



# AFRICA ENVIRONMENT OUTLOOK 2

.....  
Our Environment, Our Wealth  
Executive Summary



UNEP





# AFRICA ENVIRONMENT OUTLOOK 2

.....

Our Environment, Our Wealth

## Executive Summary



First Published by UNEP in 2006

Copyright © 2006, United Nations Environment Programme

This publication may be reproduced in whole or in part and in any form for educational or non-profit purposes without special permission from the copyright holder, provided acknowledgement of the source is made. UNEP would appreciate receiving a copy of any publication that uses this publication as a source.

No use of this publication may be made for resale or for any other commercial purpose whatsoever without prior permission in writing from the United Nations Environment Programme.

#### **DISCLAIMER**

The contents of this volume do not necessarily reflect the views or policies of UNEP or contributory organizations. The designations employed and the presentations do not imply the expressions of any opinion whatsoever on the part of UNEP or contributory organizations concerning the legal status of any country, territory, city or area or its authority, or concerning the delimitation of its frontiers or boundaries.

#### **Contacts:**

Africa Regional Coordinator  
Division of Early Warning and Assessment (DEWA)  
United Nations Environment Programme (UNEP)  
P.O. Box 30552  
Nairobi, 00100, Kenya  
Tel: + 254-20-7623785  
Fax: + 254-20-7624309  
Email: [africa.coordinator@unep.org](mailto:africa.coordinator@unep.org)  
Web: <http://www.unep.org/dewa/africa/>

African Ministerial Conference on the Environment (AMCEN) Secretariat  
UNEP Regional Office for Africa  
P.O. Box 30552, Nairobi, 00100 Kenya  
Tel: + 254 20 7624289/4284/4287  
Fax: + 254 20 7623928  
Email: [amcensec@unep.org](mailto:amcensec@unep.org)

Principal editor: Jennifer C. Mohamed-Katerere  
Assistant editor: Mayar Sabet  
Editorial support: Heritage Editorial  
Design and production: [bounford.com](http://bounford.com)

Cover Design: Audrey Ringler, DEWA UNEP

Cover photographs: background image: M. Chenje

Insets, from top to bottom:

R. Giling/Still Pictures,  
O. Karasek/Still Pictures,  
R. Giling/Still Pictures,  
M. Hamblin/WWI/Still Pictures  
O. Karasek /Still Pictures  
J. Schytte/Still Pictures,  
J. Schytte/Still Pictures,  
J. Etchart/Still Pictures

The United Nations Environment Programme acknowledges the contributions made by many organizations and individuals to the AEO-2 project. A list of acknowledgements is produced in the main AEO-2 report.



## FOREWORD

Economic development in Africa is underpinned by the quality and integrity of the natural resource base. The region's environmental assets provide opportunities for Africa to achieve the objectives of the New Partnership for Africa's Development (NEPAD) and make good progress towards meeting the targets of the Millennium Development Goals (MDGs). Africa cannot, therefore, afford to lose its environmental assets through degradation. Hundreds of millions of people depend directly or indirectly on these resources. African governments acknowledge this fact and have put in place measures to safeguard this valuable asset, including the adoption of the landmark Lagos Plan of Action in 1980. The Plan proposed concrete measures to address the interface between environment and development, and stipulated, among others, the need for African governments to define realistic policy options, strategies and programmes for incorporating environmental considerations in development planning.

African leaders established the African Ministerial Conference on the Environment (AMCEN) in 1985 to enhance regional cooperation in environmental policy responses and on technical and scientific activities to minimize degradation and to place a premium on the environmental goods-and-services which are essential to achieve sustainable development. AMCEN is the apex body on environment in Africa and has, despite various resource and capacity challenges, successfully provided regional leadership and environmental policy direction for more than 20 years. To continue doing this in a rapidly globalizing world, there is a need for a dynamic and strategic vision supported by a strong information base. Therefore, AMCEN continues to strengthen the *Africa Environment Outlook* (AEO) reporting initiative since its inception in 2000 during the 8th session in Abuja. The AEO is a flagship report which tracks regional environmental state-and-trends as well as emerging issues.

Since the publication and launch of the first report in July 2002, strategic planning within the environment landscape in Africa has changed. The environmental reporting framework at the national and sub-regional

levels has been significantly strengthened and some 22 countries and five sub-regions have produced their environment outlook reports using the AEO methodology. The report had a major influence on Africa's position during the World Summit on Sustainable Development (WSSD), which was held in Johannesburg in August 2002. It was also used in the development of the Environmental Initiative of NEPAD which was adopted in 2003 by the African Union as the framework plan for environmental programmes in the region. This is a clear link between environmental assessment and policy making of which we are proud.

Building on the momentum generated by the first report, AMCEN, with the support of the United Nations Environment Programme (UNEP), has over the past four years produced the second *Africa Environment Outlook – Our Environment, Our Wealth* (AEO-2) report. We are proud of this report, which highlights the central position Africa's environment continues to play in sustainable development, enhancing human well-being. It also flags the many opportunities the environment in Africa provides to eradicate extreme poverty and hunger, greatly enhance accessibility by the majority to safe drinking water and improved sanitation as well as achieve tremendous progress in the implementation of the MDGs.

The AEO-2 report is the achievement of Africa's institutions and experts, and is a further demonstration that Africa has the human resources and skills to chart its own destiny and realize the dream of an African renaissance. All that is needed is the political will and commitment to translate the scientific findings into action on the ground. I would like to commend all the experts, AEO collaborating centres and other stakeholders who, through their expertise and voluntary contribution to the process, have made this report possible and a worthy contribution to the body of knowledge on the African environment.

It is my hope that this report will inspire decision-makers, at all levels in the region, as we pursue our goals of sustainable development in Africa. I wish you all good reading.

Abdul-Hakim Ragab Elwaer, President



*“However improbable it may sound to the sceptics, Africa will prosper! Whoever we may be, whatever our immediate interest, however much we carry baggage from our past, however much we have been caught by the fashion of cynicism and loss of faith in the capacity of the people, let us err today and say – nothing can stop us now!”*

THABO MBEKI, THEN DEPUTY PRESIDENT OF SOUTH AFRICA (MBEKI 1996)

## INTRODUCTION

The dawn of the 21st century stands out as the beginning of a renaissance for Africa – politically, economically and environmentally. The formation of the New Partnership for Africa’s Development, NEPAD, marked a turning point and a renewed commitment to adopting policies and systems that allow Africa to prosper.

Africa’s environmental resources are an important part of this vision, for they hold vast potential for development and improving human well-being. However, for these options to remain available it is imperative that Africa acts to protect its environmental resources. This is particularly important given that Africa relies directly on natural resources to generate revenue and meet livelihood needs – any complacency in this regard comes with economic and human costs. By taking firm action to protect environmental goods-and-services and to seize the opportunities afforded by changes in the global economy it is possible for the 21st century to be Africa’s century – of prosperity, durable peace and sustainable development.

The *Africa Environment Outlook 2 – Our Environment, Our Wealth* (AEO-2) is an integrated and participatory environmental assessment, which examines the state of existing resources and highlights the opportunities and potential (current and future) of these to achieve sustainable development, eradicate poverty and reduce vulnerability, and enhance environmental sustainability. Pursuant to this, AEO-2 focuses on five consecutive and interrelated questions:

- First, how and why is the environment important from a human perspective?
- Second, how is the environment changing and why, and what opportunities does it hold?
- Third, are there special issues which affect the environment and development that require immediate attention or new approaches?
- Fourth, how will different policy choices affect the road to the future?

- Fifth, what can be done to ensure development and improve quality of life while ensuring that environmental value is retained?

## ENVIRONMENT FOR DEVELOPMENT

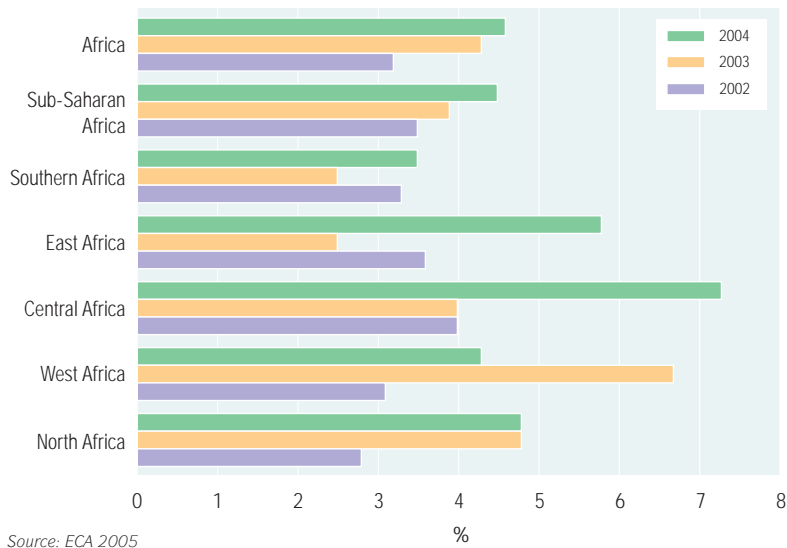
### THE HUMAN DIMENSION

For Africa, people are at the centre of its environment and development goals. Improving human well-being and promoting prosperity are key motivations of environmental policy and action:

“Human development is about freedom. It is about building human capabilities – the range of things people can do, and what they can be. Individual freedoms and rights matter a great deal, but people are restricted in what they can do with that freedom if they are poor, ill, illiterate, discriminated against, threatened by violent conflict or denied a political voice.” Human Development Report, 2005 (UNDP 2005)

Extending capabilities demands improving access to material assets including environmental goods that underpin opportunity, ensuring good health, maintaining or restoring good social relations, and guaranteeing resource security and security from harm as a result of natural disasters (MA 2006). The environment supports these aspects of human well-being through provisioning (eg food, fuel), regulating (eg water purification) and cultural (eg aesthetic, recreational) services. All people – especially those whose livelihoods are based on natural resources – are dependent on the environment. Many other livelihoods, in trade, manufacturing and processing are indirectly dependent on environmental resources.

Figure 1: GDP growth by ECA sub-region



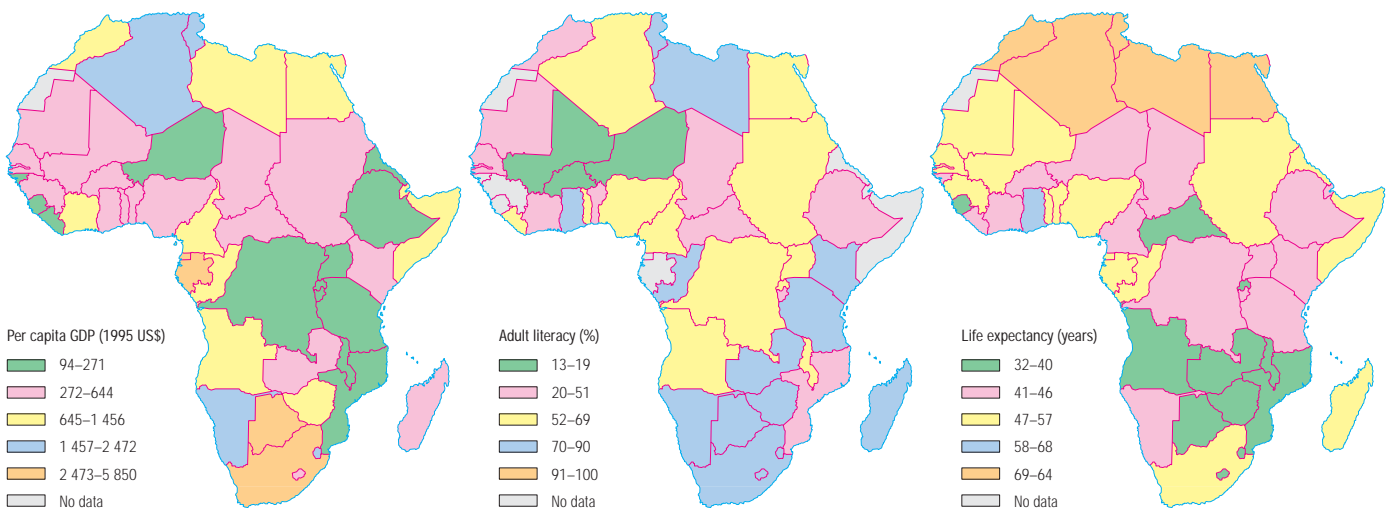
Source: ECA 2005

In meeting development objectives and targets, Africa faces multiple and complex challenges – it needs to reposition itself to take advantage of trade opportunities and provide a climate conducive to investment, economic growth and employment generation. At the same it must reduce human vulnerability to environmental change and hazards and improve living standards, while ensuring that the environment is used sustainably. To successfully deliver on all these fronts – without compromising the rights of future generations – requires not only good national and regional policies but also supportive global policies and practices.

New approaches to development have meant that economic performance has improved. In 2004, Africa recorded 4.6 per cent growth –the highest in almost a decade and a continuing improvement over both 2002 and 2003 (Figure 1). Environmental resources – oil exploitation, improved agricultural performance and higher commodity prices, and tourism –underpinned economic growth. Good macro-economic management, improved political situations and donor support were also important factors. However, this improved economic growth has not been translated into significant improvements in human well-being.

In recent years, many African countries have experienced a decline in the quality of life, as measured by the Human Development Index (UNDP 2005). Half of the population lacks access to health services. Malaria, HIV/AIDS, malnutrition, and maternal and childhood mortality remain serious problems. In rural areas about 50 per cent of the population are without access to adequate water supply, and 70 per cent are without access to adequate sanitation; in urban areas, these percentages are 20 per cent and 40 per cent respectively (WHO and UNICEF 2004). Although there has been significant progress in education over the last two decades, much remains to be done. Primary school enrolment in 16 countries is below 60 per cent, and there are more children between the age of 6 and 11 out of school than was the case in the 1990s. The average rate of adult illiteracy stands at 43 per cent. Life expectancy at birth in SSA has been reduced from

Figure 2: The many measures of poverty



Well-being can be measured using indicators other than income poverty. Three maps of Africa show country-by-country variations in the indicators used by UNDP to annually measure human development: adult literacy, life expectancy at birth, and gross domestic product per capita. [Data sources World Bank 2004a and UNPD 2003, UNESCO 2004].

Source: WRI and others 2005



50 in 1990 to 46 in 2002 (World Bank 2005). Inequity remains a major problem fuelling poverty, conflict and environmental degradation. In many countries poor people are becoming poorer (UNDP 2005) perpetuating the poverty-degradation cycle. In others, inequity has generated conflict, which in turn undercuts the ability to manage resources sustainably as well as prospects for economic development.

### THE POLICY-ACTION CHALLENGE

Human society and environmental change are closely interlinked, with changes in the one having implications for the other. Thus policy responses need to take account of the fact that:

“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.” Brundtland Commission (WCED 1987)

Having failed to act sufficiently on Brundtland’s warning, we have, since 1987, witnessed growing pressure on environmental goods-and-services, principally as a result of changes within human society, and in many parts of the world poverty has deepened. Ironically, many of these changes spurred on by development concerns increase human vulnerability and undermine human well-being. A complex mix of social, economic, policy, and natural factors drive environmental change. Key among these are poverty, conflict, land conversion, overharvesting, inadequate policies, poor monitoring, climate change and natural disasters. Globalization has offered new opportunities but has also created new challenges – for Africa it has perpetuated patterns of poverty, inequity and vulnerability.

Since 1987, environmental policy has developed phenomenally. In 1992, the United Nations Conference on Environment and Development (UNCED) brought together governments, non-governmental organizations and civil society and defined a new approach to the environment. Four multilateral environmental agreements (MEAs) addressing various aspects of the environment and establishing principles of management were adopted (Box 1). These are the Rio Declaration, the Convention on Biological Diversity (CBD), the United Nations Framework Convention on Climate Change (UNFCCC) and the Non-Legally Binding Authoritative Statement of Principles for a Global Consensus on the Management, Conservation and

#### Box 1: Environmental management principles established by the UNCED agreements

- “The polluter pays” principle
- Intergenerational equity
- Precautionary principle
- Cooperation
- Mutual responsibility

Sustainable Development of All Types of Forests. In addition, Agenda 21 – a comprehensive programme of action that recognizes the role of multiple stakeholders – was adopted. In 1994, this new approach was complemented by the adoption of the United Nations Convention to Combat Desertification (UNCCD).

Since then, many other agreements have been adopted at the global and regional level to address specific aspects of environmental management. New levels of collaboration have brought new approaches to environmental management notably transboundary natural resource management, and global recognition of joint responsibility to minimize the impacts of chemicals and climate change.

Progress towards meeting this agreed environmental and development agenda has been slow. Inadequate financing, lack of capacity and too broad an agenda have undermined progress. In 2002, the World Summit



Women collecting *Piliostigma reticulatum* pods, Burkina Faso. They will sell these as high-quality animal feed.

Source: D. Tiveau/CIFOR

**Box 2: NEPAD-EAP programme areas**

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

Source: NEPAD 2003

on Sustainable Development (WSSD) met to assess progress and to chart a way forward. It adopted an action agenda with identified goals and targets in the areas of water and sanitation, energy, health, agriculture, biodiversity and ecosystem management, and finance, trade and globalization and linked these closely to the Millennium Development Goals (MDGs). Countries were called upon to formulate national strategies for sustainable development, to begin implementation through clear laws, and to strengthen public participation in management.

Africa has sought to consolidate efforts towards sustainable development – at the national, sub-regional and regional level. Many countries have embraced access to a clean and productive environment as a fundamental human right. New environmental management institutions, including dedicated ministries, have been developed. Through the African Union (AU) and NEPAD – the region's response to tackle poverty and hunger, underdevelopment, governance problems and environmental degradation – the environment has been recognized as one of the central building blocks for development. The core objectives of the NEPAD Environmental Action Plan (NEPAD-EAP) are to combat poverty and contribute to socioeconomic development. The NEPAD-EAP has six programme areas (Box 2). Three crosscutting issues – health, the transfer of environmentally-sound technologies, and assessment of and early warning systems on natural disaster – were identified. The NEPAD-EAP focuses on building Africa's capacity to implement MEAs by investing in human resource development and public education and awareness, strengthening institutions and improving coordination, supporting the development of information systems, mobilizing and strengthening the role of scientific and technical communities, and promoting south-south cooperation and the sharing of expertise (NEPAD 2003).

In 2003, under the auspices of the AU, the Africa Convention on the Conservation of Nature and Natural Resources (ACCNNR) was adopted. Other measures adopted by the AU to strengthen effective environmental action include:

- The Pan-African Parliament's permanent standing Committee on Rural Economy, Agriculture, Natural Resources and Environment established in 2004.
- The Economic, Social and Cultural Council launched in 2005 to facilitate and promote civil society participation in its affairs.

## ENVIRONMENTAL STATE-AND-TRENDS: WHAT OPPORTUNITIES?

AEO-2 undertakes an integrated and multilevel analysis of the state of the environment and the opportunities it offers Africa. It looks at changes over a 20-year period from 1987. The multiple values of the resources are identified and this serves as a motivation for safeguarding and improving the remaining environmental assets. In general, there continues to be a downward spiral with decreases in quality and quantity of environmental goods-and-services and this is placing serious constraints on opportunities available for development and improving human well-being. Immediate action is needed to reverse this if present and future needs are to be met and prosperity is to be realized. Improving environmental management and ensuring development requires, among other measures, diversifying the range of activities and improving efficiency.

Africa's fast-growing population – in the context of slow economic growth, insufficient planning and inadequate infrastructure development – presents many environmental challenges (Box 3). This has increased demand for land for agriculture, which contributes to

**Box 3: Population Growth**

Population growth in Africa is among the highest in the world: at the beginning of the 20th century, the total population was about 118 million, representing 7.4 per cent of the global population (United Nations Population Division 1996). By 2000 it had increased six-fold to 798 million or 13 per cent of the world population (FAO 2003). By 2025 it is expected to reach 1 300 million (United Nations Population Division 2005).

Sources: FAO 2003, United Nations Population Division 1996, 2005

**Table 1: Values from land and land-based ecosystems**

Direct values Consumptive and non-consumptive use of resources:	Indirect values Ecosystem functions and services such as:	Option values Premium placed on possible future uses, including:	Non-use values Intrinsic significance in terms of:
Domestic use	Land quality	Pharmaceutical	Culture
Industrial input	Soils	Agricultural	Aesthetic
Commercial use	Micro-organisms	Industrial	Heritage
Mining	Water flow	Mining	Bequest etc.
Oil extraction	Water storage	Tourism	
Growing crops	Water recharge	Forestry	
Human settlements	Flood control	Human settlements	
Wood fuel	Storm protection	Leisure etc.	
Wild plants	Nutrient retention		
Wild animals	Moisture retention		
Tourism	Microclimate		
Waste disposal etc.	Natural sink etc.		

*Source: Adapted from Hirji and others 2002*

deforestation and habitat loss. Habitat loss through destruction, conversion and fragmentation is the leading cause of biodiversity loss. Invasive alien species (IAS) follow at a close second, although in some freshwater systems this is the primary driver. Pollution and climate change present significant threats to environmental goods-and-services. Poverty, inequity and conflict continue to be major drivers of environmental change.

The environment has multiple values (Table 1), that can be harnessed to support development.

**ATMOSPHERE**

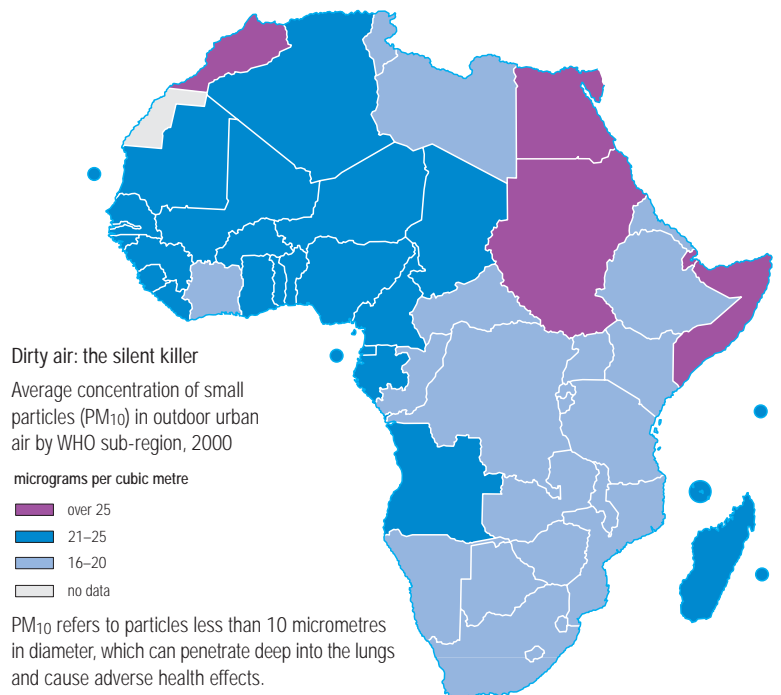
The atmosphere provides vital, but often poorly recognized, life-supporting resources that affect development opportunities, livelihoods and human well-being. These include climate systems which form the basis for health, agriculture and energy. Climate variability, climate change and growing pollution are the principle atmosphere-related challenges that Africa faces.

Although Africa is a relatively small polluter in global terms, its growing incidence of pollution is creating new challenges for human well-being and environmental integrity. Indoor pollution, primarily from the dependence on biomass fuel, has high health costs, particularly for woman and children (Gordon and others 2004).

Nevertheless, the atmosphere offers a wide range of opportunities for reducing pollution as it is an important source of cleaner energy. In addition to the health benefits, developing more accessible and cheaper energy offers development opportunities,

particularly for rural and other off-grid areas. Both wind and solar resources can be harvested to provide energy, although the costs currently associated with these are high. Wind energy potential is highest in Northern Africa and the southern part of South Africa. Africa is endowed with enormous potential for solar energy generation. A range of technologies, including

**Figure 3: Air pollution in cities in Africa**



Atmospheric resources play an important part in many economic activities. Fish drying in KwaZulu-Natal, South Africa.

Source: A. Mohamed

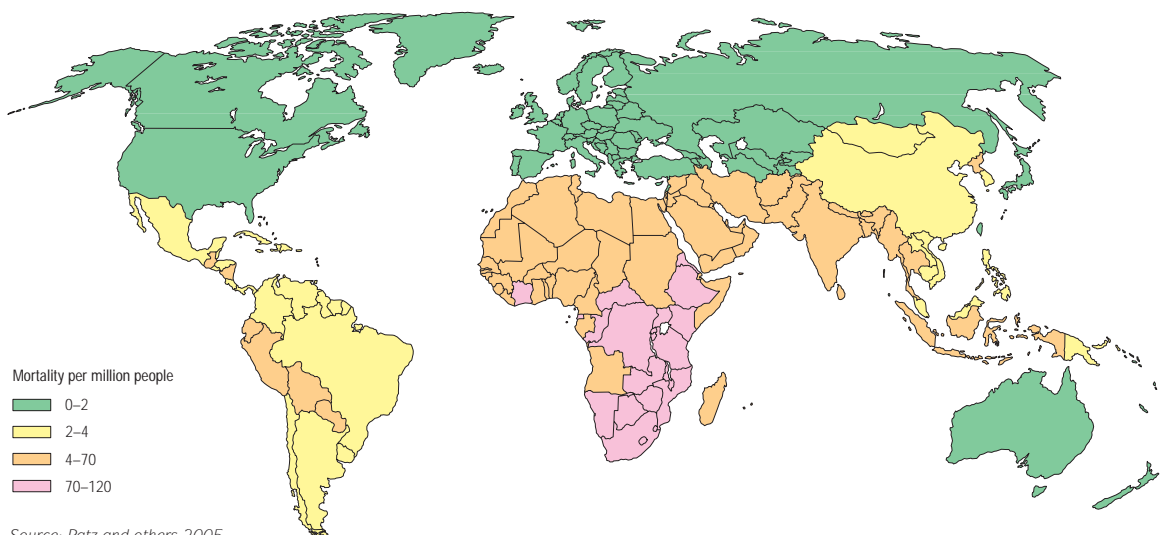


photovoltaic cells and power-concentrating mechanisms, can be utilized, particularly for small industries and households. In addition, increased access to energy also has positive spin-offs for education as girl children spend less time collecting wood and have more time to attend school. For alternative energy to become viable and cost-effective there needs to be greater investment in technology development within Africa. Africa needs to build its research and development (R&D) capacity in order to participate more effectively in the market. Other

measures could include investing in a large number of small plants to achieve economies of scale.

Climate change also potentially affects human health, primarily through increasing the range of disease-bearing insects, such as the malaria and dengue mosquitoes (Patz and others 2005). Climate change is linked to global patterns of energy consumption and production, with CO<sub>2</sub> emissions being an important factor. Africa is a small contributor to emissions (3.6 per cent) but it carries a disproportional share of the costs associated with climate change (Figure 4).

Figure 4: World Health Organization estimated mortality attributable to climate change by the year 2000



## LAND

The African landscape is a rich and dynamic mosaic of resources including forests and woodlands, mountains, deserts, coastal lands and freshwater systems that hold vast potential for development if managed sustainably (Figure 11). These include agriculture, tourism, mining, oil extraction and human settlements.

Africa is rich in mineral resources: it has about 30 per cent of the earth's minerals, including 40 per cent of gold, 60 per cent of cobalt and 90 per cent of platinum (UN 2002). In Southern African, for example, mining contributes about 60 per cent of foreign exchange earnings, 10 per cent of Gross Domestic Product (GDP) and 5 per cent of employment (SADC 2004). Oil has been the key factor in African economies growing at more than 7 per cent per year – the minimum growth required to achieve the MDG to halve poverty by 2015. In 2004 this was the case in Chad (39.4 per cent), Equatorial Guinea (18.3 per cent), Liberia (15 per cent), Ethiopia (11.6 per cent) and Angola (11.5 per cent) (ECA 2005). Mozambique, as a result of continued strong donor support and recovery in agriculture and expansion in the industrial sector, grew at 8.3 per cent in 2004.

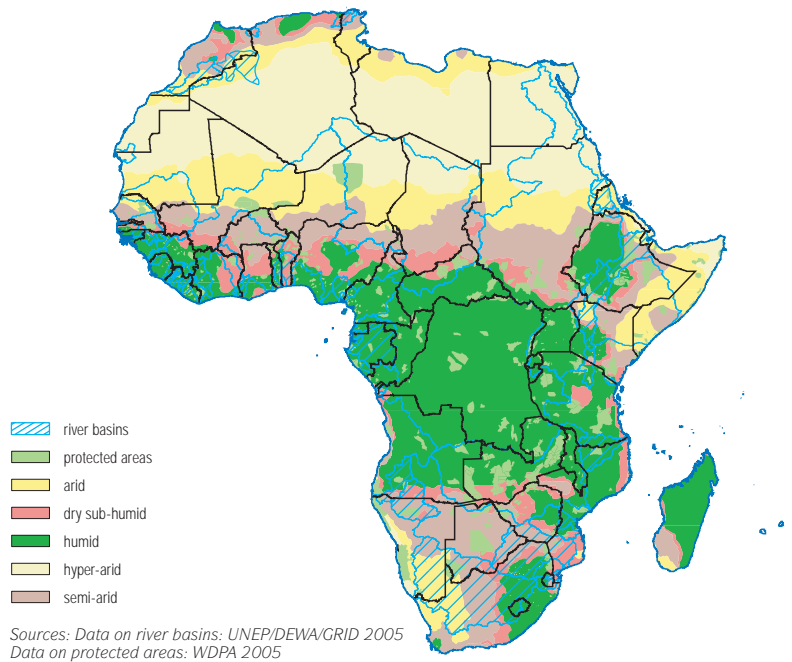
For most of Africa, agriculture is the principal economic activity, providing livelihoods and employment for many. About 203 million people (56.6 per cent of the labour force) were engaged in agricultural labour in 2002 (FAOSTAT 2004). In most African countries, agriculture supports up to 70 per cent of the population (ECA 2004). The productivity of land resources is closely related to other environmental goods-and-services, particularly atmospheric and freshwater resources (Figures 5 and 6).

Changes in climate affect food production and directly impinge on Africa's economic potential and ability to meet the MDG to reduce poverty and extreme hunger. The high costs associated with climate change and variability are closely related to poverty, poor health and dependence on agriculture, therefore measures that address these aspects and diversify the range of economic activities can be important in mitigating the affects of climate change. Rainfall has steadily been decreasing since 1968 (UNEP 1999), increasing the challenges of food production which is primarily rain-fed. Developing early warning and assessment systems is an important measure for increasing human resilience. In addition, conflict and war also disrupt food production.

The NEPAD Comprehensive Africa Agriculture Development Programme (CAADP) of 2002 seeks to:

- Extend the area under sustainable land management and reliable water management systems;

Figure 5: Climatic zones



- Improve rural infrastructure, trade and market access;
- Increase food supply and reduce hunger; and
- Accelerate gains in productivity through agricultural R&D, and technology dissemination and adoption.

One of the main challenges facing Africa is desertification. The UN General Assembly declared 2006 as the International Year of Deserts and

Figure 6: Rainfall zones

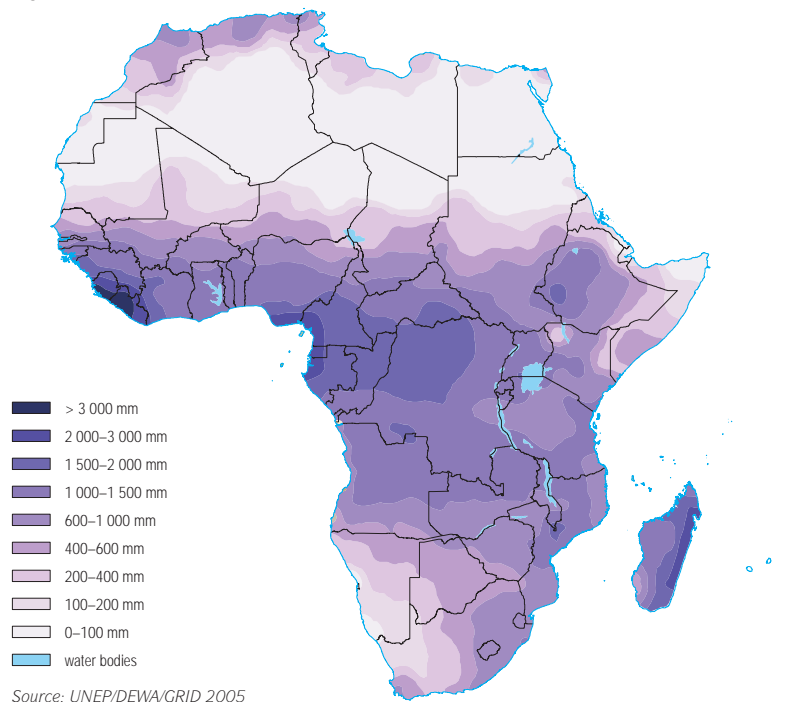
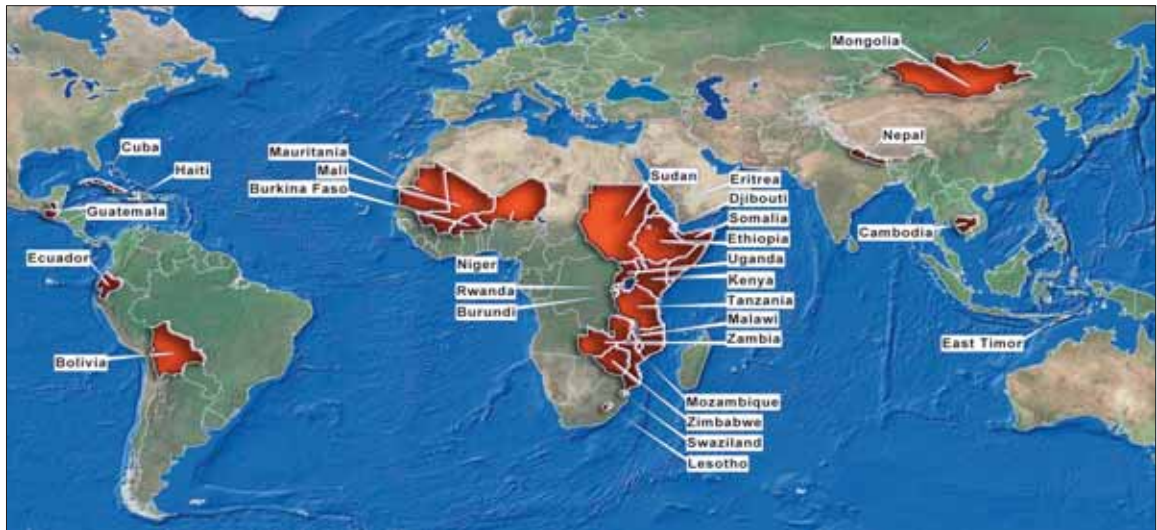


Figure 7: Countries affected by food insecurity due to natural hazards during 2005-2006 cropping seasons



Source: WFP 2006

Desertification. All 53 African countries have ratified the UNCCD, and in general most countries are moving from planning to action. This has also been an important focal point for the AU. The implementation of the UNCCD has facilitated strategic coordination at different levels. For example, the African Ministerial Conference for the sixth session of the UNCCD Conference of the Parties (COP) in 2003, urged the parties to take appropriate measures to strengthen access to the world market for agricultural products from arid, semi-arid and dry sub-humid areas of Africa (UNCCD Secretariat 2003).

### FRESHWATER

Freshwater systems provide vital environmental goods-and-services. Development opportunities are shaped primarily by access to water resources and its quality. Improving both of these is critical for promoting economic growth and meeting human needs. In 2005, only about 5 per cent of the development potential of these resources – irrigation, industry, tourism and hydropower – was expected to be utilized (ECA and others 2000).

Availability is affected by natural phenomena, such as rainfall and climate variability, and human factors,



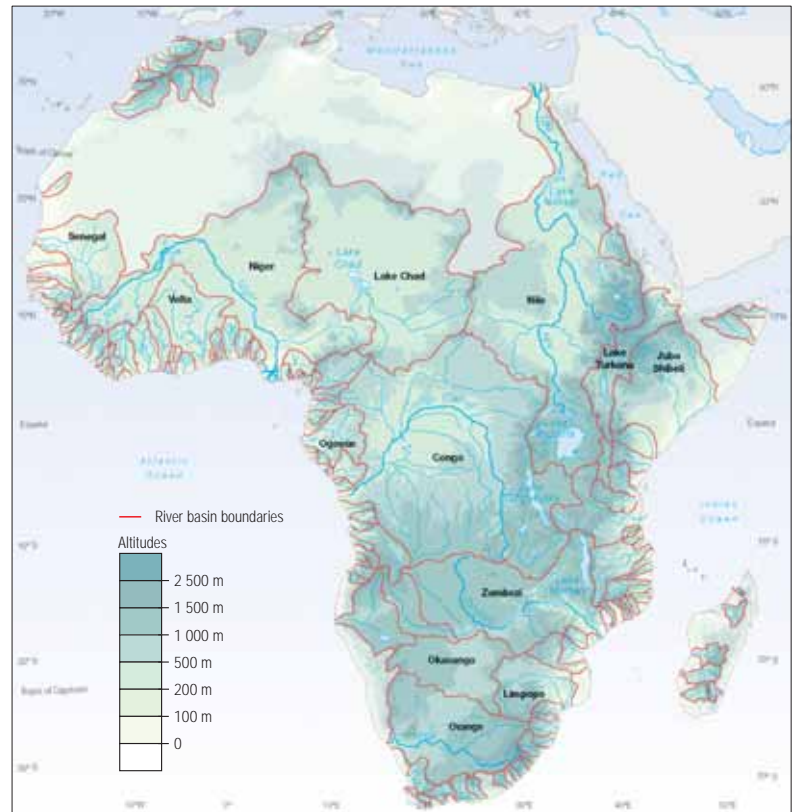
Gold panning in Kalsaka Village, Yatenga Province, Burkina Faso.

Source: Still Pictures

such as population growth, inequitable water management, inefficient use and pollution. Extreme variability in rainfall – across time and space – results in uneven distribution of surface and groundwater resources, from areas of severe aridity like the Sahara and Kalahari deserts in the northern and southern parts, to the tropical belt of mid-Africa with its abundant freshwater resources. Internal renewable freshwater resources average about 3 950 km<sup>3</sup> per year. Groundwater can be a valuable resource to meet growing demand if protective measures are in place and enforced. Annual groundwater recharge per capita is lowest for Northern Africa, ranging between 144–350 m<sup>3</sup> per capita whereas in other sub-regions, annual groundwater recharge ranges from 2 400 to 9 900 m<sup>3</sup> per capita (IGRAC 2004). There are over 50 internationally shared river and lake basins in Africa, making cooperation and collaborative management a key concern.

If used sustainably Africa's freshwater resources can be vital economic and social goods. In 2000, the World Water Forum adopted the Africa Water Vision 2025 which establishes water management targets (Box 4). Safe water supply and appropriate sanitation are the most essential components for a healthy and prosperous life. In 2002, the United Nations Economic and Social Council recognized water as a human right. Improved provision of water and sanitation facilities, to the rural and rapidly expanding urban populations, can reduce mortality rates of water-related diseases, such as cholera, diarrhoea and malaria.

Figure 8: Africa's water resource



Source: UNEP 2002

One freshwater opportunity that remains poorly utilized is hydropower. Currently, less than 5 per cent of this potential is utilized (ECA 2000). The Congo River accounts for nearly 30 per cent of Africa's surface water reserves and has the largest hydropower potential in

#### Box 4: The Africa Water Vision for 2025: targets for urgent water needs

##### By 2015:

- Reduce by 75 per cent the proportion of people without access to safe and adequate water supply.
- Reduce by 70 per cent the proportion of people without access to safe and adequate sanitation.
- Increase by 10 per cent water productivity of rain-fed agriculture and irrigation.
- Increase the area of irrigated land by 25 per cent.
- Realized 10 per cent of the development potential for agriculture, hydropower, industry, tourism and transportation.
- Implement measures in all countries to ensure the allocation of sufficient water for environmental sustainability.
- Implement measures in all countries to conserve and restore watershed ecosystems.

##### By 2025:

- Reduce by 95 per cent the proportion of people without access to safe and adequate water supply.
- Reduce by 95 per cent the proportion of people without access to safe and adequate sanitation.
- Increase by 60 per cent water productivity of rain-fed agriculture and irrigation.
- Increase the area of irrigated land by 100 per cent.
- Realized 25 per cent of the development potential for agriculture, hydropower, industry, tourism and transportation.
- Implement measures in all river basins to ensure the allocation of sufficient water for environmental sustainability.
- Implement measures in all river basins to conserve and restore watershed ecosystems.

Source: ECA and others 2000



**Coastal tourism threatens coral reefs and coastal ecosystems**  
Tourism development at Hurghada on Egypt's Red Sea coast.

Source: Google Earth

the world – much of it untapped (ECA 2000). It is estimated that it could generate 40 000 megawatts, sufficient power supply for the whole of Africa with enough over for export (ECA 2000).

### COASTAL AND MARINE ENVIRONMENTS

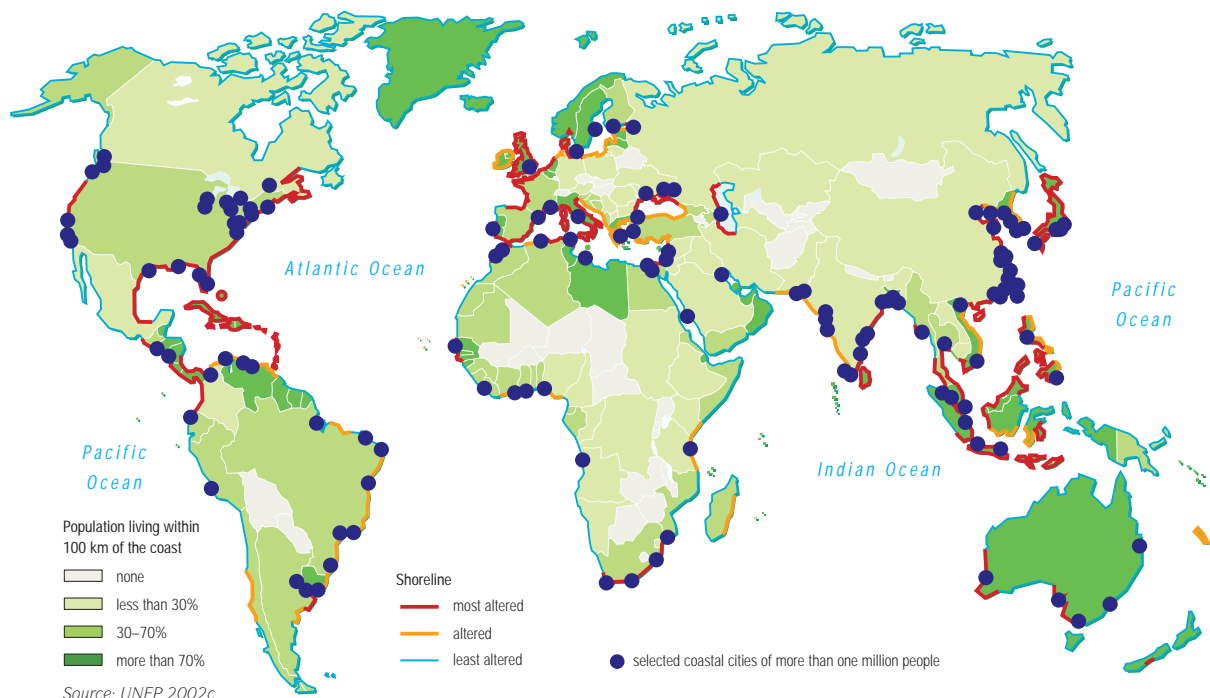
Africa's coastal and marine resources include mangrove forests, coral reefs, sea-grass beds, estuaries and fish. There are also substantial mineral resources, particularly off Africa's west coast – including oil and natural gas –

that are underexplored. In Southern Africa, alluvial diamonds are found along the Atlantic shore and in Eastern Africa titanium and zirconium are found. Coastal assets also support a growing tourism sector.

As coastal populations grow, pressures from both land-based and marine human activities increase, resulting in the loss of living resources and habitat destruction which in turn decreases livelihood opportunities and aggravates poverty (Figure 9). The main causes of this degradation, apart from natural disasters, are poverty and the economic development pressures at local to global scales. Economic gains – many bringing only short-term benefits – are being made at the expense of ecosystem integrity and the vulnerable communities that they support. The overexploitation of offshore fisheries impacts on the food security of coastal populations. The modification of river-flows to the coast by damming, irrigation and pollution threaten coastal and marine resources. Heavy industry, including oil refineries and gas liquefaction plants, terminal facilities for tankers and undersea pipelines, and bases for offshore engineering services add to pollution problems. Climate change also poses a threat.

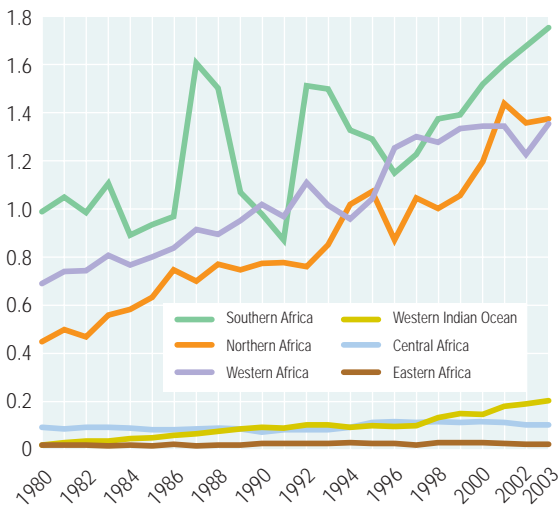
Fisheries present important opportunities, however the extent to which coastal communities, and their countries, benefit from fisheries varies greatly (Figure 10). The resources are exploited by industrial – local and foreign – as well as artisanal fleets. Where the artisanal sector is strong, as on the Atlantic coast, there

**Figure 9: Coastal populations and shoreline degradation**





**Figure 10: Reported marine fish capture in African sub-regions**  
million metric tonnes



Fishery production relates to catch of aquatic organisms, taken for commercial, industrial, recreational and subsistence purposes from inland, brackish and marine waters. The harvest from mariculture, aquaculture and other kinds of fish farming is also included. Catches of fish, crustaceans and molluscs are expressed in live weight, that is the nominal weight of the aquatic organisms at the time of capture. To assign nationality to catches, the flag of the fishing vessel is used, unless the wording of chartering and joint operation contracts indicates otherwise.

Source: FAO Fisheries Department, *Fishery Information, Data and Statistics Units*

is competition between them and the industrial sector and this often leads to conflict. Illegal, unregulated and unreported fishing by vessels from outside the region is common; this jeopardizes the catches of local, small-scale fishers with serious consequences for food security and income. Fish populations are stressed in many areas – generally artisanal fisheries are showing decreasing returns per fishing effort and reductions in the sizes of fish caught.

In some countries – particularly some small island developing states (SIDS) – tourism, with its related services, is already the largest employer and the tourism sector makes the largest contribution to GDP (Figure 14). Coral reefs are a major ecotourism attraction. There are opportunities for involving indigenous coastal communities in ecotourism, improving their well-being as well as contributing to national economies.

Most coastal countries are signatories to one or more MEAs that deal with marine and coastal management issues. These include the Barcelona Convention, the Jeddah Convention, the Nairobi Convention, the Abidjan Convention, the International Convention for the Prevention of Pollution from Ships and the United Nations Convention on the Law of the Sea. These conventions lay the basis for developing legislation and

management for the sustainable use of coastal and marine environments, integrating the various sectoral policies, and taking account of interlinkages between freshwater and coastal and marine systems.

## FORESTS AND WOODLANDS

Africa's forests and woodlands cover about 650 million ha (21.8 per cent of land area) and this accounts for 16.8 per cent of global forest cover (FAO 2005). There are several varieties of forests and woodlands including tropical rain forests, tropical moist forests, tropical dry forests, tropical mountain forests, subtropical humid forests, subtropical dry forests, subtropical mountain forests, mangrove forests and plantations (Figure 11). The distribution of forests and woodlands, and therefore available opportunities, varies from one sub-region to the other, with Northern Africa having the least forest cover while Central Africa has the densest cover. The Congo basin is home to the world's second largest continuous block of tropical rain forest (FAO 2003).

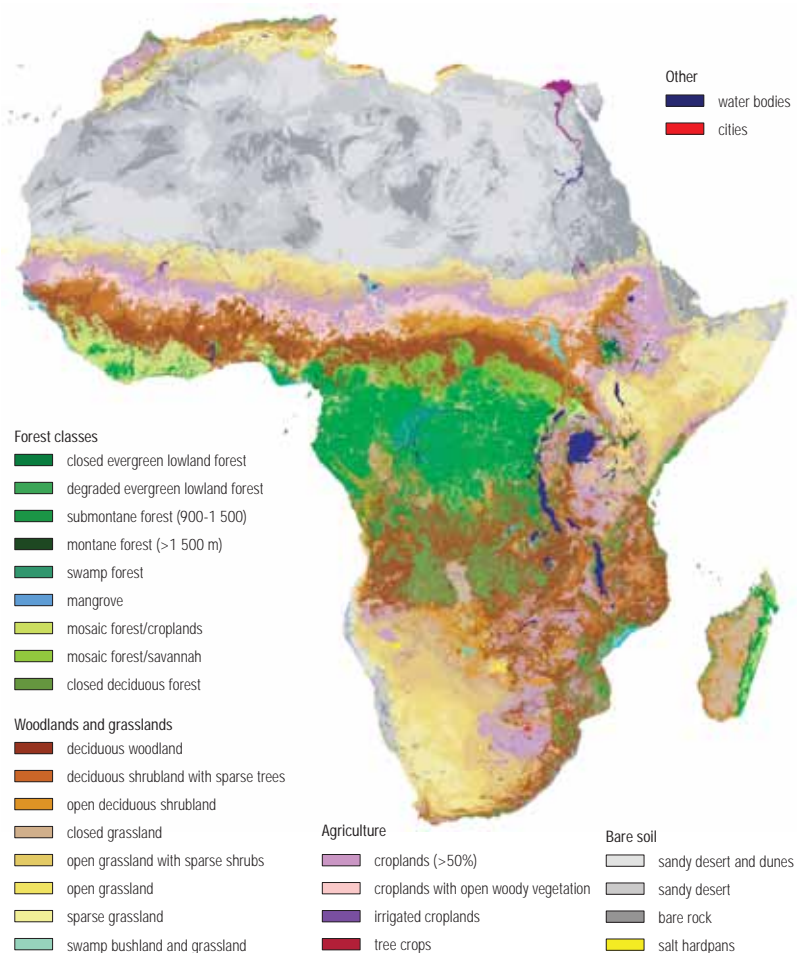
Forests and woodlands provide multiple goods-and-services that contribute to social and economic development goals and have multiple values at different levels. At the local level, uses vary extensively with the type of forest and the community, and may include construction materials, foods, energy, medicines, catchment protection, soil protection, shelter and shade, habitat for wildlife and grazing, as well as cultural values (eg sacred groves). In addition, they are valued as economic goods, although the



A wide variety of NTFPs for sale in Mfoundi Market, Yaoundé, Cameroon. Investing in R&D regarding NTFPs can increase the range of economic options.

Source: Y.Katerere

Figure 11: Forest, woodland and vegetation cover



Source: *Mayaux and others 2003*

ability of communities to benefit at this level is often limited. At the national and regional levels, forests and woodlands play an important role in catchment protection ensuring water quality and the regulation of river-flows, hydropower potential, prevention of soil erosion, timber products, biodiversity, non-timber forest products (NTFPs), energy and leisure. At the global level, they are valued for their role in climate regulation and as repositories for biodiversity.

Africa is losing its forests at a rate of 0.8 per cent per year (5 262 000 ha). Important drivers include the demand for fuel and agricultural land, livestock production and plantation crops, population growth, and infrastructure development. Other pressures include conflict, inappropriate urbanization, forest policies, poor enforcement, weak forest departments, and low investment in research, training and management.

Adding value to forest products and developing markets for environmental services can be important ways of increasing earnings from forest resources. It is also imperative to increase the opportunity for communities and other emerging entrepreneurs to

participate more directly in the market and trade. Another missed opportunity is NTFPs. The full range of benefits available from their commercialization has not been realized. One challenge is that the returns to producer communities are often very low. Africa's forests host a wide range of NTFPs (fruits, resins, gums) and genetic resources that can be used in pharmaceutical development.

In addition to the NEPAD-EAP, collaborative forest management has been a growing focus in Africa. Central Africa has embarked on various initiatives to jointly and sustainably manage its forests including the Central Africa Forestry Commission. In Southern Africa, countries have adopted a forest protocol that harmonizes approaches to forest management and establishes commitments for the management of transboundary forests.

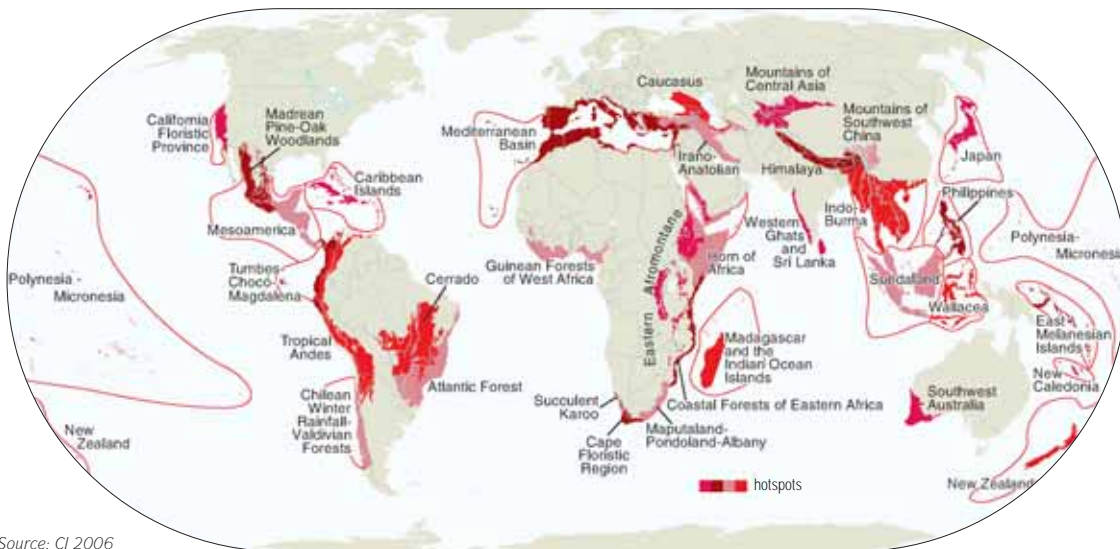
## BIODIVERSITY

Africa remains a biodiversity haven despite significant changes caused by habitat loss – from land conversion, habitat fragmentation, IAS – and unsustainable use:

- About 1 000 vertebrate species occur in just 4 of Africa's 119 ecoregions (Burgess and others 2004).
- A quarter (1 229 species) of the world's approximately 4 700 mammal species occur in Africa (Brooks and others 2001).
- More than a fifth (2 000) of the world's approximately 10 000 bird species occur in Africa (Burgess and others 2004)
- Africa has about 950 amphibian species (GAA 2004) and new species are described every year.
- The African mainland has between 40 000 and 60 000 plant species (Beentje 1996), of which approximately 35 000 are endemic.
- Africa has at least 2 000 fish species – this is thought to be the highest species richness in the world (Klopper and others 2002).

Species richness varies across Africa, with levels of diversity increasing towards the equator. In addition, there are pockets of plant species richness in Northern Africa and the southern Cape in South Africa. Montane areas are often centres of endemism for plants, birds and mammals. One of the most important of these is the coastal mountain range in the eastern part of Madagascar. However, approximately half of Africa's terrestrial ecosystems have lost more than 50 per cent of their area to cultivation, degradation or urbanization (Burgess and others 2005). Africa is home to eight of the world's 36 most vulnerable biodiversity areas – or "hotspots" (Figure 12).

Figure 12: Biodiversity hotspots



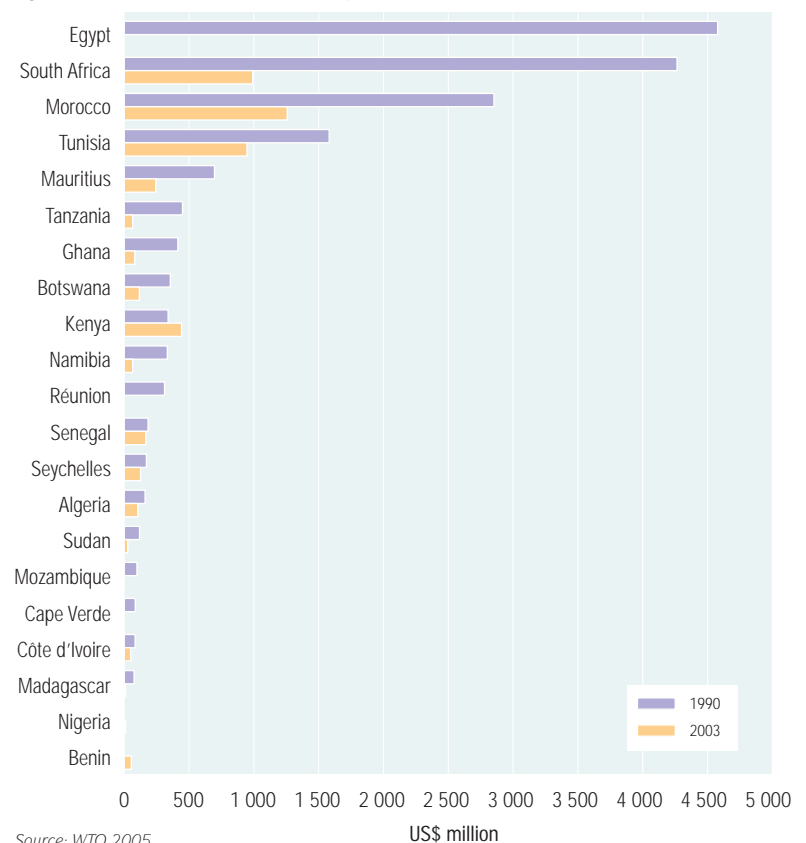
Source: CI 2006

Biodiversity underlies the provision of a large variety of benefits, including goods-and-services (eg nitrogen fixation by symbiotic bacteria in the roots of legumes) that people obtain from the environment. It is critical in creating the environmental conditions on earth that make it habitable to people and other species by, for example, regulating the climate and atmospheric composition (MA 2006). Africa's biodiversity richness offers many opportunities to support development.

Two areas that offer immense development opportunities are genetic resource use and tourism. Of the 25 per cent best-selling drugs worldwide in 1997, 42 per cent of sales came from biological or natural products, or entities derived from natural products, with a total value of US\$17 500 million (Newman and Laird 1999). Selecting substances for investigation often depends on traditional knowledge – given this, developing systems in which communities' contributions are acknowledged and rewarded is essential. Nature-based tourism – one of the fastest-growing tourism sectors worldwide and in Africa – depends on the conservation of natural landscapes and wildlife. It makes up approximately half of the total tourism market. In 2003 and 2004, Africa attracted 78.1 million international tourists and in 2004 arrivals grew at 10 per cent worldwide and 14 per cent in Africa (WTO 2005). However, the region shared only 7.4 per cent of the global increase of 69 million tourists, and almost all the increase was concentrated in Northern Africa (ECA 2005). The growth of this industry, and earnings from it, varies considerable (Figure 13); for some countries, particularly SIDS, tourism is a key contributor to GDP (Figure 14).

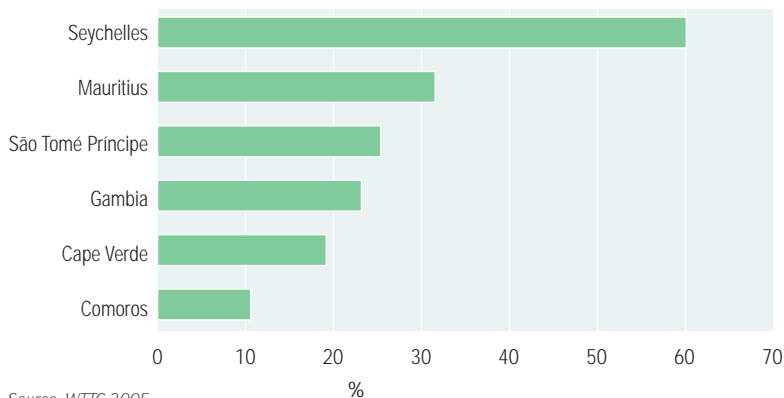
Sustainable use of biodiversity is essential if these opportunities are to be retained. Increasingly, Africa is acknowledging the need to go beyond protected area management as the basis for conserving biodiversity. The system of protected areas, although extensive – covering more than 2 million km<sup>2</sup> – is patchy, offering protection primarily to the savannah habitats and to

Figure 13: International tourism receipts in African coastal countries, 1990 and 2003



Source: WTO 2005

**Figure 14: Travel and tourism economies as percentages of Gross Domestic Product 2005 for selected SIDS and Gambia**



Source: WTTC 2005

large charismatic mammals. Many plants and range-restricted species are not adequately provided for. The challenge for Africa is not to extend protected areas – to effectively protect plant and vertebrate diversity at least 30 per cent of SSA will need to be brought under protection – but to improve conservation measures in other areas and to effectively incorporate sustainable use into other land use.

### **INTERLINKAGES – A VALUABLE STRATEGY FOR MAXIMIZING OPPORTUNITIES**

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. 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 Brundtland report:

“An environmental crisis, a development crisis, an energy crisis. They are all one.” (WCED 1987).

For all natural resources an interlinkages approach can be a valuable strategy for improving management and governance and ensuring development benefits. By taking both a horizontal (linking the different resources) and a vertical (linking the different policy responses as well as socioeconomic factor) approach comprehensive solutions can be developed. Successful approaches involve coordinating action across different sectors and specifically:

- Understanding and providing for the interlinkages between and among the biophysical aspects of the environment and existing policy responses at sub-regional, regional and global levels;
- Understanding and building links between policies for trade and investment, R&D, science and technology, and health and poverty;
- Recognizing the link between green and brown environmental issues;
- Establishing processes which improve cooperation between science, policy making, practice and management;
- Taking into account different knowledge and value systems;
- Developing inclusive policy processes with multiple stakeholders;
- Developing systems for mediating and making trade-offs between different interests;



IWRM adopts an interlinkages approach by ensuring that the multiple uses of freshwater are taken into account in management, including its ecosystem functions. Here, a fish eagle (*Haliaeetus vocifer*) fishes in Lake Malawi.

Source: M. Chenje

- Harmonizing law and policies which operate at different levels; and
- Creating better linkages between different levels of decision making from the local to national to sub-regional to regional.

Established approaches for incorporating interlinkages include:

- Mainstreaming environment into policies, such as poverty reduction strategies;
- Linking policies at different scales, such as linking NEPAD-EAP and the MDGs;
- Improving cost-benefit analysis, for example through the use of environmental impact assessments (EIAs); and
- Empowering people and institutions through creating governance interlinkages.

## EMERGING CHALLENGES

One function of AEO is to keep track of environmental problems (or solutions) that may affect achieving key objectives and targets, and to bring these to the attention of policymakers. Emerging issues are not necessarily new issues – they may be old issues which, because of changing circumstances, present new challenges or new opportunities. AEO-2 focuses on four emerging issues that are of regional significance: Genetically Modified (GM) Crops, Invasive Alien Species (IAS), Chemicals, and Environment for Peace and Regional Cooperation

### GENETICALLY MODIFIED CROPS

The introduction of genetically modified organisms (GMOs) in Africa probably equals the CITES listing of the African elephant as the most divisive issue among policymakers in the region. Already there is an apparent split – with some countries spearheading the use of GM crops and others opposed to even importing GMO food that is unprocessed. The GMO issue has international dimensions revolving around issues of agricultural production and food security, pesticide use and environmental pollution, risks to biodiversity and human health, and the role of the private sector and international trade. Controversies are mainly about (Young 2004):

- The interpretation of science and specifically whether GMOs are inherently safe or inherently dangerous from a human and environmental perspective;
- Economic analysis and in particular how to evaluate the cost-and-benefits associated with GMOs; and



GM trial potatoes in Makhatini, South Africa.

Source: Biowatch

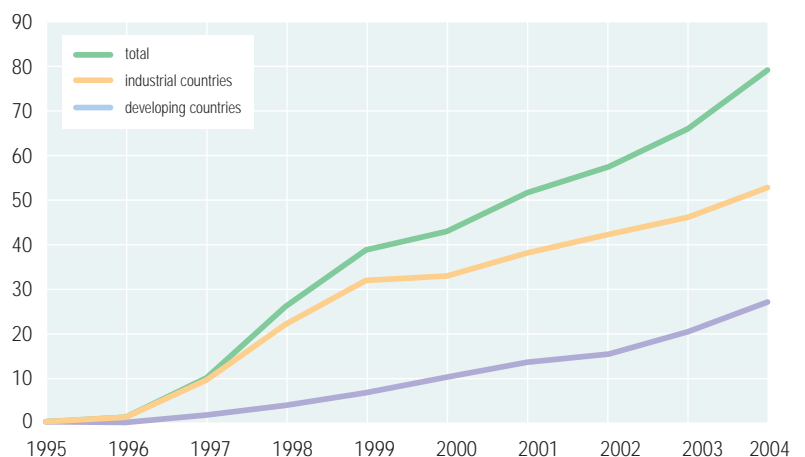
- Socio-cultural impacts and biosafety implications of food production and security, livelihoods, and human and environmental health.

Although GMO technology is relatively new and many countries still do not have strong institutional systems for monitoring and evaluation (M&E) and enforcement, its use is poised to gain ground over the coming decades. However, data and information on GMO impacts will probably lag behind, compounding the challenges of uncertainty and sound policy making.

African governments, individually and collectively, are faced with an enormous challenge given the high levels of uncertainty surrounding this technology and

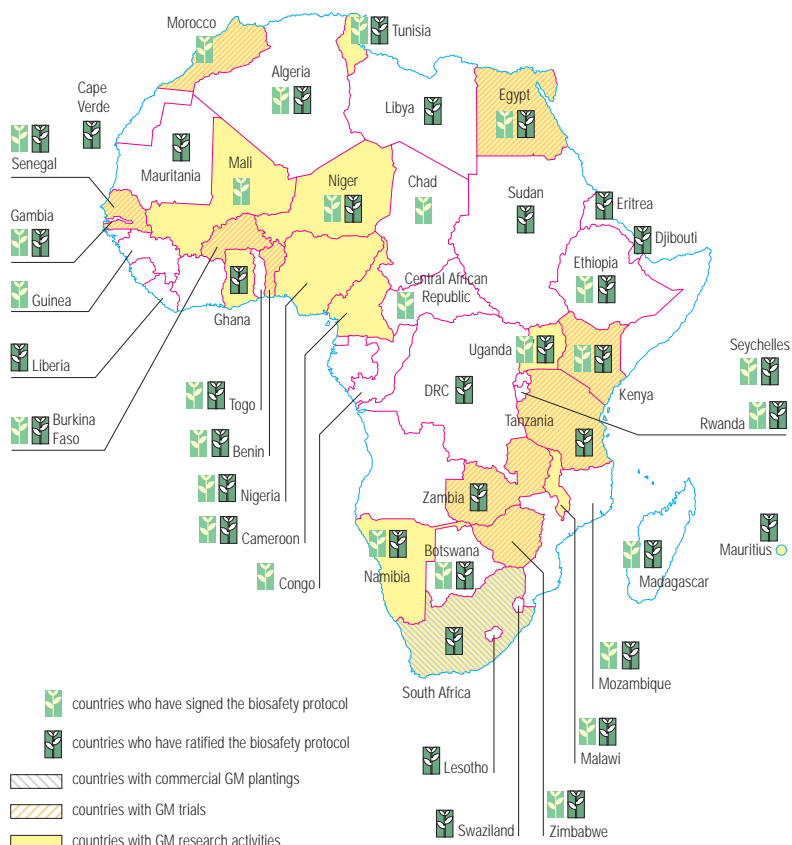
Figure 15: Global area of biotech crops

million hectares



Source: James 2004

Figure 16: GM status in Africa



Source: African Centre for Biotechnology 2005, CBD 2006, James 2004

its use. Governments will need to develop appropriate laws, policies and regulations and strengthen the institutions for effective decision making, M&E and enforcement. At the centre of a response package should be a commitment to making the best decision possible based on all relevant available information – including scientific knowledge and the priorities and values of its people.

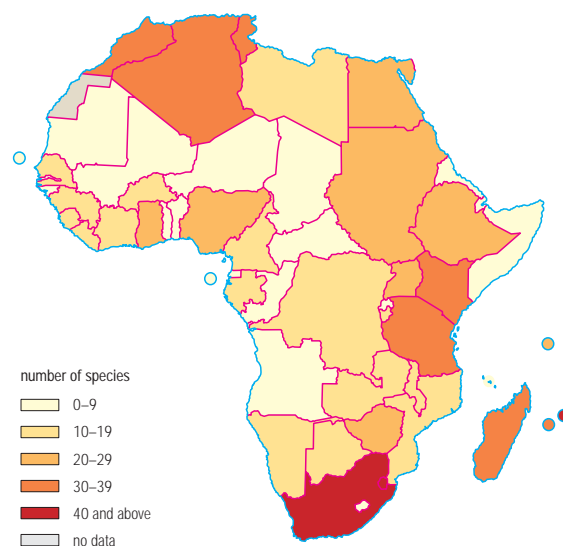
The AU’s Model Law on Safety in Biotechnology is a valuable starting point for developing national frameworks. National laws also need to take account of the provisions of the CBD and the Cartagena Protocol. In particular, legislation will need to incorporate the precautionary approach, including measures to evaluate risk, and monitor the release of GM products into the environment. Investments in capacity-building will be critical. Where appropriate, governments could introduce measures for labelling food products which contain GMOs and ensuring that consumers are provided with adequate information to exercise their right of product choice. Farmers’ rights will also need to be taken into account. Where governments opt to allow GM products into their markets a supportive legal framework will need to be developed.

**INVASIVE ALIEN SPECIES**

The introduction of IAS has been both accidental and intentional. Intentional introductions are, and have been, motivated by economic, environmental and social considerations. In the forest sector, for example, *Pinus*, *Eucalyptus* and *Acacia* species are important sources of pulp, timber and fuelwood, yet at the same time they have placed tremendous strain on water resources, as has been the case in Southern and Eastern Africa. Many introductions, however, are unintentionally coming into countries with other goods and, in the case of marine IAS, in the ballast water of ships. Although only a small percentage of these alien species will become invasive, when they do their impacts are immense, insidious and usually irreversible, and they may be as damaging to native species and ecosystems on a global scale as the loss and degradation of habitats (IUCN/SSG/ISSG 2000). IAS are now considered as second only to habitat loss as a cause of biodiversity loss. The economic costs associated with controlling IAS are enormous: economic losses due to IAS amount to about 5 per cent of the world economy or about US\$1.4 million million annually, which is about three times Africa’s total GDP (National Botanical Institute and Global Invasive Species Programme 2004).

Failure to respond effectively will mean IAS will continue to undermine the provision of essential ecosystem functions and reduce the availability of environmental goods, thus threatening livelihoods. This requires multilevel responses. The introduction of IAS is incredibly difficult to reverse (MA 2006) and consequently the 2000 COP of the CBD agreed that

Figure 17: The incidence of IAS in Africa



Source: data from IUCN/SSG/ISSG 2004



Protecting vulnerable ecosystems such as South Africa's Cape Fynbos must be a priority.

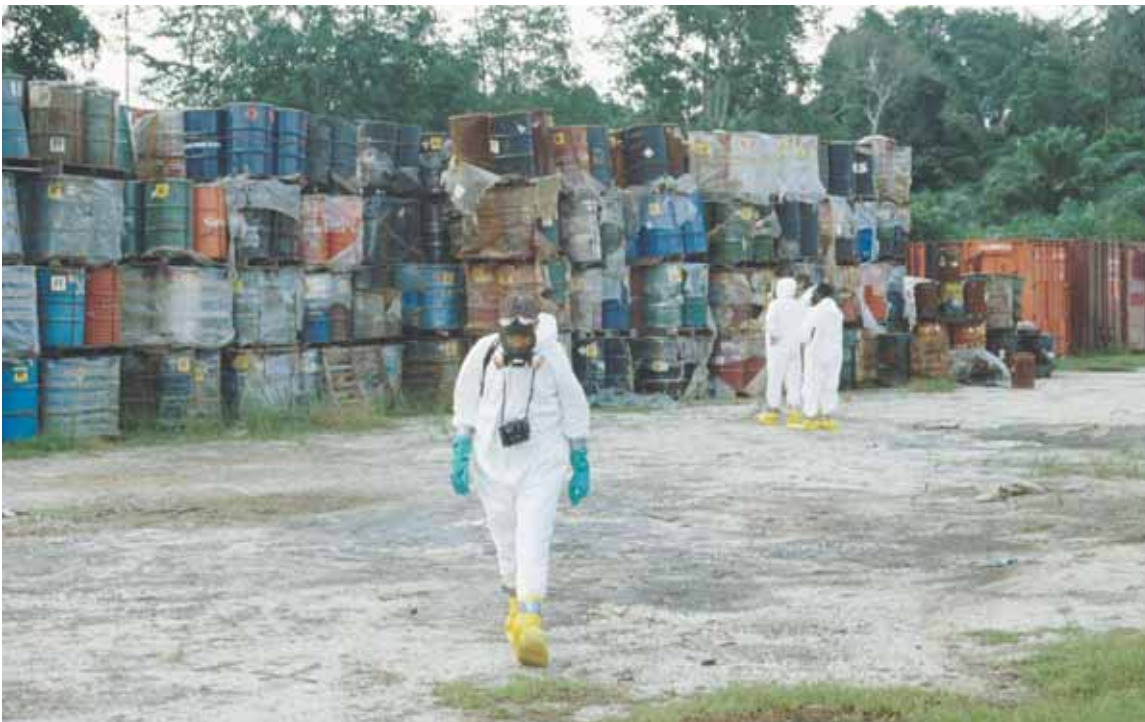
Source: M. Chenje

priority should be given to controlling the introduction of IAS and, where introduction has already taken place, measures should be adopted to prevent their establishment and spread. Public education about their impacts, along with effective customs controls and phytosanitary regulations are important measures. Given that trade and international travel are primary causes of the spread of IAS, multilateral cooperation, planning and action are essential.

## CHEMICALS

Although currently Africa is neither a major consumer nor producer of chemicals in global terms, the level of risk it faces is disproportionately higher than regions with sufficient resources to effectively manage and monitor chemical use. With economic growth, Africa is likely to grow as a producer and consumer of chemical products, increasing the importance of this issue (OECD 2001).

Chemicals have adverse effects for human, wildlife and ecosystem health, causing disease and undermining essential functions (MA 2006, WWF 2004). New evidence shows that chemicals previously thought to be safe present significant threats to wildlife (WWF 2004). Exposure to agricultural and industrial chemicals and waste exacerbates the impacts of traditional environmental health risks in many developing countries. Contaminated sites and obsolete stocks – Africa has at least 50 000 tons of obsolete pesticides – present serious problems which require immediate actions (NEPAD 2003). Water-source contamination may lead to a decrease in the environmental goods-and-services freshwater systems supply, and reduce the ability of governments to meet the MDG targets on the provision of safe water. Poor access to information compounds the challenges of chemical management; for example agricultural producers and workers often have insufficient knowledge about the chemical-related



Toxic waste dump, Koko, Nigeria.

Source: C. Seckett / Still Pictures

health risks and, therefore, do not adopt adequate protective personal measures.

Nevertheless, chemicals have many useful applications and are an intrinsic part of modern life. They are widely used in manufacturing, mining, agriculture and the public health sector and are also widely used to control damage to infrastructure and diseases such as malaria. The challenge for Africa is to improve chemical management and adopt a life cycle approach. This requires capacity-building, investing in the technology required for effective M&E, and improving the ability to deal with related health impacts.

Globally, several MEAs have been adopted that deal with chemical use, including:

- Agenda 21;
- The Stockholm Convention on Persistent Organic Pollutants;
- The Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade;
- The Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal; and
- Africa's Bamako Convention on the Ban of the Import into Africa and the Control of Transboundary Movement and Management of Hazardous Wastes within Africa.

Key legal approaches in these agreements include the precautionary approach, producer liability principles, "the polluter pays" principle, and comprehensive right to know laws. In May 2004, African governments adopted a resolution supporting the UNEP-led Strategic Approach to International Chemicals Management, which seeks to promote synergies and coordination among regulatory instruments and agencies. African governments have accepted that the development of a chemicals management framework that focuses on sound management throughout their life cycle is essential. Such an approach may include risk reduction measures, information and knowledge systems, improved governance, capacity-building, and the control of illegal international trade (UNEP 2006).

### ENVIRONMENT FOR PEACE AND REGIONAL COOPERATION

Sustainable environment management often requires collaboration at the sub-regional or regional level. Where such cooperation exists, opportunities for stability and peace – necessary conditions for development – are increased. Conflict, in contrast, has severe environmental, human and economic costs.

Over the decades, an institution structure ranging from the UN, to the AU and NEPAD, to regional economic communities (RECs) has developed. This is complemented by collaborative institutions with specific environmental focuses, such as river basin commissions (RBCs) – some dating back nearly 100 years (Giordano and Wolf 2003), transboundary national parks, large marine ecosystems, transboundary mountain management, hydropower generation and exploitation of oil. Regional cooperation also extends to economic sectors such as trade and tourism.

Despite these and other cooperative activities, Africa has continued to experience major armed conflicts which have left millions dead, hundreds of millions internally displaced or forced to flee across national borders, and the environment has been seriously threatened. In 2003, Africa had the largest number of refugees – 2.9 million of the 9.7 million refugees worldwide were Africans (UNHCR 2004). Conflict impacts upon people in multiple ways: it threatens human security and detracts from the opportunities people have as well as their quality of life. Many people face starvation as a direct result of conflict, and women and girls face the risk of rape and kidnapping (OSAA 2005). Conflict destroys social and political networks, consequently increasing the incidence of social exclusion. Settlements of refugees

Figure 18: Refugee influx adjacent to national parks in Africa



Source: UNEP/DEWA/GRID 2005





Conflict Logs: abandoned roundwood logs as a result of the imposition of a timber exporting embargo on Liberia.

Source: Y.Katerere

To live is to choose.  
But to choose well,  
you must know who  
you are and what you  
stand for, where you  
want to go and why  
you want to get  
there.

Kofi Annan Secretary  
General of the United  
Nations

and internally displaced people present special challenges for achieving environmental and human well-being goals. Virtually none of these settlements were planned to support the numbers of people which now inhabit them. In many areas this has resulted in a high level of environmental vulnerability (Figure 18). For example, refugee settlements alongside the Virunga National Park in the DRC placed considerable strain on its resources. Such settlements may also have undesirable impacts on the host communities and resource use by the host communities.

Armed conflict is a serious threat to regional development priorities. Consequently, investing in conflict avoidance and peace-building efforts, by improving governance, addressing poverty and increasing cooperation, is essential.

## OUTLOOK

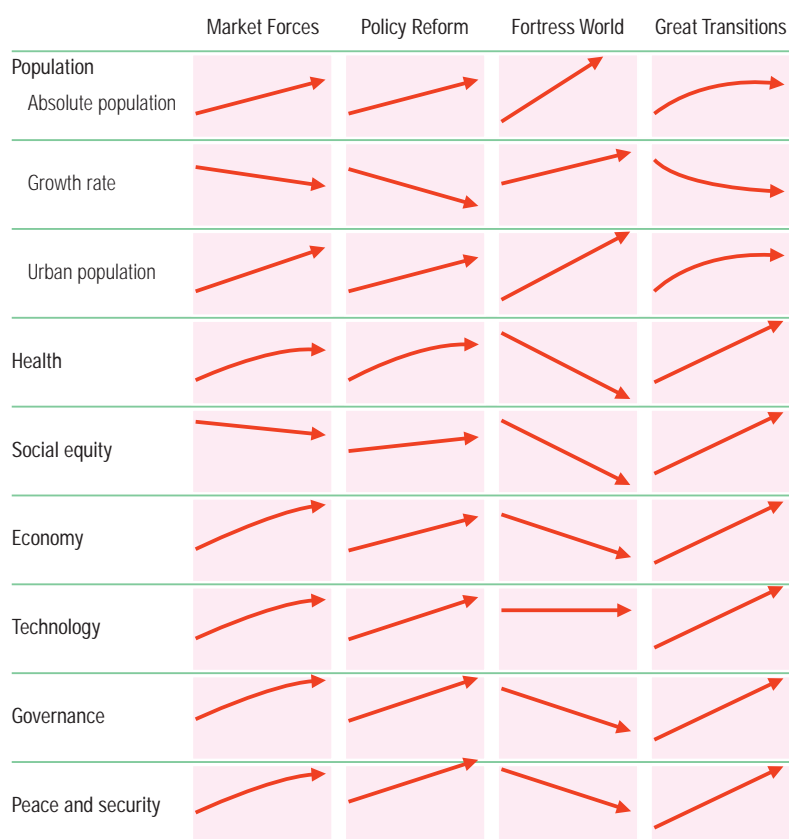
### THE FUTURE TODAY

The AEO-2 report looks at the future through the lens of four scenarios – *Market Forces*, *Policy Reform*, *Fortress World*, and *Great Transitions*. The scenario analysis provides a framework for understanding how various issues or sectors impinge on one another and the implications that any particular policy choice will have for the future (Figure 19). Scenarios address the question, “what if?” and the resultant narrative follows an “if...then” logic. In so doing, scenarios help in preparing for different possibilities, and in enabling

policymakers to deal effectively with new challenges and minimize impacts on people and the environment.

The *Market Forces* scenario is defined in terms of prevailing economic growth paradigms based on the experience of the developed countries, mostly of Europe

Figure 19: Illustrative patterns of the changes over time of key scenario assumptions



and America, and it is premised on the belief that this model of development is appropriate for the rest of the world, or that it is the ultimate model that the whole world would rely on, or adopt for development. Central to the thinking of this paradigm is the existence of the invisible hand of market mechanisms, which controls the allocation of resources and the distribution of the benefits of growth. In this scenario the economy is increasingly privatized and there is a gradual withdrawal of government as principal actor from the development process: the function of government is to provide an enabling environment while the private sector is the impetus for economic growth. Consequently, opportunities are defined by market mechanisms with no significant intervention from government. The private sector maximizes on profits, always seeking out sub-regions with the cheapest labour to produce high-value or brand products. People's search for satisfaction is based on increased acquisition and therefore consumerism becomes the socially defining value. The world economic system responds by increasing production of goods-and-services with increased burden placed on natural resources.

The *Policy Reform* scenario is in many ways similar to that of the *Market Forces* scenario. However, unlike the *Market Forces* scenario, there is the realization of the need for governments to address the negative impacts of change. Socioeconomic and political considerations

may make it expedient for governments to take actions that favour citizens, rather than wait for the operation of the market to correct these ills. Consequently, policy reforms focus on engineering development through positive and proactive interventions even on such issues as privatization. While accepting the desire for a gradual withdrawal of government as principal actor in the development process, government is not content with just providing the enabling environment for economic growth, and it puts in place M&E systems that ensure that the private sector follows laid-down policies which are beneficial to the people.

The *Fortress World* scenario emerges as a result of the struggle for power between two or more groups of people in a nation, identified here as the elites and the masses. The elites have access to resources of economic growth and monopolize them for their own development, while the masses have few resources and are often not in a position to decide their own destiny. As a result of the need to protect themselves and their investments, the elites organize themselves into enclaves, strongholds or garrisons. These enclaves are connected through treaties and alliances with each other at the national and regional levels, and through networks of economic interaction at the global and international levels. They are often well connected with multinational companies which operate in these enclaves. The *Fortress World* scenario is a crystallization of certain patterns of historical behaviour among peoples and nations where inequalities abound, and where efforts have not been taken or mechanisms put in place for the mitigation of the effects of inequalities.

The *Great Transitions* scenario seeks to adapt the positive aspects of the other scenarios to strengthen the three pillars of sustainable development – environment, society and economy. This scenario views neither the *Market Forces* nor the *Policy Reform* as sufficient to address the ills that economic growth has placed on the environment, but sees the need for the evolution of a new development paradigm in which the sustainability of the environment is not compromised. It is envisaged that behavioural patterns that characterize modern societies, such as consumerism, give way and that instead people define a new level of satisfaction that is not materialistic. The major paths through which the *Great Transitions* scenario evolves include a new set of strategies that differs from current strategies and approaches, and that approaches development at conceptual, methodological, institutional, operational and financial levels. Central to the *Great Transitions* scenario is the general disillusionment with dominant societal values, such as



The doors we open and close are our choice.

Source: J.C. Mohamed-Katerere

consumerism, and the prioritization of the economy over the environment with its negative impacts on human well-being, development and the environment. In this scenario, a new generation of thinkers – scientists, leaders, civil society organizations and activists – come together and shape national and global dialogue and policy towards promoting the interlocked goals of environmental sustainability and development. The *Great Transitions* scenario is based on visions of a desirable and environmentally sustainable future.

## POLICY OPTIONS

### BACK TO OUR COMMON FUTURE: A RENAISSANCE FOR THE ENVIRONMENT

At the regional level, Africa has made significant steps towards a meaningful environmental policy framework. The challenge now is to translate this into effective programmes at all levels – regional, sub-regional, and national – and to develop efficient institutions and systems for this purpose. AEO-2 identifies specific options for actions related to the themes in Section 2: *Environment State-and-Trends: A 20-Year Retrospective* and Section 3: *Emerging*

*Challenges*. In addition, issues identified by African policymakers as being of priority, such as the position of SIDS, are highlighted. Medium-term outlooks are presented as a basis for specifying the policy actions that could be taken.

The chapter presents a policy menu, covering a range of responses to the policy gaps, and promising strategies for further progress. Although in many respects the issues identified for action are not new, the approach to these has become more focused, clearly identifying target dates and stakeholders. The specific actions proposed focus on curbing ongoing environmental degradation and seizing the development opportunities offered by Africa's environmental wealth. This involves going beyond traditional poverty alleviation strategies that focus on symptoms and adopting approaches that enhance the capacity of people and institutions to more effectively use the available opportunities. The actions identified emphasize the need for investment in human, social, economic and environmental capital if Africa is to prosper. For the actions to lead to meaningful outcomes, Africans must be prepared to take bold decisions and show genuine political commitment to human well-being, poverty eradication and sustainable resource use.

Across the specific action areas, some common approaches to policy can be identified:



Fishermen pulling their nets in Cape Verde.

Extending land under irrigation is an important goal for achieving food security.



Irrigation. Large-scale farming in south-western Burkina Faso.

Source: D. Tiveau/CIFOR

- Environmental policies need to be complemented by policies and programmes that address issues of poverty and equity, technology, R&D, trade and investment, and infrastructure development.
- Environmental, economic and political interdependence calls for regional cooperation, building on and sharing resources for the common good, and not pitting the interests of one nation against another. Useful strategies for promoting peace, social stability, economic growth and protection of natural resources can include lobbying for the AU Constitutive Act, particularly its conflict management provisions, to be applied in resolving disputes over natural resource use or access, and recognizing the crucial role that RECs have played in promoting peace and sub-regional cooperation.
- Investing in capacity-building in multiple sectors and at all levels is essential, although some sectors, such as agriculture and science and technology, may be priorities.
- People – the focus of development – need to be seen not as a homogenous bundle but as specific groups and individuals, and policy needs to address their specific needs. This includes, for example, addressing issues of gender and the empowerment of small entrepreneurs. Incorporating gender-based measures in social, economic and environmental policies, and ensuring that data collection and analyses are gender-disaggregated, is important.
- Strengthening national environmental planning and including all stakeholders is a priority. This includes mainstreaming natural resource issues in all development initiatives to facilitate effective, efficient and equitable use, and proper valuation of their contribution to sustainable development.



Smallholder farming using furrow irrigation, Burkina Faso.

Source: Y. Katerere

- Adopting EIAs and other cost-benefit analysis systems is an important aspect of this.
- Adopting the environment as one of the key areas to be included in the NEPAD African Peer Review Mechanism (APRM) may help in prioritizing this area. At present, the environment is not one of the criteria used to review the performance of each other's governments.

In general, the specific actions focus on enlarging and enhancing the range of sustainable development options by improving human well-being and establishing more sustainable and integrated approaches to environment and development.

Policies – across the different environmental sectors and issues – that promote human well-being include:

- Integrating poverty-environment issues into economic policy reforms. Implementing pro-poor environmental fiscal reforms and ensuring that foreign direct investments are more pro-poor and pro-environment.
- Strengthening the resource rights of users, particularly poor people, and improving implementation of measures that promote fair and equitable sharing of benefits.
- Protecting the rights of consumers and farmers regarding the introduction and use of GM technology and products, chemicals and the use of indigenous knowledge.
- Enhancing the capacity of poor people to manage the environment by bringing communities and other resource users on board as both managers and planners.
- Improving opportunities for trade and entrepreneurship by, among other measures, promoting market access for environmental products.

- Expanding access to environmentally sound and locally appropriate technology. For example, improving access to clean energy technologies may help reduce ill health associated with indoor air pollution and at the same time increase the ability to engage in small enterprises.
  - Reducing human vulnerability to environmental change by investing in irrigation, and strengthening early warning and assessment systems related to environmental change and natural disasters.
  - Investing in all forms of education to enhance capabilities and promoting indigenous knowledge systems in sustainable use and management of the environment.
  - Investing in improving the quality of life in urban areas, including through the better provision of essential services and diversifying the livelihood opportunities available. In addition, improving urban planning to minimize the impact of settlements on the environment, particularly the encroachment and conversion of habitats and ecosystems.
- Improving environmental management and ensuring it is sustainably used must be a priority. Actions that can be taken include:
- Institutionalizing an inter-sectoral and inclusive approach to policy development. For example, using the Africa Finance Minister's Forum, that is periodically organized by the ECA, to hold a joint session with AMCEN ministers on economic, financial and environmental policy linkages.
  - Strengthening the national capacity for policy analysis, so that stakeholders have ready access to information on the critical policy interlinkages to support them in making informed decisions at all levels.
  - Strengthening the data and information systems in the various sectors, including the development of indicators.
  - Strengthening the institutional capacities for M&E and enforcement for all natural resources as well as for IAS, chemicals and GMOs.
  - Developing pollution standards and effective systems for their implementation as well as developing cradle-to-grave management regimes to deal with chemicals and other products that present risks.
  - Developing national, sub-regional and regional strategies for climate change adaptation to minimize its potential negative impacts on natural resources. This includes formulating and implementing adaptation measures to minimize the impacts on land and freshwater resources.
  - Promoting integrated resources management strategies that are based on an ecosystems approach including for land, coastal zones and freshwater. This includes management approaches that acknowledge the linkages between different sectors, such as those between freshwater systems and coastal and marine environments.
  - Retaining and protecting environmental services by ensuring the allocation of sufficient water for environmental sustainability, conserving and



*Prunus africana* is a valuable medicinal plant, Cameroon.

Source: O. Ndoye/CIFOR

Which road to the future will Africa choose?

Source: Y. Katerere



restoring watershed ecosystems, and sustainably using biodiversity.

- Promoting the more efficient use of natural resources through, for example, water re-use and recycling, valuation and, where appropriate, market mechanisms.
- Incorporating the accepted environmental law principles including “the polluter pays” principle and the precautionary approach into resource management.
- Enhancing public awareness of environmental issues by working with the private sector, farmers and scientists to make reliable and appropriate information on GMOs, chemicals and IAS available to all stakeholders.
- Maintaining protected areas – both land and marine – by improving capacities, forming partnerships with other countries, and restoring landscapes. This may include providing adequate incentives for adjacent communities to support protected areas through better benefit sharing and increased participation in management. The implementation of the African Protected Areas Initiative (APAI) is a priority.
- Adopting or strengthening measures, consistent with the CBD 2010 targets, to promote the conservation of ecosystems, as well as species and genetic diversity. Such measures should include better integrating land use, development and conservation by recognizing that most species will occur outside protected areas.
- Preventing and controlling IAS through control of entry points, awareness raising, aquatic and terrestrial programmes, and developing a special programme for their control on Africa’s SIDS.
- Developing and implementing national biosafety frameworks including policies, regulatory regimes, systems for making informed decisions, public participation and mechanisms for M&E.
- Information sharing in a variety of areas including trade of natural resources.
- Investing in R&D, and where appropriate developing multilateral collaboration and partnerships with farmers and the private sector.

## ABBREVIATIONS

ACCNNR	Africa Convention on the Conservation of Nature and Natural Resources
AEO-2	Africa Environmental Outlook – Our Environment, Our Wealth
APAI	African Protected Areas Initiative
APRM	African Peer Review Mechanism
AU	African Union
CAADP	Comprehensive Africa Agriculture Development Programme
CBD	Convention on Biological Diversity
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
COP	Conference of the Parties
EIAs	environmental impact assessments
GDP	gross domestic product
GLR	Great Lakes Region
IAS	invasive alien species
IWRM	Integrated water resources management
MDGs	Millennium Development Goals
M&E	monitoring and evaluation
MEAs	multilateral environmental agreements
NEPAD	New Partnership for Africa's Development
NEPAD-EAP	New Partnership for Africa's Development Environment Action Plan
NTFPs	non-timber forest products
R&D	research and development
RBCs	river basin commissions
RECs	regional economic communities
SIDS	small island developing states
SSA	sub-Saharan Africa
UNCCD	United Nations Convention to Combat Desertification
UNCED	United Nations Conference on Environment and Development
UNFCCC	United Nations Framework Convention on Climate Change
WSSD	World Summit on Sustainable Development

## REFERENCES

- African Centre for Biosafety (2005). GMOs in African Agriculture – Country Status: Southern Africa. <http://www.biosafetyafrica.net/south.htm>
- Beentje, H.J. (1996). Centres of plant diversity in Africa. In *The biodiversity of African plants: proceedings XIVth AETFAT congress, 22-27 August 1994, Wageningen, The Netherlands* (eds. Van Der Maesen, L.J.G., Van Der Burgt, X.M., Van Medenbach de Rooy, J.M.), pp 101-9. Kluwer Academic Publishers, Dordrecht
- Burgess, N.D., Kuper, W., Mutke, J., Brown, J., Westaway, S., Turpie, S., Meshack, C., Taplin, J., McClean, C. and Lovett, J.C. (2005). Major gaps in the distribution of protected areas for threatened and narrow range Afrotropical plants. *Biodiversity and Conservation*. 14, 1877-94. [http://www.botanik.uni-bonn.de/system/mitarbeiter\\_homepages/kueper/Burgess\\_et\\_al\\_2005\\_Gap\\_analysis.pdf](http://www.botanik.uni-bonn.de/system/mitarbeiter_homepages/kueper/Burgess_et_al_2005_Gap_analysis.pdf)
- Brooks, T. Balmford, A., Burgess, N., Fjeldsa, J., Hansen, L.A., Moore, J., Rahbek, C. and Williams, P. (2001). Toward a blueprint for conservation in Africa. *BioScience*. 51(8), 613-24
- CBD and UNEP (2003). Biosafety and the Environment: An introduction to the Cartagena Protocol on Biosafety. Convention on Biological Diversity and the United Nations Environment Programme. <http://www.biodiv.org/doc/press/presskits/bs/cpbs-unesp-cbd-en.pdf>
- CI (2006a). Biodiversity Hotspots. Conservation International Washington D.C.. <http://www.biodiversityhotspots.org>
- ECA (2005). *Economic Report on Africa 2005: Meeting the Challenges of Unemployment and Poverty in Africa*. Economic Commission for Africa, Addis Ababa. <http://www.uneca.org/era2005/front.pdf>
- ECA (2004c). *Land Tenure Systems and their Impacts on Food Security and Sustainable Development in Africa*. Economic Commission for Africa, Addis Ababa. [http://www.uneca.org/eca\\_resources/Publications/sdd/Land\\_Tenure\\_systems.pdf](http://www.uneca.org/eca_resources/Publications/sdd/Land_Tenure_systems.pdf)
- ECA (2000). *Transboundary River/Lake Basin Water Development in Africa: Prospects, Problems, and Achievements*. ECA/RCID/052/00. United Nations Economic Commission for Africa, Addis Ababa. [http://www.uneca.org/publications/RCID/Transboundary\\_v2.PDF](http://www.uneca.org/publications/RCID/Transboundary_v2.PDF)
- FAO (2005). *State of the World's Forests 2005*. Food and Agriculture Organization of the United Nations, Rome. <ftp://ftp.fao.org/docrep/fao/007/y5574e/y5574e00.pdf>
- FAO (2003). *Forestry Outlook Study for Africa – African Forests: A View to 2020*. African Development Bank, European Commission and the Food and Agriculture Organization of the United Nations, Rome. <ftp://ftp.fao.org/docrep/fao/005/Y4526B/y4526b00.pdf>
- FAOSTAT (2004). *FAOSTAT – FAO Statistical Databases*. Food and Agriculture Organization of the United Nations. <http://faostat.fao.org/>
- GAA (2004). Global Amphibian Assessment Database. Global Amphibian Assessment. IUCN – the World Conservation Union. <http://www.globalamphibians.org/>
- Giordano, M.A. and Wolf, A.T. (2003). Transboundary Freshwater Treaties. In *International Waters in Southern Africa* (ed. Nakayama, M.), pp. 71-100. UNU Series on Water Resources Management and Policy. United Nations University Press, Tokyo
- Gordon, B., Mackay, R. and Rehfuss, E. (2004). *Inheriting the World: the Atlas of Children's Environmental Health and the Environment*. World Health Organization, Geneva. <http://www.who.int/ceh/publications/en/atlas.pdf>

- Hamblin, A. (1998). *Environmental Indicators for National State of the Environment Reporting – the Land*. Australia: State of the Environment (Environmental Indicator Reports). Department of the Environment, Canberra. <http://www.deh.gov.au/soe/land/pubs/land-ind.pdf>
- Hirji, R., Johnson, P., Maro, P. and Matiza Chiuta, T. (eds. 2002). *Defining and Mainstreaming Environmental Sustainability in Water Resources Management in Southern Africa*. Southern African Development Community, IUCN – The World Conservation Union, Southern African Research and Documentation Centre and World Bank, Maseru/Harare/Washington, D.C.
- IGRAC (2004). Global Groundwater Regions, version 25 May 2004. International Groundwater Resources Assessment Centre. <http://igrac.nitg.tno.nl/pics/region.pdf>
- IUCN/SSC/ISSG (2004). Global Invasive Species database. IUCN – the World Conservation Union Species Survival Commission, Invasive Species Specialist Group. <http://www.issg.org/database/species/search.asp?st=100ss&fr=1&sts>
- IUCN/SSC/ISSG (2000). IUCN Guidelines for the Prevention of Biodiversity Loss Caused by Alien Invasive Species. IUCN – the World Conservation Union Species Survival Commission, Invasive Species Specialist Group. <http://www.iucn.org/themes/ssc/publications/policy/invasivesEng.htm>
- James, C. (2004). Preview: Global status of commercialized Biotech/GM crops 2004. ISAAA Briefs, No. 32. International Service for the Acquisition of Agri-Biotech Applications, Ithaca
- MA (2006). *Ecosystems and Human Well-being: Current State and Trends*. Volume 1. Millennium Ecosystem Assessment. Island Press, Washington. <http://www.millenniumassessment.org/en/products.global.condition.aspx>
- Mayaux, P., Bartholome, E., Massart, M., Van Cstem, C., Cabral, A., Nonguierma, A., Diallo, O., Pretorius, C., Thompson, M., Cherlet, M., Pekel, J.F., Defourny, P., Vasconcelos, M., Di Gregorio, A., Fritz, S., De Grandi, G., Elvidge, C., Vogt, P. and Belward, A (2003). A Land Cover Map of Africa. Joint Research Centre, European Commission
- Mbeki, T. (1996). *Statement of Deputy President T Mbeki, On Behalf of the African National Congress, on the occasion of the Adoption by the Constitutional Assembly of "The Republic of South Africa Constitution Bill. 1996."* Government of South Africa, Cape Town. <http://www.anc.org.za/ancdocs/history/mbeki/1996/sp960508.html>
- National Botanical Institute and Global Invasive Species Programme (2004). *Invasive Alien Species – A Challenge to NEPAD: Africans Working Together to Protect Life and Livelihoods*. National Botanical Institute and Global Invasive Species Programme, Cape Town
- NEPAD (2003). *Action Plan for the Environment Initiative*. New Partnership for Africa's Development, Midrand. [http://nepad.org/2005/files/reports/action\\_plan/action\\_plan\\_english2.pdf](http://nepad.org/2005/files/reports/action_plan/action_plan_english2.pdf)
- NEPAD (2002). *Comprehensive Africa Agriculture Development Programme (CAADP) – New Partnership for Africa's Development*. Food and Agriculture Organization of the United Nations, Rome. [http://www.fao.org/documents/show\\_cdr.asp?url\\_file=/docrep/005/Y6831E/y6831e00.htm](http://www.fao.org/documents/show_cdr.asp?url_file=/docrep/005/Y6831E/y6831e00.htm)
- NEPAD (2001). The New Partnership for Africa's Development. The New Partnership for Africa's Development, Abuja. <http://www.nepad.org/2005/files/documents/inbrief.pdf>
- Newman, D.J. and Laird, S.A. (1999). The influence of natural products on 1997 pharmaceutical sales figures. In *The Commercial Use of Biodiversity: Access to Genetic Resources and Benefit-Sharing* (eds. ten Kate, K. and Laird, S.A.), pp 333–5. Earthscan, London
- OECD (2001). Environmental Outlook for the Chemicals Industry. Organisation for Economic Co-operation and Development. <http://www.oecd.org/dataoecd/7/45/2375538.pdf>
- OECD Development Centre and AfDB (2005). *African Economic Outlook 2004/2005*. Development Centre of the Organization for Economic Co-operation and Development and the African Development Bank. Organization for Economic Co-operation and Development, Paris
- Olson, D. M. and Dinerstein, E. (2006). The Global 200: Priority ecoregions for global conservation. (PDF file) *Annals of the Missouri Botanical Garden* 89:125-126. WWF Conservation Science Program 1998 – 1999. Ecoregions Database. <http://worldwildlife.org/science/data/terreco.cfm>
- OSAA (2005a). Human Security in Africa. United Nations Office of the Special Adviser on Africa, New York. <http://www.un.org/africa/osaa/reports/Human%20Security%20in%20Africa%20FINAL.pdf>
- Patz, J.A, Campbell-Lendrum, D. Holloway, T. and Foley, J.A. (2005). Impact of regional climate change on human health. *Nature*, 438(7066), 310-7
- SADC (2004). Mining Sector – Mining in SADC Member States. Suthern African Development Community, Gaborone. [http://www.sadc.int/index.php?action=a1001&page\\_id=tifi\\_mining](http://www.sadc.int/index.php?action=a1001&page_id=tifi_mining)
- UN (2002). Summary of the economic and social situation in Africa, 2001: Recent economic trends in Africa and prospects for 2002. E/2002/17. United Nations. <http://daccesssdds.un.org/doc/UNDOC/GEN/N02/345/63/PDF/N0234563.pdf?OpenElement>
- UNCCD Secretariat (2003). Cotonou Declaration (Unofficial translation of the French version). Proceedings of the African Ministerial Conference preparatory to the sixth session of the Conference of the Parties (COP.6) to the United Nations Convention to Combat Desertification (UNCCD). Cotonou, Benin. 30 June-4 July. <http://www.unccd.entico.com/pdfs/reports/declaration-africa.pdf>
- UNDP (2005). *Human Development Report 2005: International cooperation at a crossroads – Aid, trade and security in an unequal world*. United Nations Development Programme, New York. [http://hdr.undp.org/reports/global/2005/pdf/HDR05\\_complete.pdf](http://hdr.undp.org/reports/global/2005/pdf/HDR05_complete.pdf)
- UNEP (2006). Background paper on chemicals management. UNEP/GC/SS.IX/9/add.2. Background papers for the ministerial level consultations on energy and environment for development, chemicals management as well as tourism and the environment. Addendum. Ninth Special Session of the Governing Council/Global Ministerial Environment Forum, Dubai, 7-9 February 2006. Governing Council of the United Nations Environment Programme, Nairobi. <http://www.unep.org/GC/GCSS-IX/DOCUMENTS/K0583555-GCSS-IX-9-Add2.doc>
- UNEP (2002). *Vital Water Graphics: An Overview of the State of the World's Fresh and Marine Waters*. United Nations Environment Programme, Nairobi. <http://www.unep.org/vitalwater>
- UNEP (1999). *Global Environment Outlook-2000*. United Nations Environment Programme, Nairobi. <http://www.grida.no/geo2000/english/index.htm>
- UNEP/DEWA/GRID (2005). Africa Database. United Nations Environment Programme, Nairobi. <http://gridnairobi.unep.org>
- UNHCR (2004). *2003 Global Refugee Trends*. United Nations High Commissioner for Refugees, Geneva. [http://www.unhcr.se/se/pdf/Global\\_trend\\_2003.pdf](http://www.unhcr.se/se/pdf/Global_trend_2003.pdf)
- United Nations Population Division (2005). *World Population Prospects: The 2004 Revision Population Database*. United Nations, New York. <http://esa.un.org/unpp>



- United Nations Population Division (1996). *Annual Populations 1950-2050 (the 1996 Revision)*. United Nations, New York
- WCED (1987). *Our Common Future*. World Commission on Environment and Development. Oxford University Press, Oxford
- WDPA (2005). World Database on Protected Areas 2005. CD-ROM. United Nations Environment Programme-World Conservation Monitoring Centre and IUCN- The World Conservation Union. [Http://sea.unep-wcmc.org/wdbpa/](http://sea.unep-wcmc.org/wdbpa/)
- WFP (2006). Natural hazards: global overview of countries of concern. World Food Programme of the United Nations. [http://www.wfp.org/newsroom/in\\_depth/early\\_warning/index.asp?section=2&sub\\_section=2](http://www.wfp.org/newsroom/in_depth/early_warning/index.asp?section=2&sub_section=2)
- WHO and UNICEF (2004). *Meeting the MDG Drinking Water and Sanitation Target: a Mid-term Assessment of Progress*. World Health Organization and United Nations Children's Fund. [http://www.who.int/water\\_sanitation\\_health/monitoring/jmp04.pdf](http://www.who.int/water_sanitation_health/monitoring/jmp04.pdf)
- World Bank (2005). Regional Fact Sheet from the World Development Indicators 2005. [http://siteresources.worldbank.org/DATASTATISTICS/Resources/ssa\\_wdi.pdf](http://siteresources.worldbank.org/DATASTATISTICS/Resources/ssa_wdi.pdf)
- WRI in collaboration with UNEP, UNDP and the World Bank (2005). *World Resources 2005: The Wealth of the Poor – Managing Ecosystems to Fight Poverty*. World Resources Institute in collaboration with the United Nations Environment Programme, the United Nations Development Programme and the World Bank. World Resources Series. World Resources Institute, Washington, D.C. [http://pdf.wri.org/wrr05\\_full\\_hires.pdf](http://pdf.wri.org/wrr05_full_hires.pdf)
- WTTC (2005). Country League Tables – Travel and Tourism: Sowing the Seeds of Growth – The 2005 Travel & Tourism Economic Research. World Travel and Tourism Council, London. <http://www.wttc.org/2005tsa/pdf/League%20Tables%202005.pdf>
- WWF (2004). *Causes for Concern: Chemicals and Wildlife*. WWF-World Wide Fund for Nature, Gland. (prepared by Brown, V.) <http://www.worldwildlife.org/toxics/pubs/causesforconcern.pdf>
- World Tourism Organization (2005). International Tourist Arrivals & Tourism Receipts by Country. <http://www.world-tourism.org/facts/menu.html>
- Young, T. (2004). Genetically Modified Organisms and Biosafety: A background paper for decision-makers and others to assist in consideration of GMO issues. IUCN – The World Conservation Union, Gland. [http://www.iucn.org/themes/law/pdffdocuments/GMO\\_English.pdf](http://www.iucn.org/themes/law/pdffdocuments/GMO_English.pdf)



# AEO

## COLLABORATING CENTRES

---



### AMCEN/UNEP IN COLLABORATION WITH:



Agence Internationale pour le  
Développement de l'Information  
Environnementale (ADIE)  
<http://www.adie-prgie.net>



National Environmental Management  
Authority (NEMA)  
<http://www.nemaug.org>



Centre for Environment and Development for  
the Arab Region & Europe (CEDARE)  
<http://www.cedare.org.eg>



Network for Environment and Sustainable  
Development in Africa (NESDA)  
<http://www.nesda.kabissa.org>



Commission de l'Océan Indien (IOC)  
Indian Ocean Commission (IOC)  
<http://www.coi-info.org>



Southern African Research  
and Documentation Centre  
  
Southern African Research and  
Documentation Centre (SARDC),  
Musokotwane Environment Resource  
Centre for Southern Africa (IMERCSA)  
<http://www.sardc.net/>





African Ministerial Conference on the Environment (AMCEN)  
c/o UNEP Regional Office for Africa  
P.O. Box 30552, Nairobi 00100, Kenya  
Tel: (+254) 20 7624289/84/87 Fax (+254) 20 7623928  
Email: amcensec@unep.org

United Nations Environment Programme (UNEP)  
Division of Early Warning and Assessment  
P.O. Box 30552, Nairobi 00100, Kenya  
Tel: (+254) 20 7623287 Fax (+254) 20 7624309  
Email: africa.coordinator@unep.org