sustainable Development (WSSD) Johannesburg Plan of Implementation, individually and collectively, provide opportunities for enhancing synergies, promoting interlinkages among the environmental challenges, and mainstreaming the environment within and across institutional, temporal and spatial boundaries. Box 4 highlights some of the interlinkages related to the implementation of activities, at a national level, to address the MDGs and demonstrates that the appropriateness of such an approach will vary from country to country.

Adopting an interlinkages approach in the formulation of policy and the development of programmes can help to ensure that interventions are more relevant, robust and effective, and that these policies are based on principles that are cross-sectoral

Box 3: Ecology and economy: dual factors in improving human well-being

"Economy is not just about the production of wealth, and ecology is not just about the protection of nature; they are both equally relevant for improving the lot of humankind."

"... the distribution of power and influence within society lies at the height of most environment and development challenges. Hence new approaches must involve programmes of social development, particularly to improve the position of women in society, to protect vulnerable groups, and to promote local participation in decision making."

Source: WCED 1987

and interdisciplinary. This approach can also help to sharpen the focus of policy and action, while at the same time ensuring that spatial and temporal factors across multiple sectors and ecosystems are also fully considered. Interlinkages may help bring into focus certain issues, such as gender, that are often neglected. When effective institutional systems are developed to implement an interlinkages approach, it can give policymakers the advantage of having a better grasp of the range of options available, the costs and benefits of their decisions, and how to determine the interdepartmental links that are necessary to promote "joined-up policies."



Ensuring access to safe and clean water requires taking into account technology, gender issues and water tenure regimes at the national and local level. An internally displaced woman takes water from a well (provided by ACT) in Muacanhica, Moxico province, Angola.

Source: P. Jeffrey/ACT

Box 4: Interlinkages for health-related MDGs

The pursuit of the health-related MDGs may demand interventions based on interlinkages between different governmental institutions. In any given case, several different government departments' or agencies' mandate might be directly relevant to meeting the targets associated with the different goals. The choice of vehicles for these interventions may differ not only between sectors, but also at different phases of the intervention. Interlinkages between ministries and sectors will thus be vital for policy making, planning and evaluation, but the delivery of operational services may be best undertaken by one institution with integrated powers and resources.

Goal 4 of the MDGs focuses on reducing child mortality. Target 5 seeks to reduce under-five mortality rate by two-thirds from 1990 to 2015. The incidence of infant mortality varies greatly across the region, ranging from an infant mortality rate of 165 in every 1 000 in Sierra Leone, to 84 in every 1 000 in Madagascar, and 17 in every 1 000 in Mauritius. The interventions necessary to achieve this MDG target vary from country to country, depending on the levels of child health already achieved and on the primary causes of death.

In some countries, such as Seychelles and Mauritius, the principal interventions might focus on further developing the already high technology neonatal care services available in the highly specialized national paediatric units and on providing rapid emergency transport to ensure that the most vulnerable small and sick babies are referred from community services to the centralized specialist units. These specialized services in most African countries are largely controlled, funded and managed through a central health ministry. Interlinkages with other ministries and sectors are not the principal mechanism for achieving this MDG in these countries.

In countries where the infant mortality is very high, and closely linked to environmental factors, the principal interventions may be the provision of safe water, controlling atmospheric and other pollution, improved sanitation, better nutrition and providing basic primary health care to urban and rural areas. Ministries of health are not responsible for water, sanitation and food, but have an important role to play in promoting the development of the services and supporting their colleagues at cabinet level, so that they have the necessary funds and technical support to accomplish the task. Interlinkages to achieve these health objectives are vital at the policy and planning stages, as the delivery of many of these services depends on the work of ministries other than health.

Source: Roberts 2004

IMPROVING UNDERSTANDING THROUGH INTERLINKAGES

A myriad of social and economic factors, ranging from demographic changes, poverty and health, industry and trade, economic liberalization including structural adjustment programmes (SAPs) and resource extraction impact on and shape the environmental challenges facing Africa. Thus understanding problems and defining effective responses to the challenges presented often requires multilevel and inter-sectoral cooperation.

Directly and indirectly, anthropogenic activities affect ecosystem health and productivity. Economic factors, particularly trade, and science and technology, are major recurring themes that affect, and in many cases exacerbate, problems.

A key challenge facing Africa is the entrenched nature of poverty, which traps people into unsustainable livelihoods and perpetuates their dependency on the primary use of natural resources. This subsistence-based existence is further compromised by extreme weather events, such as droughts, and cumulative environmental change. Box 5 highlights the interlinkages between environment and human society and looks at how environmental change and in particular the disappearance of the Alemaya lakes in the Ethiopian Highlands has changed the lives of more than half a million people of that area.

DEMOGRAPHIC AND ENVIRONMENTAL CHANGE

Demographic change impacts on the environment in many ways. The relationship between demographic factors and the environment is multidimensional and is affected by change in other sectors including trade, economic activity, investment, research and the development of technology. Poverty, health and governance systems are also closely linked to how demographic changes will impact on the environment.

Population growth and density is one of the most important drivers of environmental change in Africa, particularly as this relates to the exploitation and use of the environment as well as to waste generation and its management. In the last two decades (1980-2000), the population of Africa grew from 469 million to 798 million (FAO 2003), increasing demand for food, water, arable land and firewood as well as other material needs such as education, health care, housing, energy, transport and infrastructure. Related activities in, but not limited to, industry and trade create new environmental pressures and thus, if poorly managed, economic growth can negatively impact on the environment.

Expanded economic activities which are poorly planned and inadequately monitored can place increased pressure on ecosystems, including forests and woodlands, and coastal and marine areas, through the loss of biodiversity, habitat degradation, and water, land and air pollution. However, the pressure placed on the environment by a growing population is exacerbated by the lack of alternative livelihoods. Limited opportunity for adding value to natural resources harvested and an economy that encourages the export of unprocessed materials may lead to ever-

Chapter 8 • Interlinkages: The Environment and Policy Web

increasing harvests. Increased use of natural resources, for example the use of biomass in many cities in Western Africa for charcoal production to meet growing energy needs, is a result of the lack of alternative clean and environmentally friendly energies, which in turn can be attributed to the lack of investment in research and development.

The degradation of natural resources may adversely affect the very livelihoods dependent on them, forcing people to develop coping strategies that can be

detrimental to ecological sustainability. The Commission for Africa (2005) finds that moving to cities is one such coping strategy. The inability of natural resources to meet needs may be more than just a matter of availability of resources but a feature of access and distribution patterns. Insecure tenure and laws prevent rural people from managing and using natural resources as assets. This undercuts productivity and efficiency. In 1980, only 28 per cent of Africans lived in cities; however by 2030, the proportion of

Box 5: Environmental change impacts lake population in Ethiopian Highlands

The Alemaya lakes in the Ethiopian Highlands originally covered more than 175 140 ha but had shrunk to 87 910 ha in 1985 and to a mere 58 600 ha in 2002. It is now believed that the lakes have all but completely dried up.

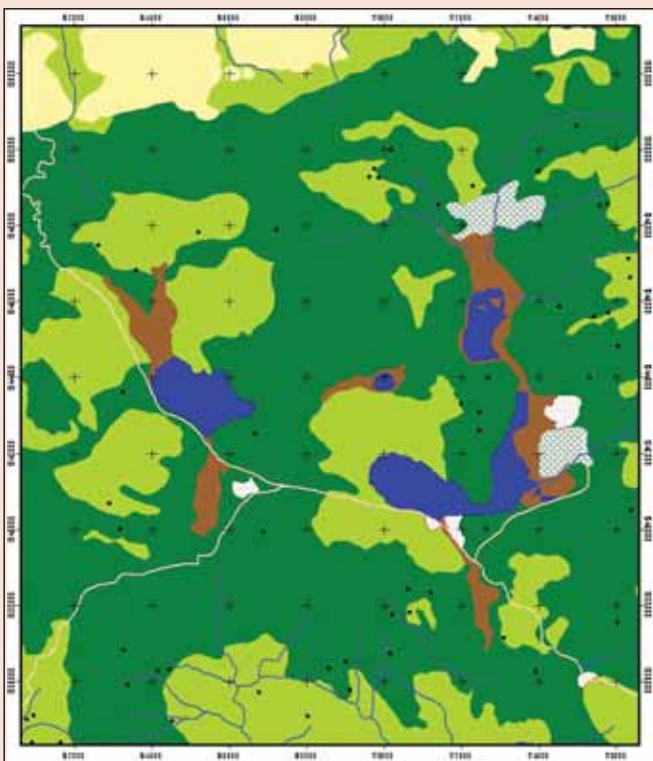
The loss of the lakes, which were a source of drinking water and were used for irrigation and fisheries, has affected the livelihoods and well-being of more than 550 000 people in the Ethiopian towns of Alemaya and Harar. Irrigation has had to be discontinued, effectively eliminating the supply of fresh vegetables and fruits in both towns. The

people also no longer have access to fresh fish from the lakes.

Preliminary research seems to suggest that serious siltation has been a major factor in the destruction of the lakes. A dramatic increase in urban and rural settlements is also believed to have put tremendous pressure on natural resources in the area, including water resources. Engineering works, including the construction of roads and other infrastructure, may have led to the loosening of topsoil, leading to soil erosion and siltation of the lakes. The images below show the dramatic environmental change between 1985 and 2002.

Source: RCMRD 2005

Alemaya Lakes area – land cover map 1985



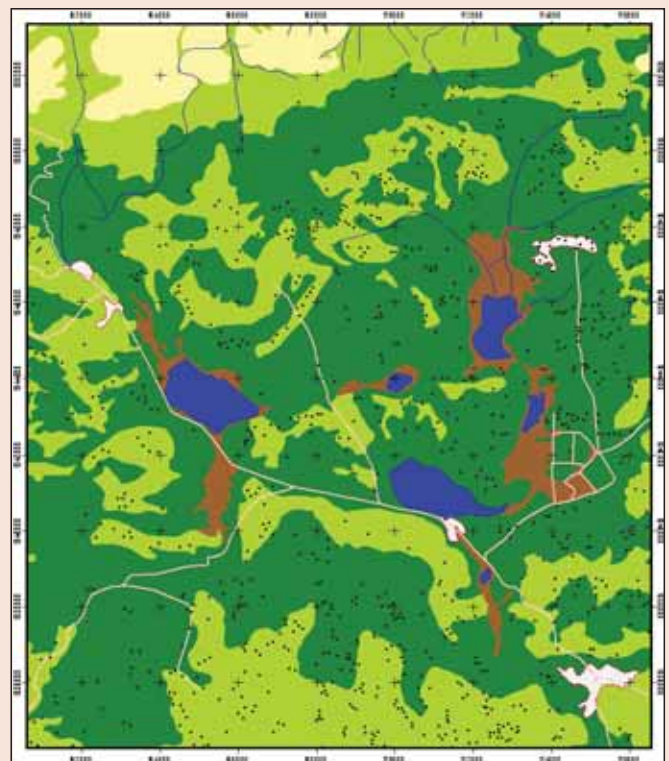
Legend

• settlement	■ lakes	■ shrubs
— rivers	■ original lake	■ towns
— roads	■ limestone	■ grasslands
	■ farms	

Scale 1:600,000
0.8 0 0.8 1.6 2.4 3.2 4 kilometres

Map prepared by: Regional Centre for Mapping of Resources for Development

Alemaya Lakes area – land cover map 2000



Legend

• settlement	■ lakes	■ shrubs
— rivers	■ original lake	■ towns
— roads	■ limestone	■ grasslands
	■ farms	

Scale 1:600,000
0.8 0 0.8 1.6 2.4 3.2 4 kilometres

Map prepared by: Regional Centre for Mapping of Resources for Development

Governments and communities are faced with the difficult choice of reaping the immediate value of forest conversion against the values of maintaining forests.



Clear-felling of forests for agriculture.

Source: C. Lambrechts/UNEP



Slash-and-burn of indigenous hardwood forests, Liberia.

Source: Y. Katerere



Harvesting of timber logs from old forests for commercial sale.

Source: J. Maillard/ILO

Africa's urbanized population is expected to reach 53.5 per cent, compared to 39 per cent today (compiled from WRI 2005). Africa is the fastest urbanizing region in the world and it is also one of the poorest. Although urbanization is closely associated with people seeking new livelihood opportunities, rapidly growing urban environments may not be able to provide these. Urbanization may create new pressures on existing infrastructure, leading to the spread of informal settlements. Some 72 per cent of Africans living in urban areas live in slums without access to basic environmental or social services (UN-Habitat 2003). Urban livelihoods in Africa are often characterized by worsening standards of human well-being including:

- Inadequate access to shelter and security of tenure, and all the problems associated with overcrowding;
- Growing vulnerability to environmental health problems and natural disasters;
- Growing inequality and increasing crime and violence, which have a disproportionate impact on women and the poorest of the poor; and
- A lack of community participation in decision making (UN-Habitat 2003).

The extreme deprivation of health, education and other services as well as poor social relations makes breaking out of poverty difficult. These factors, along with the lack of opportunity available to poor people, have heavy environmental costs.

In the absence of viable alternative livelihoods, urbanization may, in itself, constitute an increased pressure on natural resources through direct and indirect use. Inadequate urban planning, including poor infrastructural development, and the inability of the economic sector to fully absorb growing needs, means that urban populations continue to rely on natural resources as a source of supplementary income. This may include collecting natural resources, such as wild fruit and firewood, for immediate domestic use or as the basis for commercial activity. Urban agriculture is a particularly important phenomenon. In Northern Africa, urbanization is leading to the loss of fertile land, desertification, soil erosion, clearance of forests and woodlands, and pollution of surface and groundwater. In Southern Africa, as shown in Box 6, SAPs resulted in more poor people in urban areas engaging in agriculture.

There can be remarkable damage to marine and coastal ecosystems from urban expansion and sprawl in coastal zones, as shown in Chapter 5: *Coastal and Marine Environments*. Coastal and marine pollution, and the resulting degradation of water quality, are

Chapter 8 • Interlinkages: The Environment and Policy Web

Box 6: Environmental and social impacts of urban agriculture

In Zimbabwe, both cropping and animal husbandry are practised extensively in cities, primarily in order to supplement nutritional needs. Women are the main participants in urban agricultural activities, possibly due to economic disadvantage, the lack of alternative opportunities and women's role in household food provision and preparation.

Urban agriculture provides important opportunities for poor people. Low-income households engaged in urban agriculture are generally better off than those not engaged in agricultural activities: they tend to have more meals per day, they can afford to purchase protein-rich foods, and they exhibit better overall health. Economic outputs are significant and self-production of food allows low-income households to save money on foodstuffs.

In the affected areas, no conservation measures were found. Urban agriculture was found to:

- Affect the cost of urban management (eg run-off increase leading to increased costs of infrastructure maintenance such as water purifying tanks);
- Result in nutrients accumulating in water bodies. Organic elements found in water were too high for human consumption, irrigation use or support for aquatic life;
- Deprive the soil of nutrients; and
- Result in tree loss from the opening up of land for agricultural production.

Source: IDRC 2002

driven by urban, residential and industrial wastes from inland systems as well as from coastal cities. Growing urban areas attract major industrial clustering. In many countries, industrial and mining activities contribute significantly to water and atmospheric pollution, placing new burdens not only on the environment and human health but also on already struggling public sector institutions, such as health services and local government institutions, which are often responsible for regulating and managing pollution management. In Eastern Africa, the clearance of mangroves for urban settlements is affecting marine and coastal ecosystems.

These environmental problems are not simply the result of population growth, but are closely linked to other social and economic factors. For example, the lack of adequate investment in infrastructural development

that can support these growing communities is an important factor contributing to the lack of economic opportunity, high environmental costs and thus low levels of human well-being. High transportation costs in Africa have a severe impact on trade (UN Millennium Project 2005c), increasing the costs of products and suppressing demand. The railways and roads put in place in colonial times were primarily designed to transport minerals and other raw materials to the ports for shipping to Europe. They were not designed to encourage trade among African sub-regions. Africa's transport costs – local, national, regional and international – are twice or more than those of Asian countries (Commission for Africa 2005).

The short-term positive human well-being gains and the negative environmental costs demonstrate the need for policy approaches that can create a win-win situation. Chapters 2-7 of Section 2: *Environmental State-And-Trends: 20-Year Retrospective* consider the opportunities presented by environmental goods-and-services for human development.

INNOVATION AND ENVIRONMENTAL CHANGE

Innovation drives human society, but brings with it both benefits and costs. Science and technology can be a double-edged sword, sometimes pushing forward economic opportunities through new applications and products, and sometimes causing adverse environment effects, such as pollution. However, improved knowledge, especially in the context of a strong science-policy link, based on African priorities and inclusive of public, private and civil actors, can lead to important initiatives that support sustainable development by addressing key challenges.

Many policy initiatives, including the WSSD Johannesburg Plan of Implementation and NEPAD, address this urgent need for investment in science and technology. Nevertheless, it is important not to see science and technological development as a silver bullet. Chapters 9 and 11 look at the challenges and opportunities of science in relation to genetically modified crops and chemicals, respectively.

One of the many benefits of science has been the improvement in society's ability to respond more effectively to environmental change and shocks. However, the opportunities available to Africa remain constrained due to low levels of technological and overall development and this has far-reaching adverse consequences for both ecosystems and human well-being. Disaster preparedness and response are closely linked to levels of investment in science and technology, and to governance systems. In much of Africa, the



Hafun village. The aftermath of the 26 December 2004 tsunami that travelled across the Indian Ocean from Indonesia to Africa hitting a 650-km stretch of coastline in north-western Somalia.

Source: UNHCR

capacity for resilience is further undermined by a variety of socioeconomic factors including poverty and the lack of public access to information and knowledge in vulnerable areas. The high level of vulnerability to environmental changes has consequences at multiple

levels – and many African countries' economies are particularly susceptible, as shown in Boxes 7 and 8. These Boxes demonstrate the importance of an interlinkages approach in both problem analysis and in finding solutions: scientific and technology interventions that take into account the social and economic realities should be prioritized over the importation of technologies developed elsewhere, and closely linked to economic, environment and development strategies. Investment in education as well as in public institutions is essential.

Responding appropriately to the challenge of climate change, declining rainfall and desertification is one area where the need for increased understanding is necessary for developing appropriate early warning and mitigation strategies. The web of intertwined negative impacts of climate change is depicted in Box 7. The multiple impacts, across sectors and at different levels, indicate the need for an interlinkages approach to both research and response.

ECONOMIC AND ENVIRONMENTAL CHANGE: THE REACH OF GLOBAL POLICY

Economic activities straddle national boundaries and are affected by global, regional and national processes. Global policies and practices have direct impacts, at national and regional levels, on environmental sustainability and human well-being – sometimes

Box 7: Climate change-related interlinkages in the Sahel

In the Sahel, there has been on average a 25 per cent decrease in rainfall over three decades. Climate variability and the frequency and intensity of severe weather events are projected to increase. Africa is likely to get drier in northern and southern latitudes and wetter in the tropics. Projections further indicate that there will be variation within regions and countries: Southern Africa may be drier as a whole, but some countries may be wetter than average.

Rising sea levels, coastal erosion and flooding are projected to adversely impact coastal communities and economies. Climate-induced changes to crop yields, ecosystem boundaries and species ranges will all dramatically affect the distribution and productivity of agriculture. Climate-related threats to food security, water and energy security and the increased incidence of vector- and water-borne diseases will further undermine Africa's ability to develop. Globally, an additional 80 million to 125 million people will be at risk of hunger by 2080 – up to 80 per cent of whom will be in Africa because of its dependence on ecosystems that will be the first to disappear.

Source: Commission for Africa 2005

Chapter 8 • Interlinkages: The Environment and Policy Web

increasing opportunities, but at times decreasing opportunities. An interlinkages approach can be effective in maximizing opportunities and minimizing negative impacts. Such an approach can offer opportunities for a better understanding of the global-regional-national links and set the basis for more effective institutional and policy responses.

Africa has made dramatic economic improvements since 2002 – in addition to impressive growth rates, inflation is also at an all-time low. In 2004, Africa achieved a growth rate of 5.1 per cent (OECD Development Centre and AfDB 2005), the highest in the last five years and significantly higher than the rates of 3.7 per cent in 2003 and 2.9 per cent in 2002 (AfDB 2004). However, the challenges facing Africa remain immense. Despite the richness of its biological, mineral and human resources, the region remains poor and levels of human well-being are in decline for many countries (UNDP 2005). The 2005 Human Development Index (HDI) shows that more than 20 countries in sub-Saharan African (SSA) have suffered dramatic reversals in human development since 1990. Sub-Saharan Africa must grow an average 7 per cent per year to reduce poverty by half by 2015 (AfDB 2004). Food insecurity threatens millions each year, especially in the Horn of Africa and Southern Africa.

Africa is home to more malnourished people than any other continent (UNEP 2005) and hosts 27 per cent of those who lack access to safe water at the global level (World Bank 2004).

Africa and its people face many obstacles in turning their natural assets into wealth. These have their roots in policies and practices at the global level: the arenas of international trade, development aid, and international finance and investment influence the broad economic and political setting that Africa finds itself in, places it at a distinct disadvantage and perpetuates poverty (WRI and others 2005). Africa's economic, political, social and cultural systems are increasingly susceptible to globally-driven policies due to globalization. Box 8 shows how closely linked national economic performance is to the global economy as well as to environmental change. The challenge for Africa lies not only in how to make economic activity more efficient, in terms of production and environmental costs, but also in how to deal with the ramifications of global imbalance and its impacts on sustainable development and human well-being. The opportunities offered by globalization need to be harnessed while, at the same time, Africa must take measures to protect and cushion itself from potential negative effects.

Box 8: Global–national economic linkages

In the period 2004 to 2005, global economic recovery and the general rise in global commodity prices gave a positive impetus to African oil and metal exports. Some oil exporters also benefited from new oilfields in Southern and Central Africa (Angola, Chad and Equatorial Guinea). However, countries in Western Africa faced losses from lower prices for cotton and cocoa, and the persistence of cotton subsidies elsewhere.

Currency fluctuations also affected economic performance. The sharp appreciation of the euro adversely affected the franc zone countries, while the strengthening of the rand has affected the Southern African economies whose currencies are pegged to it.

This high dependency on global factors makes African economies extremely vulnerable. This is compounded by high dependency on natural resources and a relatively high level of vulnerability to environmental change. In the 2003–2004 period, favourable weather conditions in Eastern, Central and Southern Africa translated in a rebound in



Immature desert locust swarm (covering about 3–6 km²) milling over a field of harvested millet north of Bambey, Senegal.

Source: M. de Montaigne/FAO

agricultural production (mainly in Ethiopia, Malawi, Zambia and Rwanda). In contrast, agricultural output in Western Africa suffered from locust infestation, although its impact was limited by early treatment of the affected areas.

TRADE AND INDUSTRY

Trade is incredibly powerful, with taxes, tariffs, import quotas and subsidies imposed elsewhere affecting opportunities for human well-being and sustainable environmental management in the developing world, including in Africa.

The global market and the policies of multilateral economic organizations have implications for the Africa region. The balance of power in international trade organizations, such as the World Trade Organization (WTO), is tilted in favour of rich countries despite each country having an equal vote (WRI and others 2005). Trade and trade-related agreements, such as those on intellectual property, may affect the trade opportunities for African countries. Trade liberalization may make it more difficult for countries to pursue their environmental policies where these affect free market opportunities and may demand wide-scale reforms, with uncertain benefits that developing countries can ill afford. Negotiations in multilateral fora may favour those with better access to financial and human resources.

As the Commission for Africa (2005) noted, protectionist policies in some countries have adversely affected fisheries and trade in cotton and sugar in Africa. For example, despite the impressive efforts to reform the cotton sector in Benin, Burkina Faso, Chad and Mali, the persistence of cotton subsidies elsewhere has depressed world prices and damaged their cotton industry (OECD Development Centre and AfDB 2005).

Subsidies are not the only barriers that Africa faces in international trade. There are also non-tariff barriers and standards which may be difficult for many African nations to comply with. The composition of Africa's exports has essentially remained unchanged and its

share of world trade has collapsed from about 6 per cent in the 1980s to 2 per cent in 2002 (Commission for Africa 2005). Had its share increased by 1 per cent, Africa's share in the world market would have earned it US\$70 000 million, about five times what the region received in development aid (Watkins and Fowler 2002).

The trade situation of African countries is further worsened by the dependence on a very narrow range of primary commodities (coffee, cocoa, tea, palm oil and minerals). In SSA, for example, those commodities account for about half of merchandise exports. Table 1 shows this trend for selected African countries. The consequences of this dependency are four adverse trends that militate against increasing the countries' share in international trade (Watkins and Fowler 2002):

- Slow market growth;
- Adverse price trends;
- Low value-added; and
- Market competition.

Liberalized trade measures have led to loss of global market share and substantial income in many African countries. The share of food and agriculture in total merchandise trade fell from 17 per cent to 10 per cent from 1980 to 1997 (OECD 2000); the terms of trade for Africa's commodity exports were 20 per cent lower at the end of the 1990s than in the early 1970s. Without this, Africa's share of the world export markets would have been twice as large as it is today (UNCTAD 2001). Many agricultural markets are dominated by rich countries, which subsidize their own farmers at US\$1 000 million a day (OECD 2000) or US\$365 000 million annually. Trade protectionism by the rich industrialized regimes is the antithesis of free and

Table 1: The significance of trade in primary commodities

Country	Commodity	Percentage share of		
		Gross national income	total merchandise exports	Total agricultural exports
Malawi	Tobacco leaves	23.8	59	74
São Tomé and Príncipe	Cocoa beans	16.9	69	97
Burundi	Coffee	7.2	75	83
Kenya	Tea	6.5	26	42
Guinea-Bissau	Cashew nuts	6.3	48	91
Chad	Cotton	5.7	37	71
Ethiopia	Coffee	5.4	62	69
Burkina Faso	Cotton	4.9	39	77

Source: FAO 2002

Chapter 8 • Interlinkages: The Environment and Policy Web



Global trade regimes and local opportunities are closely linked. Here, women in Mfoundi Market, Yaoundé, Cameroon, sell their agricultural produce.

Source: P. Nyemeck/CIFOR

liberalized trade, policies that have been recommended to developing countries.

Currently, manufacturing, trade, transportation, urbanization, and other activities in the industrialized regions put considerable pressures on the biosphere and stratosphere which influence the environment in Africa and other parts of the world. The G8 countries account for 45 per cent of global greenhouse gas emissions, which is a major cause of climate change, global warming and extreme weather events (Valente, 2005). These changes trigger a series of inter-related biophysical and socioeconomic circles such as drought, floods, hunger, displacement of people and loss of livelihoods, as shown in Box 7. These impacts are particularly severe in Africa given the dependency on natural resources for both subsistence livelihoods, and industry and manufacturing. With more than seven out of ten people engaged in resource-dependent activities, such as subsistence farming, livestock production, fishing, hunting, artisanal hunting and logging (WRI and others 2005), biophysical environment change, whether sudden or cumulative, impacts negatively on the majority of the people.

To respond affectively to these challenges, Africa needs to improve its global competitiveness. As discussed in Chapter 1: *The Human Dimension*, technological and infrastructural investment, developing niche markets, and improving economic and political governance through reducing corruption and conflict are all important strategies to respond to the environmental challenges and to enhance opportunities.

INVESTMENT, AID AND DEBT

Global financial relationships have significant implications for economic, development and environmental policies. The continued imbalance makes African countries extremely vulnerable to external pressures. Various African initiatives, including NEPAD, seek to develop interlinkages between the global, regional and national levels – and to engage the global community and to promote more equitable relationships based on partnership and joint responsibility.

Africa's debt burden continues to be a major drain on economic growth and human well-being. Sub-Saharan Africa's external debt burden in 2003 amounted to US\$185 000 million (Commission for Africa 2005). The average African country spends three times more on repaying debt than it does on providing basic services to its people (Katsouris 2004). By the end of 2004, Africa will spend about 70 per cent of its export earnings on external debt servicing (Katsouris 2004). Additionally, this debt burden has opened Africa up to externally driven economic and political reforms. Although, with globalization and the end of the Cold War, these ties have become less obvious, much development aid remains tied (World Resources Institute and others 2005) and thus aid remains a crucial driver of development patterns. Poverty Reduction Strategy Papers, for example, serve as a basis for countries to qualify for debt relief and donor assistance under the Heavily Indebted Poor Countries (HIPC) Initiative, concessional lending, and the World Bank's Country Assistance Strategy (Bojö and Reddy 2002).

The debt burden increased from the late 1970s until the late 1990s, as many countries sought loans to service their debts to avoid bankruptcy. The debt burden forced many African countries to liberalize their economies and adopt SAPs: this had far-reaching implications for human well-being and environmental sustainability. Standard features of the SAPs included reducing or removing subsidies on basic commodities and services, and austerity measures in government spending. They also focused on export and macro-economic stability, reduced the size of the public sector's share in the economy, liberalized trade and froze government hiring. In most cases, these policies had detrimental environmental and social impacts, as shown in Box 9. Additionally, SAPs resulted in job cuts, forcing the unemployed to clear new land for agriculture (Katerere and Mohamed-Katerere 2005), and increased dependence on natural resources. For example, many urban poor people increased agriculture in order to supplement their incomes as discussed in Box 6. Africa's growing debt burdens, and its repayment obligations, constrain the range of opportunities available to it by locking Africa into unsustainable production systems. Africa's debt burden is growing despite debt relief to HIPC. Recognizing the linkage between debt and the lack of development, two of the targets for MDG 8 specifically commit the global community to address the debt problem.

Private capital is playing an increasingly important role in shaping economic development in Africa. Foreign direct investment (FDI) has become the dominant route for financial flows to developing countries (Oxfam

America 2002) as shown in Figure 1. By the mid 1990s, FDI had replaced development aid as the main form of financial inflows to Africa. Although Africa has benefited from increased FDI, its share has remained relatively small and concentrated in extractive industries. Sub-Saharan Africa's share amounts to about US\$62 000 million (World Bank 2005). Capital inflows from workers' remittances are significant investment and now exceed official development assistance (Sorensen 2004). In 2000, Africa accounted for about 15 per cent of total global remittances of US\$72 000 million – that is US\$10 700 million (Sorensen 2004). In the same year, Africa also received US\$14 413.6 million in official development assistance (ODA) and aid (WRI 2005).

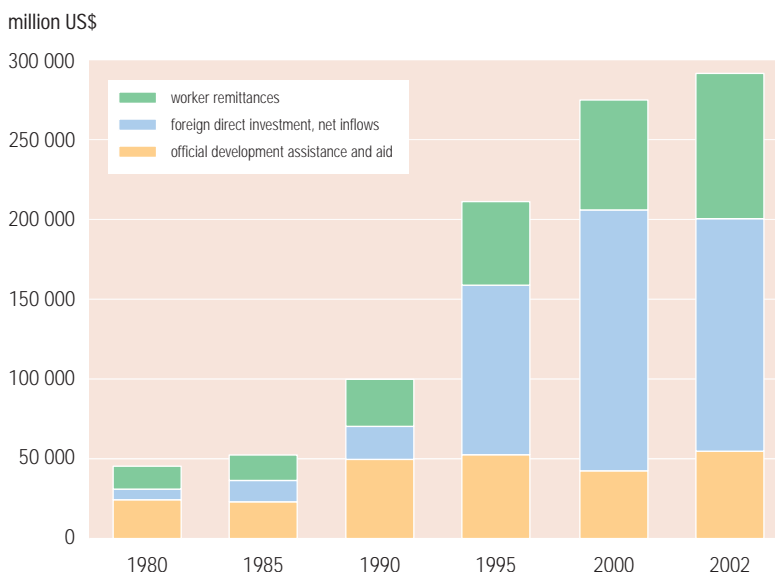
Box 9: Human and environmental costs associated with structural adjustment

Structural adjustment programmes (SAPs) have contributed to increased deforestation in some countries in Africa. In Côte d'Ivoire, for example, structural adjustment measures in the agricultural sector not only increased economic performance but also led to significant changes in land use. Twenty years of export-led agricultural development seriously impacted on the environment, forcing the government to admit in a Policy Framework Paper (PFP) for 1998-2000 that the country's environment and forests are "faced with a number of problems, particularly soil degradation, deforestation, the loss of biodiversity and pollution" (Friends of the Earth 1999). While the government tried by the late 1990s to protect the country's remaining forests, illegal cocoa and coffee planters cut down trees in protected forest areas to expand cropland. In 1997, for example, 30 per cent of protected forests were "illegally occupied" by farmers growing up to 100 000 tonnes of cocoa (Friends of the Earth 1999). Long-term environmental stability was reported at that time to be at risk as cocoa and coffee production moved to new areas due to exhausted soils.

One consequence of structural adjustment has been reduced government spending on health and education – this has been very taxing to Africa's human and economic development, especially with the advent of the HIV/AIDS epidemic. The 2005 HDI shows that more than 20 SSA countries had suffered dramatic reversals in human development since 1990: HIV/AIDS and the loss of social services were important causes.

Sources: Friends of the Earth 1999, UNDP 2005

Figure 1: Financial flows to developing countries 1980-2002



Source: WRI and others 2005 (data from the World Bank 2001)

Chapter 8 • Interlinkages: The Environment and Policy Web

**IMPROVING RESPONSES:
INTERLINKAGES IN POLICY**

Developing an interlinkages approach to policy responses holds promise for identifying comprehensive solutions and for building synergies between diverse policies, thus maximizing the resources available for implementation. Interlinkages between different scales – temporal and spatial – potentially enhance opportunities for implementation. The successful implementation of many policies is dependant on an interlinkages approach. Increasingly an interlinked approach is evident in policies themselves.

In the two decades since *Our Common Future* was published, governments in Africa have increasingly given policy attention to both green and brown environmental issues. Governments today are equally concerned about brown issues, which include air and water pollution, and solid waste management, and acknowledge the link with green issues. Previously, environmental management in Africa focused on the preservation of wildlife and other natural resources; in many countries, particularly in Eastern and Southern Africa, this policy was directly linked to tourism. Environmental management and policy has evolved considerably since the mid-1980s from a wildlife conservation focus to being more integrated, taking into account social and economic issues. Several policy interventions since the 1992 Earth Summit, from Agenda 21 to the WSSD Johannesburg Plan of Implementation to NEPAD's Environmental Action Plan (NEPAD-EAP) give credence to the need for an integrated approach to environmental problems. Development policies are increasingly following suit.

**COMPREHENSIVE AND INTERLINKED POLICIES: THE
POVERTY REDUCTION STRATEGY PAPERS**

Policies that are comprehensive and adopt an interlinkages approach provide better opportunities for addressing multiple, related challenges and for developing effective solutions.

The World Bank's poverty reduction strategies (PRS) have broken with the narrower economic interventions of the 1980s and 1990s and adopted a more interlinked and comprehensive framework to reducing poverty, that is results orientated (Bojô and Reddy 2003b). Many countries in Africa have or are developing Poverty Reduction Strategy Papers (PRSPs), as shown in Table 3. In many of these PRSPs, the environment is treated as a key factor because improved environmental conditions, among other results, can help reduce poverty. The reduction of extreme poverty and hunger, and environmental



Investing in children, ICT and education increases future opportunities. Here a school supported by a horticulture company provides children with the opportunity to use computers.

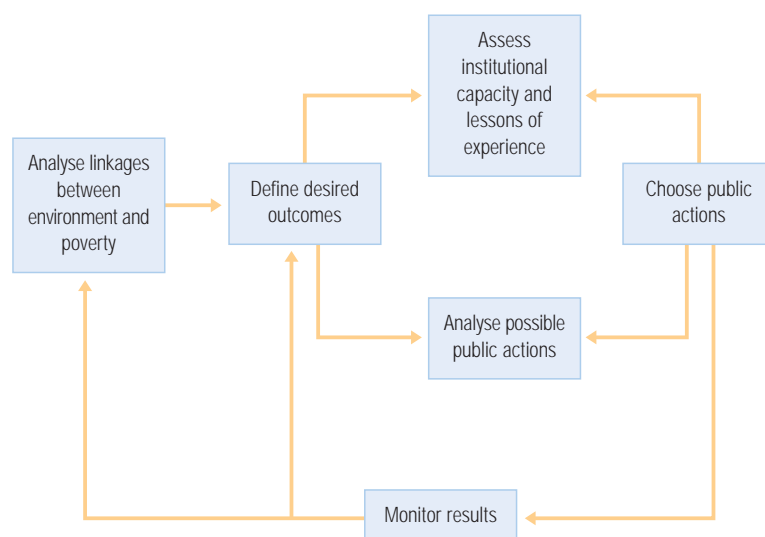
Source: R. Giling/Still Pictures

sustainability – both of which are part of the MDGs – are closely linked to the poverty objectives of PRSPs.

For PRSPs to be successful they should take into account a comprehensive understanding of poverty in a particular country, choosing the most effective public actions to reduce poverty, and to monitor outcomes and impacts. Figure 2 shows the process of preparing environmental sections of a PRSP.

In highlighting the rationale for systematic mainstreaming of environment in PRSPs and associated processes, the World Bank stresses that environmental conditions have major effects on the health, opportunities, and security of poor people.

Figure 2: Process of preparing environmental sections of a PRSP



Source: Bojô and others 2004

For example, the World Bank reported in 2001 that the burden of disease in sub-Saharan Africa from major environmental risks was 26.5 per cent, compared to 18 per cent in all least developed countries (LDCs) (Bojö and others 2004). The environmental risks considered include poor water supply and sanitation, vector diseases (such as malaria), indoor and urban air pollution, and agro-industrial waste. Table 2 shows the

main causes of mortality in Africa. Many of these, including respiratory diseases, diarrhoeal diseases and malaria, are caused by environmental factors.

While PRSPs are mainly concerned with addressing poverty, the objectives are also important for achieving sustainable development and, thus, dealing with environmental concerns. The realization of the MDG targets is closely related to reducing and eradicating

Table 2: Main causes of mortality in Africa

Communicable diseases, maternal and perinatal conditions and nutritional deficiencies

Type	Disease	Numbers of deaths	% of all deaths	Cumulative
Infectious and parasitic diseases	HIV/Aids	2 196 956	21%	21%
Respiratory infections	Lower respiratory infections	1 025 455	10%	30%
Infectious and parasitic diseases	Malaria	962 736	9%	39%
Infectious and parasitic diseases	Diarrhoeal diseases	702 822	7%	46%
Infectious and parasitic diseases	Childhood diseases	695 187	7%	52%
Perinatal conditions	Perinatal conditions	576 278	5%	58%
Infectious and parasitic diseases	Measles	426 743	4%	62%
Infectious and parasitic diseases	Tuberculosis	335 142	3%	65%
Total number of deaths from all diseases		10 681 000	100%	100%

Source: Ssemakula 2002 [Data adapted from WHO 2002, Annex Table 2]

Box 10: Incorporation of environment in Poverty Reduction Strategy Papers (PRSPs)

Mainstreaming environment into PRSPs still faces various challenges. There is considerable variation in environmental mainstreaming. It ranges from marginal attention to consistent mainstreaming across sectors. Nevertheless, there is a low but improving average for mainstreaming. The following trends are evident:

- **Full PRSPs are better mainstreamed.** In comparison to interim PRSPs, there is a tendency for full PRSPs to better integrate environmental factors. High-scoring countries include Zambia, Ghana and Mozambique.
- **Environmental priorities differ across countries.** Poverty Reduction Strategy Papers devote relatively more attention to issues such as water supply, sanitation, vulnerability to natural hazards, land tenure and institutional capacity. They devote relatively less attention to indoor air pollution, biodiversity, gender and environmental relationships, urban environment and the impacts of macro-economic policies on the environment.

- **The conditions for effective monitoring are often weak.** Few PRSPs present quantified, time-bound, costed, realistic targets and indicators relating to environment. Environmental health indicators generally get more attention than natural resources management indicators.
- **Failure to take a long-term perspective.** A few PRSPs explicitly introduce a long-term perspective and make reference to MDGs for 2015, but most do not. PRSPs that present long-term targets corresponding to the MDG 2015 horizon often present unrealistic plans without adequate budget support and institutional capacity for implementation.
- **Lack of effective monitoring and evaluation.** Implementation progress reports are generally not satisfactory in their discussions of the environmental proposals outlined in the PRSPs. Annual progress reports could provide good opportunities to address these gaps.

Source: Bojö and Reddy 2003b

Chapter 8 • Interlinkages: The Environment and Policy Web

poverty. Appendix 1 lists the MDG targets and shows progress towards achieving these. However, the extent to which these considerations have been included in country PRSPs varies considerably. Box 10 identifies some of the major trends and Table 3 evaluates environmental mainstreaming in PRSPs.

A review of PRSPs of some African countries already shows strong interlinkages in, between and across environmental, social and economic issues

(Bojö and Reddy 2003b) as shown in Table 3. For example, the Burkina Faso PRSP notes that climatic conditions and low agricultural productivity due to soil and water degradation are major constraints to economic growth, contributing to extreme poverty and severe food insecurity in rural areas. Income from farming and livestock raising is highly dependent on rainfall, which varies considerably from year to year (Bojö and others 2004). The PRSP highlights a soil and water conservation programme to break the vicious circle of soil degradation, poverty and food insecurity.

In Mauritania, Kenya and Zambia, the PRSPs express concern about property rights related to natural resources and how this affects poverty. Kenya's PRSP proposes to implement a land law to create an efficient and equitable system of land ownership. It also notes that the violation of water rights, conflicts and pollution have increased (Bojö and others 2004).

The extent to which the MDGs are specifically addressed also varies. Box 11 gives some examples of African countries that have specifically incorporated the MDGs where these are directly relevant from an environmental perspective.

Table 3: Average country environmental mainstreaming scores

Country	PRSP type	Average environment score (scale 0-3)
Zambia	Full	2.4
Ghana	Full	2.2
Mozambique	Full	2.2
Kenya	Interim	1.9
Mali	Full	1.7
Burkina Faso	Full	1.7
Senegal	Full	1.7
Rwanda	Full	1.7
Malawi	Full	1.7
Ethiopia	Full	1.6
Guinea	Full	1.6
Niger	Full	1.5
Benin	Full	1.5
Mauritania	Full	1.4
Gambia	Full	1.2
Uganda	Full	1.1
Madagascar	Interim	1.1
Cape Verde	Interim	1.0
Tanzania	Full	0.9
Chad	Interim	0.8
Côte d'Ivoire	Interim	0.8
Cameroon	Interim	0.6
Lesotho	Interim	0.6
Sierra Leone	Interim	0.6
Democratic Republic of the Congo	Interim	0.6
Guinea-Bissau	Interim	0.5
Djibouti	Interim	0.5
Central African Republic	Interim	0.3
São Tomé and Príncipe	Interim	0.3
Average score		1.2

Source: Bojö and Reddy 2003b

Box 11: Focus on Millennium Development Goals in the PRSPs

Ethiopia: The PRSP discusses issues relating to traditional energy, water and sanitation. However, baselines and targets on water supply and sanitation presented in the PRSP appear to be ambitious considering the progress on access to water and sanitation during the period from 1990 to 2000.

Guinea: The PRSP presents targets and indicators relating to water supply and electricity in terms of coverage, service delivery and cost recovery for 2010. Indicators relating to renewable energy, infections from insanitary conditions, tenure and access to affordable housing are also proposed.

Mauritania: The PRSP presents targets and indicators relating to secure tenure, subsidized housing, and access to water and sanitation. Indicators relating to current and targeted amounts in terms of litres per capita and cost of drinking water are also considered for monitoring.

Rwanda: The targets and performance indicators relating to health, education, gender, and access to water and sanitation proposed in the PRSP coincide with the MDGs' time frame of 2015. The PRSP proposes to collect information to develop outcome, access, process and proxy indicators, and refers to relevant surveys to be used to generate the information.

Zambia: Access targets on water supply and sanitation are presented for 2015, with indicators such as number of water points, distance to water facility, volume of water treated, and number of committees strengthened to support water supply and sanitation. Targets for electrification are presented for 2010.

Source: Bojö and Reddy 2003b

OPPORTUNITIES FOR COST-BENEFIT ANALYSIS: THE VALUE OF ENVIRONMENTAL IMPACT ASSESSMENT

The interlinkages approach has the benefit of enabling policymakers to achieve a better grasp of the costs and benefits of their decisions.

A policy geared towards enhancing utility of the forestry sector by extending commercial logging, for instance, can be very costly to a biodiversity-rich country. For example, in Cameroon – one of the most ecologically diverse countries in Africa – intensive logging threatens the country's tropical rainforests and the habitat of over 40 species of wildlife, including gorillas, elephants and the black rhinoceros, with extinction (Friends of the Earth 1999). According to research in the late 1990s, the number of logging enterprises increased from 194 to 351 in 1995, following the devaluation of the local currency in 1994. Timber exports grew by 49.6 per cent between 1995-96 and 1996-97 (Friends of the Earth 1999).

The oil industry is another high-profile issue in which interlinkages between the environment and social and economic development are important. The benefits and costs associated with the industry are often contested.

Although the oil industry has been linked to high levels of growth through increasing national income and employment, it can also be a cost on the environment, impacting negatively on coastal and marine environments and tourism, leading to long-term loss of jobs and thus slowing economic growth. In the Niger Delta region of Nigeria, SSA's largest oil producer, oil extraction has caused severe environmental degradation due to oil spills and lax environmental regulations (Energy Information Administration 2003). Inadequate investment, social and governance policies have meant that growth has not benefited poor people. For many, oil refineries, wells and transportation activities are opportunities to increase and diversify trade relationships with other nations and to participate in the global economy. There is often controversy around oil extraction activities. For example, the US\$3 700 million Chad-Cameroon Pipeline Project, which was approved by the World Bank in June 2000, has been the target of protests from environmental and human rights groups. They argue that the project would dislocate inhabitants along the pipeline route and harm wildlife in the rainforests through which the pipeline would pass. Oil pollution is a major issue in Africa with the chronic release of oil in ports through ship leakage, ship maintenance or mishandling (Energy Information Administration 2003). According to the US Energy Information Administration, the problem of oil discharge in ports is often ignored, even though cumulatively the oil may negatively impact the surrounding ecosystem, including seabeds, wetlands and mudlands, which are environmental resources of economic significance (Energy Information Administration 2003).

Various tools and policy-making processes seek to address the complex human-environment nexus and use interlinkages to do so. These include integrative assessment processes (discussed in Chapter 9: *Genetically Modified Crops*) and inclusive policy processes (discussed in Chapter 1: *The Human Dimension* and Chapter 9: *Genetically Modified Crops*). Environmental impact assessments (EIAs) are important tools which employ an integrated and interlinked approach to evaluating relative costs and benefits in diverse spheres – demonstrating the interlinkages between environmental, social and economic issues – and creating opportunities for deciding on appropriate development opportunities. They seek to produce early and adequate information about the likely environmental consequences of certain plans and projects, to propose alternatives and to establish measures to mitigate harm. Additionally, EIAs



An Ijaw woman and her child fishing in a communal forest around her village in the Delta region of Nigeria. The fish catch has dropped dramatically as a result of oil spillage from a nearby oil extraction pipe.

Chapter 8 • Interlinkages: The Environment and Policy Web

potentially bring a multiplicity of government agencies and institutions, organizations, experts and members of the public into the decision-making process. The need for an interlinkages approach is further demonstrated in Box 12, which considers the loss of energy in the oil production process that could be used to produce electricity. This lost opportunity is the result of a poorly developed natural gas industry. An interlinkages approach, such as through an EIA, would have helped identify these costs and benefits at an early stage and is, therefore, fundamental to identifying opportunities for development.

National oil industry practices, such as those raised above, may have a bearing on the implementation of several policy instruments, including MEAs such as the Convention on Biological Diversity (CBD), the Ramsar Convention on Wetlands (Ramsar) and the United Nations Framework Convention on Climate Change (UNFCCC), global targets such as the MDGs, and regional plans and programmes such as the NEPAD-EAP, as well as African regional conventions. Box 12 shows that local activities have impacts that may be felt at different scales. Thus, in developing responses to situations like that described in Box 12, it is crucial that

the link to global and regional policy instruments be made. Additionally, for Africa to benefit from the oil industry and simultaneously avoid environmental impacts of global significance, capacity needs to be improved. This can be addressed by the global community making good its pledge at the WSSD to invest in industry and sustainable production methods.

Environmental impact assessment tools are more useful in understanding the complexity of the issues at stake than traditional cost-benefit analysis, which sets out to add up in monetary terms the benefits of a public policy and compare them to the costs. There are major challenges in cost-benefit analysis. More often than not it involves comparing aspects that are fundamentally different and whose range of values cannot be reduced to purely monetary terms. The environment has both use and non-use values. (see Chapter 1: *The Human Dimension* for a discussion of the diverse values of environmental resources). Non-use values are particularly hard to quantify in monetary terms. Cost-benefit analysis cannot overcome its fatal flaw: it is completely reliant on the impossible attempt to price the priceless values of life, health, nature and the future (Heinzerling and Ackerman 2002).

Box 12: Flaring: lost opportunities and environmental costs

In Nigeria, Angola, Cameroon and Gabon, due to limited gas infrastructure, natural gas which is released during oil production is often burned off, or “flared”, rather than captured for use. Flaring in Africa alone could produce 200 Terawatt hours (TWh) of electricity annually, which is about 50 per cent of the current consumption of the region. This is also equivalent to more than 10 per cent of committed emission reductions by developed countries under the Kyoto Protocol for the period 2008-2012.

Flaring also has environmental impacts. It has been described as “a significant source of carbon emissions” in Africa. Nigeria is the world’s highest natural gas flaring country with 42.6 per cent of its total annual natural gas production being flared. In December 2004, the government announced that the country had reduced its natural gas flaring by 30 per cent. It has been estimated that Africa every day flares gas equivalent to 12 times the energy that the region uses.

Flaring in Africa is, therefore, not only a major economic loss and a missed opportunity for development, but also a contributor to greenhouse gas emissions. An interlinkages



The Hassi Messaoud oilfields, Algeria.

Source: K. D. Francke/Still Pictures

approach would have helped identify these costs and benefits at an early stage and thus is fundamental to identifying opportunities for development. Seizing the opportunities from this process requires investment in industry and access to technology.

Box 13: Building partnerships for Environmental Impact Assessments: Eastern Africa

Environmental impact assessment is an important tool for development planning and decision making. Their use ensures that potential environmental impacts are identified, assessed and taken into account at the project design phase and thus unnecessary costs are avoided.

Despite the undoubted importance of EIA as a planning tool, there are many issues and constraints related to its application in SSA. The major constraint to implementation is that there are few institutions equipped to conduct environmental impact assessments. Some countries lack established EIA systems and the resources required to train managers in EIA. The vast majority of countries with existing EIA systems have problems in implementing them due to insufficient human, technical and financial resources.

Since the African Ministerial Conference on the Environment (AMCEN) of 1995, in Durban, South Africa, the IUCN's Eastern Africa Regional Programme (IUCN-EARP) has been instrumental in facilitating consultative meetings aimed at developing a programme for EIA

enhancement in Africa. This programme, which falls under the umbrella of environmental planning and assessment, is designed to raise EIA capacity in each of the ten countries covered by IUCN-EARP through the:

- Establishment and enforcement of EIA systems;
- Enhancement of capacity to effectively manage EIA;
- Encouragement of private sector participation;
- Development of expertise specific to the region;
- Integration of biodiversity in development; and
- Creation of financial stability for EIA systems.

This programme of work was designed through a consultative process with stakeholders, practitioners and experts from government agencies, research and training institutions and the private sector. IUCN coordinates this effort, and linkages are currently being made with related initiatives in Africa such as the Network for EIA in the Great Lakes Region and similar programmes in Southern Africa and Madagascar.

Sources: Joseph 2004, Energy Information Administration 2003

Despite the value of EIAs as a decision-making tool, the region faces various challenges in fully implementing this approach, particularly the lack of capacity in human, financial and technical areas. Box 13 looks at how IUCN – the World Conservation Union (IUCN) and the governments in Eastern Africa are working together to enhance EIA capacity.

IMPROVING IMPLEMENTATION THROUGH INTERLINKING POLICIES AT DIFFERENT SCALES: NEPAD-EAP AND THE MDGs

Creating interlinkages between different policies and programmes is an effective way to develop synergies and enhance opportunities for using available resources more effectively. Interlinking policies at different scales can offer new opportunities for implementing institutions.

The environmental, social and economic challenges facing policymakers at the national level are as important as those at the sub-regional and regional levels, and often there are remarkable similarities. Through a process including national governments, the NEPAD-EAP prioritizes six environmental programme areas and three crosscutting issues. It also recognizes poverty as the main cause and consequence of environmental degradation and thus that there is an

urgent need to halt the downward spiral of poverty and break the poverty-environment nexus (NEPAD 2003). While it recognizes the value of MEAs and global environmental policy processes, its focus is on responding to African national priorities. The MDGs, although globally defined targets, have to be realized in the national context, thus establishing linkages with regional, sub-regional and national programmes is critical to their realization. The MDGs can be effectively linked to NEPAD-EAP programme areas, which are:

- Combating land degradation, drought and desertification;
- Conserving Africa's wetlands;
- Prevention, control and management of invasive alien species;
- Conservation and sustainable use of marine, coastal and freshwater resources;
- Combating climate change in Africa; and
- Transboundary conservation and management of natural resources.

All these areas are important for the realization of the MDGs, for example for the goals of alleviating extreme poverty and hunger, and achieving environmental sustainability. Table 4 shows how the MDGs are linked

Chapter 8 • Interlinkages: The Environment and Policy Web

Table 4: Linkages between the MDGs and the environment

Millennium Development Goals	Examples of links to the environment
1. Eradicate extreme poverty and hunger	Livelihood strategies and food security of the poor often depend directly on healthy ecosystems and the diversity of goods and ecological services they provide.
2. Achieve universal primary education	Time spent collecting water and fuelwood by children, especially girls, can reduce time at school.
3. Promote gender equality and empower women	Poor women are especially exposed to indoor air pollution and the burden of collecting water and fuelwood, and have unequal access to land and other natural resources.
4. Reduce child mortality	Water-related diseases such as diarrhoea and cholera kill an estimated 3 million people per year in developing countries, the majority of which are children under the age of five.
5. Improve maternal health	Indoor air pollution and carrying heavy loads of water and fuelwood adversely affect women's health and can make women less fit for childbirth and at greater risk of complications during pregnancy.
6. Combat major diseases	Up to one-fifth of the total burden of diseases in developing countries may be associated with environmental risk factors – and preventive environmental health measures are as important and at times more cost-effective than medical treatments.
7. Ensure environmental sustainability	Current trends in environmental degradation must be reversed in order to sustain the health and productivity of the world's ecosystems.

Sources: DFID and others 2002, UN Millennium Project 2005a

to the environment. The potential for creating effective interlinkages between these areas is dependent on governance systems, human resource availability and capacity, and funding. Table 5 highlights some of the interlinkages between NEPAD-EAP and MDGs.

In addition to the linkages between the NEPAD-EAP programme areas and MDG 7, there are also links to the other MDGs and to many MEAs. Several of these agreements are directly relevant to a specific area, while others have wider-reaching implications across all programme areas. The African Convention on the

Conservation of Nature and Natural Resources (ACCNNR), for example, creates a broad framework for dealing with a range of environmental challenges and is applicable to all the programme areas of NEPAD-EAP. Both the CBD and the ACCNNR are dynamic, complex and non-linear interventions which encourage both thematic and institutional interlinkages.

Partnership and institutional links can empower governmental institutions and agencies. For example, such an approach will enhance the capacity of African governments to integrate environment into social and

Table 5: Links between MDG 7: Ensure environmental sustainability and NEPAD-EAP

MDG 7: Targets	Examples of related environment programme areas (PA)
Integrate the principles of sustainable development into country policies and programmes and reverse the loss of environmental resources.	PA1: Integrate strategies of poverty eradication into programmes and projects related to desertification control and mitigation of effects of drought. PA5: Integrate national adaptation strategies into national sustainable development planning.
Halve by 2015 the proportion of people without sustainable access to safe drinking water.	PA2: Development of plans and policies to promote the wise use of wetlands.
By 2020 to have achieved a significant improvement in the lives of at least 100 million slum dwellers.	PA1: Promotion of the development of sustainable water supply and sanitation in drylands.

Sources: UN 2005, NEPAD 2003

economic processes, and into comprehensive development frameworks, such as the poverty reduction strategies (UNEP 2003). Interlinkages are necessary to meet the MDG targets, and Box 14 on MDG implementation in the West Indian Ocean islands sub-region, illustrates this point. Success across the Africa region on achieving the MDG targets is shown in Appendix 1.

An interlinkages approach can lead to policy development which more effectively promotes trade, capacity-building and infrastructure development and

addresses governance-related factors, such as high transaction costs, conflicts, debt and rent-seeking practices, and uncontrolled extractive industries and trade.

Combating land degradation, drought and desertification

The objectives of the NEPAD-EAP first programme area – combating land degradation, drought and desertification – cannot be achieved without strong links to the conservation of Africa's wetlands, combating climate change and the transboundary conservation and management of natural resources. Land degradation is a major challenge for realizing sustainable development in Africa, affecting poverty reduction, peace and security, and economic and ecological health. About 110 million ha of Africa's 494 million ha of vegetated land have been classified as degraded. Land degradation is a major impediment on Africa's path towards meeting the MDGs; important impacts include escalating desertification, soil erosion, declining soil fertility, salinization and pollution by agrochemicals. Since 1950, an estimated 500 million hectares of Africa's land have been affected by soil degradation, including at least 65 per cent of agricultural land (Peopleandplanet.net 2003). Chapter 3: *Land* gives an overview of this resource and the challenges and opportunities it offers.

Desertification – a major environmental issue in Africa – is related to land degradation. According to the Millennium Ecosystem Assessment (MA), biological diversity is adversely affected by desertification, which also contributes to global climate change through soil and vegetation loss. Climate change may adversely affect biodiversity and exacerbate desertification due to increased evapotranspiration and a likely decrease in rainfall in drylands (MA 2005). Figure 3 highlights the interlinkages among desertification, global climate change and biodiversity loss.

The pressures leading to land degradation are socioeconomic and climatic. Poverty, conflict, intensive agriculture leading to soil loss and salinization, deforestation and land clearance for agriculture, and the cultivation of marginal lands are important contributors. Climate change pressures include reduced rainfall (or increased extreme rainfall events) and increased temperatures, which together lead to a reduction in vegetation cover and aggravated erosion by run-off and wind.

The responses to these pressures are at two levels. The first level concerns policies and management relating to land use and is potentially within the grasp of states to tackle through interdepartmental policy interventions

Box 14: Progress towards MDGs in the Western Indian Ocean islands sub-region

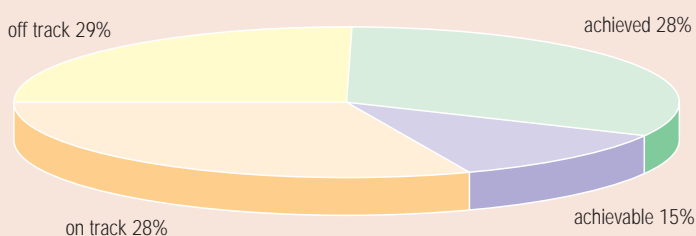
The Western Indian Ocean (WIO) islands (The Comoros, Madagascar, Mauritius and Seychelles) have made substantial progress towards achieving the MDG goals and targets. Progress is defined as target already achieved, achievable by target date or movement towards the target. Taking the four countries as a whole, 28 per cent of the targets in the MDG system have already been achieved, a further 15 per cent are achievable by the due dates if current progress is maintained, and on a further 28 per cent they are on track (UN 2005 and UN Statistics Division 2005). Of the environmental targets, nine have been achieved, and progress has been made on a total of 12.

Based on a detailed review of five countries across the globe, the Sachs studied the cost of implementing the MDGs. Based on local data and evidence of best practice, broad cost estimates for achieving the goals were identified, estimated in terms of average cost per capita, separating the different elements of the task (Sachs 2005). Applying this approach within the sub-region, the medium-term programme for pursuit of MDGs at a cost of US\$74 per head per year, would require from Madagascar 10 per cent of annual Gross Domestic Product (GDP), from the Comoros 4 per cent of annual GDP, from Mauritius 0.6 per cent and from Seychelles 0.4 per cent.

Progress in the region as a whole has been mixed but there has been some success given that progress in any country is related to the baseline from which it started in 1990. Moreover, the cost of moving towards the targets differs from country to country as well as the type of interventions required.

Sources: UN 2005, UN Statistics Division 2005, Sachs 2005

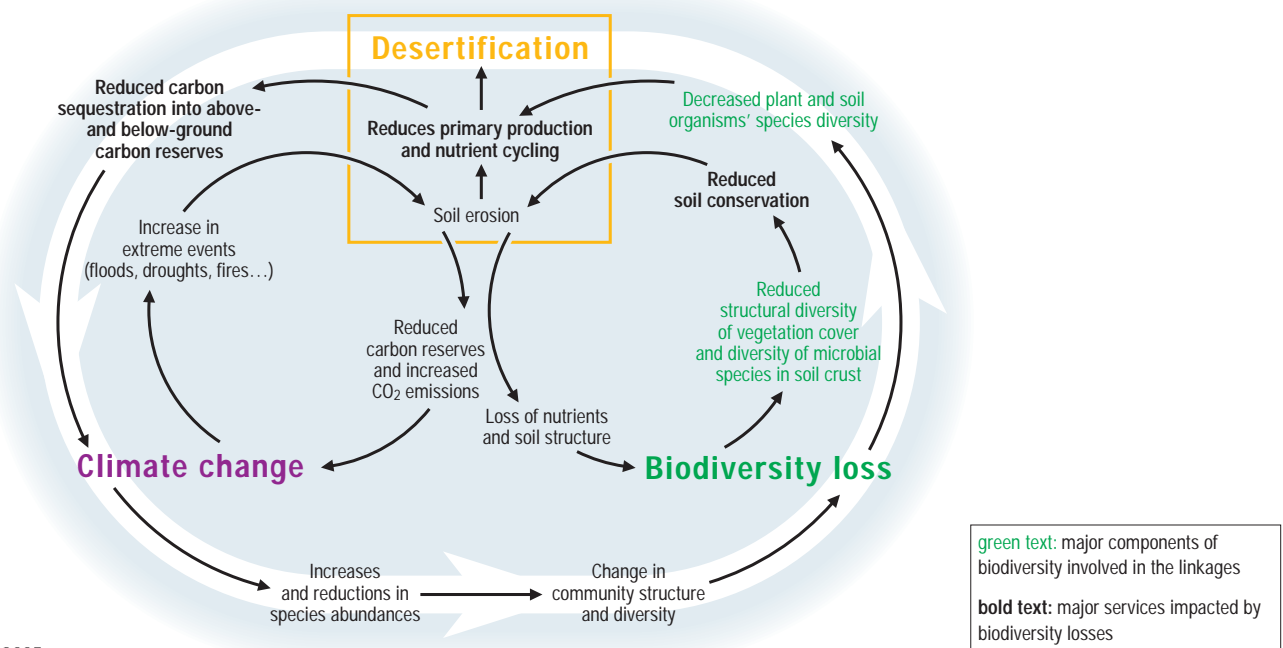
Western Indian Ocean Islands progress on MDGs



Source: UN 2005, MDG Statistics, UN website January

Chapter 8 • Interlinkages: The Environment and Policy Web

Figure 3: Linkages and feedback loops among desertification, global climate change and biodiversity loss



Source: MA 2005

The major components of biodiversity loss (in green) directly affect major dryland services (in bold). The inner loops connect desertification to biodiversity loss and climate change through soil erosion. The outer loop interrelates biodiversity loss and climate change. On the top section of the outer loop, reduced primary production and microbial activity reduce carbon sequestration and contribute to global warming. On the bottom section of the outer loop, global warming increases evapotranspiration, thus adversely affecting biodiversity; changes in community structure and diversity are also expected because different species will react differently to the elevated CO₂ concentrations.

Source: MA 2005

and cooperative management at catchment and national levels, and in transboundary cases at international levels. Such interventions may relate to water use and agricultural policy, for example. The second level of responses, in respect of the climate change pressures, is at the international or intergovernmental level and is concerned with making representations for actions to tackle global warming, relevant at that level.

In trying to address the challenges of land degradation, policymakers in Africa need to explore the synergies provided by the NEPAD-EAP, the MDGs (especially MDG 1 and 7), the CBD, the United Nations Convention to Combat Desertification (UNCCD) and UNFCCC. The social, economic and environmental dimensions of land degradation are interlinked, and these cannot be considered in isolation if success is to be achieved. Interlinking these issues also provides for many different institutions and organizations which otherwise would not naturally collaborate to do so. Such interlinkages would contribute to enhancing human well-being and human sustainability.

As for land degradation, the responses are at two main levels. Interventions relate to land and water

allocation and management and to policies dealing with pollution control, both from point sources and diffuse agricultural sources. Interdepartmental interests are likely to be relevant to the management of these pressures, with cooperative arrangements aiming for an equitable distribution of benefits from resource usage. The level of response in respect of the climate change pressures is at the international or intergovernmental level. At the global level the key MEA is Ramsar. Also significant, however, are the CBD and those conventions dealing with migratory species.

Conserving Africa's wetlands

Africa's inland and coastal wetlands provide a rich and broad range of resources and services, for example fisheries, and ecosystem services that are under severe threat from a combination of human activities and climatic pressures. Fish accounts for 50 per cent of animal protein sources in Africa; in some countries, including Liberia and Ghana, it constitutes as much as 65 to 70 per cent of animal protein consumed (WRI and others 2005), consequently protecting and enhancing this resource is important for meeting MDG target 2.

Given this nutritional contribution, conserving wetlands is also important for realizing the MDG health-related targets. Goods-and-services derived from wetlands can contribute to improved local incomes and thus to the realization of MDG target 1, where better opportunities for local people to manage these as assets are created. The value of this resource, including the opportunities it offers for development and improving human well-being, and threats to it, are discussed more fully in Chapter 5: *Coastal and Marine Environments*.

Human-related pressures include:

- Landfills;
- Pollution from urban, industrial, mining and agricultural sources leading, for example, to eutrophication;
- Reduction of freshwater inflow as a result of water diversion, damming within the catchment, the lowering of groundwater tables, and deforestation. In the case of coastal wetlands, reduced freshwater inflow may increase salinity and threaten biodiversity; and
- Climate change, resulting in increased evaporation and reduced rainfall, and indirectly, over the longer term, sea-level rise.

This web of pressures indicates the need for policy responses based on interlinkages.

Conservation and sustainable use of marine, coastal and freshwater resources

The effective and equitable distribution and use of water may be the most important of all the NEPAD priority issues. The state of this resource, the challenges facing its management, and the opportunities it offers for development are discussed fully in Chapter 4: *Freshwater*. Access to adequate, safe water significantly contributes to improved health and food production, an ability to earn income and self-reliance. Its management has impacts across spatial and temporal levels. Water allocation between countries may affect rights and opportunities at the local level, as well as the opportunities available to future generations. The importance of multi-stakeholder approaches, and in particular the inclusion of women at various planning levels, has been specifically acknowledged in the World Water Forums since the 1990s (UNEP 2004). Poor access to water and poor water quality may have a disproportional impact on women's health and time: women are often the main collectors of water for household use and undertake most of the household tasks, such as cooking and washing, which use water (UNEP 2004). Inadequate investment in water supply systems and poor water governance regimes are the chief anthropogenic threats to water resources in Africa (UNEP 2005).



The traditional "half-moon" technique is used to enhance water retention in rain-fed agriculture in the Sahel.

Source: J. C. Mohamed-Katerere

Chapter 8 • Interlinkages: The Environment and Policy Web

Coastal ecosystems, including wetlands, estuaries, mangroves and reef flats, are highly productive and rich in biodiversity, but they are at risk from physical disruption through, for example, urbanization and tourism infrastructure, eutrophication due to sewage and excessive agricultural nitrate run-off, oil pollution, solid waste and litter, and the discharge of effluents. As with other wetland systems, reduced freshwater availability due to damming in catchment and increased use of water for irrigation is also an issue. Climate change is an indirect pressure in that one effect is increasing sea surface temperatures leading to reef coral bleaching and mortality, while increased acidity of seawater may reduce the calcification of many marine organisms. The destruction of reef systems affects biodiversity and fish stocks, having major impacts on the well-being of coastal communities.

The responses to this range of pressures affecting water resources need consideration across sectors and at many levels, with national policies developed between government departments concerned with water resources, agriculture, industry, fisheries, environment etc, as well as at the intergovernmental level. There is also wide scope for community involvement in the conservation of these vital resources.

There are many policy responses dealing with water management. The CBD applies to both freshwater and coastal and marine ecosystems and sets the general framework for biodiversity conservation. The Convention on International Trade in Endangered Species of Fauna and Flora (CITES) regulates trade in endangered species. At the global level, the United Nations Convention on the Law of the Sea (UNCLOS) is the primary MEA setting out the rights and duties of nations in the use of the sea. The United Nations Convention on the Law of the Non-navigational Uses of International Watercourses provides an important framework for managing freshwater systems. There are many sub-regional and bilateral agreements which further refine this policy and managerial framework. Chapter 12: *Environment for Peace and Regional Cooperation* discusses cooperative initiatives in river basin management.

Combating climate change

In order to effectively address the problems of climate change, policy responses are required at the international or intergovernmental level. African countries need to engage more effectively at this level and ensure that national and regional interests are better represented in the relevant global fora. This includes investing in cost-effective and environmentally



The women of this gardening cooperative in Mutenda, Zimbabwe, rely on a nearby dam for irrigation for most of the year.

Source: H. Wagner/IFAD

sustainable energy, promoting climate-friendly carbon and technology markets, and mainstream responses to climate change and variability (UN Millennium Project 2005b). Some responses at local to national levels may be appropriate, but these may be adaptive rather than combative, involving, for example, changes in land use. For example, reforestation may be appropriate over the long term, though the use of such approaches is controversial.

Addressing climate change is crucial to protecting food production systems. This may involve restoration and more effective management of desertified lands and is thus directly related to the achievement of targets 1 and 2 of MDG 1. Rising sea levels threaten coastal areas, and in particular small island developing states (SIDS), and thus have implications for the realization of many MDGs.

Climate change has, as discussed in Chapter 1: *The Human Dimension* and earlier in this chapter, important implications for human health. A disproportional burden of this is felt in Africa, particularly by poor people, women, the elderly and children. Combating climate change is important then for attaining the MDGs' health targets (Goals 4, 5 and 6).

EMPOWERING PEOPLE AND INSTITUTIONS: INSTITUTIONAL AND GOVERNANCE INTERLINKAGES

Throughout much of Africa, the interlinkages between institutions and within governance processes are poorly developed. Developing an interlinkages approach can improve opportunities for more effective regional cooperation, inclusive policies, improved regional-national synergies, and stronger and more sustainable partnerships.

International law and policy, at both the global and regional levels, identifies motivations as well as an overall framework for developing institutional interlinkages, as set out in Box 15. These international law principles help to address problems of unequal power between countries.

One major and crosscutting challenge for developing institutional linkages is the lack of harmonization of environmental management approaches (Mohamed-

Box 15: International law framework for improved institutional linkages

Creating opportunities for effective collaboration requires a clear and agreed framework.

The United Nations Charter urges states to cooperate in order to avoid the scourge of war, to reaffirm fundamental human rights, to establish conditions under which justice and mutual respect can be maintained and to promote social progress. It urges states to build good neighbourly relations and to employ international machinery for the promotion of the economic and social advancement of all people. In Africa, the African Union (AU), with its focus on sovereign equality; solidarity, peace and security; human rights, democracy and the rule of law; equity and mutual benefit; and the peaceful settlement of disputes complements this framework.

International law identifies several key principles that set the basis for cooperation and that can be helpful in building interlinkages. These include state sovereignty, state responsibility and good neighbourliness. Specific multilateral agreements address various aspects of human society, defining the agreed standards and frameworks, and further elaborating on the basis for collaboration. These areas include development, trade, human rights and environmental management.

Source: Mohamed-Katerere 2001

Katerere 2001). Legal systems in Africa are closely linked to their colonial past, with different countries having English, French or Portuguese legal systems. More specifically, in terms of environment, common approaches have not been developed across nations. Regional initiatives, such as the ACCNRR, set a clear basis for the harmonization of such legal and policy frameworks at the sub-regional level.

Governance regimes impact on environmental management and change, in multiple ways and at different scales, across all environmental sectors.

- First, environmental governance – and decentralization and devolution of power – affects the opportunities local users have in managing environmental resources and in particular their ability to manage natural resources as productive assets (WRI and others 2005).
- Second, political governance, and in particular how power is shared between the centre and the local, is particularly important. For example, poor governance, within inadequate levels of transparency and accountability, often results in managerial systems that are vulnerable to corruption and conflict. Conflict has multiple ramifications for economic development and trade (OECD Development Centre and AfDB 2005), environmental sustainability and human well-being. Africa has suffered more than 30 wars since the 1970s (UN 1998). According to the World Bank, in 2005 about one-fifth of Africa's people lived in countries affected by conflict and for the average African country, half of the indicators point to a risk of conflict (World Bank 2005). The poorest counties have the highest risk of new conflicts (UN Millennium Project 2005c). Chapter 12: *Environment for Peace and Regional Cooperation* highlights the interconnectedness of conflict with the loss of biodiversity, the overharvesting of ecosystems goods and services, the spread of illegal trade in natural assets and population displacement. These are all detrimental to ecosystems health and productivity. Good governance is critical for resolving conflict and building peace, mitigating its ill effects and avoiding conflict.
- Third, governance in non-environmental areas, such as trade, is also of direct significance. Corporate and trade-related governance may have important implications for environmental change. While a weak regulatory system might be attractive from an investment perspective, it can have disastrous environmental and social costs. Emeseh (2004), for example, suggests that the lack of or weak

Chapter 8 • Interlinkages: The Environment and Policy Web

enforcement of environmental regulations in Nigeria is designed to protect international oil companies. Companies engaged in extracting timber from Liberia, diamonds from Angola and Rwanda, coltan from Rwanda, and gold from Uganda are all sheltered from environmental regulation enforcement (Watkins and Fowler 2002), creating both human and environmental costs. Similarly, the dumping of hazardous wastes in Africa has been a major problem, especially during the 1970s, 1980s and early 1990s, and has left many parts of Africa faced with the problems of stockpiles. International agreements, such as the Bamako Convention, which seek to regulate this, have not been fully incorporated into national legislation.

BUILDING EFFECTIVE REGIONAL ORGANIZATION

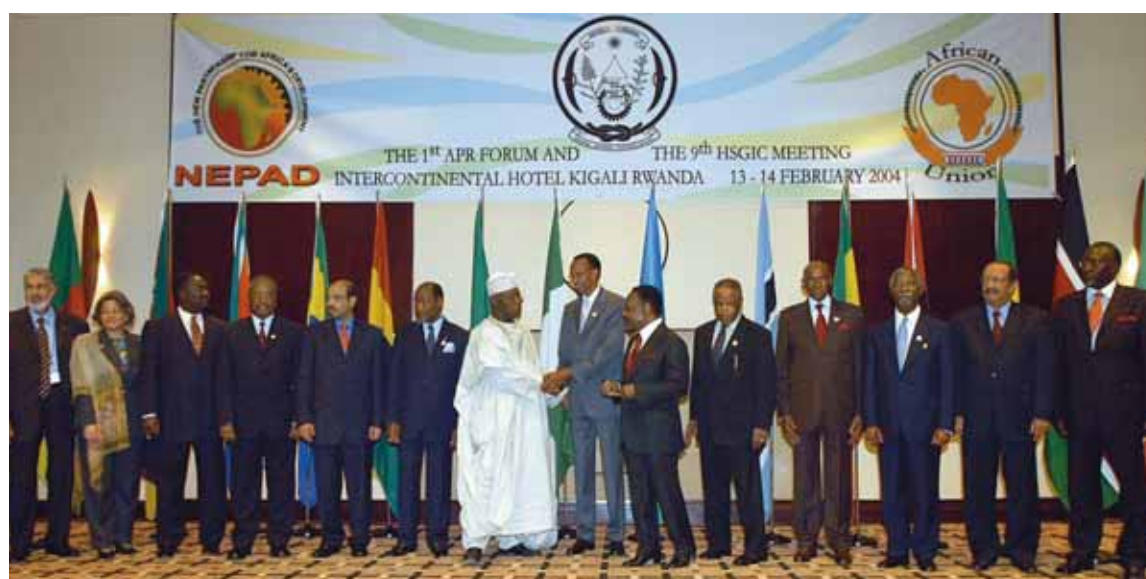
Interlinkages between and among institutional structures dealing with environmental management and policy and those from other institutions whose area of mandate has a relationship to the environment, such as trade and health, remain weak and need to be redressed if development challenges are to be effectively addressed.

At the national level, management and governance systems are based on different sectors. The World Resources Institute (WRI) suggests that sectoral approaches to environmental management and governance at the international level mirror patterns at the national level and this remains true for Africa (WRI and others 2003).

Boxes 2 and 4 show, in relation to health issues, that responding effectively to challenges may require interventions in different sectors. In order to achieve

this, mechanisms not just for coordinating response but also for coordinating problem analysis are needed. One challenge is to achieve this without overstressing the capacity of institutions that are already under considerable financial and human resource strain. Options include developing multilevel, inter-sectoral and inter-state strategies that cut across institutions and, at an early stage, developing deliberative and inclusive policy-making processes. These should be complemented by processes that review and refine policy, in order to support adaptive management.

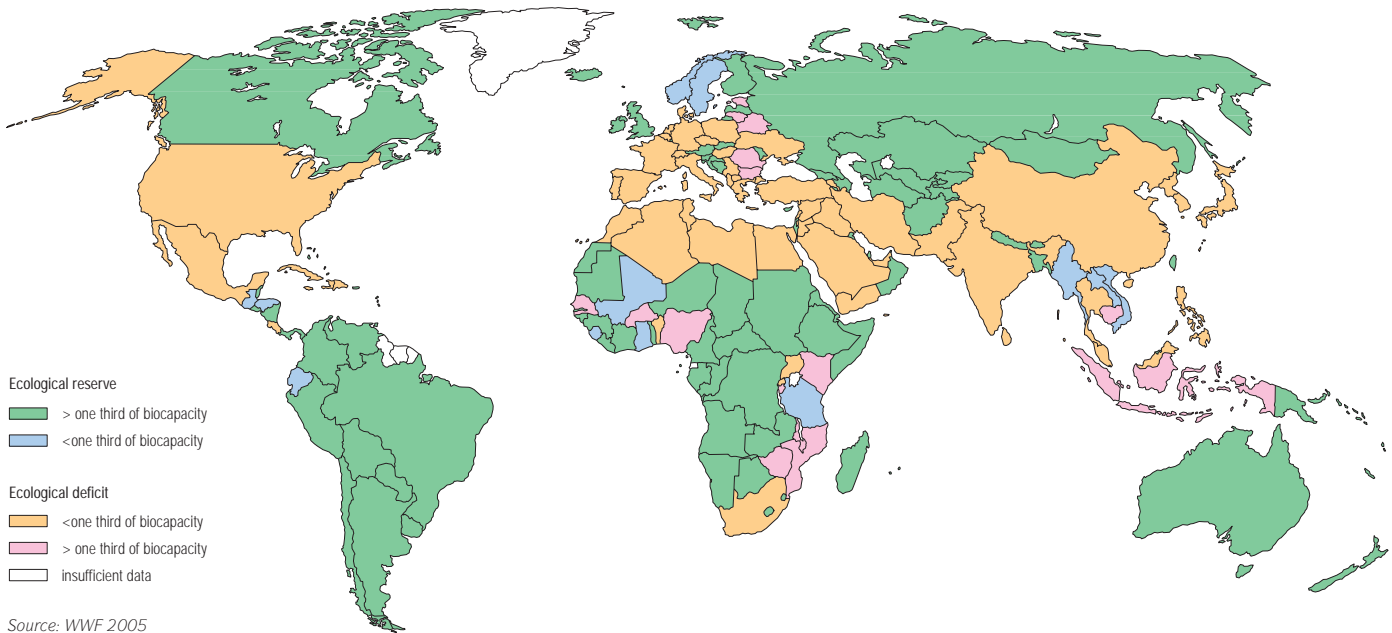
At the regional level, the main institutional responses have been sectoral. The main regional and sub-regional institutional development has been the creation of economic groups which cluster countries around common issues and specifically around economic and social development. These organizations have focused primarily on economic cooperation and trade, with less attention paid to environmental issues. The Commission for Africa (2005) reports that trade among Common Market for Eastern and Southern Africa (COMESA) countries grew by 15 per cent, from US\$4 500 million in 2002 to US\$5 300 million in 2003. These organizations have therefore been effective in increasing trade integration among their members. As more integrated approaches to development have emerged that focus on the links between environment, development and human well-being, these organizations have developed a broader range of interests. The Southern African Development Community (SADC), for example, has been instrumental in the development of collaborative approaches to watercourses, forests and wildlife – although the interlinkages between these issues and their relation to other issues remain relatively weak. The



Heads of State at the 1st African Peer Review meeting and the 9th Heads of State and Government Implementation Committee, 13-14 February 2004, in Kigali, Rwanda.

Source: Government of Rwanda

Figure 4: Ecological debtor and creditor countries 2001



role of these institutions in promoting environmental collaboration is discussed in Chapter 1: *The Human Dimension*. Chapter 12: *Environment for Peace and Regional Cooperation* considers the value of inter-state collaboration on environmental issues. The challenge now lies in taking this a step further and for these economic commissions to become effective vehicles for ensuring the integration of environment into the development process.

The African Ministerial Conference on the Environment (AMCEN) is an Africa-wide body for environmental policy development and environmental governance. It can, as discussed in Chapter 1: *The Human Dimension*, be an important vehicle for improving environmental cooperation, although it still faces various challenges in securing finance for the implementation of its programmes, the harmonization of regional and global environmental issues, and the full incorporation of these issues at the national and sub-regional levels, among many others.

A mechanism that fully addresses policy interlinkages at the regional level is yet to be developed. Given that decisions affecting the environment are most frequently taken outside “the environment sector,” such as trade and finance, a regular interface between AMCEN and other equivalent bodies at the regional level needs to be strengthened. Implementation of framework MEAs such as the CBD and the ACCNRR requires multisectoral coordination and policy integration. Environment ministries and their entities, such as AMCEN, can face real challenges in such situations.

INCLUSIVE POLICY PROCESSES

An added challenge for institutions is how to bring other actors into the policy-making process. The inclusion of civil and private sector groups and citizens into policy making, environmental management and decision-making processes can have positive effects.

Chapter 9: *Genetically Modified Crops* considers how such an approach can contribute to policy that responds more effectively to national and local priorities and values. As discussed in Chapter 1: *The Human Dimension*, opportunities for greater involvement in decision making are being created at the regional and sub-regional levels. However, these have not been able to effectively take on these challenges.

LINKING INSTITUTIONAL RESPONSES FROM NATIONAL TO REGIONAL LEVEL

Regional organization faces the challenge of effectively linking national responses and policies with those at the regional level – linkages need to be developed not just between countries but also within countries. Certain kinds of regional cooperation, such as the management of transboundary parks and spatial development issues, require an interlinkages approach that brings together the relevant players across, and within, countries.

How is this to be achieved in an efficient and effective manner? Large organizations and committees that bring together all stakeholders are often cumbersome, ineffective and become overly bureaucratic. One approach is to systematically develop processes for harmonizing law at the sub-regional and regional level.

Chapter 8 • Interlinkages: The Environment and Policy Web

In the SADC region this has been a key focus of environmental collaboration, which has developed several protocols to their founding treaty that establish an agreed approach in a given area. With this understanding, and clear and harmonized responses, the basis for partnerships and increased collaboration across sectors becomes easier. Law harmonization is a costly, intense and time-consuming process which requires extensive consultation and discussions at the national level that result in the clear identification of priority issues and the range of acceptable responses. A second option is to establish a process of regional engagement in which the different priority areas and responses are reconciled. This may require negotiation and mediation.

Evolving partnerships in natural resource-based management includes organizations for water, forests and wildlife. For example, the Nile Basin Initiative (NBI) brings together ten riparian countries to manage the entire basin of the Nile. Central African countries established the Congo Basin forest partnership to effectively manage the sub-region's forest resources. This initiative is strategic in that forests in Central Africa have been overexploited due to conflict in the sub-region. Nine countries, namely, Cameroon, Central African Republic, Republic of the Congo, Democratic Republic of the Congo, Equatorial Guinea, Chad, Burundi, Rwanda and São Tomé and Príncipe, established the Forest Commission of Central Africa under the Conference of Ministers for the Forests of Central Africa (COMIFAC). The aim of COMIFAC is to facilitate the harmonization and monitoring of forest policies in Central Africa (COMIFAC 2004). There are also examples of similar partnerships in the wildlife sector. These include the Ai-Ais/Richtersveld Transfrontier Park, an international park between South Africa and Namibia, established by a treaty in 2003, and the Great Limpopo Transfrontier Park connecting South Africa's Kruger National Park, Mozambique's Limpopo National Park and Zimbabwe's Gonarezhou National Park (Mohamed-Katerere 2001). Initiatives for collaborative marine management include the agreement between Angola, Namibia and South Africa to jointly manage the Benguela Current Large Marine Ecosystem (Mohamed-Katerere 2001).

MULTILATERAL ENVIRONMENTAL AGREEMENTS

Although the objectives of most MEAs are interlinked and an interlinkages approach to environmental challenges at a thematic level has been developed, the same levels of interaction have not been created between the administering authorities at the different spatial levels – national to global. This presents its own

challenges to establishing synergies for effective implementation. There is a need to link regional institutional structures with the institutions for administering the different MEAs. Improving interlinkages between regional institutions is also important. This involves developing multilevel and cross-sectoral interlinkages.

African countries are party to a number of international and regional conventions. At a regional level these include Bamako (which deals with Hazardous Waste) and the ACCNNR. Global MEAs include Basel, CITES, the CBD, the UNCCD, the UNFCCC and Ramsar. Many African countries are still developing systems for incorporating these conventions into their programmes and policies, and thus have not yet focused on developing interlinkages between conventions. However, addressing this at an early stage – and as part of the process of implementing the conventions – may create opportunities for spreading costs and increasing synergies between these different MEAs. It is also important to develop synergies between implementing institutions for these conventions and institutions involved in poverty alleviation, health and other development needs.

Specific challenges relate to collaboration in communications as well as to information flow, particularly as it relates to reporting requirements. One way to address this is through the development of shared databases. Funding may be an important constraint, particularly as it is often given for sectoral projects and not for groups of projects that promote an interlinkages approach. Human capacity may also limit opportunities for interlinkages.



The Zambezi River in Luangwa District, Zambia, is part of the Zimbabwe-Mozambique-Zambia (ZIMOZA) transboundary management area, facilitated by IUCN, which brings governments and communities together in a partnership that aims to enhance its potential as a tourist destination.

Source: IUCN ROSA

In developing synergies it might be helpful to cluster conventions – depending on their focus – around specific themes. For example the CBD and its Cartagena Protocol, Ramsar, UNCLOS and the World Trade Organization among others are all important in the management of invasive alien species. It is helpful to create specific synergies between these conventions to develop an effective managerial regime which can be implemented at the national level. Similarly, the successful implementation of several MEAs is dependent on effective customs management. Here interlinkages between CITES, the Cartagena Protocol and the Basel and Bamako Conventions, and with customs authorities, is essential to manage trade in and movement of endangered species, living modified organisms, chemicals and hazardous waste. Developing customs capacity to meet the challenges of these conventions is best done in a holistic manner in order to avoid duplication of costs.

The United Nations Environment Programme (UNEP) can play an important role in promoting an interlinkages approach, particularly by facilitating communication among MEA secretariats and with the WTO.



COMESA, in partnership with the Regional Agricultural Trade Expansion Support (RATES) programme, is involved in addressing challenges of food security through fairer trade and food aid. COMESA truck transporting grain.

Source: RATES Trade Center

EMERGING PARTNERSHIPS

Across Africa there are various initiatives that focus on building partnerships across sectors. For environmental policymakers these emerging partnerships present important opportunities. Policymakers are faced with the challenge of how to build collaboration between these partnerships and other processes, develop linkages and ensure the better inclusion of environmental issues in their activities.

Intra-regional trade

Trade is a major source of economic development and can boost resources available for improving social and environmental services. Given this, and the impacts of trade on environment, developing linkages with trade organizations is an important opportunity for the environment.

The Abuja Treaty of 1991 proposed the establishment of an African Economic Community by the year 2000 in order to foster the economic, social and cultural integration of the continent. An important milestone in that direction would be to establish free trade zones at the level of the existing sub-regional economic communities, since intra-regional trade can be a major boost for African economies.

Regional economic integration provides a forum for the negotiation of outstanding trade issues and can be a useful vehicle for delivering payments for ecosystem services. For instance, the NBI is an appropriate forum where upper riparian countries of Uganda and Ethiopia may negotiate funding for watershed protection from the lower riparian countries of Egypt and Sudan. In addition, the hydroelectricity power authorities in Sudan and Egypt could channel resources to support reforestation in upper riparian countries whose watersheds maintain a steady, clean and sustainable flow of water.

New Partnership for Africa's Development

The New Partnership for Africa's Development (NEPAD) is a multisectoral initiative focused on achieving economic revival in Africa; the linkages between economic development and other sectors, such as science and technology and the environment, have been clearly identified. It seeks to build partnerships and promote cooperation between African countries as well as between Africa and other international groups, such as the G8. Within Africa, an important aspect of this cooperation is the African Peer Review Mechanism (APRM) discussed in Box 16.

The APRM has developed and adopted a coherent environment action plan (NEPAD-EAP) and strategies to address the region's environmental challenge in an

Box 16: African Peer Review Mechanism (APRM)

Within the framework of the NEPAD, the members of the AU have adopted a system of voluntary peer review named African Peer Review Mechanism. It is the systematic examination and assessment of the performance of a state by other states. The ultimate goal is to help the reviewed state improve its policy making and adopt best practices. Peer review examinations and assessments rely heavily on mutual trust and understanding between the states being reviewed and reviewers.

The typical mandatory review takes place every three to five years unless under special circumstances an ad hoc review is requested. An APRM starts by developing a report (Background Documents and Draft Programme of Action) and is followed by an APRM team visit to the country concerned to discuss the report. Areas subject to review are democracy and political governance, economic governance and management, corporate governance and socioeconomic development. The programme of action should have benchmarks with specific time to measure the capabilities of a country to comply with the NEPAD objectives and commitments, including protection of human rights, free and fair political processes, sound fiscal management and macro-economic governance. The peer review is a self-assessment mechanism performed by Africa.

Source: Cilliers, undated

integrated manner. The NEPAD-EAP views better governance, poverty eradication, economic growth and income distribution as part and parcel of Africa's sustainable development. In July 2003, the second session of the Assembly of the African Union Heads of States and Government endorsed the Action Plan for the Environment Initiative of NEPAD. UNEP (2004) indicates that implementation of the plan is challenging and will require the support and active participation of African countries as well as development partners to provide finance and coordination.

The NEPAD initiative and the NEPAD-EAP recognize policy interlinkages and the relationship between biophysical and anthropogenic factors. Implementing a multidimensional plan through a sectoral structure at the national level compounds the challenge of financing, and at the same time opens up new opportunities for policy integration at the sub-regional and national levels.

SEIZING OPPORTUNITIES: INTERLINKAGES IN ENVIRONMENT FOR DEVELOPMENT

"...today's development economics is like eighteenth-century medicine... when impoverished countries have pleaded... for help... the main... prescription has been budgetary tightening for patients much too poor to own belts..." (Sachs 2005).

Trade is the engine of development but, despite richness in natural resources, life in many African countries has been dominated by preventable poverty, malnutrition and disease. As the world markets open, so the disadvantages associated with poverty in many African countries are becoming more exposed.

A recent analysis of the Eastern and Southern African countries of the COMESA group put disparity in competitive power into sharp focus, as discussed in Box 17. Similar types of disparities have been noted by the World Bank in their comparative review of the capacities and potential of developing countries in Africa, South Asia, East Asia and Latin America for meeting the challenges of the 21st century (World Bank 2000). They found that African countries, by comparison with other countries, derive a lower level of income per capita from land resources, have lower capital stock per worker, have lower levels of human development, and that the agricultural production index for Africa whilst increasing in total was declining per capita. These findings are consistent with the disabilities that constrain the human and environmental potential of this intrinsically rich region. They do much to explain why Africa's economy has not responded better to the international support it has received or to its own efforts at development.

However, this does not sufficiently explain the African dilemma, for Africa has also been constrained by the external macro-economic environment and the development policies that have been linked to the aid that it has received. The traditional theories of free trade have taken inadequate account of the uneven playing field that holds back Africa's progress. In the face of these disparities, the former remedies proposed by international agencies for economic adjustment programmes to overcome poverty and debt have not worked well in Africa. The revised approach to the economics of development arising from the UN study directed by J. Sachs (UN Millennium Project 2005c) and his more recent commentary on reforming the framework for economic analysis for promoting growth

and reducing poverty (Sachs 2005) propose the use of a fresh evidence-based diagnosis for the analysis of macro-economic issues. This gives more hope for the future of Africa and more attention to its specific needs and potential.

The checklist for making what Sachs refers to as a “differential diagnosis” of a country’s economic potential, is based on a clinical model of examination, putting the “patient” at the centre of attention (CMH 2001). This contrasts with the rather simplistic economic principles used in the past, drawn from Western macro-economic experience, which has proved largely irrelevant to the needs of developing countries. Gunnar Myrdal, a Nobel Prize winner in economics, 35 years ago, exposed similar fundamental flaws in Western macro-economic and development policy in Asia (Myrdal 1968). To overcome these flaws, Sachs proposes that development studies

should begin with a review of the local physical, human and natural capital, the social, epidemiological and demographic factors in poverty in the country under review, the capacity of the country’s business environment, the national economic and fiscal policy, the physical geography of the country, local governance, cultural barriers and geopolitics. The essential change Sachs proposes is to avoid using a “one-solution-fits-all” approach to problem-solving and thus to develop diagnoses and remedies tailored to the needs of each country and to its specific problems and potentials. That is the new method of “clinical economics”.

The results of intervention can be measured in terms of their effectiveness in attaining measurable targets such as reducing soil erosion, improving growth in crops, and reducing the burden of diseases. But results can also be valued in terms of the impact they make on

Box 17: The COMESA* countries and the uneven playing field for global trade

Developed European countries have the following advantages over COMESA countries. The Europeans have:

- 20 times the level of GDP per capita;
- Twice the percentage of population with access to safe water;
- 70 times the capacity for communication by telephone;
- 45 times the level of health expenditure per capita;
- 33 times the level of provision of physicians per 100 000 population; and
- 50 per cent more of their populations with access to essential drugs.

This comparative advantage is reflected in the levels of health and development in the COMESA countries, which by comparison with their European and developed country partners have:

- 300 times the burden of disease from HIV/AIDS, malaria and TB per million population;
- Seven times the level of infant mortality;
- Only two-thirds of the expected life span;
- Half the overall level of human development; and
- Two-thirds of the adult literacy rate.

These inherent disadvantages for Africa represent costs and constraints in international trade holding back the rate of development in COMESA countries, which are amongst the poorest and least developed in the world. Estimates have been made for tackling the problems of HIV/AIDS, TB and malaria in the COMESA countries, based on the most cost-effective interventions, as part of a programme of economic and social development. This strategy requires an investment of \$1 100 million per year, or US\$4 per capita, until 2007 to raise

substantially the level of coverage of health programmes and to gain greater mastery over the health problems. This needs to be undertaken within the context of more general improvements in health services and other essential provisions for health such as safe water, effective communications systems and literacy programmes.

It has been estimated elsewhere, that in Africa, the gap between present spending on essential support for development is US\$50 per capita per year, of which US\$15 per capita represents the gap on health spending. About 28 per cent of the population of the COMESA countries is not covered by health spending at a level sufficient to provide essential services. The gap in health between the COMESA countries and Europe reflects this poverty of investment. The Copenhagen Consensus project supports the view that in economic terms the best buys to meet the most pressing global challenges include control of HIV/AIDS, malaria, and other diseases, and the provision of safe water and sanitation. But as well as financial resources the COMESA countries require international interlinkages to secure improvements in human and institutional capacity and technical transfer, together with interlinkages at local level to ensure coherent policy, planning and sustained executive action in delivery of services and the best use of resources. In addition, they need international support and reform of European economic policy to ensure that the uneven playing field in the global market does not forever exclude them from fair competition.

**The COMESA Group comprises Angola, Burundi, Comoros, Democratic Republic of the Congo, Djibouti, Egypt, Ethiopia, Eritrea, Kenya, Libya, Madagascar, Malawi, Mauritius, Rwanda, Seychelles, Sudan, Swaziland, Uganda, Zambia and Zimbabwe.*

Chapter 8 • Interlinkages: The Environment and Policy Web

wealth, economic growth, and on the value of human and natural capital. For example, disease affects economic growth by reducing healthy life expectancy, reducing parental investment in children, and adversely affecting commercial productivity, business investment, social cooperation and macro-economic stability. It has been estimated that countries that have eradicated the environment-related disease, malaria, tend to grow more than one percentage point a year compared to countries with a high risk of malaria. This can produce a long-run average effect that a country with continued malaria risk generates half the level of per capita income than one which has eradicated the disease or has not been subject to it (Gallup and Sachs 2001). Telecommunications development can also boost economic growth (UN Millennium Project 2005b). This finding is reflected in the strong association between levels of telecommunications and GDP per capita. Telecommunications is a key element in creating the basis for interlinkages within and between sectors at national and international level and improving the efficiency of human capital.

Such measures of the value of results incorporate use values, but the environment also has a non-use or aesthetic value. This may be reflected in its use by tourists, using a method of implied valuation, but measurement of non-use values can also be assessed by indicators of willingness to pay. The principal difference between cost-effectiveness analysis and cost-benefit analysis is in the valuation of the benefits in economic terms.

In order to identify those factors which promote the best use of the environment for development, the new approach to development economics requires a detailed review of transport and trade (including ports, navigable waterways and paved roads); population density; power and telecommunications; arable land and its productivity; agronomic conditions including the length and reliability of the growing season, soils and irrigation, and climate variation; human and plant diseases, pests and animal disease. Such factors are closer to the local productive capacity, but were largely ignored in the past in macro-economic appraisals offered by Western advisers. It was the advisers, and not the local people, who became the driving forces and determined the constraints and conditions of much of the failed macro-economic aid suffered by developing countries in the past.

At country level, the macro-economic planning framework also needs to be consistent with the budgeting requirements of countries, to include a separation of capital and non-capital costs, the identification of the costs of human resources linked to

local pay and also the international market for specialized labour, as well as the often neglected assessments of the costs of capital maintenance, repair and renewal. Increasingly, planners need to be informed on the unit costs of developments so that scaling-up can be done to cover the size of interventions required. Scaling-up should be based on standards derived from local experience, or failing that from experience of other countries that have adopted similar interventions.

As countries move towards a medium-term expenditure framework and results-based budget procedures, so the plans for intervention need to include the links between capital and non-capital expenditure. Results should be based on using measurable and verifiable indicators of performance. Whilst broad-brush global and regional estimates of meeting the MDGs can be derived from long-run average costing methods, at local level countries will need to assess the marginal costs of the steps needed in meeting these goals, and the relative cost-effectiveness of making progress in different areas of intervention. As countries reach close to target levels, it is likely that the next steps in intervention will be more costly and require different technology from those required in earlier phases. In such analysis, both the costs of intervention and the opportunity costs of forgoing the value of using those resources for other ends, have to be considered. The assessment of the



Massawa Harbour, Eritrea, is the main harbour on the Red Sea.

Source: R. Mulder/Still Pictures

externalities arising, for example, from the use of fossil fuels in terms of land and air pollution, should be included in analysis and, where practical, internalized in the pricing structure of the fuels themselves. It is only then that the cost of energy derived from renewable sources can be properly assessed.

Economic appraisal should not be limited to the public sector, but should also embrace private undertakings. Many companies are now responding to shareholder pressure and publishing environmental accounting statements which include the cost of environmental infringements and investment in green technology to reduce environmental damage. This is promoting a greater awareness in the private sector of environmental values and the cost and effectiveness of cleaner technologies. This is resulting in changes in design and procurement practice which should also be reflected in the public sector, which in most countries is the largest investor in new buildings, such as schools, hospitals, offices and housing, and which is

the largest purchaser of equipment and furniture. Many countries have been slow to adopt environmentally friendly policies for public sector building and purchasing practices.

In addition, the use of economic and fiscal measures to supplement statutory controls and legislation is attracting more interest and could emerge as a critical new tool in promoting greater weight to be given to environmental values in Africa. What is important, however, is not the choice of instrument but the effectiveness of its use.

The essential message of economics and environment for development is to establish policy and programmes on the basis of the evidence of their costs and their effects. This means building a basis of evidence to support the diagnosis and choice of remedies. Such remedies should focus on promoting better use of environmental resources for social and economic sustainable development in Africa. To achieve this will require interlinkages at the national level, between departments of government and the private



Mount Oku, Bamenda Highlands, Cameroon. Collecting medicinal plants and making cures provides an income for many people.

Source: M. Edwards/Still Pictures

Chapter 8 • Interlinkages: The Environment and Policy Web

sector, and at the international level to ensure recognition of the need for equity in trading relations. More equitable trade needs to take account of current disparities in capacities for development, the underlying costs of poverty and disease, and the potential of environmental resources (see Box 17).

CONCLUSION

Africa has made tremendous progress in trying to address the environment and development challenges of the past two decades. However, results are mixed.

In many countries, new environmental institutions at different administrative levels, such as environment management agencies, have been established to tackle both green and brown environmental issues. At sub-regional and regional levels, economic groupings have accepted the challenges to develop interlinked and forward-looking strategies to ensure that Africa achieves some of the MDG targets.

Despite such progress, the environment is yet to be fully mainstreamed in all sector-specific policies and in economic development. In particular, the relationship between the environment and continued poverty has not been fully acknowledged. The conclusion reached by the Brundtland Commission in 1987 that institutions tend to be independent, fragmented, and work “to relatively narrow mandates with closed decision-making processes,” remains true 20 years later. The 20 year-old challenge by the Commission to policymakers remains as relevant today as it was then, and it is fitting to repeat it:

“The real world of interlocked economic and ecological systems will not change; the policies and institutions concerned must.”

and

“The ability to choose policy paths that are sustainable requires that the ecological dimensions of policy be considered at the same time as the economic, trade, energy, agricultural, industrial, and other dimensions – on the same agendas and in the same national and international institutions” (WCED 1987).

Interlinking the environment and human development, understanding the causes and effects of environmental change and developing appropriate policy responses remain challenges facing Africa today.

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Chapter 8 • Interlinkages: The Environment and Policy Web

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