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**SUSTAINABLE
DEVELOPMENT
REPORT ON
AFRICA
2005**

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- Social dimension**
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- Institutional indicators**

ABBREVIATIONS

AfDB	African Development Bank
AGDI	African Gender and Development Index
AGI	Africa Governance Indicators
AIDS	Acquired Immune Deficiency Syndrome
APELL	Awareness and Preparedness for Emergencies at Local Level
APDF	African Project Development Facility
AQL	Air Quality Limit
ASDI	African Sustainable Development Index
ASM	Artisanal and Small-scale Mining
AU	African Union
AWPS	African Women Progress Scoreboard
BEE	Black Economic Empowerment
BOP	Balance of Payments
CAO	Compliance Advisor Ombudsman
COMESA	Common Market for Eastern and Southern
CO ₂	Carbon Dioxide
CSD	Commission on Sustainable Development
CTL	Coal to Liquid Africa
DBSA	Development Bank of Southern Africa
DDC	District Development Coordinating Committees
ECOSOC	Economic and Social Council
ECWAS	Economic Community of West African States
ECZ	Environmental Council of Zambia
EFAP	Ethiopian Forestry Action Programmes
EIA	Environmental Impact Assessment
EITI	Extractive Industries Transparency Initiative
EPSI	Expanded Economic Policy Stance Index
ESI	Economic Sustainability Index
ESI	Environmental Sustainability Index
ESAP	Environmental and Social Assessment Procedures
FACS-SD	The Forum for African Civil Society on Sustainable Development
FAO	Food and Agriculture Organization
FDI	Foreign Direct Investment
GDI	Gender-related Development Index
GEF	Global Environmental Facility
GHGs	Green House Gases
GNP	Gross National Product
GRI	Global Reporting Initiative
GSI	Gender Status Index
GTL	Gas to Liquids technology
HDSA	Historically Disadvantaged South African
HDI	Human Development Index
HIPC	Heavily Indebted Poor Countries
HIV	Human Immunodeficiency Virus

IBA	Impact and Benefit Agreements
IEA	International Energy Agency
ICT	Information and Communication Technology
ICPD	International Conference on Population and Development
ICMM	International Council on Mining and Metals
IFC	International Finance Corporations
IMF	International Monetary Fund
IPRSPs	Interim Poverty Reduction Strategy Papers
JPOI	Johannesburg Plan of Implementation
LCA	Life Cycle Assessment
LCM	Life Cycle Management
LDCs	Least Developed Countries
LPG	Liquid Petroleum Gas
MDGs	Millennium Development Goals
MEA	Multinational Environmental Agreements
MMSD	Mining, Minerals and Sustainable Development
NAMF	New African Mining Fund
NCSD	National Councils for Sustainable Development
NEPAD	New Partnership for Africa's Development
NDCC	National Development Coordinating Committee
NDP	National Development Plan
NGOs	Non Governmental Organizations
NNPC	Nigeria National Petroleum Corporation
NNI	Net National Income
NO _x	Nitrogen Oxide
NSDC	National Sustainable Development Councils
NSC	National Steering Committee
NLTV	National Long Term Visions
ODA	Official Development Assistance
OECD	Organization of Economic Cooperation and Development
OSI	Overall Sustainability Index
PCDP	Public Consultation and Disclosure Plan
PDCC	Provincial Development Coordinating Committees
PECA	Pool Energetique d'Afrique Centrale
PEDA	Population, Environment, Development and Agriculture
PPSI	Population Pressure on Sanitation Index
PRI	Productive Resources Index
PRS	Poverty Reduction Strategies
PRSP	Poverty Reduction Strategy Papers
PSR	Pressure-State-Response
PSTBI	Population Sanitation and TB Index
PV	Photovoltaic
RBI	Resource-based Industrialization
RECs	Regional Economic Communities
RET	Renewable Energy Technology
SADC	Southern Africa Development Community

SAPs	Structural Adjustment Programmes
SAPP	Southern African Power Pool
SDRA	Sustainable Development Report on Africa
SSA	Sub-Saharan Africa
SO ₂	Sulphur Dioxide
SGI	Sustained Growth Index
SME	Small and Medium Enterprises
STBI	Sanitation TB Index
SETBI	Sanitation, Energy and TB Index
SEI	Sanitation and Energy Index
TCI	Trade Competitiveness Index
TEI	Trade-enabling Environment Index
WAGP	West African Gas Pipeline
WAPP	West African Power Pool
WCU	World Conservation Union
WCS	World Conservation Strategy
WCED	World Commission on Environment and Development
WHO	World Health Organization
WSSD	World Summit on Sustainable Development
UNEP	United Nations Environmental Programme
UNCED	United Nations Conference on Environment and Development
UNECA	United Nations Economic Commission for Africa
UNDP	United Nations Development Programme
UNCSD	United Nations Commission on Sustainable Development
USGS	United States Geological Survey
VAT	Value Added Tax
VOCs	Volatile Organic Compounds

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Overview

Africa is endowed with rich and diverse renewable and non-renewable natural resources, yet the great majority of its people remain among the poorest in the world. Improving the welfare of people in Africa requires peace and stability together with sustainable development to address immediate challenges, such as poverty and diseases, and to balance economic and social goals with environmental integrity. To address development challenges and reduce extreme poverty and hunger, African countries need to maximize wealth creation, and to ensure that the gains are channeled towards improving the welfare of all people in an environmentally friendly development. They need to integrate the economic, social, and environmental dimensions into the development and implementation of their growth strategies. To achieve this ambitious goal, countries must undertake a systematic and carefully coordinated series of policies and strategies that will improve people's lives in a progressive and sustainable manner.

Sustainable development is the main focus of this inaugural 2005 issue of the Sustainable Development Report on Africa (SDRA). The SDRA provides the first comprehensive analyses and assessment of the status of sustainable development in Africa. The theme of this year's edition of the SDRA, *Managing Land-Based Resources for Sustainable Development*, covers social, economic and environmental sustainability analyses. It embraces challenges ranging from developing appropriate and comparable indicators for measuring and monitoring sustainable development to improving public participation in the sustainable development of mineral resources. The report examines the numerous sustainable development challenges facing Africa such as increasing poverty and inequality, population growth and urbanization, gender inequality, land degradation, water scarcity, and air pollution.

Why land-based resources?

The focus on land-based resources is justified by the overwhelming reliance of African economies on natural resources. Land-based primary products dominate the exports sector, yet the value added to the African economies is minimal compared to the financial gains that accrue outside the continent. In order for the continent to sustain economic growth it would need to develop physical and financial infrastructure, including regional trade and markets, taking into account the implications of transformations, such as increasing regional integration and rapid urbanization, Africa also would need to invest in human capital. These are areas important for achieving sustainable development in Africa, but are not thoroughly covered in the current issue of the SDRA.

Related to land-based resources, are good governance, peace and stability, which are generally considered conditions for achieving sustainable development in Africa. Land-based resources such as diamonds and oil are often linked to conflict situations in Africa. Many parts of Africa have experienced periods of long and protracting conflicts that deprived millions of people from the basic needs for survival. However, the achievement

of peace in the major conflict countries such as Mozambique, Angola, Sierra Leone, Liberia, and The Sudan is a major step towards building the environment that is conducive for achieving sustainable development in Africa. Moreover, with good governance, peace and stability Africa can achieve greater regional integration.

Why the SDRA?

The intertwined challenges to development in Africa necessitate the use of a holistic approach that integrates the economic, social and environmental dimensions, and generates new knowledge, policies and actions. The SDRA therefore tries to fill in the gap in knowledge by monitoring and assessing the interrelationships between the three dimensions of sustainable development. The United Nations Economic Commission for Africa (UNECA) is aware that measuring and managing Africa's sustainable development challenges is key to achieving the Millennium Development Goals (MDGs) and other internationally agreed development goals.

Member States have entered into a number of sustainable development related commitments, which provide guidance to efforts to attain overall sustainable development. At the regional level, the New Partnership for Africa's Development (NEPAD) adopted by the African Summit in 2001 provides a framework for sustainable development in Africa. However, the main framework for sustainable development is found in the outcome documents of the 2002 World Summit for Sustainable Development (WSSD), which supports the implementation of the NEPAD vision. The 2000 Millennium Summit adopted the MDGs, which can be seen as the convergence of the commitments entered into in the 1990s round of conferences, and which now provides direction to much of current development efforts by member States and the international community.

Within the UNECA, analysis of several aspects of sustainable development is undertaken through reports such as the Economic Report on Africa, African Governance Report, African Gender Report, and African Regional Integration and Trade Report. In assessing sustainable development in Africa, the SDRA takes stock of the main outcomes of these reports.

The UNECA assists African countries in implementing sustainable development as laid down in the WSSD outcome documents and related regional and international frameworks by providing greater coherence and better coordination at country, sub-regional and regional levels. This is done through creating fora where policy makers can meet with each other and other stakeholders to discuss different aspects of sustainable development, learn from each other, and lay the foundation for a coherent way forward. The commission provides useful tools through the production of reports monitoring and evaluating different elements of sustainable development in a number of areas, including socio-economic issues, environmental factors, governance, gender equity, equality and empowerment, trade and regional integration, as well as HIV/AIDS and related diseases such as malaria and TB in relation to development and governance. Through its

Sustainable Development Division, the UNECA produces reports on a range of issues including population and sustainable development, environmental impact assessments and institutions, agriculture and food security, science and technology, and natural resources. These reports contain lessons learned, constraints and recommendations on the way forward to assist member States to strengthen mechanisms for achieving sustainable development. The knowledge generated will enhance the capacity of African governments to adopt and implement policies, programmes and strategies for sustainable development.

The SDRA assesses the status of sustainable development in Africa by using a range of indicators of sustainability, incorporating all dimensions of sustainable development. The indicators that are used for the assessment have been selected based on their relevance, credibility and legitimacy, and are discussed in the second chapter of the Report. Building on lessons learned through the work on this inaugural issue of the SDRA, a composite Sustainable Development Index will be developed, to further assist in the assessment of the progress towards sustainable development in Africa.

Through the SDRA, member states will be informed of the status of sustainable development in Africa, offer explanations and give policy directions to achieve sustainable development. It will also be a reference document for Development Partners, Universities, researchers and the Society at large.

The SDRA will be published biennially. The first part of each issue will concentrate on monitoring and indicators, while the second part will revolve around thematic issues. The report will also make policy recommendations.

What are the main findings of this SDRA?

Organized in two related parts, the key findings of the SDRA-2005 can be summarized as follows:

Part one of the SDRA assesses the status of sustainable development in Africa. It highlights the importance of indicators for measuring and translating knowledge into meaningful and manageable units of information to support policy analyses and planning. However, the availability, suitability and use of quantitative and qualitative indicators for measuring the progress of countries and the region towards attaining the goals, objectives and principles of sustainable development are limited. Hence there is need to develop an indicators' framework that contains the three dimensions, and the principles of sustainable development, including institutional indicators.

The status of sustainable development in Africa leaves a lot to be desired. The findings on social and economic sustainability reveal that some countries have experienced notable progress while some other ones are still lagging behind. Existing evidence points to stagnant and sometimes declining levels of quality of life and the social environment. This highlights the urgency for concerted efforts to effectively implement policies,

programmes, and strategies that have already been adopted to facilitate sustainable development. And in cases where these do not exist; the need for their formulation, adoption and aggressive implementation is equally urgent. This is an imperative if African countries are to achieve the targets set in the MDGs, JPOI and other related internationally agreed development goals. In doing so, African countries will need to treat all the three dimensions of sustainable development equally and to take an inter-sectoral approach in dealing with identified challenges. There is also a need to establish and build the capacity of national and regional institutions to implement, monitor and evaluate sustainable development goals.

As regards environmental sustainability, the analysis shows that Africa's environment is continuously being degraded. The region is increasingly experiencing desertification, climatic variability and extreme events such as floods and droughts. Furthermore, the region is most vulnerable to the impacts of climate change and its response and adaptation capabilities are limited. The region's forests, biodiversity, and coastal and marine environments are also under threat as a result of rapidly growing populations, urbanization and industrialization.

Countries need to adopt and implement sustainable development action plans that address sustainable development challenges. It is encouraging to note that some countries have adopted plans such as integrated water resources management, integrated coastal area management and environmental impact assessments. Community based natural resources management programmes are also increasingly being adopted to promote the sustainable management of forest and biodiversity resources. This has allowed communities to fully participate in the planning and management of natural resources from which they derive their livelihoods.

In spite of the policy responses undertaken by African countries to address environmental problems, significant challenges persist and these include the inadequate institutional and legal frameworks for environmental management, inadequate financial, technical and human resources and the low levels of awareness on the part of local communities regarding the impact of their activities on the environment. Addressing these challenges will require enhanced political will on the part of governments and the commitment of development partners to sustainable development issues. Should these challenges remain unaddressed, many African countries will find it difficult to "meet the needs of the present without compromising the ability of future generations to meet their own needs."

Part two of the SDRA examines the linkages between key sectoral issues such as land, water, energy and mineral resources and sustainable development. The report notes that land-based resources are at the base of attaining sustainable development and the MDGs in Africa. The continent is well endowed with land-based resources, such as farmland, rangelands, forests, rivers and other sources of hydropower, oil, gas and a range of different minerals. However, currently, the vast potential that these resources represent remains largely untapped, and on the whole continent has therefore failed in its quest to

use these resources in an efficient, equitable, and sustainable manner for poverty reduction and wealth creation.

Indeed, the fragility of Africa's environment, coupled with rapid urbanization and unsustainable patterns of consumption of energy, water and other resources, is associated with a reversal in sustainable development on the continent. For example, the move to increase food production to meet the increased demand for food has led to the expansion of crop cultivation, commercialization, reduced land fallow periods and the blocking of animal migratory routes. These changes in land use patterns have, in turn, resulted in decreased access to water, as well as soil erosion, land degradation, overgrazing and deteriorating rangelands, and deforestation. As land use patterns have changed, so has the pattern of land tenure and land ownership, which has seen an evolution from communal and open access ownership to private ownership with an increasing trend towards land sales – yet, customary systems of tenure remain dominant across Africa, and conflicts resulting from tensions between the parallel systems as well as over access to resources in general abound.

In order to increase the well being of people and further industrial and other forms of development, there is a need to meet the increasing demand for reliable and affordable commercial energy supplies. Present consumption relies heavily on primary energy sources, which is highly inefficient and harmful to the environment. Africa is endowed with abundant energy resources in the form of fossil fuels (oil, gas, and coal), water that could be used for hydropower, uranium, biomass and other renewable energy resources (solar, wind, geothermal power). However, as a result of lack of development of the resources themselves, as well as lack of infrastructure and facilities to use the energy productively on the continent, these rich sources remain largely untapped. Only 7 per cent of Africa's hydropower potential is currently used, and, partly because of lack of ownership of resources as well as low demand on the continent, Africa is a net exporter of energy in the form of oil, gas and coal.

Africa is an important supplier of natural resources globally, and the extractive industry (oil, gas, minerals) plays a crucial role in several African economies. Accounting for more than 50 per cent of Africa's export in the 1990s, the extractive industry constitutes Africa's largest export category. Exploitation of Africa's abundant mineral resources was a major motivation for colonization, and still is a challenge to channel revenues generated from mineral and natural resource exploitation towards domestic savings and investment.

Indeed, one of the major challenges of sustainable development is to use the wealth created from non-renewable resources as an engine of economic growth and social development in an environmentally friendly manner. This will ensure that by the time when finite resources run out, Africa would attain a sustainable level of development where the economies would be more diversified and the continent no longer relies on raw materials as its primary source of income.

Currently, a number of national, sub-regional, regional and global initiatives seek to harness Africa's resources in order to maximize their contribution to sustainable development of the continent. An important prerequisite for such development is political stability and the appropriate policy environment to encourage private investment, while balancing and managing local, national and international concerns and interests, and promoting growth that benefits the poor and does not harm the environment. Forging partnerships between African governments, business communities and civil society groups would greatly enhance their potential to create policies that would further sound management of land-based resources, and harmonize policies to maximize the benefits to sustainable development that derives from this sector. Creation of such policy environments at the national levels is currently taking place in a number of African countries and sub-regions. At the regional level, the NEPAD programme implies that African leaders, inspired by a shared vision, are seeking to ensure sound governance and harmonized policies to promote sustainable development on the continent.

Drawing on experiences of what works, and building on existing frameworks and commitments that some lessons for the way forward emerge. In promoting sustainable development, environmental, social and economic dimensions must all be addressed in order ensure balanced progress which benefits people at all levels of society. An inter-sectoral approach to identified challenges ensures that the different aspects will be addressed appropriately through adoption of sustainable development-oriented policies, programmes, strategies and related instruments. Interested stakeholders in the public, private and civil sectors must be identified and meaningfully involved in the development of relevant policies, programmes, and instruments at all levels. As capacity both for policy formulation, implementation and monitoring is limited, building and enhancing capacity must be pursued, and all actors need to engage in implementation, as well as monitoring and assessing progress. Finally, coordination mechanisms to reduce duplication of efforts and create beneficial linkages should be pursued, and useful partnerships, both between different sectors and at different levels should be promoted along with fostering good governance and the political will to oversee the implementation of the sustainable development agenda.

Part One

**ASSESSING THE STATUS
OF SUSTAINABLE
DEVELOPMENT
IN AFRICA**

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Chapter I

SUSTAINABLE DEVELOPMENT

CONCEPTS AND ISSUES

I.1 Sustainability and sustainable development

Sustainable development has led to profound changes in the way development is understood, conceptualized and measured worldwide. Sustainability and sustainable development often are treated interchangeably. According to Dovers, sustainability is a “long-term and difficult goal of reaching an ecologically sustainable state” while sustainable development is “the variable (and as yet poorly-defined) process by which we might move somewhat nearer to this goal” (Dovers.1993 p. 217). Sustainability and sustainable development have significantly influenced the societal goals, and the processes for achieving welfare and development. At the forefront, the traditional perception of development has been questioned, primarily because it jeopardizes the integrity of the environment, disregards the welfare and needs of future generations, and fosters social inequalities and injustice. Therefore, development activities must go beyond achieving short-term economic gains to take into account far reaching long-term social and environmental impacts and consequences.

In order to achieve sustainability, development strategies and plans, as well as policies and decision-making processes, must become participatory and open for actors and partners. Not only are people demanding a greater say in planning and decision-making, but also civil society organizations, NGOs, the private sector, and development partners are becoming more aware and continuously pressing for involvement in planning and implementation of development activities. Broad participation entails continuous monitoring, revisiting and assessing the development activities for the interest of the society at large.

The literature is replete with various approaches on sustainable development. The economic approach to sustainability is based on the Hicks-Landahl concept of the maximum flow of income that could be generated while at least maintaining the stock of assets (or capital), which yield these benefits (Solow 1986). In relation to sustainability, capital is seen as comprising manufactured, natural and human components. Considered alone, the economic approach portrays perfect substitutability among these sources of capital. In other words, it asserts that it is possible to run down natural capital in the process of growth as long as enough savings are made and invested to compensate for the depletion of natural capital. But this view is considered as “weak sustainability” because it seeks to maintain the aggregate of monetary value of the total stock of assets, assuming a high degree of substitutability among the various types of capital.

On the other hand, the social concept of sustainability is people-centered, and seeks to maintain the stability of social and cultural systems, including the reduction of destructive conflicts (Munasinghe and McNeely 1995). Equity is an important aspect of this approach. Preservation of cultural diversity and cultural capital, and the better use of knowledge concerning sustainable practices embedded in less dominant cultures, are desirable. Modern society would need to encourage and incorporate pluralism and grassroots participation into a more effective decision-making framework for socially sustainable development.

However from the environmental view of sustainable development, the problem of irreversibility and catastrophic collapse make perfect substitutability questionable (Pearce and Turner, 1990). This view supports a "strong sustainability" rule, which requires the separate preservation of each category of critical asset (for example, manufactured, natural, socio-cultural, and human capital) assuming that they are complements rather than substitutes.

Environmental sustainability also focuses on the stability of biological and physical systems (Munasinghe and Shearer, 1995). Of particular importance is the viability of subsystems that are critical to the global stability of the overall ecosystem. It is, therefore, important to consider the environmental consequences in the process of growth. Furthermore, "natural" systems and habitats may be interpreted broadly to also include man-made environments like cities. The emphasis is on preserving the resilience and dynamic ability of such systems to adapt to change, rather than conservation of some "ideal" static state. Natural resource degradation, pollution, and loss of biodiversity reduce system resilience.

Reconciling these various concepts and operationalizing them is a major challenge. The economic and social elements interact to give rise to issues such as intra-generational equity (income distribution). Any policy that places emphasis only on growth without considering income distribution will not be sustainable in the long run because of the likely upheavals and sub-optimal labor utilization. The economic-environmental interface has yielded new ideas on valuation and internalization of environmental impacts. Finally, the social-environmental linkage has focused attention on inter-generational equity (rights of future generations) and popular participation.

The foregoing discussion suggests a broad integrated conceptual approach in which the net benefits of economic activities are maximized, subject to the maintenance of the stock of productive assets over time, and the provision of a good livelihood for the people. To achieve sustainable development, therefore, there ought to be a trade-off between economic optimization, management of the natural resources stock and provision of optimal social goals.

It is therefore important that environmental and social concerns be integrated in the economic development agenda if development is to be sustainable. Integrating economic, social, and environmental dimensions as interdependent, mutually supportive and

reinforcing of long-term development is therefore indispensable. Sustainable development calls for participatory and multi-stakeholder approaches to dealing with development issues, involving a wide range of actors; government, private sector, civil society organizations, institutions of higher learning and research and development partners.

I.2 International agenda on sustainable development

The agenda on sustainable development figured prominently in a series of international conferences starting with Stockholm Conference on the Human Environment (1972). It set the stage for global environmental assessment, and for addressing the links between environment and development. The conference was therefore an important milestone in drawing attention to the need for holistic and integrated development planning as well as addressing intergenerational equity issues. Another milestone in the history of international agenda on sustainable development is the World Conservation Strategy (WCS), published in 1980 by the World Conservation Union (WCU). This strategy asserts that conservation cannot be achieved without development that will alleviate the misery of the hundreds of millions of people living in poverty. Stressing the interdependence of conservation and development, the WCS first gave currency to the term “sustainable development” (IUCN 1991).

However, sustainable development gained worldwide attention through the report of the World Commission on Environment and Development (WCED) entitled “Our Common Future”, otherwise known as the “Brundtland Report”. The Brundtland Report (1987) defines sustainable development as development that “meets the needs of the present without compromising the ability of future generations to meet their own needs.” The Brundtland Report brought sustainable development to the center-stage of the development debate. It questioned the pathways of development followed by the rich and the poor countries, and called for revisiting societal goals to take into account environmental integrity, social justice and equity, the welfare of current and future generations, and public participation in development. Furthermore, the report provided a new approach and conceptual understanding of the development process, and created demand for new concepts, tools and measures, and new data, information, and knowledge for advanced policy analyses.

Since 1990 the United Nations has hosted many conferences and summits to address global economic, social and environment challenges. The one most directly relevant to global sustainable development concerns was the United Nations Conference on Environment and Development (UNCED), also called the Earth Summit, held in Rio de Janeiro, Brazil, in 1992. The Rio Summit came up with an agreement that the protection of the environment, and social and economic development were fundamental to sustainable development. This led to the development of a global program of action dubbed “Agenda 21” that was designed to promote sustainable development for humanity.

A five-year review conducted in 1997 revealed that little progress had been made in implementing Agenda 21. The desired momentum for accelerated implementation and a political declaration affirming a renewed commitment failed to be generated. In light of this, the World Summit on Sustainable Development held in Johannesburg in 2002 conducted a further 10-year review of the implementation of the outcomes of UNCED, particularly Agenda 21, and reinvigorated global commitment to sustainable development. The findings of the regional reviews conducted in the run-up to WSSD confirmed a generally low level of implementation of Agenda 21, which was particularly glaring for the Africa region.

The WSSD came out with three outcomes aimed at strengthening the implementation of Agenda 21: the Political Declaration, the Johannesburg Plan of Implementation (JPOI) and the Type II Partnerships initiative. The Political Declaration reaffirmed global commitment to the objectives of sustainable development. The Plan of Implementation contained targets and timetables to engender actions on a wide range of issues. The partnership commitments numbered over 200 at the time of the Summit and included major initiatives by development partners.

I.3 Sustainable development issues in Africa

Most African countries are facing a plethora of development challenges. The continent not only faces increasing levels of extreme poverty and hunger; Africa is also experiencing the highest disease burden in the world. In addition, the continent has high poverty levels aggravated by food shortages, low levels of education and human capital. The rate of urbanization on the continent is also one of the highest in the world. Environmental degradation and desertification are major concerns. Different parts of the continent are highly susceptible to climatic changes leading to droughts and floods. Other environmental issues include increasing air pollution indoors and in the cities, and deforestation (See Chapter III). All these challenges have played a role in deterring development in the continent.

These current challenges to sustainable development in Africa are somehow rooted in past policies and strategies. They have persisted for long despite several development strategies undertaken since independence. In the 1960s and 1970s, many African countries pursued development planning as the main strategy for development. For many countries, this strategy of growth was state-based with the rationale that the State was big enough to mobilize resources for the daunting task of development. Besides, private capital and the relevant institutions were not developed enough to undertake development. The strategy followed by most African countries relied mainly on the exploitation of natural resources. Unfortunately, while the strategies generated income for the countries during a period when the prices of the exported raw materials were high, they did not lead to sustainable creation of formal employment or industrial development. On the contrary, the strategies led to environmental degradation and worsened the exposure of weaker economies to external shocks, thereby increasing poverty and reversing social development (World Bank, 2003).

As a result of the poor economic performance, the majority of African countries embarked upon Structural Adjustment Programs (SAPs) during the 1980s and 1990s and Poverty Reduction Strategies (PRSs) from 1999. The SAPs were meant to correct the macro-economic imbalances that had occurred as a result of state-controlled economic policies in most countries. They were also to generate quick growth to compensate for the long-term low average growth for the continent. These policies failed to integrate the environmental and social dimensions of sustainable development. Even for the macro-economy, not much attention was paid to important sectors such as agriculture, industry and employment.

The shift to PRSs occurred as a result of the acknowledgement that many adjustment measures did not accelerate development, but generated negative impacts for the poor. Furthermore, it was recognized that there was a connection between adjustment programmes and growing poverty, inequality and environmental degradation. The PRSs were originally conceived in the context of HIPC debt relief initiative and hence did not adequately incorporate environmental and social development concerns. However, countries are building on their experiences, and as they move towards the 'second generation' of PRSs more broad-based sustainable development concerns are being and will be integrated, particularly in the context of the MDGs (ECA 2006).

The SAPs and earlier generations of the PRSs suffered from lack of effectiveness and coordination of policy, and lack of ownership. Policies had contradictory sectoral impacts because they were not harmonized. The recommendation in Agenda 21 to put in place National Sustainable Development Councils (NSDCs) to harmonize policies will address this policy incoherence. Finally, most African countries have not put in place strategies and policies to coordinate the agricultural, industrial and social sectors to generate significant valued addition, employment, and incomes and eradicate poverty.

Sustainable development issues in Africa have been frequently echoed in regional and global summits and conferences. The regional initiative on "sustainable development for Africa" endorsed at the WSSD in Johannesburg, for example, states that sustainable development in Africa "has remained elusive for many countries" as poverty remained a major challenge for most of the countries and the continent has not yet benefited from globalization. Moreover, the efforts to achieve sustainable development in Africa have been hindered by "conflict, insufficient investment, limited market access opportunities and supply side constraints, unsustainable debt burdens, historically declining levels of official development assistance and the impact of HIV/AIDS." (United Nations 2003, p. 36).

The WSSD called upon the international community to reinvigorate its commitments and "give effect to a new vision based on concrete actions for the implementation of Agenda 21 in Africa." (United Nations 2003, p. 36). The JPOI stipulates actions at all levels to achieve sustainable development in Africa (See Box 1.1), namely, actions to support the implementation of the NEPAD's vision and the PRSPs, as they provide a framework for sustainable development and poverty eradication in Africa. Moreover, paragraphs 63 to

71 of the of the JPOI provide a list of actions for achieving sustainable development in Africa, covering implementation of the UNCCD, land and natural resources, health systems, natural disasters and conflict, water resources development, agricultural productivity and food security, regional trade and economic integration, hazardous chemicals and waste, digital opportunities to bridge the digital divide, sustainable tourism, conservation and biological diversity, and sustainable urbanization and human settlements.

I.4 The NEPAD: Africa's initiative for sustainable development

The African Heads of State adopted at the African Summit held in Lusaka, Zambia, 2001, the New Partnership for Africa's Development (NEPAD) for special attention and support to achieving sustainable development in the continent. The NEPAD is a continental plan that sets the conditions for achieving sustainable development, outlines the sectoral priorities for actions and policy interventions, and identifies the strategies for resources mobilization (See Box 1.2). It provides a long-term vision, statement of the problems facing sustainable development in Africa, and a programme of actions to resolve the problems and achieve the vision.

The NEPAD initiatives seek to accelerate sustainable development in Africa. At

Box 1.1
Actions for achieving sustainable development in Africa

1. Create an enabling environment at all levels to achieve sustained economic growth, peace, stability and security, good governance, human rights, and gender equality.
2. Support the implementation of the vision of NEPAD and other established regional and sub-regional efforts.
3. Promote technology development, transfer, and diffusion; development of effective science and technology institutions.
4. Support national programs and strategies for education, strengthen research institutions, and support achievement of the MDGs.
5. Enhance industrial productivity, diversity and competitiveness of the African countries, enhance the contribution of the industrial sector, particularly mining, minerals and metals to the sustainable development.
6. Strengthen capacities to undertake environmental legislative, policy and institutional support for sustainable development.
7. Deal effectively with energy problems in Africa.
8. Develop affordable transport systems and infrastructure so as to promote connectivity for sustainable development.
9. Provide resources to meet needs related adverse climatic conditions, extreme weather events, sea level rise etc.
10. Provide technical support for afforestation and reforestation, and build capacities for sustainable forest management.

Source: United Nations 2005 World Summit on Sustainable Development, Johannesburg 2002 Political Declaration and Plan of Implementation.

the forefront, Africa needs to create an enabling environment for sustainable development through the achievement of peace and stability, security, good governance, human rights, corporate social responsibility, and regional integration. These are the conditions that will enable the continent to harness its human and natural resources potentials to achieve sustainability, and to address complex issues of increasing poverty, the HIV/AIDS pandemic, and environmental degradation.

However, the continent is constrained by a host of internal and external factors that derail its progress on the sustainable development agenda. Such factors include low domestic savings and investment, high debts, low FDI, low market access because of trade barriers, low competitiveness and diversification of the economies, and lack of adequate capacities to plan and manage the development process. According to the NEPAD, Africa needs mobilization of internal and external resources, as well as capacity building in many areas, such as institutional support, transportation, infrastructure, strengthening of research institutions, and supporting knowledge and information systems.

Box 1.2
The NEPAD priorities

- a. Establishing the conditions for sustainable development by ensuring
 - Peace and security
 - Democracy and good political, economic and corporate governance
 - Regional co-operation and integration
 - Capacity building
- b. Policy reforms and increased investment in the following priority sectors
 - Agriculture
 - Human development with a focus on health, education, science and technology and skills development
 - Building and improving infrastructure, including Information and Communication Technology (ICT), Energy, Transport, Water and Sanitation
 - Promoting diversification of production and exports, particularly with respect to agro-industries, manufacturing, mining, mineral beneficiation and tourism
 - Accelerating intra-African trade and improving access to markets of developed countries
 - The environment
- c. Mobilizing resources by
 - Increasing domestic savings and investments
 - Improving management of public revenue and expenditure
 - Improving Africa's share in global trade
 - Attracting foreign direct investment and
 - Increasing capital flows through further debt reduction and increase ODA flows

Source: NEPAD <http://www.nepad.org/2005/files/inbrief.php>

The NEPAD became the regional framework for catalyzing international support to Africa. In this regard the report of the UN Secretary General Advisory Panel on the International Support for NEPAD concluded that the NEPAD initiative cannot succeed without significant international support on aid, debt relief, trade, capital flows and remittances, private sector development, improving the quality and coordination of support provided by the United Nations system, and improving the monitoring of pledges and disbursements (UN General Assembly 2005).

I.5 Conceptualization of sustainable development issues in Africa

The broad integrated approach and issues discussed above constitute the bases for conceptualizing sustainable development in Africa. Conceptualization will serve several purposes. First, it will improve the understanding and analyses of sustainable development. Second, it will inform the formulation of a relevant indicators' framework and the selection of the relevant data and information. While the former is expounded below, the latter will be analyzed in details in chapter II.

Sustainable development situation in Africa. In order to ameliorate the situation and improve the understanding and analyses, sustainable development in Africa can be conceptualized in terms of interactions between natural and human systems, and the policy environments that modulate their linkages and repercussions. Figure 1.1 gives a cross sectional view of some possible interactions between natural systems and human systems. In real life such interactions are often much more complex than is depicted here.

The natural systems consist of water, energy, land, and minerals. The choice of these natural systems is guided by the thematic part of the SDRA (Part Two). Economic and social developments in Africa are largely dependent on these components of the natural systems. There are several other components of the natural systems, such as atmosphere and climate that are equally important but not shown in the figure.

On the other hand, the human systems in the social, economic and institutional spheres consist of the people, and of the economic and social sectors, and of management policies and institutions. People are the focus of human development activities. Their welfare is dependent on human systems and on natural systems. Therefore sustainability entails maintaining the development and integrity of all systems.

The two systems and their components are intertwined in a web of interactions of different magnitudes and varying impacts. The economic and social sectors facilitate human interactions with land-based natural resources. Simply, these interactions can be described in a context of "use" of the resources in each sector, and "degradation" that results from production and consumption processes. The human activities in each sector "use" natural resources in a production process that also generates some form of "degradation" such as air pollution, water contamination, and land degradation. The "use" and degradation" are represented by solid and dotted arrows, respectively, and are

important for understanding sustainability of the systems and sub-systems.

Within each system there are also interactions of different kinds. In the natural systems, land, water, energy and minerals interact in cycles with positive and negative impacts. For example, energy and water are linked to land through the formation of biomass, which plays an important role in the preservation of the environment. The interaction between water and land could lead to soil erosion, such as in tropical areas. Understanding such environmental interactions are important for the sustainability of natural systems.

Likewise, the human systems interact in several ways. For example, people provide human capital to the various social and economic sectors, and, in return, they receive income in the form of wages. In human systems, people matter not only for their demographic profiles in terms of age, sex and numbers, but also for their social characteristics in terms of education, health, skills and knowledge. Together these factors account for the production and competitiveness of local economies. They also directly impact on the levels and patterns of consumption, and consequently on the extent of use and degradation of the land-based resources.

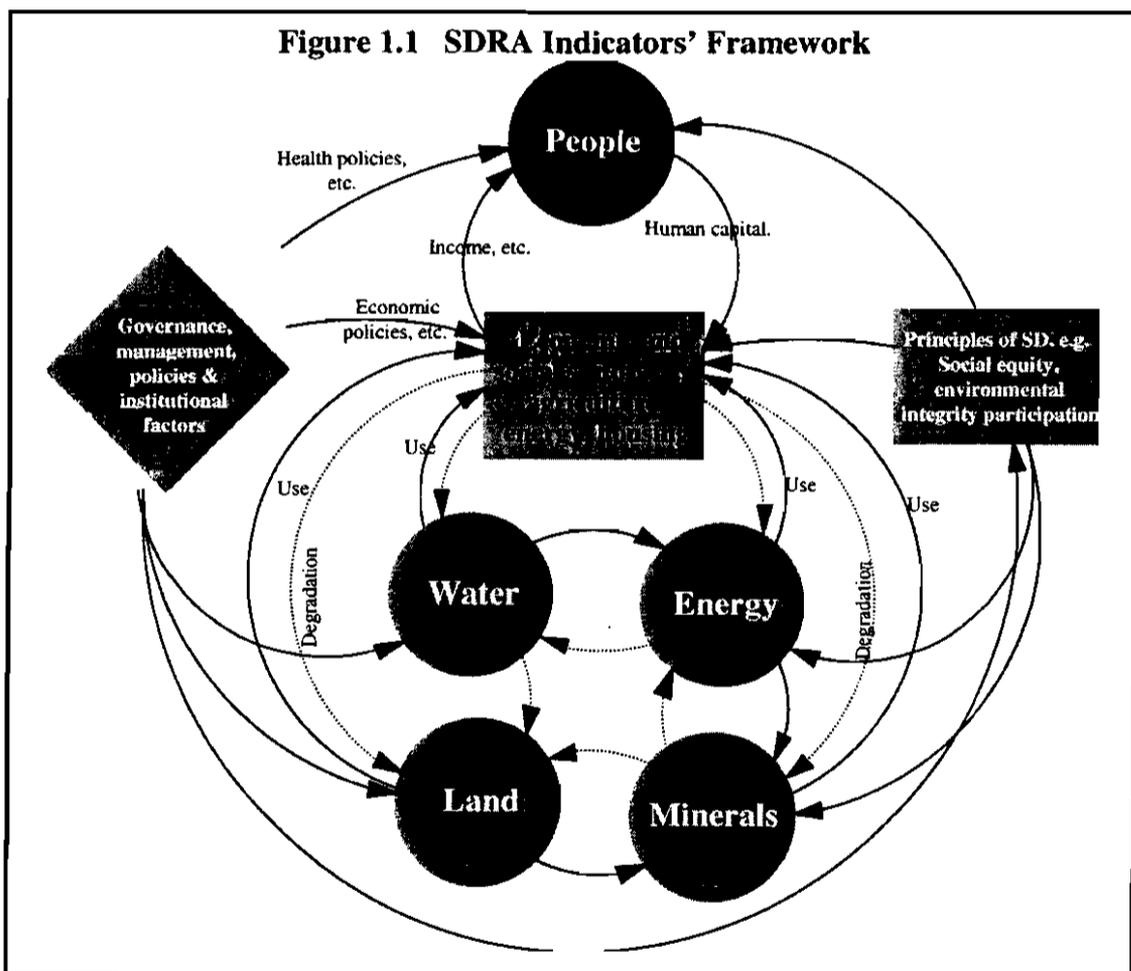


Figure 1.1 also shows the roles of governance, management, policies and institutional factors in modulating the interactions described above, and in regulating their outcomes in terms of social equity, environmental integrity, futurity and participation in development activities. The quality of governance, management, policies and institutions determine, to a large extent, the outcomes and sustainability of both human systems and natural systems.

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Chapter II

SUSTAINABLE DEVELOPMENT INDICATORS

TOWARDS AN INDICATORS' FRAMEWORK FOR AFRICA

Methods for assessing interactions between different sectoral environmental, demographic, social and developmental parameters are not sufficiently developed or applied. Indicators of sustainable development need to be developed to provide solid basis for decision-making at all levels and to contribute to a self-regulating sustainability of integrated environment and development systems. Agenda 21 – Chapter 40

Encourage further work on indicators for sustainable development by countries at the national level, including integration of gender aspects, on a voluntary basis, inline with national conditions and priorities. Plan of Implementation of the WSSD 2002

II.1 Introduction

Indicators are important for measuring and translating knowledge into meaningful and manageable units of information to support policy analyses and research, and to inform planning and decision-making. This chapter is specifically on indicators of sustainable development in Africa. It succinctly reviews the international recommendations on indicators, and scans the existing literature for the state of knowledge on approaches for measuring sustainable development. The main objective of the review is to layout the international policy and agenda on indicators, and to explore the conceptual methodologies, usefulness and relevance of indicators' frameworks for measuring and studying progress towards sustainable development. The chapter analyses the implementation of international agenda on indicators in Africa. Subsequently it develops an SDRA indicators' framework to serve as conceptual understanding of the sustainability concept in the context of social, economic and environmental developments in the continent.

II.2 International agenda on sustainable development indicators

An important pillar of the sustainable development agenda is the use of indicators for measuring progress at all levels. Sustainable development indicators are quite important for gaining insights into the complex and intertwined social, economic and environmental systems, and to generate new knowledge and information on their

linkages and interactions. Moreover, the indicators are needed to address critical questions relating to environmental integrity, public participation and inter- and intra-generational equity. Decision makers and planners need indicators to identify and prioritize policy interventions, to assess impacts, to harmonize policies and actions, and to design long-term development strategies.

The demand for indicators have largely been shaped by the sustainable development approach, and the international agenda on indicators have gained the attention and support of the international community in the conferences and summits held since the 1990's. Through these conferences and summits the international community laid down the global policy agenda on indicators to support planning and decision-making systems at all levels, and requested countries, regions and development partners to systematically implement and report on the sustainable development agenda. For instance, Agenda 21 emphasizes the need for integrating decision-making systems in economic, social and environmental dimensions, and at the policy, planning and management levels. It also emphasizes the importance of assessing the progress of countries and regions towards the achievement of sustainable development, and the need for new measures and indicators to perform the assessment.¹

Furthermore, Agenda 21 highlights the fragmentation in decision-making, weaknesses in statistical systems, and the general lack of capacity for the collection and assessment of data, particularly in developing countries. It identifies two programmes on: (a) bridging the data gap and (b) improving information availability, to be implemented so as to ensure that decision-making is anchored on sound information (See Box 2.1). The data gaps programme is based on the need for more and new types of data, general lack of capacity for collection and assessment of data, and inadequacy of the commonly used

Box 2.1
Proposed activities on data and indicators for sustainable development

I. Activities for bridging the data gap

- Development of indicators of sustainable development
- Promotion of global use of indicators of sustainable development
- Improvement of data collection and use
- Improvement of methods of data assessment and analysis
- Establishment of a comprehensive information framework
- Strengthening of capacity for traditional information

II. Activities for improving availability of information

- Production of information useable for decision-making
- Establishment of standards and methods for handling information
- Development of documentation about information
- Establishment and strengthening of electronic networking capabilities
- Making use of commercial information sources

Source: Agenda 21, Chapter 40

indicators, such as the GNP, to measure sustainability. The information availability programme is premised on the difficulties to find the appropriate information at the required time and at the relevant scale of aggregation, and on the inadequate management of information because of financial and human resources constraints. In order to address these concerns, Agenda 21 proposed activities to bridge the data gaps and improve availability of information. These proposals are summarized in Box 2.1.

These proposed activities have been asserted at global summits and international conferences convened since the 1990s. Acknowledging development for people as a universal and inalienable right that must be “fulfilled so as to equitably meet the population, development and environment needs of the present and future generations”, the ICPD (Cairo 5-13 September 1994) emphasized interrelationships between population, sustained economic growth and sustainable development, and highlighted the importance of data collection, analyses and dissemination. The five-year (ICPD+5) review called on the countries to “strengthen their national information systems to produce reliable statistics on a broad range of population, environment and development indicators in a timely manner” (UNFPA 2000), and on the international community to strengthen the capacity of the developing countries, particularly African countries, to develop innovative and cost effective solutions for meeting data requirements for monitoring and evaluation.

The World Summit for Social Development (1995), which focused on profound social development problems such as poverty, unemployment, social exclusions, and social inequalities, called on the countries to develop “quantitative and qualitative indicators of social development, including, where possible, disaggregation by gender, to assess poverty, employment, social integration and other social factors...” (UN 1995). Also, the WSSD (2002) discussed the implementation of Agenda 21, and stressed the need for strengthening the information, statistical and analytical services relevant to sustainable development policies and programs, including data disaggregated by sex, age and other factors (UN 2003). Moreover, it called for further work on indicators for sustainable development by countries, including integration of gender aspects, and the need to support developing countries to “collect data that are accurate, long-term, consistent and reliable”, and to “use satellite and remote-sensing technologies for data collection and further improvement of ground based observations” (UN 2003).

These international agenda on development goals, targets and indicators have been harmonized under the MDGs. The MDGs framework defines eight goalsⁱⁱ and 18 time-bound targets that are linked to a set of 48 quantitative indicators. The goals reflect a limited set of national and international development priorities. The targets are set primarily to facilitate actions. All targets are time-bound, with 1990 as the common baseline year. The indicators provide quantitative monitoring of progress towards achieving the targets. Some of the indicators, such as population, total fertility rate, adult literacy rate, and gross national income per capita, are not related to specific goals. The indicators should be measured at the national and sub national levels (rural, urban, region, etc.) wherever possible. Recognizing lack of data for some of the indicators, the

framework underscores the importance of national capacity buildingⁱⁱⁱ of statistical systems to provide accurate, timely and more reliable data.

All these developments have shaped the demand for data and indicators, and influenced the design of technical tools and measures, and the quality of analyses and assessment of the progress towards sustainability. They have entailed investment in capacity building, particularly investment in institutional capacities and statistical systems necessary for integration of the substantive dimensions of sustainable development. Moreover, these changes have inspired intellectuals and institutions of excellence to develop frameworks as tools for identification of relevant indicators, assessment of data availability, quality and their use and relevance for realization of the principles of sustainable development.

II.3 Measuring sustainable development

The quest for sustainability has led to the development of various tools and measures for structuring and conducting sustainable development policy analyses. Most of these tools and measures emphasize the importance of frameworks that synchronize the principles and dimensions of sustainable development. This approach is not new. In the field of social sciences, the pioneer work of Bauer (1966), Biderman (1966) and Sheldon and Moore (1968) focused on frameworks for social development indicators. Their main purpose was to define and measure social progress, and establish national goals and priorities. The 1970's witnessed further developments in indicators' frameworks for the purpose of measuring progress and ranking countries on a commonly defined scale. A pioneer in this respect is the Social Indicators Programme of the Organization of Economic Cooperation and Development (OECD), which integrates the environment in urban development systems (OECD 1978, 1982).

The Human Development Index (HDI) marks further development on indicators' frameworks for measuring progress and ranking countries on a commonly defined scale. The HDI is a composite tool that measures the average achievement of a country in three dimensions; (a) longevity measured by life expectancy index (b) educational attainment measured by the education index comprised of the adult literacy rate and the combined gross primary, secondary and tertiary enrollment ratios and (c) the standard of living measured by the GDP index calculated using adjusted GDP per capita (PPP\$). Since 1990, the Human Development Report has been ranking countries according to their achievements in these three dimensions (UNDP, 2000). The HDI has led to the derivation of other composite indices such as the Human Poverty Index, Gender-related Development Index (GDI) and Gender Empowerment Measure (GEM). The calculation of all these indices involved development of a framework and establishment of a database for all countries in the world. The indicators for African countries have often been described as of poor quality, low coverage and lacking time series. These limitations have seriously distorted the ranking of these countries on the global scale of human development.

Sustainable development introduces new and complex dimensions to indicators' frameworks. Particularly, the integration of the dimensions of sustainable development requires social, economic, environmental and institutional indicators. Also, intergenerational equity, environmental integrity, and public participation, are principles on which few indicators and technical tools are available. Following Agenda 21, frameworks that seek to integrate economic, social, and environmental indicators, and take into account the precepts of sustainable development became more popular^{iv}. In addition, the dimensions of these frameworks have expanded at community, national, regional and global spectrums of development. Generally, these frameworks provide a wide range of technical tools^v that can be organized under thematic and systemic approaches.

The thematic approach of indicators' framework, which is the most widely used, conceptualizes sustainable development in the context of themes and sub-themes, such as social, economic, environmental, etc. There are several examples of this approach^{vi}, the most known of which is the thematic indicator framework developed, through years 1995-2000, by the United Nations Commission on Sustainable Development (UNCSD). The framework has evolved a driving force-state-response to adoption of themes and sub-themes that was prompted by recommendations from testing in 22 countries^{vii}. Against the background of these tests, the framework has been re-focused to emphasize the 15 main themes related to sustainable development -- (6 social; 5 environmental; 2 economic; and 2 institutional themes) and 38 sub-themes to guide the development of national indicators. Its main purpose is to make the "indicators of sustainable development accessible to decision-makers at the national level, by defining them, elucidating their methodologies and providing training and other capacity building activities. At the same time, it was foreseen that indicators as used in national policies could be used in the national reports to the Commission and other intergovernmental bodies." (UNCSD 2000)^{viii}.

The systemic approach, on the other hand, emerged from general awareness of the shortcomings and limitations of the thematic approach (Bossel 1999).^{ix} It considers sustainable development as a dynamic process of interrelated human and natural systems and subsystems - how systems change and impact on each other, and how they are likely to evolve in the future. The systemic approach has led to the formulation of the Bellagio Principles. These ten principles^x serve as guidelines for conducting the assessment, including the choice and design of indicators and their interpretation and communication to policy makers, at all levels -government, private sector, corporate, and international.

II.4 ECA activities on indicators

The ECA frequently produces technical tools to generate new knowledge to assist the Commission in policy analyses and to measure the progress and achievements made by African countries in various spheres of development. Summarized in Table 1, these

tools are mostly thematic composite indices, such as the Overall Sustainability Index (OSI), Economic Sustainability Index (ESI), and the African Gender and Development Index (AGDI). The ECA also developed a model for analyses of the nexus issues. These technical tools are quite important, as they analyse some specific dimensions of sustainable development. Therefore it is pertinent to build synergies around them; explore their strengths, weaknesses and draw some relevant lessons for assessing progress towards achieving sustainable development in Africa.

1. Assessment of the composite indices

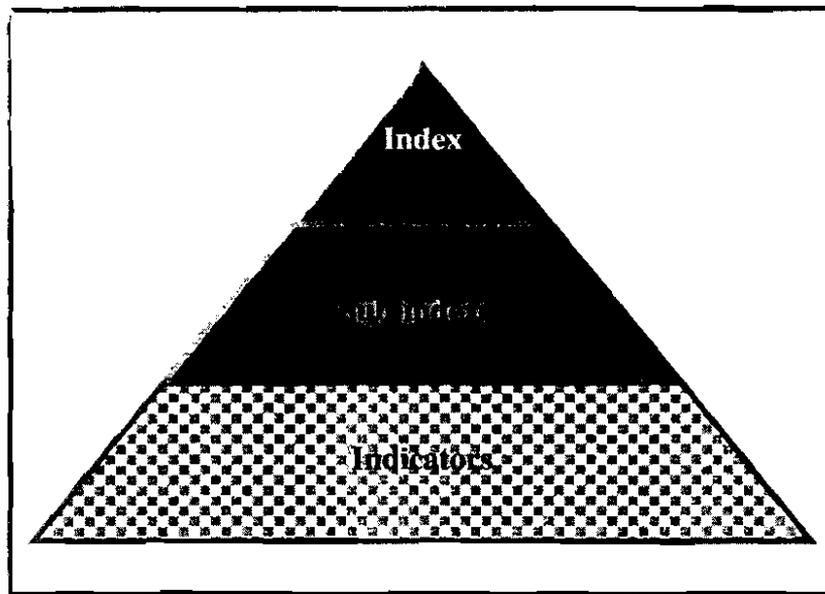
The technical tools listed in Table 2.1 have been developed by the Commission for studying the constraints and challenges African countries face, and for identifying appropriate actions, strategies and policy interventions that are needed to make progress towards, for example, achieving long-term economic sustainability, enhancing trade competitiveness of the African countries, promoting regional integration and cooperation, achieving good governance, mainstreaming gender, progressing towards sustainable modernization of agriculture and rural transformation. Moreover, these tools are linked to the achievement of regional and global policy goals and initiatives, such as the Abuja Treaty establishing the African Economic Community and the NEPAD.

Though the composite indices differ in technical structure and coverage, similar thematic frameworks have been used for aggregating the relevant indicators under specific themes and/or sectoral issues. The composite indices are aggregative and hierarchical in nature. They integrate different information at various levels. At the base level, the hierarchical structure usually starts with indicators that are aggregated to an intermediate level of sub-indices, leading to the final composite indices (See Figure 2.1). This hierarchical structure is useful for identifying and selecting the relevant indicators, scoring the variables, aggregating the scores, assigning weights and adopting a reference point.

Another characteristic of these composite indices is that they employ several statistical techniques including scoring, ranking, factor analyses, cluster analyses, and regression analyses, for the calculation of parameters, grouping the countries, sectors, and themes into high, moderate and low performers, and/or by sub-regional classifications. These analyses play a useful role in pinpointing the strengths and weaknesses, and in identifying lessons learnt at various levels: country, sub-region, sector, RECs, etc. They enrich comparative policy analyses through identifying the best and worst performer countries, and help in identifying the areas where actions and policy interventions are needed.

However, these composite indices suffer from many limitations. Data availability is the major limitation affecting the choice of indicators, the selection of countries, and the time frame. Often some countries and some important indicators are dropped because of lack of data. Consequently, the time frame is often shortened to accommodate the largest number of indicators for the maximum number of countries. In fact, lack of data over a reasonable time series, is a problem in many countries in Africa.

Figure 2.1
Hierarchical structure of composite indices



In addition, there are conceptual limitations with the Overall Sustainability Index (OSI), which is the only composite index among the ones listed in Table 1 that provides an overall measurement of the progress of the African countries towards sustainable development. The OSI comprises 27 indicators aggregated under three sub-indices: (a) economic sustainability (17 Indicators), (b) environmental sustainability (4 indicators) and (c) institutional sustainability (6 indicators). Its major limitation is in providing conceptual definition of sustainability that is based on enhancing individual and collective well being as the central aim of sustainable development. The OSI focuses on human and manufactured capital, and productivity, and on economic sustainability. The social and environmental dimensions of sustainable development have been severely limited by the selection of few indicators. The institutional indicators are limited, too, and they largely neglect the progress made by African countries on the establishment of national sustainable development councils and committees, formulation of national sustainable development strategies, and integration of environmental indicators in national development plans. These limitations undermine the validity of the OSI as an “overall” measure of sustainable development in Africa. The SDRA indicators’ framework has been designed to build on the OSI taking into account its limitations.

2. Assessment of the PEDDA model

In addition to the composite indices, the ECA developed a model as a technical tool for studying the linkages between Population, the Environment, Development and Agriculture in Africa (PEDDA).^{xi} PEDDA is an index-based system dynamics model, as

opposed to the thematic and sectoral composite indices above-mentioned. The framework of the model is based on three modules - population, natural resources (land and water) and agricultural production (See Figure 2.2). It includes HIV/AIDS as an important health component of the development paradigm in Africa, and how it impacts other modules of the PEDDA.

The PEDDA framework focuses on a set of causal factors that are relevant to the specific chain of negative spiral interactions (vicious circle) resulting from high population growth, environmental degradation and low agricultural productivity leading to food insecurity. The vicious circle operates through the negative impact of a fast-growing food-insecure segment of the population on the natural resources stock, which in turn leads to a decline in agricultural production, inducing a higher food insecure population.

The *vicious circle* approach focuses on the weaknesses of real systems to explain why food insecurity and poverty in Africa are increasing. Such an approach is helpful for identifying the linkages between various interventions that are needed to address the vicious circle - poverty reduction strategies, environmental conservation interventions, education interventions, illiteracy eradication campaigns, health interventions, etc. Each of these interventions will contribute in different ways to breaking the vicious circle. Important as they are, these interventions need to be viewed holistically and based on a comprehensive strategy that recognizes their mutual interdependence. These dimensions call for extending the policies, decision-making and planning beyond the traditional sector-specific approach, and for long-term strategic planning.

Moreover, the PEDDA framework treats integration, which is one of the requirements of sustainability analyses, in a systems dynamic and interactive manner with positive and negative feedbacks overtime and across the various interacting components. Building on past and current trends, the model allows for alternative policy scenarios for the future, depending on assumptions specified by the user.

Sustainability in the context of the PEDDA framework entails that stress from various systems and subsystems can trap societies in increasingly destructive responses with interrelated forces leading to worsening of the living conditions of people, and in the natural and environment systems. However, one problem with this framework is that it left out economics, which is an important factor in modulating human interactions with the natural and environment systems. Economic growth and income distribution in Africa are factors that also contribute to the vicious dynamics described above. In addition the PEDDA framework is somewhat silent on the institutional factors, which are important for modulating the economic, social, and environmental dimensions of sustainable development.

The first step in the formulation of a framework is the clarity of its purpose and the issues it intends to address. The purpose could be for measurement of performance, assessment, monitoring and evaluation, integration, or reporting. Measuring performance in economic, social and environmental spheres implies that some targets are set for the purpose of policy comparisons. Whether an indicator is useful or not depends on the framework and purpose, issues and targets for which it has been identified. If the purpose is to assess progress towards sustainable development, then the design of the framework and the selection of the indicators must conform to the precepts of sustainability mentioned before. Fulfillment of such a requirement will provide some guarantees for proper generation and use of the sustainability concept and to avoid wrong interpretation.

What is a sustainability indicator? Generally an indicator is a tool used to compress a large quantity of information into a simple and meaningful form. This implies that an indicator adds value through the generation of new knowledge, using a set of existing information. A sustainability indicator weaves the economic, social and environmental information. Therefore, one of the important requirements of indicators frameworks for sustainable development is balanced coverage of its social, economic, and environmental dimensions.

Usually, frameworks identify and define the appropriate set of indicators based on some criteria, such as coverage, relevance, reliability and feasibility. Such criteria are needed to ensure the quality of the data. Invariably, rarity and the quality of data are the main problems with indicators frameworks. The quality of data largely determines the quality of the sustainability indicators and the analyses on which they are based. Also frameworks often define the selected indicators and identify the units of measurement, and the sources of data. Often, the frameworks specify the levels of aggregation of the indicators into groups and sub groups, and the purposes of each aggregation. The real value of frameworks is in the aggregation of the data into a meaningful hierarchical structure of sustainability indicators. Each hierarchy will provide a meaningful set of information for measuring the relative position of a community, country, or sub-region on a commonly defined scale. In these ways, frameworks add value to the data and their analyses.

Indicators' frameworks use a wide-range of statistical methods for the analyses of the results. Depending on approach and conceptual theories, some of these methods provide a partial definition of integration in terms of causality and feedback loops. Some treat integration as a linear process, while others consider nonlinear and complex relationships involving more dynamic interactions between human activities and the environment. These variances are important to keep in mind when designing an indicators framework. It is important to illuminate and understand the complex interactions of human, social and economic activities with the environment.

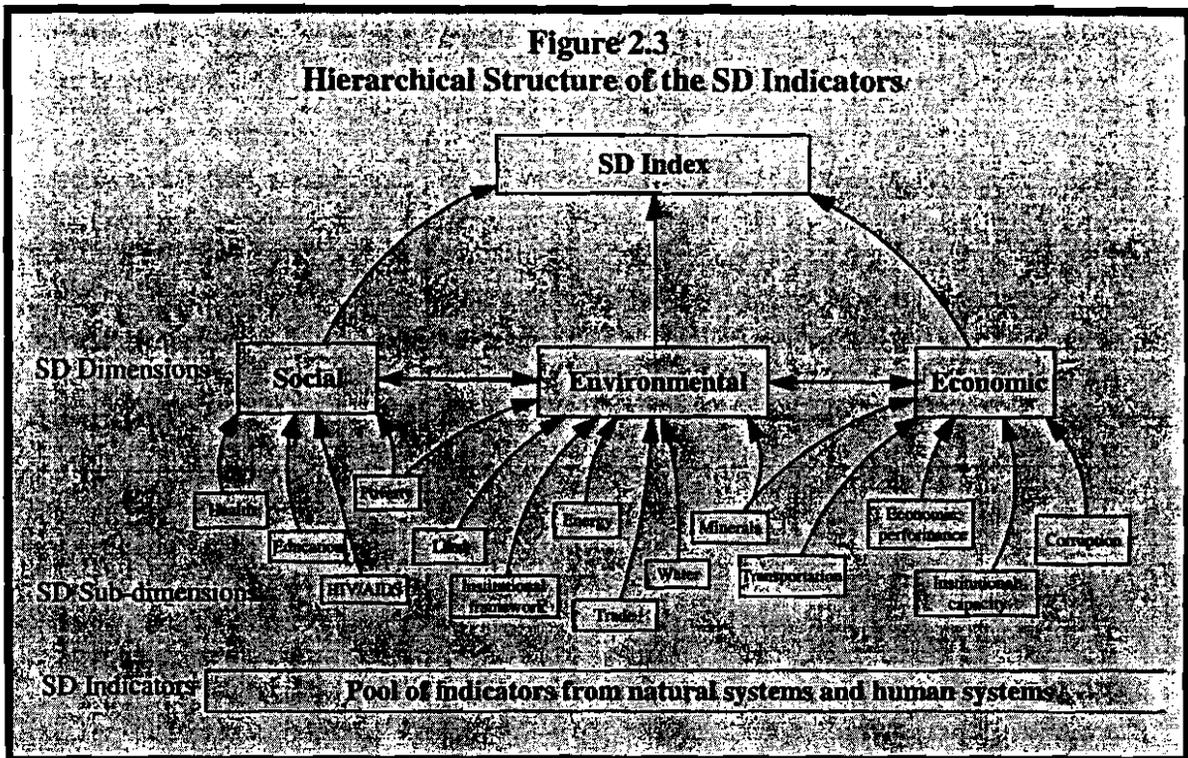
An important characteristic of indicators' frameworks is that they are often revisable and adaptable to the needs of different users at different levels. The set of indicators evolve overtime as need arises, framework changes, and new data become available. Also, an

indicators' framework may change over time as scientific understanding improves and the demand and use of indicators change.

II.6 SDR indicators' framework

Figure 1.1 in chapter 1 shows the SDR indicators' framework. It provides a conceptual understanding of the report and defines, integrates and coherently balances the social, economic and environmental dimensions of sustainable development while integrating the institutional factors of these three dimensions. The SDR indicators' framework will be used to integrate the principles of environmental integrity, social equity and public participation in the development process in Africa. These principles are often linked to the final policy precepts of sustainable development.

Based on the SDR indicator's framework, Figure 2.3 shows a plausible structure of indicators for sustainable development in Africa. The structure is hierarchical as a pool of indicators from the natural and human systems are aggregated at the sub-dimensional level to generate a number of sub-indices, which are in turn aggregated to generate sub-indices at the dimensional levels of sustainable development: social, environmental and economic. Subsequently, the indices lead to the overall aggregate index of sustainable development. This hierarchical structure of indicators will be used in this report to reflect on sustainability concepts and study the availability, suitability and use of indicators for sustainable development in Africa. Further development and implementation of the SDR indicators framework, and the detailed calculations of the indices and sub-indexes as well as the choice of relevant statistical tools will be carried out in the second issue of the SDR.



1. Simple indices developed in subsequent analysis of sustainable development in Africa

In the analysis presented in Chapter III, focus is put on indicators on which all the 53 countries have data from the database compiled by ECA's Sustainable Development Division to develop some simple indices. The year 2002 is used as the focal point for analysis. Using these as the basic criteria for selecting the indicators, only a limited number of variables were identified. These are: (1) population growth rates; (2) access to improved sanitation; (3) TB prevalence rates; and (4) per capita energy consumption. Using two or more of these variables in combination, a number of simple indices will be developed in Chapter 3. Each index will be calculated using the average of country rankings based on that index divided by the number of countries; and the range for each index will be 0 to 1. The lower the index the less pressure or disadvantage exists for a particular country. The indices are:

- PPSI defined as "Population pressure on sanitation index";
- STBI defined as "Sanitation TB index";
- SEI defined as "Sanitation energy index";
- PSTBI defined as "Population, sanitation and TB index"; and
- SETBI defined as "Sanitation, energy and TB index".

II.7 Assessment of data for the SDRA indicators' framework

The consistency, accuracy, and coverage of data largely determine the reliability of the technical tools and measures, and the quality of their outcomes, and their relevance for policy analyses and actions. Therefore, data are national assets on which countries would need to continuously invest to improve their quality and production, as well as promote their use to enhance effective development planning and decision-making.

All statistical offices and related institutions in Africa share some common objectives of data production and dissemination to support national planning and decision-making. However, the market for data in Africa is highly imbalanced due to a wide-range of factors. First, achievement of the objectives of statistical systems requires continuous commitment and government will to add value to the important role of data and statistical analyses in planning and decision-making. Low funding, shortage of skills and several other institutional constraints often derail the implementation of data and statistical activities in many countries across the region.

Second, and on the demand side, the data market in Africa manifests imbalances emanating from internal and external pressures. Without exception, national institutions require various data and for a wide-range of uses, such as policy research, planning, and management. The demand for data is usually exasperated by lack of information on poverty and the outbreak of health hazards such as HIV/AIDS, Malaria and TB. Moreover, it is often augmented by the need to meet international obligations, such as the MDGs. Specifically, the implementation of Agenda 21 and the Johannesburg Plan of Implementation require long-term qualitative and quantitative data, for which many countries lack capacity to produce and analyze. New information is needed on the natural resources, and on environmental degradation that result from development and human activities. These demands for data far exceed the capacity of national statistical systems in many countries in Africa.

Box 2.2
Data challenges in Nigeria

A major problem affecting even the writing of this report and which affects development planning is the data gap that exists. There is, thus, a clear need for strengthening data systems in Nigeria to improve the knowledge bases for planning and programme management. It is crucial to develop and institutionalize the practices of modern socio-economic development planning where appropriate consideration is given to appropriately gender-disaggregated data, result-based management and population variables.

The data collection should be done in each sector and efforts made to link all sectors that collect and use data to avoid duplication and resource wastage. It is also necessary to focus on mechanisms for establishing, maintaining and updating comprehensive and truly national databases linking all sectors and all tiers.

A major issue in the difficulty of formulating policies on environment has been the paucity of real technical data and information on the environment and resources. Major policy formulations have been done piecemeal, often in response to major environmental crisis and disasters. Public debate on environmental and resource management has been greatly limited, partly by the level of development and enlightenment on such issues, and partly by the long absence of democratic governance which normally encourages analytical reasoning and debate.

Source: Osumigun (2005)

However, and in the midst of escalating demand for data in the face of capacity constraints, some African countries, such as Botswana and the Republic of South Africa, have made significant strides on developing data production systems through implementation of system-wide statistical activities. In addition, many countries continue to undertake national housing and population censuses and national sample surveys.

Against this backdrop, it is pertinent to review the outcome of reports on the status of sustainable development in selected countries: Cameroon, Ethiopia, Ghana, Kenya, Niger, Nigeria, Mauritania, Tunisia and Zambia. Prepared by national consultants, the analyses in these reports are based on qualitative and quantitative data obtained from several sources including statistical offices, official government publications, international sources such as the World Bank Africa Database and the UN Statistical Yearbook. Paucity of data is frequently mentioned as a major constraint in the preparation of the reports. For example the report on Nigeria shows how data gaps impaired development planning, and the formulation of national policies in the country (See Box 2.2). Particularly the data problems are manifested in knowledge gaps, and difficulties in the formulation of policies on the environment. The report recommends strengthening of the data system in Nigeria.

Similarly, the report on Zambia demonstrates how data are a serious problem for assessing sustainable development in the country (See Box 2.3). The database is rudimentary and the data are scattered across sectors. Most of the available data are on

the economic and social sectors, and very little data are available on the environment and institutional dimensions. The economic and social data are available with the Central Statistics Office and in the economic reports and documents of the Ministry of Finance and National Planning and the Bank of Zambia. Sometimes indicators from various sources are contradictory, reflecting the need for harmonization and standardization of data. Most of the available data lack periodicity and regularity, therefore limiting the undertaking of meaningful trend analyses.

In addition to the Country Reports the Sustainable Development Division of ECA established a database from international sources specifically for the SDRA. The main purposes of the database are to: (a) Scan the environment for availability and suitability of data and indicators for sustainable development in Africa (b) Provide input into the thematic chapters of the SDRA, and (c) Use the database for sketching an indicator framework based on the thematic approach of the Commission on Sustainable Development (CSD).

With indicators structured around the social, environmental, economic, and institutional dimensions of sustainable development, the database covers 53 countries and all five sub-regions in Africa. All indicators commence in year 1990, the year adopted by the international community as reference for monitoring progress toward the achievement of internationally agreed development goals. The sources and list of indicators are shown in Table 3. The international agencies collect indicators that are relevant for their activities and areas of specialization. For analyses of the state of the economy the World Bank and the IMF usually provide reliable indicators. The UN Population Division frequently produces population estimates and projections, while the FAO compiles indicators on agriculture and water. However, indicators frequently produced by these international sources are often obtained from the African countries: usually they are not up-to-date, and in many instances, are different from the indicators officially released and used by the government.

As for economic indicators, a review of the international sources of data against the CSD thematic framework reveals the strengths and weaknesses of indicators obtained from Africa. Indicators, such as GDP per capita, GDP growth, debt, domestic saving, foreign direct investment, and ODA, are often used to measure the structure of African economies. Some of the indicators of the consumption and production patterns, such as generation and recycling of waste, are not available for the great majority of the countries.

On the social side, good quality time series data for 1990 to 2004 are limited to a few indicators such as population growth rate, life expectancy at birth and infant mortality rate. Other social indicators, such as literacy and enrollment rates, unemployment rate, poverty indicators, maternal mortality rate, per cent of the population with access to safe

Box 2.3
Data challenges in Zambia

the information gap is also a serious constraint to sustainable development in Zambia. Information data production and processing is important for policy research as well as for establishing institutions and building national capacities for sustainable strategic planning and development.

Data on environmental indicators are not available although there is widespread evidence of environmental problems such as air and water pollution, deforestation, depletion of wildlife and fish and soil degradation. These problems have led to the prediction that Zambia will soon face an environmental crisis unless the trends are drastically reversed.

The problem of data on environmental indicators has been attributed to the lack of capacities in the relevant institutions that are supposed to undertake inventories and surveys. The last national wide forest inventory was done in 1969. The Forestry Department currently has no capacity to carry out a nation-wide inventory. As for greenhouse gases inventory, there has been only one carried out in 1994 more than 10 years ago.

Source: Aongola (2005)

drinking water and adequate sewage disposal, are not available for most of the countries for the period 1990 to 2004. These indicators might be available at the countries, but extra efforts are needed to obtain them.

Production and dissemination of environment indicators is still at an early stage in Africa. Most of the countries need to build capacities for environmental data production. With these caveats, the problem of the availability of accurate and adequate environmental indicators is due to several reasons. First is the complexity of the technical definition of some of the indicators. Second, even if there is an agreed and clear definition, countries do not apply them strictly when gathering data. Third, for some indicators such as land, for example, FAO undertakes national censuses of agricultural land use every 10 years; for other years, data are generally estimated. Most of the national data are also derived in the same way, which affects their accuracy. Finally, lack of adequate financial and human resources hinders the ability of countries to collect these data.

However, availability could be expressed either in comparison with other environmental indicators or on the type of the indicator itself. For instance, in the energy sector, data are almost non-existent for renewable energy such as geothermal, solar, wind, wood and waste electricity generation, except for hydroelectricity. Whereas, the indicators for the water sector are comparatively better. Among green house gases, data for carbon

dioxide emissions are relatively available than the rest of the gases like nitrous oxides, methane, etc. The same applies to land. Although statistics are available for indicators such as 'ratio of arable land to total land area', 'total forest area' etc., information on rate of deforestation or reforestation is scarce. In the area of biodiversity, the indicator 'protected area as a per cent of total area' has sufficient data in comparison with other indicators. However, the criteria for classification of 'protected area' may vary from country to country resulting in discrepancies of data accuracy.

Table 2.1 ECA Frameworks for Composite Indices

COMPOSITE INDICES	OBJECTIVES AND STRUCTURE
Overall Sustainability Index (OSI)	Tracks the progress of African countries towards sustainable development. To study the state of economic, institutional and environmental sustainability in the countries and in the region, and the main obstacles to achieving sustainable development. . The OSI comprises three Sub-indices: - Economic sustainability index (based on 17 indicators) Environmental sustainability index (based on 4 indicators) Institutional sustainability index (based on 6 indicators)
Economic Sustainability Index (ESI) and Sustained Growth Index (SGI)	Measures the economic performance of countries over a long period of time, and to assess a country's medium-to long term potential to produce and maintain good economic performance. The ESI comprises six sub-indices: - Human capital development (11 indicators) Structural diversification (4 indicators) External dependency (5 Indicators) Transaction costs (8 Indicators) Macroeconomic sustainability indicators (6 indicators) Sustained Growth Index (SGI) The SGI assesses three aspects of per capita GDP growth: level, regularity and volatility of growth rates.
Economic Policy Stance Index (EPSI)	Measures the performance of countries in light of the economic policies they have pursued. The EPSI comprises two sub-indices and a ratio: - Fiscal policy (3 indicators) Monetary policy (3 indicators) Exchange rate policy (ratio of parallel to official exchange rate).
Expanded Economic Policy Stance Index (EEPSI)	The EEPSI is same as EPSI supplemented with: - Sustainable growth and structural transformation (9 indicators) Market and institutional development (4 indicators) Macroeconomic policies (3 indicators).
Regional Integration Index	Tracks the progress of regional economic communities, member states and Africa as a whole towards regional integration and cooperation. To facilitate comparisons of outcomes and performance based on common denominators. To explain reasons for progress on the stated goals and objectives of the RECs. To compare efforts and results among member states and RECs. Sub-indices on regional integration are estimated at four levels: sector, country, regional economic community, and continent.

COMPOSITE INDICICES	OBJECTIVES AND STRUCTURE
Trade Competitiveness Index (TCI)	<p>Measures and compares the trade competitiveness of African countries, and identify the specific areas where policy measures and institutional changes may be necessary. The TCI consists of three sub-indices each capturing different dimensions of trade competitiveness: -</p> <ul style="list-style-type: none"> Trade-enabling Environment Index (TEI) (11 indicators) Productive Resources Index (PRI) (10 indicators) Infrastructure Index (II) (10 indicators)
Africa Governance Indicators (AGI)	<p>Measures the state of governance in Africa as reflected by political, economic and social affairs in each country. It consist of 83 indicators clustered in 23 groups under: -</p> <ul style="list-style-type: none"> Political representation, political system, power distribution, political party freedom and security, electoral process independence in credibility. Institutional effectiveness, legislature's effectiveness, and judiciary's effectiveness and accountability. Executive's effectiveness, effectiveness in state structures, civil service transparency and accountability, government services efficiency and decentralization of structures. Human rights and rule of law, human rights, respect of rule of law, law enforcement organs. Economic management, investment policies attractiveness, pro-investment tax policies, tax system efficiency and corruption. Control of corruption
The African Gender and Development Index AGDI	<p>Measures the gap in the status of women and men in Africa, and assesses progress made by African governments in implementing the gender policies they have developed. It also presents the level of inequality that exists between women and men through the gaps in various spheres review the underlying gender relations, and helps governments improve their performance on gender equality and equity. The AGDI consists of two parts: -</p> <ul style="list-style-type: none"> The Gender Status Index (GSI), which covers the quantitatively measurable aspects of gender: in Social power (13 indicators) Economic power (18 indicators) and Political power (11 indicators). The African Women Progress Scoreboard (AWPS) composed of women's rights, social power, economic power, and political power.

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ENDNOTES

ⁱ For more details see United Nations Division for Sustainable Development, UNCED Agenda 21, Brazil 3-14 June 1992.

ⁱⁱ The seventh goal is: "ensure environmental sustainability" to be achieved through integrating the principles of sustainable development into country programs and reverse the loss of environmental resources, halving by 2015 the proportion of people without sustainable access to safe drinking water, and to have achieved, by 2020, a significant improvement in the lives of at least 100 million slum dwellers. Seven indicators are listed under these targets, to be used for measuring progress towards sustainability.

ⁱⁱⁱ United Nations Development Group. 2003. *Indicators for Monitoring the Millennium Development Goals*. United Nations, New York. This handbook provides guidance on the definitions, concepts, and sources of data for each of the indicators.

^{iv} IISD Compendium of Sustainable Development Indicator Initiatives.

<http://www.iisd.org/measure/compendium/>

^v The International Institute for Sustainable Development compiles a compendium of more than 660 sustainable development initiatives.

^{vi} For example, State-Pressure-Response Framework, Driving force-State-Response framework, the Dashboard, etc.

^{vii} The national testing process began in 1996 and ended in 1999. African countries that took part in the voluntary testing were Ghana, Kenya, South Africa, Tunisia and Morocco.

^{viii} United Nations Commission on Sustainable Development, *Indicators of Sustainable Development Guidelines and Methodologies*. Also see United Nations Department of Economic and Social Affairs, *Report: Fifth Expert Group Meeting on Indicators of Sustainable Development*, Division for Sustainable Development, New York, 7-8 April 1999. United Nations Department of Economic and Social Affairs, *UN CSD Theme Framework and Indicators of Sustainability*, Final Draft, Price Waterhouse Coopers for Division for Sustainable Development, November 18, 1999. United Nations Department of Economic and Social Affairs, *Fifth International Workshop on CSD Indicators of Sustainable Development (2000)*. United Nations Department of Economic and Social Affairs, *Report of the Consultative Group to Identify Themes and Core Indicators of Sustainable Development*, Division for Sustainable Development, New York, 6-9 March, 2000. United Nations Department of Economic and Social Affairs, *UN CSD Theme Framework and Indicators of Sustainability*.

^{ix} For more details see Bossel, H. 1999. *Indicators for Sustainable Development: Theory, Method, Applications*. International Institute for Sustainable Development, Winnipeg, Canada.

^x Principle 1 calls for basing the assessment on an established vision for sustainable development including clear goals. Principles 2 through 4 deal with holistic perspective, essential elements and adequate scope of the assessment. These should include review of the social, economic and ecological functioning of the whole system, the negative and positive consequences of human activities, equity and disparities at all levels and across present and future generations, considering the ecological, social and economic conditions, and the contribution non-market activities to social well-being, adoption of a time horizon long enough to capture all timing scales of the system. Principles 5 to 7 emphasize practical focus, openness and effective communication. They call for organizing a framework for indicators, limiting their number to a set of carefully selected key issues, standardizing their measurement, making explicit assumptions, judgments and

interpretations, and selecting indicators that are stimulating to decision-making. Principle 8 focuses on representation and broad participation in the assessment process, while principles 9 and 10 call for building institutional capacity to ensure continuity of the process. Hardi, P & T. Zdan. 1997. *Assessing Sustainable Development: Principles and Practice*. International Institute for Sustainable Development, Winnipeg, Canada.

^{xi} Economic Commission for Africa, 2001. *Booklet on Population, Environment, development and Agriculture (PEDA) Model*. PEDA Advocacy Booklet: The Nexus. Also see PEDA Advocacy Booklet: projections on Aging for Botswana, Projections for Ethiopia, Case Study: Cameroon.

Chapter III

ASSESSING THE STATUS OF SUSTAINABLE DEVELOPMENT IN AFRICA

III.1 Introduction

Africa is at the crossroads of sustainable development as it searches for policy mixes, programmes, strategies and appropriate institutional mechanisms to improve the quality of life of people. Progress towards achieving sustainable development will ultimately lead to the attainment of the international and regional development goals and targets. Therefore it is imperative to continuously assess the progress of Africa on the social, economic and environmental dimensions of sustainable development. Building on the issues and concepts analyzed in chapters 1 and 2, this chapter assesses the status of sustainable development in Africa. The analyses focus on social sustainability, economic sustainability, and environmental sustainability. The chapter covers institutional sustainability as a streamlined area on capacity building for achieving sustainable development in Africa. Moreover, selected sustainable development indicators are used for the analysis of the linkages of these dimensions. The chapter concludes with recommendations, policy implications and the way forward.

III.2 Social sustainability

Social sustainability entails continuous improvement in social well-being and quality of life. Therefore, this section focuses on social and human development indicators. The indicators examined include infant and child mortality, life expectancy at birth, maternal mortality, HIV prevalence rate, malaria prevalence rate, TB prevalence rate, population growth rate, total fertility rate, and rate of urbanization. Under social indicators, the following are examined - the percentage of a population living below the poverty line, adult literacy rate, primary and secondary school enrolments, percentage of population with access to improved sanitation, and percentage of population with access to safe water. Gender is streamlined throughout the analysis where availability of data permits. The section is divided into three subsections; namely, human factors; social environment; and disease burden.

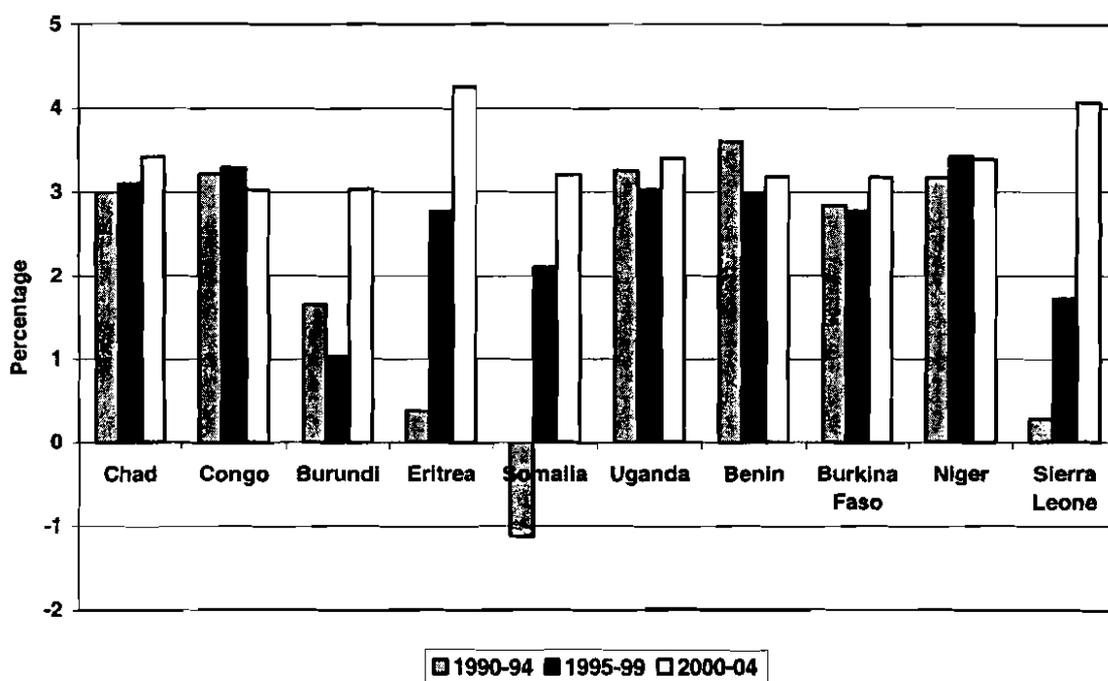
1. *Human factors*

Rapid population growth continues to be recognized as creating a demographic poverty trap in the poorest countries, reflecting the impact of poverty on the ability to make investments, as well as the treadmill effect of the ever-increasing levels of expenditure required for the provision of basic social services (ECA 2005b). Human beings are both

the creators and consumers of wealth. Therefore, it should always be put at the center of any discussion on sustainable development.

In 2000-2004, the sub-regions with the highest population growth rates (above 2 per cent per annum) were West Africa, East Africa and Central Africa. Countries like Chad, Congo, Burundi, Eritrea, Somalia, Uganda, Benin, Burkina Faso, Niger and Sierra Leone recorded growth rates of at least 3 per cent (see Figure 3.1). For countries with the highest population growth rates in the continent, population change is placing a high burden on their effort to invest into meeting the social, economic and health needs of the people. This negatively affects the countries' efforts to meet the targets of the international agreed development goals.

Figure 3.1: Trends in countries with highest population growth rates, 2000-04



Urbanization adds an additional challenge in the context of rapid population growth. Urban population growth rates in Africa are among the fastest in the world. Countries recording urban population growth rates of 5 or more per cent in 2000-2004 included Chad, Burundi, Eritrea, Kenya, Rwanda, Mauritania, Angola, Mozambique, Burkina Faso, Guinea Bissau, Mali, Niger, and Sierra Leone. The highest urban growth rates were recorded in Rwanda (11.8 per cent), Burundi (6.4 per cent) and Eritrea (6.3 per cent). However, urban population growth rates have gone down, while the urbanization rates defined as the percentage urban of the total population, have increased.

Rapid urbanization constrains public and private efforts to improve the socio-economic conditions of the people. For example, a review of initiatives undertaken by African

countries to meet the target of improving the quality of life of 100 million slum dwellers made by ECA (2005a) indicates that, with the exception of a few countries such as South Africa, efforts made to improve the quality of life of urban dwellers have not had much impact on various aspects of quality of life especially housing provision, slum upgrading and poverty reduction. This suggests that concerted effort is required in this area in the future. Therefore, the NEPAD Cities Programme is a timely initiative¹, which, if successfully implemented, will contribute to the achievement of the MDGs in the future (ECA, 2005a).

Total fertility rates provide a measure that can be utilized to assess how countries have formulated and implemented policies, programmes and strategies aimed at managing population change in such a way that it is compatible with efforts being made to bring about meaningful development. Available information suggests that most countries in Central, East and West Africa had total fertility rates of 4 or more children per woman in 2000-04. Countries such as Chad, Congo, Burundi, the Democratic Republic of Congo, Somalia, Uganda, Angola, Malawi, Burkina Faso, Guinea-Bissau, Liberia, Mali, Niger and Sierra Leone had total fertility rates above 6 children per woman.

Despite these high levels of fertility, it can be noted that most countries experienced a fertility transition. Countries that achieved rates lower than 4 children per woman, were on the front line of this transition and included: Algeria, Egypt, Libya, Morocco, Tunisia, Botswana, Lesotho, Mauritius Namibia, South Africa, Swaziland, Zimbabwe and Cape Verde.

The ICPD+10 Global Survey report (UNFPA, 2004) found that the shifts and changes in policies and/or programmes occurred within the demographic, social, economic and health contexts in specific countries. Just as contextual factors in the 1990s influenced the specifics of the 20-year Programme of Action of the International Conference on Population and Development (ICPD-PoA) for 1995-2015, the demographic and other changes during 1995-2003 had, to an extent, a bearing on the progress achieved by 2003. Likewise, the expected future trends in demographic and other situations can be expected to influence the pace and extent of needed changes in policies and programmes during the decade of 2005-2015, to help realize by 2015 the goals of the ICPD-PoA and those of related international frameworks such as the MDGs, JPOI, and NEPAD. The results on population change given so far, suggest a great deal remains to be done to implement policies and programmes that will bring population change in harmony with efforts to sustain social and economic development with appropriate conservation of the environment.

It is, therefore, encouraging that some countries in the region have made concerted efforts to adopt and implement policies, programmes and strategies to integrate population in all facets of sustainable development (UNFPA, 2004). Countries such as Morocco, Tunisia and South Africa are trying their best to deal with population issues. Hence, it is not surprising that these countries are also among countries in the region leading the transition from high to lower fertility rates (and implicitly lower population

growth rates). But overall, this effort is still lower in Africa than in other developing regions of the world such as Asia and Latin America; suggesting that a great deal remains to be done in the population sector to achieve the goals set for 2015.

Moreover, countries have also made concerted efforts to adopt and implement population and reproductive health policies. But the expected outcomes of such policies and programmes are often largely thwarted by HIV/AIDS, the persistence and resurgence of TB and malaria, as well as deepening poverty.

Infant and child mortality provide some of the best indicators of human development although the latter would reflect the effect of social and economic conditions on survival during early childhood, including the effect of risks of malnutrition and under-nutrition during the weaning period, as well as infectious and communicable diseases. Lower infant mortality rates reflect improved social, economic and public health conditions. For Africa, it is clear that the sub-regions with better social and economic conditions, free of conflict and drought conditions, and relatively free of the scourges of HIV, malaria and TB, have relatively lower infant mortality rates than areas that are badly affected by these factors. In 1990-94, countries with relatively high infant mortality rates (at least 150 per 1000 live births) were Angola, Liberia, Niger and Sierra Leone. These were either conflict-affected countries or drought-prone countries, two factors that greatly exacerbate poor social and economic conditions. And in 2000-04, Niger and Sierra Leone continued to exhibit the worst mortality conditions in Africa. Despite the overwhelming burden of disease on the continent; some countries witnessed declines in infant mortality rates as a result of improved social and economic conditions.

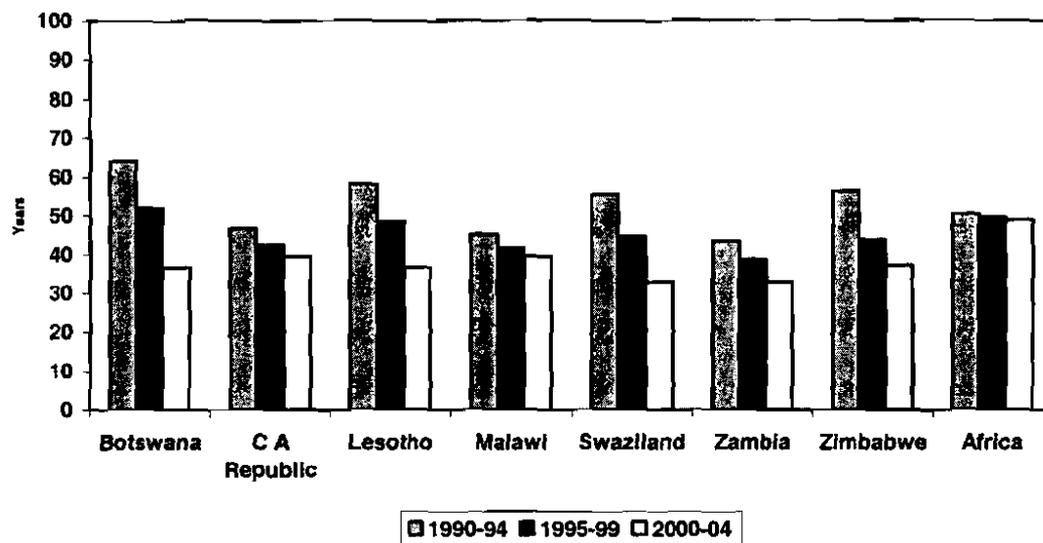
Countries with under-five mortality rates higher than 200 per 1000 live births in 1995-99, included Chad, the Democratic Republic of Congo, Somalia, Burundi, Angola, Malawi Mozambique, Burkina Faso, Guinea Bissau, Liberia, Mali, Niger, Nigeria and Sierra Leone. By 2000-04, Burundi, Malawi, Mozambique and Burkina Faso recorded under-5 mortality rates below 200 per 1000 live births.

Life expectancy has stagnated or gone down in many African countries. Countries with the lowest life expectancy values in 1990-94 were Rwanda, Somalia, Angola, and Sierra Leone. Again, these were all countries in conflict situations. In 2000-2004, countries in the same category were the Central African Republic, Botswana, Lesotho, Malawi, Swaziland, Zambia and Zimbabwe. Figure 3.2 shows the trends in life expectancy in countries with the lowest levels in 2000-2004, and this reflects a mixture of worsening social and economic conditions and the grave impacts of HIV/AIDS and related diseases, especially in Southern Africa.

In all situations, regardless of the level of survival, females enjoyed higher life expectancy than males (a normal biological dividend for females, but which may sometimes be dramatically reduced or even reversed by adverse social, economic, environmental and cultural factors). But overall, the evidence shows that Africa is

hardly making progress towards achieving the internationally agreed targets for moving towards sustained quality of life, and, hence, sustainable development.

Figure 3.2: Trends in life expectancy in countries with the lowest levels in 2000-04

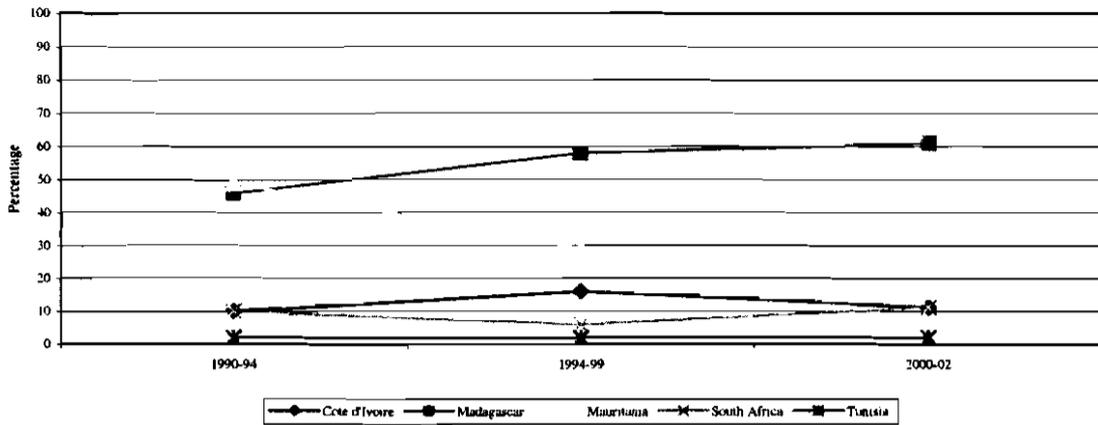


Maternal mortality ratios give us a general idea about the state of maternal health and the health of women in general, in a particular community. This is so, despite the problems related to gathering maternal mortality dataⁱⁱ. Available information indicates that the number of countries with maternal mortality rates below 500 per 100,000 live births changed from 11 in 1995 to 13 in 2000. The countries with such rates in 2000 were Gabon, Comoros, Algeria, Egypt, Libya, Morocco and Tunisia, Botswana, Mauritius, Namibia, South Africa and Swaziland, and Cape Verde. But this few number of countries suggests that concerted effort is required if the MDG on maternal mortality if a reduction by three-quarters is to be achieved in the region by 2015.

2. *Social environment*

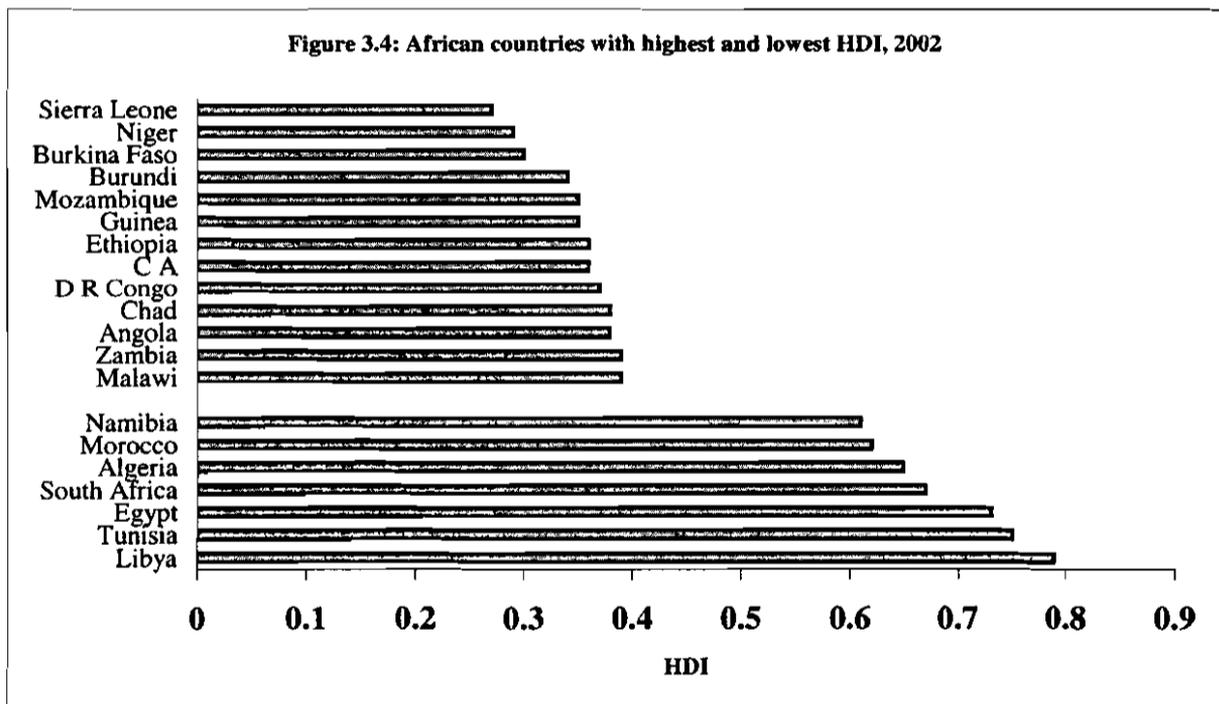
Poverty has remained a constant threat to the welfare of the African people. Available evidence reflects that for selected countries poverty levels have, since the early 1990s, stagnated at higher levels or, in some cases, marginally declined compared to the situation in 1990-94 (Figure 3.3). The data available are, however, inadequate and this calls for other poverty indicators to lay the backdrop for a more detailed discussion.

Figure 3.3: Population below \$1 per day consumption for selected countries



Information from UNDP (2005) shows that in 2002 the majority of the least developed nations pervaded by poverty were from Africa. The Human Development Index (HDI) and the Human Poverty Index (HPI) generated by the organization suggested that within Africa most sub-regions contained areas of extreme poverty. These pockets included countries like the Central African Republic, Chad, and Democratic Republic of the Congo, Ethiopia, Burundi, Angola, Malawi, Mozambique, Zambia, Burkina Faso, Guinea Bissau, Mali, Niger and Sierra Leone. Countries that did well were Gabon, Algeria, Egypt, Libya, Morocco and Tunisia, Namibia and South Africa (Figure 3.4).

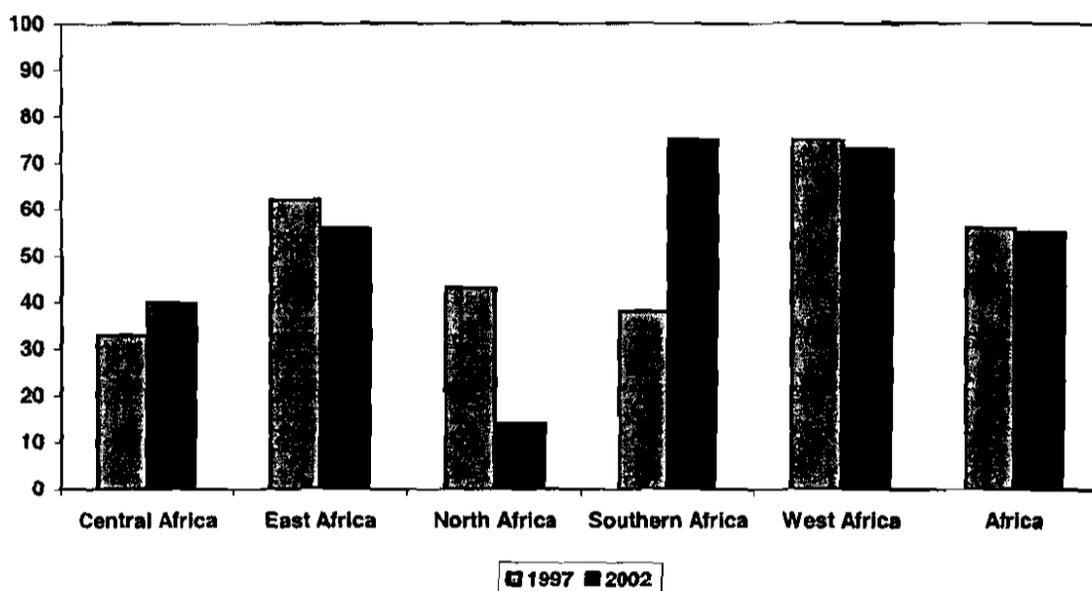
Figure 3.4: African countries with highest and lowest HDI, 2002



The percentage of countries with a human poverty index of 40 and more confirm that Africa has stagnated or experienced a very marginal reduction in poverty (Figure 3.5). While Northern Africa experienced substantial reductions in poverty, the reductions were marginal in Eastern Africa and Western Africa, and the situation changed for the worse in Central and Southern Africa, especially in the latter sub-region.

For the period 1995 to 2003, the percentage of underweight childrenⁱⁱⁱ was higher (over 30 per cent) in Eastern and Western Africa than in other sub-regions (UNICEF 2005). The affected countries in these regions include the Democratic Republic of Congo, Eritrea, Ethiopia, Madagascar, Burundi, Mauritania, Burkina Faso, Mali and Niger. These are countries with high poverty levels too. Additional information on stunting shows that countries with 30 per cent or more children stunted were high in Eastern Africa, Southern Africa, Western Africa and Central Africa. Northern Africa was better off, with only 20 per cent of the countries reporting such a high percentage of stunting.

Figure 3.5: Percentage of countries with HPI of 40 percent and above, Africa and sub-regions



It is, therefore, clear from available evidence that the majority of countries in the region will find it difficult to meet the MDG on halving, between 1990 and 2015, the proportion of people whose income is less than one dollar per day. An example from Kenya presented in Box 3.1 confirms that special and urgent strategies are needed to deal with the scourge of poverty and hunger. Collaborating information from the ECA's analysis of progress and challenges found in Africa in pursuit of the MDGs extends the situation in Kenya to a wide range of countries in the region (Box 3.2). The ECA (2005a) concluded that with regard to the achievement of the MDGs within Africa, it is only the

North African countries (Algeria, Egypt, Libya, Morocco and Tunisia), and eight countries in SSA (Botswana, Burkina Faso, Cameroon, Ghana, Lesotho, Mauritius, South Africa and Uganda) that are likely to meet the poverty reduction target.

Box 3.1

Poverty and sustainable development in Kenya

Kenya's poverty incidence rose from 52 per cent in 1982 to an estimated 56 per cent in 2004. During the same period, rural absolute poverty had increased from about 48 per cent to about 60 per cent with urban informal settlements and rural areas being more adversely affected. More seriously, the gap between the rich and the poor increased with poverty levels standing at approximately 56 per cent of the population by 2003, up from 52% in 1994. The interaction of the poor and the environment has resulted in undesirable consequences which contribute to the worsening poverty situation in Kenya. As a result of poverty, the poor engage in activities such as poor farming practices, overgrazing, burning of trees, manure sharing and poor waste disposal, to mention but a few.

The Gini coefficient increased from 0.40 in 1982 to 0.49 in 1992. The Gini coefficient for 1992 for urban areas was about 0.45. The distribution of income has continued to worsen. For instance, in 1982 in the rural areas, the bottom 20% of the population received 4.9 per cent of the income while the top 20 per cent received 56.9 per cent. By 1992, the distribution was 3.5 per cent and 60.2 per cent respectively. The poorest 20 per cent were even worse off in the urban areas in 1992 where the lowest 20 per cent received 2.9 per cent and top 20 per cent received 58.8 per cent.

Source: Biodiversity Conservation and Information Network (2005)

Box 3.2

Poverty and hunger in Africa

Although North Africa as a whole and a small number of SSA economies have the potential to reach the sub-goal of reducing extreme poverty by half by 2015, the slow pace of progress in the majority of countries indicates that as a continent, Africa is unlikely to reach this goal, given current trends. The number of the poor in Africa has actually risen since the 1990s by over 90 million, while the average income of the poor has declined, indicating worsening income distribution within the countries. On the whole, the proportion of people living with insufficient food has declined by only 3 percentage points since 1990 while hunger still prevails. This is especially true for rural Africa.

Source: ECA (2005a)

Furthermore, African countries have undertaken numerous poverty reduction initiatives with support from development partners and civil society (ECA 2005a). For example, 31 countries are involved in the PRSP process (26 with completed PRSP documents, and four with Interim PRSPs (IPRSPs)). The PRSP process has, however, been beset with lack of adequate participation of stakeholders, and neglecting the mainstreaming of key sectors and issues such as environment, gender and children. In addition, the partnership arrangements for financing the process are conservative and unfriendly to the situation of developing countries. All these are important components of the priority issues that should be tackled to achieve sustainable development in Africa.

Unemployment is related to the poverty situation in the region since increasing levels of unemployment and underemployment exacerbate poverty. A consideration of the unemployment trends for selected countries confirms that despite the fluctuations, unemployment has risen since the 1990s and remained high over the period to 2000 (Figure 3.6). Moreover, available statistics since 2000 suggest that the situation is not improving. A recent ECA survey of economic and social conditions in Africa for the period 2004-2005 reveals that economic growth has not translated into employment creation or poverty reduction. Yet employment, as a source of income for the poor, would be an important factor in poverty reduction.

Available unemployment data also shows that females are generally disproportionately worse off than men in most countries (Figure 3.7). The unemployment rates have, however, remained at lower levels in a few countries such as Egypt and Mauritius. A major factor affecting employment opportunities in most countries is the young age structure and high rate of population growth, which is primarily driven by high fertility levels. High levels of fertility add to increasing numbers of the youth entering the working age in economies that have not expanded at the same pace as population. This does not only make it difficult for such economies to absorb the youth looking for work, but also difficult to absorb the old workers who are unemployed or underemployed.

Figure 3.6: Trends in unemployment rates for selected countries, both sexes

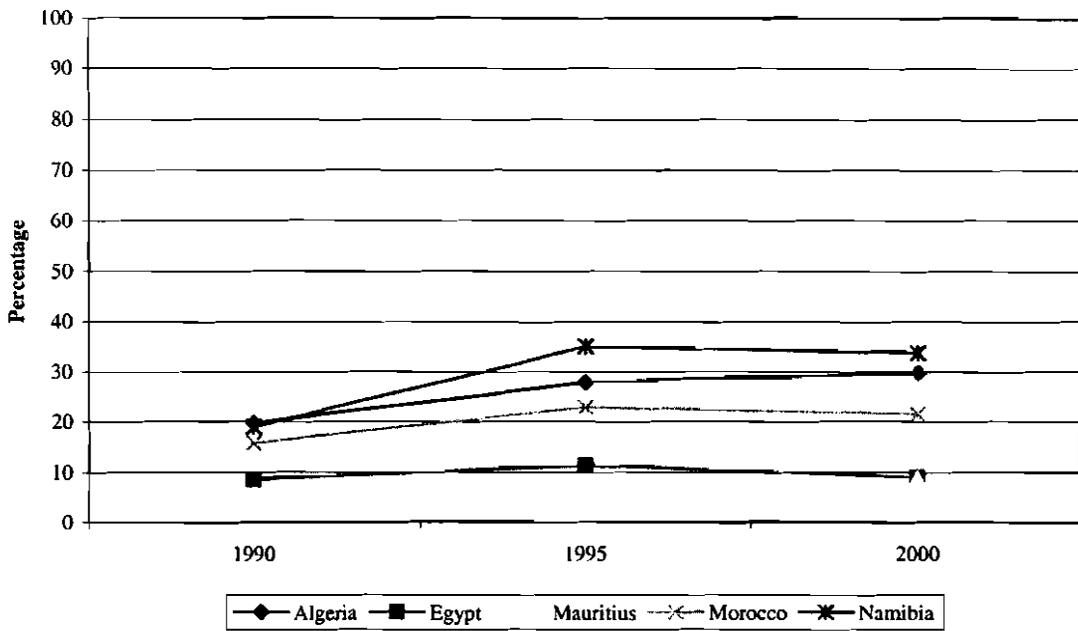
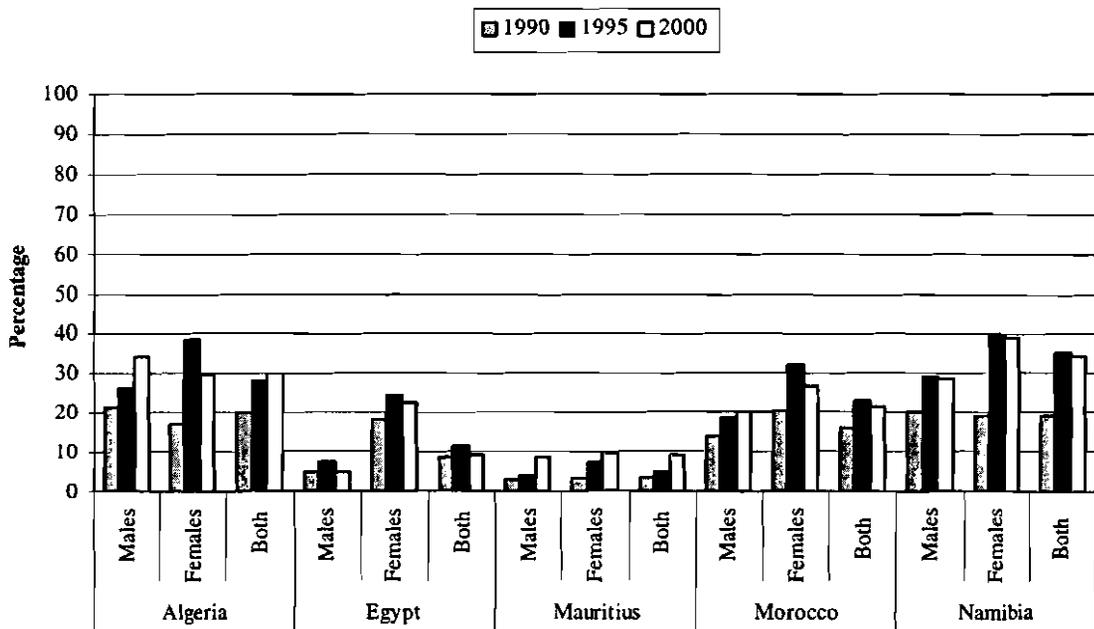


Figure 3.7: Trends in unemployment rates for selected countries by sex



Illiteracy rates would normally reflect the lack of capacity to acquire and utilize information and new knowledge through reading and writing. This keeps people in a trap of ignorance and lack of capacity to acquire and utilize new knowledge. Within the

continent, West Africa had the highest proportion of countries with illiteracy rates of 60 per cent and above in 1990 (69 per cent). Over the period 1990 to 2005, however, the proportion of countries with illiteracy rates of 40 per cent and above decreased from 70 per cent to 42 per cent, reflecting the concerted effort on the part of African nations to eliminate illiteracy. The overall good performers in 2005 were Congo, Equatorial Guinea, Kenya, Libya, Botswana, Lesotho, Mauritius, Namibia, Swaziland, Zambia, Zimbabwe, Cape Verde, Ghana, Nigeria and Togo.

Reductions in illiteracy mask some gender gaps. While the proportion of countries with illiteracy rates of 40 per cent and over for males changed from 45 per cent in 1990 to 24 per cent in 2005, the change was from 80 per cent to 50 per cent for females within the same period. This suggests a narrowing gender gap. The countries with the largest gender gap (more than 20 per cent) were Malawi, Liberia, Togo, Benin, Malawi, Morocco, Central African Republic, Guinea Bissau, Eritrea, Burkina Faso and the Democratic Republic of Congo. In contrast, Lesotho, Botswana, South Africa, Namibia, Swaziland, Zimbabwe, Ghana and Gambia had gender differences of less than 10 per cent. In fact, illiteracy rates in Lesotho and Botswana were higher for males than for females.

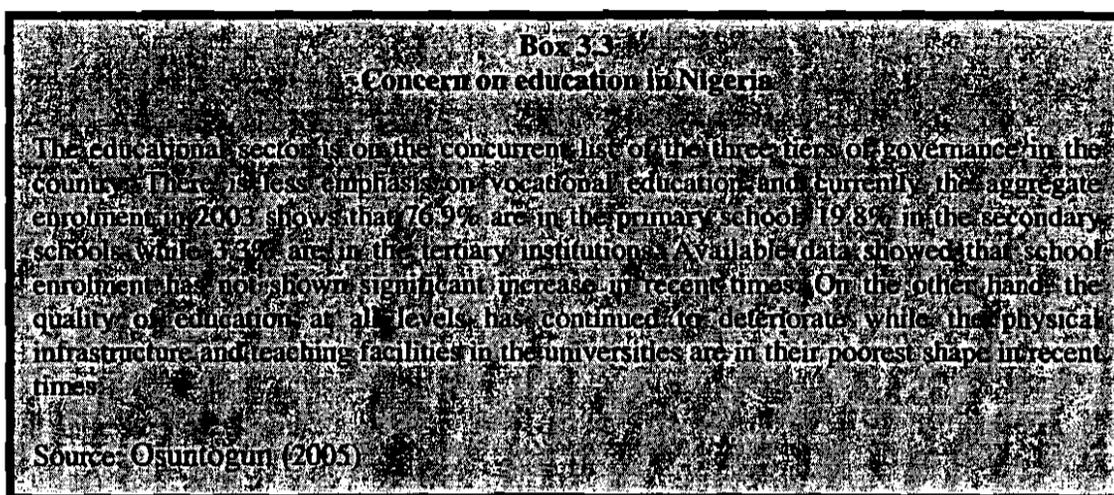
Overall, however, a great deal remains to be done if the goal of promoting gender equality and empowerment of women is to be achieved by 2015. Removing gaps in illiteracy that are unfavorable to women, would be one supportive mechanism to achieving universal primary education by 2015 and eliminating gender disparities at all levels.

Net primary enrolment ratios changed very little for both sexes, for Africa as a whole. For example, the enrolment ratios of 40 per cent or more for both sexes were registered for 21 per cent of the countries in both 1998/1999 and 2002/2003. The gender gap was still relatively the same in 2002/2003 as it was in 1998/1999 with more males than females getting more access to primary education. The differences between the net enrolment ratios for males and females indicated that there was a gender gap of 10 per cent or more in Chad, Togo, Guinea, Niger, Nigeria, and Cote d'Ivoire, Burkina Faso, Burundi and Ethiopia in 2002/03 in favor of males. On the other hand, Botswana, Lesotho, Mauritius, Namibia, South Africa, Swaziland, Kenya, Madagascar, Rwanda and Zimbabwe, recorded parity or differences in enrolment ratios in favor of females. For Africa as a whole, the gender gap remained at relatively the same level of seven per cent over the period.

Gross secondary school enrolment ratios show that there was a slight increase in enrolment ratios for Africa as a whole and for both sexes from 34 per cent in 1998/1999 to 37 per cent in 2002/03. The gender gap was 10 per cent or more in Benin, Chad, Gambia and Eritrea in favor of males. In contrast, the island states of Cape Verde, Mauritius and Seychelles, as well as Libya, Tunisia, Botswana, Lesotho, Namibia, South Africa and Swaziland had parity or positive differences in favor of females (as high as 7 per cent in Namibia and South Africa). Generally, however, changes in the gender gap

were marginal for some countries with reversals for others over the period. However, Africa, as a whole, registered an increase in the gap from 4 to 6 per cent.

Overall, therefore, it appears that there was a slight deterioration in the net primary enrolment ratios and a stagnation in the secondary school enrolment ratios from 1998/99 to 2002/03, putting in doubt Africa's effort to achieve the MDG on universal primary education and parity in secondary enrolments by 2015. Box 3.3 illustrates concern on education with an example from Nigeria.



The proportion of the population with access to improved sanitation indicates that in 2002, 15 per cent of African countries had 60 per cent or more of their population with access to improved sanitation. The star countries were Seychelles, Algeria, Egypt, Libya, Morocco, Tunisia, Mauritius and South Africa. At the other extreme, less than 30 per cent of the population had access to improved sanitation in the Central African Republic, Chad, Congo, Sao Tome and Principe, the Democratic Republic of Congo, Eritrea, Ethiopia, Somalia, the Comoros, Mozambique, Burkina Faso, Guinea, Liberia and Niger.

For countries with rural-urban information available, it was clearly reflected that access to improved sanitation is biased towards urban areas. While 45 per cent of the reporting countries provided access to improved sanitation to over 60 per cent of their urban populations, only 9 per cent of the reporting countries did so to similar proportions in the rural areas. Conversely, while only 6 per cent of reporting countries provided access to improved sanitation to less than 30 per cent of their populations in urban areas, 49 per cent did so for their rural populations.

No data on trends in improved sanitation were available, and this made it difficult to determine Africa's progress towards achieving the MDG on sanitation. But this could be implicitly shown by progress made by African countries to provide safe drinking water

to their populations since there is a direct link between safe drinking water and sanitation.

The proportion of population with access to safe water indicates that there was improvement between 1990 and 2000; with 44 per cent of countries providing improved access to safe water in 1990 compared to 56 per cent of countries doing so in 2000. Nevertheless, the majority of countries in SSA are poor providers of safe drinking water and improved sanitation; a fact that is collaborated by the information in Box 3.4.

Box 3.4
State of provision of safe water in Sub-Saharan Africa

In 2002, SSA had the second lowest drinking water coverage rates of 58 per cent (only surpassing Oceania which had 52 per cent coverage) while North Africa had 99 per cent coverage. In absolute numbers, however, of the 1.1 billion without access to improved drinking water sources, 76 per cent lived in Sub-Saharan Africa (surpassing Asia with 61 per cent) while this figure stood at 14 per cent in North Africa. In 2002, sanitation coverage was lowest in Sub-Saharan Africa (36 per cent) and in absolute numbers, 87 per cent of people without access to improved sanitation lived in sub-Saharan Africa. During the same period, sanitation coverage in North Africa was 73 per cent.

Source: ECA (2005a), WHO/UNICEF JMP (2004), UN Millennium Project (2005).

Available rural-urban information suggests, however, that access to safe drinking water was higher in urban than rural areas. For example, the rural proportions were 40 per cent and 38 per cent in 1990 and 2000, respectively, as opposed to 91 per cent and 88 per cent respectively for urban areas for countries providing access to safe water to 60 per cent or more of their populations. Fast urban growth, however, is likely to threaten adequate provision of safe water to urban dwellers as slum areas expand due to rural-urban migration and overburdened public budgets.

3. Disease burden

In 2005, HIV prevalence rates among the 15-49 age group exceeded 20 per cent in Botswana, Lesotho, Namibia, South Africa, Swaziland, and Zimbabwe. Consequently, the reversal in life expectancy at birth observed in Southern Africa is partly a result of the high prevalence rates of HIV.

Malaria prevalence rates indicate that in 2000-2004, out of the 28 countries with data in Africa, 7 recorded the highest rates of 15,000 or more per 100,000. These were Burundi, Botswana, Malawi, Mozambique, Zambia, Ghana, and Guinea. Overall, countries with high malaria prevalence rates increased between 1995-99 and 2000-04. Consequently, Africa's march towards halting and beginning to reverse the incidence of malaria and

other major diseases is hanging in the balance and puts in doubt the possibility of achieving the health MDG.

TB prevalence rates were high in Central, West, Southern and East Africa where rates of 200 per 100,000 or more were recorded in 2003. In the case of North Africa, 57 per cent of the countries in the region recorded the lowest prevalence rates (less than 100 per 100,000). Countries in the region with the lowest recorded rates were: Seychelles, Algeria, Egypt, Libya, and Tunisia while countries with the highest rates were Djibouti, Kenya, Rwanda, Somalia, Uganda, Mauritania, Swaziland, Cote d'Ivoire, Sierra Leone and Togo.

The trends over the period 2000 to 2003 indicate that for Africa as a whole, prevalence rates of 200 per 100,000 and above were recorded in 83 per cent of the countries in 2000. This suggests that TB continues to constitute a major disease burden for the African population.

The analysis indicates that:

- Whereas in 1990-94, 33 per cent of the countries with recorded rates grew at 3 per cent or more, by 2000-04, the proportion had declined to 19 per cent.
- African urban growth rates, though high by world standards, shall experience moderate declines. While in 1990-94, 61 per cent of the countries in the region registered urban population growth rates of 3 per cent and more, countries registering similar rates in 2000-04 had gone down to 53 per cent. Even with these declining urban growth rates, the rate of urbanization in Africa will continue to increase.
- Fertility declines are projected to continue. The proportion of countries with six children per woman or more changed from 78 per cent in 1990-94 to 60 per cent in 2000-04.
- Infant and under-five mortality will remain high in the region and the pace of change will range from low to modest. Life expectancy will stagnate and sometimes decline due to a number of factors including increasing poverty and disease burden.
- The majority of countries in the region will find it difficult to meet the MDG on halving, between 1990 and 2015, the proportion of people whose income is less than one dollar per day.
- Unemployment is likely to remain high and even rise. Trends in unemployment for selected countries confirm that unemployment has risen since the 1990s and remained high over the period.
- Net primary enrolment ratios will change marginally for both sexes and the gender gap will remain relatively the same (it was the same in 2002/2003 as it was in 1998/1999 with more males than females getting more access to primary education).

- Access to safe drinking water will continue to improve. There was improvement between 1990 and 2000. Forty four per cent of countries with information reported improved access to safe water in 1990 compared to 56 per cent in 2000.
- Fast urban growth, however, is likely to threaten adequate provision of safe water to urban dwellers and overburden public budgets.
- HIV prevalence rates in Africa indicate that the pandemic will continue to pose a major disease burden.
- Malaria is on the resurgence. Countries with high malaria prevalence rates increased between 1995-99 and 2000-04; and
- TB will continue to generate a constant disease burden for the African population. Between 2000-2003, Africa as a whole had prevalence rates of 200 per 100,000 and above.

III.3 Economic sustainability

Economic sustainability in Africa performed reasonably well in the 1960s and early 1970s but did poorly in the following two decades. However, since the late 1990s, the economy has picked up, providing a reason for renewed optimism. But the recovery's sustainability is fragile for two reasons. First, strong domestic savings do not underpin it. Second, Africa's economies remain vulnerable to outside shocks (ECA 2001a). Indeed, economic growth for 1990-2000 averaged only 2.1 per cent a year, less than population growth of 2.8 per cent and considerably less than the 7 per cent growth needed to reduce by half the proportion of Africans in poverty by 2015 (ECA, 2001a). Moreover despite substantial progress in macroeconomic stabilization, deregulation, privatization, trade, and exchange rates reform, structural constraints and institutional weaknesses continue to inhibit a vigorous supply response, as most economies still depend on primary products, exhibiting a high export concentration. While 60 per cent of all exports from Africa are agricultural (66 per cent of which is unprocessed); they account for only 8 per cent of the countries' GDP.

In this section, the status of Africa's economic sustainability (as an important component of sustainable development) is reviewed by examining key indicators for the period 1990 to around 2002. These indicators include growth rates of GDP, balance of payments, exports and imports; savings and investments; agriculture, manufacturing, debt and the structure of the economy. Current indicators are compared to past performance. In the process, policies will be reviewed paying particular attention to their likely impacts on economic and other sectors.

1. Economic performance before 1990

Many African countries adopted national development plans with the state serving as the engine of growth in the 1960s and 1970s. Ironically, this was the only significant period of improved development for African countries. Between 1965 and 1973, the average

annual GDP growth rate for Africa was 5.7 per cent while population growth rate was 2.7 per cent. Other indicators such as agriculture, manufacturing, investment, savings, exports and imports also showed remarkable performance (AfDB, 2001).

However, from 1974 till 1990s, most African economies performed poorly basically due to higher oil prices and poor governance. Between 1974-1979, average GDP growth rate was 3.5 per cent with a higher population growth rate of 2.9 per cent while the period of poorest growth rate was between 1980-1988 when average GDP growth rate was 2 per cent with population growth of 2.8 per cent. Other economic indicators also performed relatively poorly (AfDB, 2001).

The poor economic performance of the mid 1970s and 1980s led to the formulation of Structural Adjustment Programs (SAPs) composed of trade and payments liberalization, generous incentives for the extraction of natural resources, privatization, labor retrenchments, removal of subsidies on social services, such as education, health and utilities. The poor were severely affected while badly needed human resources and financial resources leaked out of Africa. Lack of accountability and frustrations at the lack of progress created conditions in which many political leaders resorted to rent seeking (Tutu, 1992; Tutu *et al*, 1993).

2. Economic performance 1990-2002

From 1990 to 2002 the average real GDP grew by 3.3 per cent and from 2003-2004 the average real GDP growth was 3.8 per cent. Central Africa had the highest growth rate (4.2 per cent), followed by North Africa at 3.9 per cent, East Africa at 2.9 per cent and West Africa at 2.4 per cent.

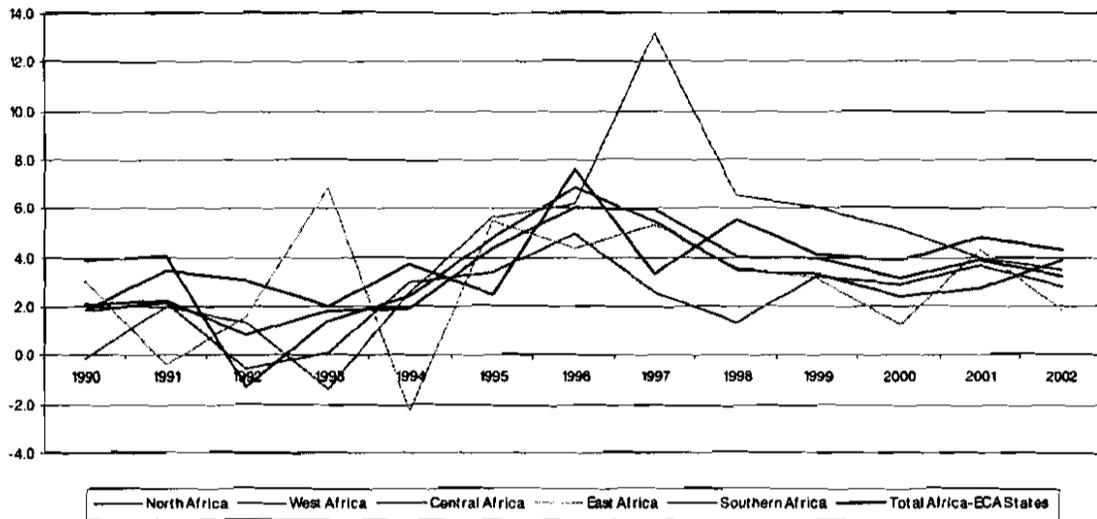
After initial slump in growth in 1991 and 1992, Africa's growth rate began to improve, peaking in 1996. Although there was a slump after 1996, the economy began to pick up again from 1999 till 2002 with real growth rates between 1 per cent and 3 per cent (Fig 3.8).

Although Africa's performance was generally not encouraging, some countries made slight progress. The North African countries continued to achieve high growth rates. Mauritius, Seychelles Botswana, South Africa, Namibia, Lesotho, Equatorial Guinea, Gabon, Ghana and Cape Verde recorded the highest GDP growth.

Despite the relatively enhanced economic performance in the 1990s, per capita incomes have continued to be stagnant since 1990. The average real per capita income for Africa was US\$1,027 with Southern, North and Central Africa averaging US \$1,557, \$1,172 and \$1,076 respectively. Related figures for East and West Africa were \$898 and \$435 respectively. In fact, for most countries, the level of per capita income in 2001 was worse than in 1960. In Ghana, for instance (Box 3.5), the real per capita income in 1960 was US\$450 as compared to US\$429 for 2002 (SDD Database, 2005). However, a few countries such as Mozambique, which has recorded average real GDP growth of 8.1 per

cent per year in the 1990s, provide examples of best practices that can lead to substantial economic transformation (Box 3.6).

Figure 3.8 Trends of real growth of GDP at market price by sub-region, 1990-2000



Box 3.5
Negative impacts of Economic Growth on the Environment

After more than two decades of the implementation of the reforms, the macroeconomic performance has improved. The Ghanaian economy, which recorded an annual average growth of -2.2% between 1975 and 1982, average annual inflation of 64.9% and balance of payments deficit of \$6.8 million over the same period, experienced an average annual growth of 4.8% and per capita growth of 1.9% from 1984 to 2004, although the real per capita GDP of \$420 in 2001 falls short of the \$450 earned in 1960. This success was achieved at the expense of environmental and social considerations and necessitated the implementation of Programme of Actions to Mitigate Social Cost of Adjustment (PAMSCAD).

Source: Baah-Nuakoh and Twerefou (2005).

Box 3.6
Mozambique's miracle

Mozambique is a striking example of what sound policies can achieve. Although poor with average yearly per capita income of \$190 compared to \$1,397 for Southern Africa, it is one of the fastest growing economies in Africa, especially since 1996. The average real GDP growth over the decade is 8.1 per cent compared to the average for Africa and Southern Africa of 3.3 per cent. The ratios of GDI, FDI, ODA, and gross savings to GDP were 32 per cent, 4.8 per cent, 25 per cent and 18 per cent respectively compared to 24 per cent, 3.4 per cent, 12.3 per cent and 20 per cent for Southern Africa. This achievement was made in spite of the devastating floods of February and March 2000.

The country broke from Portuguese rule in 1975 into a highly regulated economy and survived a protracted civil war. In 1987 the government committed to privatization and since then its programme has been one of Africa's most active, restructuring or privatizing more than 900 state enterprises. The government is committed to reducing poverty and improving living standards.

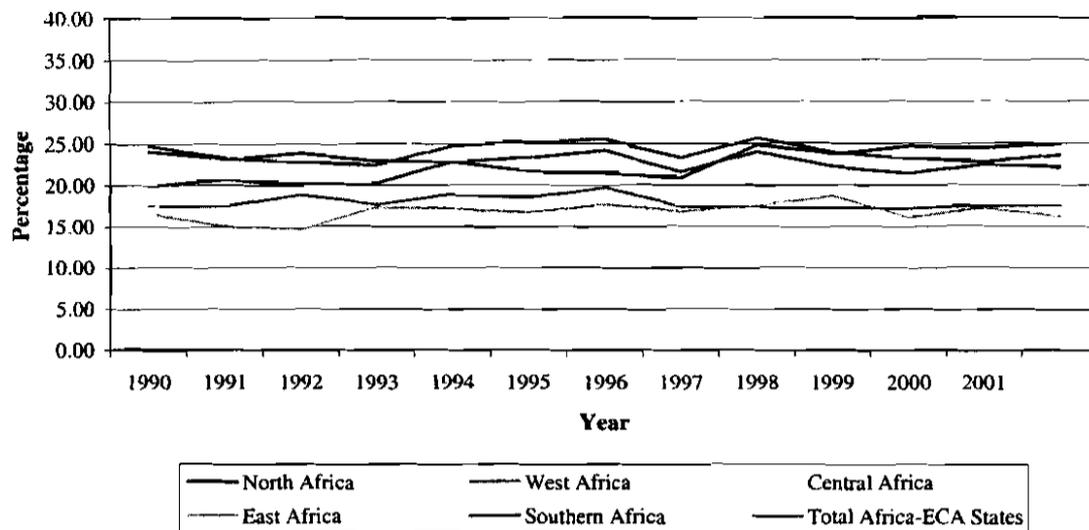
The banking system was partially privatized in the mid-1990s, exchange bureaux have been legalized and measures have been taken to liberalize the current account of the balance of payments, reducing the spread between official and parallel (black market) exchange rates. Growth of money and quasi-money has slowed from more than 70% (1992) to 17% (1998). Indeed, sound monetary policy lowered inflation—rampaging at more than 50% in 1988—to less than 2% in 1999.

Source: IMF 2000a, b; World Bank 2000b, c.

Savings are low and investment is limited. Gross National Savings as proportion of GDP that averaged 18.6 per cent between 1965 and 1979 for Africa fell to 16 per cent between 1980 and 1993; and to 12 per cent between 1990 and 2002. The average sub-regional performance was 18 per cent for North and Southern Africa, 11 per cent for East Africa, and 6 per cent from Central Africa (Figure 3.9). Botswana maintained an average of 40 per cent while Namibia averaged 40 per cent since 1993. It is noteworthy that Botswana has continued to manage the revenues from its natural resources optimally.

The low level of savings is partly due to low-income level that is attributed to inappropriate monetary and fiscal policies. In addition, conflicts in Central Africa might have contributed to the low savings ratio.

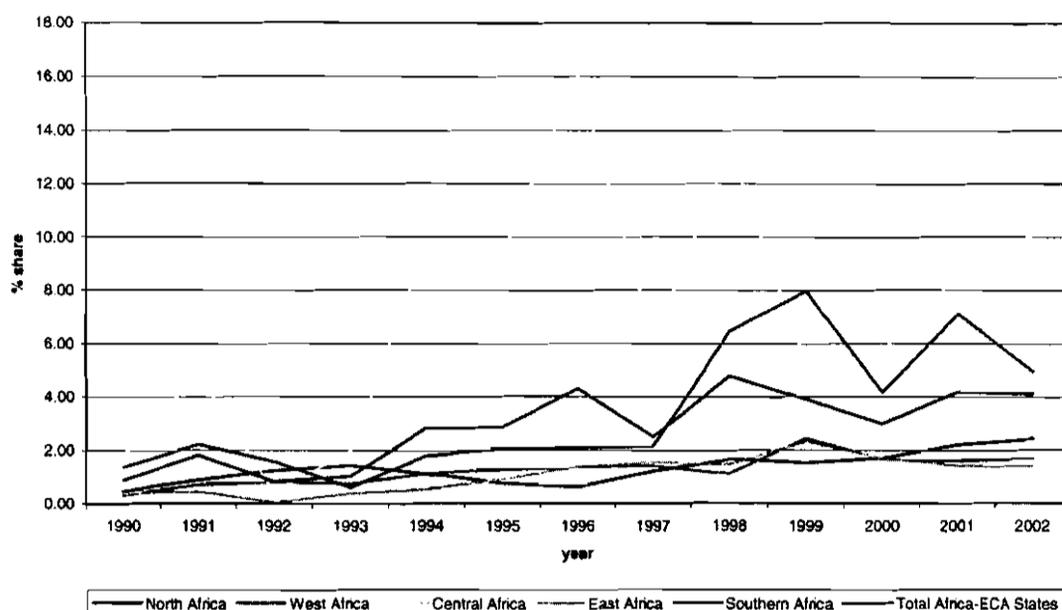
Figure 3.9: Trends of Gross domestic investment as share of GDP (%) by sub-regions, 1990-2002



Incidentally, gross domestic investment has been consistently higher than gross savings although fairly constant at an average of 22 per cent. Investment increased from 20 per cent in 1993 to 23 per cent in 1994 but has fluctuated around 22 per cent since. Paradoxically, Central Africa, which recorded the lowest rate of savings, showed the highest rate of investment (an average of 28 per cent), followed by Southern Africa at 24 per cent, and North Africa at 23 per cent. West and East Africa trailed with 17 and 18 per cent respectively (Figure 2.9). The generally low level of investment in Africa is partly due to the low savings rate and disposable income in the region.

FDI stagnated and ODA is starting to recover. Africa's share of Foreign Direct Investment (FDI) dropped from 25 per cent in the early 1970s to just 5 per cent in 2000. Despite this, FDI has seen a general average increase since 1997 with Central Africa recording the highest increase. Generally, FDI is concentrated on the richer countries of the continent; thus, further marginalizing the great majority of the poorest countries in the region. This indicates that despite the macroeconomic reforms, FDI has stagnated or marginally improved for most countries (Figure 3.10).

Figure 3.10. Trends of FDI as percentage of GDP by sub region, 1990-2002



FDI as a percentage of GDP for North, West and East Africa has averaged 1 per cent a year over the period 1990 to 2002. Only Central Africa received significant FDI (averaging 7 per cent a year) over the period, followed by Southern Africa (3 per cent). This suggests that Africa still needs to improve its business environment in order to attract investment.

Aid to Africa also increased from just under US\$ 1 billion in 1960 to US\$ 32 billion in 1991. But by the end of the 1990s, aid had fallen to almost half the 1991 level. After declining through most of the 1990s, net ODA to Africa has begun to recover, rising from a total US\$ 15.7 billion in 2001 to US\$ 21.2 billion in 2002 (AfDB, 2004) and US\$26.3 in 2003 (ECA, 2005a). But this is still a far cry from the \$32 billion recorded in 1991.

3. *Balance of payments*

Africa continues to record negative balance of payments (BOPs). Studies conducted by the ECA indicated that 34 out of 44 countries reviewed in 2004 experienced current accounts deficit of about five per cent of Gross Domestic Product. The SAPs of the 1980s and 1990s did not improve the BOPs. In addition, Africa has a negative balance of trade in the majority of processed agricultural products. Again, Africa's terms of trade were lower than those of the rest of the world and also more volatile between 1992 and 1999 (Kagwanja, 2004).

Primary products form the bulk of Africa's exports. Despite substantial progress in reform—macroeconomic stabilization, deregulation, privatization, trade, and exchange rates—primary products still dominate Africa's exports. Most African economies still depend on primary products, exhibiting a high export concentration (ECA 2001b). In fact, 60 per cent of all exports from Africa are agricultural while 66 per cent of all exports are unprocessed (Yumkella *et.al* 1999). Many countries depend on less than three primary products for up to 90 per cent of their export revenue. The five major export crops in terms of average annual value of export for Africa for 1998-2003 were cotton, cocoa, coffee, tobacco and sugar.

Taking coffee as an example, it is estimated that it accounts for 75 per cent of total merchandize exports for Burundi, 62 per cent for Ethiopia and 54 per cent for Uganda. Similarly, cocoa constitutes 69 per cent of total exports for Sao Tome and Principe, 36 per cent for Cote d'Ivoire and 24 per cent for Ghana. Cotton accounts for 39 per cent of exports of Burkina Faso, 37 per cent for Chad and 33 per cent for Benin. In the case of mining, Zambia depends on copper for 90 per cent of total export earnings.

Paradoxically, export crops account for a small proportion of GDP. For example, cocoa accounts for 17 per cent of the GDP of Sao Tome and Principe, 14 per cent for Cote d'Ivoire and 5.5 per cent for Ghana, while coffee accounts for 7 Per cent of GDP for Burundi, 5 per cent for Ethiopia and 4 per cent for Uganda. Cotton contributes 7 per cent of GDP for Mali, 6 per cent for Benin and 6 per cent for Chad (Kagwanja, 2004). This explains the perverse poverty in Africa because although primary export products account for a small proportion of GDP, substantial financial support is given to it to the detriment of other agricultural products that accounts for a greater proportion of GDP. However, there is tremendous potential for intra-African trade in processed agricultural products, particularly in milk, oils, flour and cakes (Kagwanja, 2004). These areas should be given special attention in the future.

4. *Agriculture and food security*

Agricultural productivity has been low over the years. The average productivity of agricultural land in Africa was estimated at only 42 per cent of that in Asia and 50 per cent of that in Latin America during the 1990s. Similarly, the productivity of labor in African agriculture averaged only 57 per cent of that in Asia and Latin America.

With the exception of cotton that had a clear growth in output between 1990-2002, all other crops fluctuated. Coffee output fluctuated around 830,000 metric tons; tea around 312,000 metric tons; cereal around 2,268 million metric tons and cocoa around 1,579 million metric tons. This may be largely attributed to Africa's failure to take advantage of technology to increase production. The continent has largely relied on increasing production by expanding agriculture on marginal lands (Kagwanja, 2004).

Despite the fact that at least 70 per cent of Africa's labor force is engaged in agriculture, Africa is not food secure and still imports most of the important food items. Africa relies

on 3.23 million tons of food aid annually and imports 25 per cent of its food grain requirements. In fact, Africa's annual food aid demand reached \$1.7 billion in 2002. (FAO, 2004) The main food items are cereals, starchy roots, sugar and sweeteners, pulses, vegetable oils, vegetables, fruits, meat, milk and fish/seafood. Africa imports all of these food items except fruits and groundnut oil for which it is self-sufficient (Kagwanja, 2004). With the majority of Africa's population engaged in agriculture, which has been performing poorly partly due to lack of significant financial investment, African poverty continues to be perpetuated.

5. *Poverty, debt and income inequality*

Poverty and income inequality are widespread and severe. In Sub-Saharan Africa, 52 per cent of people live on less than \$1 a day (in 1995 dollars adjusted for purchasing power parity), with 59 per cent in rural areas and 43 per cent in urban areas (ECA, 2001b). In 1998 the average monthly expenditure was only \$14 per person by the rural poor and \$27 by the urban poor.

With a Gini coefficient of 51 per cent, Africa has the worst income distribution in the world. In contrast, income inequality is lowest in Southeast Asia, which has a Gini coefficient of 32 per cent. The richest 20 per cent of the population account for 40 per cent of the expenditure while the poorest 20 per cent of the population account for 9 per cent of the expenditure. Africa is at the other extreme (ECA, 2001b).

Rapid urbanization in Africa is accompanied with urban poverty. In spite of the data limitations on the scale and depth of urban poverty in Africa is increasing (Sachs *et al* 2004). Above half of the urban inhabitants in Mozambique, Chad, Zambia, Niger and Madagascar are below the national poverty line. Reconnect research (Yousif 2005) indicate that poverty is higher in the cities of Sub-Saharan Africa than in North Africa. Therefore, increasing urban poverty is symptomatic of rapid growth of slums, poor housing and sanitary conditions, and high pressure on urban-based social services (water, education, electricity, transport, etc.).

In terms of debt, many African countries remain severely indebted. As a percentage of GDP, Africa's external debt is higher than that of any other developing region of the world. A substantial proportion of Africa's export earnings has been used for debt repayment, and this imposes a huge debt burden on the continent, perpetuating poverty and contributing to environmental degradation as well as the inability of African countries to implement sustainable development agreements.

6. *Structural transformation of African economies*

The period under review shows that Africa is going through a pseudo structural transformation of the economies that is normally expected with development. On average Africa's economy is composed of GDP with a higher proportion of services (43 per cent), followed by industry (26 per cent) and agriculture (25 per cent). The continent

is moving in the right direction. But is the transformation real? With the exception of Central Africa whose services sector was 39 per cent of GDP, the rest of the sub-regions had a service component ranging from 42 per cent in Southern Africa to 44 per cent in North Africa.

For industry, Southern Africa is leading with an average of 30 per cent followed by Central Africa (31 per cent), North Africa (30 per cent), West Africa (21 per cent) and East Africa (16 per cent). However, the important industrial sub-sector, manufacturing, is very small. Southern Africa has the highest manufacturing sector (14 per cent) followed by North Africa (12 per cent), East Africa (9 per cent), Central (7 per cent) and West Africa (4 per cent).

In terms of agriculture, West Africa has the highest proportion with an average of 34 per cent of GDP, followed by East Africa (31 per cent), Central Africa (27 per cent), North Africa (20 per cent), and Southern Africa (15 per cent).

Structural transformation is meant to improve the quality of life of the people by increasing productivity in agriculture, transferring labor force to higher earning sectors of manufacturing and services. This strategy will create higher earning employment and demand for the chain of outputs of the other sectors. Thus, one expects a reduction in the share of agriculture and increasing shares of manufacturing and services with corresponding high employment, increased incomes and significantly reduced poverty.

However, the kind of transformation taking place in most countries in Africa is not the type associated with sustainable development. Indicators of real structural transformation are non-existent. About 70 per cent of the labor force is in agriculture with no increase in productivity, leading to under-employment and poverty in that sector. The service sector is mainly composed of retail and wholesale trade in products that are mostly imported. The result is lower incomes and under-employment in that sector. To compound the situation, the manufacturing sector has collapsed in many countries. Thus, in the case of Africa, although the agricultural sector is shrinking, it has not led to an increase of the manufacturing sector, or an increase in employment opportunities and higher incomes and poverty reduction.

7. *Sustainable development and MDGs*

ECA has indicated that Africa needs to grow at 7 per cent per year in order to reduce by half the proportion of Africans in poverty by 2015. Although the Commission's analysis of the progress and challenges of MDGs indicated that many countries have made effort to integrate the MDGs into their national development plans and budgets and have also matched them with the NEPAD goals, given current trends, with few exceptions, the continent will not meet most of the MDG targets within the set timeframe (ECA, 2005a).

The analysis concluded that only the North African countries (Algeria, Egypt, Libya, Morocco and Tunisia), and nine countries in SSA (Botswana, Burkina Faso, Cameroon,

Ghana, Lesotho, Mauritius, Mozambique, South Africa and Uganda) are likely to meet the poverty reduction target.

8. *Indicators for future growth*

The indicators of Africa's sustainable economic growth show prospects for future growth. Since 2000, several indicators including GDP growth rate, FDI, GDI, Gross Savings and ODA have shown upward growth. The recent debt forgiveness for some African countries and the promise by the G-8 to increase ODA to 0.7 per cent of their GNP indicate some faith by external development partners. Above all, efforts toward implementing good governance, conflict resolution, the NEPAD and the African Peer Review Mechanism show the commitment by African governments to make progress.

III.4 Environmental sustainability

Environmental sustainability is the focus of this section. It analyzes key changes in the state of the environment, while highlighting pressures and impacts. To the extent possible, indicators are used in assessing trends and progress towards meeting key targets of the JPOI, the MDGs, while relating these to relevant NEPAD themes, particularly, its environment initiative. Indicators used include: CO₂ per capita emissions; methane emission in million metric tons; emissions of common anthropogenic pollutants; proportion of degraded land, forest area as a percentage of total land area; percentage threatened species; percentage of water use; water stress and scarcity in countries; and total fishery production. Assessment is done in an integrated manner in order to bring out the linkages between the different environmental themes on the one hand, and between environment theme and the social and economic dimensions of sustainable development. The themes cover the three environmental media namely: atmosphere, land and water

1. *Atmosphere*

Changes in climatic conditions are largely attributed to natural causes, however climate variability due to human activities has become increasingly significant in recent times. There has been a decreasing trend in the frequency of days with minimum temperatures below the 1961- 1990 10th percentile threshold over most of the continent. An increasing trend in the frequency of high maximum temperature events is also observed for almost all of Africa (WMO, 2003)

In terms of precipitation records, the Sahel has experienced a decrease in maximum five-day precipitation totals. This is consistent with the observed decrease in annual precipitation observed during the 1961- 1990 period. For northwestern Africa, a lesser decrease in maximum five-day precipitation totals is observed, but this is consistent with results observed in southwestern Europe (WMO, 2003). The equatorial belt generally has high rainfall, whereas northern and southern African countries, and those in the Horn of Africa, are typically arid or semi-arid. All parts of Africa, even those that usually

have high rainfall, experience climatic variability and extreme events such as floods or droughts (UNEP, 2002a).

Extreme events resulting from climate variability have had adverse economic, social and environmental impacts in Africa, thus demonstrating the continent's susceptibility and weak adaptive capacities to these events (Box 3.7).

Box 3.7
Impact of climate variability

Floods have led to displacement of people and animals, loss of life and property, environmental degradation, destruction of infrastructure, large losses to the economy, among many other socio-economic miseries. Drought on the other hand has adverse negative impacts on agriculture, livestock, wildlife, tourism, water resources, and hydroelectric power generation.

Drought results in low water flow and fall in the levels of dams that are often associated with severe power rationing, closure of some industries, and large losses in their economies. Water supply for industrial and domestic consumption is usually severely interrupted during drought. Lack of water and pasture in some areas often lead to severe conflicts between wildlife and pastoral communities. Notable examples of the hazards of extreme climate events were demonstrated by the impacts of the 1997/98 El Niño-related floods and the 1999-2001 drought in the Horn of Africa. Source: www.climateadaptation.net/docs/papers/Ogalla%20DMC%20paper.pdf, 21-09-05.

Precipitation deficits for the first six months of 2000 exceeded 100 mm across a large part of the Greater Horn. The combination of drought and civil strife left an estimated 20 million people facing food shortages in the Greater Horn, of which 10 million were affected in Ethiopia alone (WMO, 2003). The drought drastically reduced Kenyan hydroelectric power output, precipitating a US\$72 million emergency loan from the World Bank. Source: Washington *et al.* 2004.

During the 1991/92 droughts in southern Africa, estimates put the total number of people affected at 36 million, 20 million of whom were considered to be at serious risk of starvation. Cereal output in SADC (excluding South Africa) fell from an average of 11.3 million tons to 6.2 million tons (translating into billions of dollars of cereal crop losses). Import needs rose to 7 million tons, with a further 5.5 million tons for South Africa. In total, 11.4 million tons of cereals were imported. (www.sarpi.org.za/documents/d0001237/EI367/Impo90s2004_chapter.pdf, 21-09-05, Washington *et al.* 2004). During the 1999 and 2000 drought in southern Africa, the GDP of countries in the region was affected by between 2.5 and 3.5 percent.

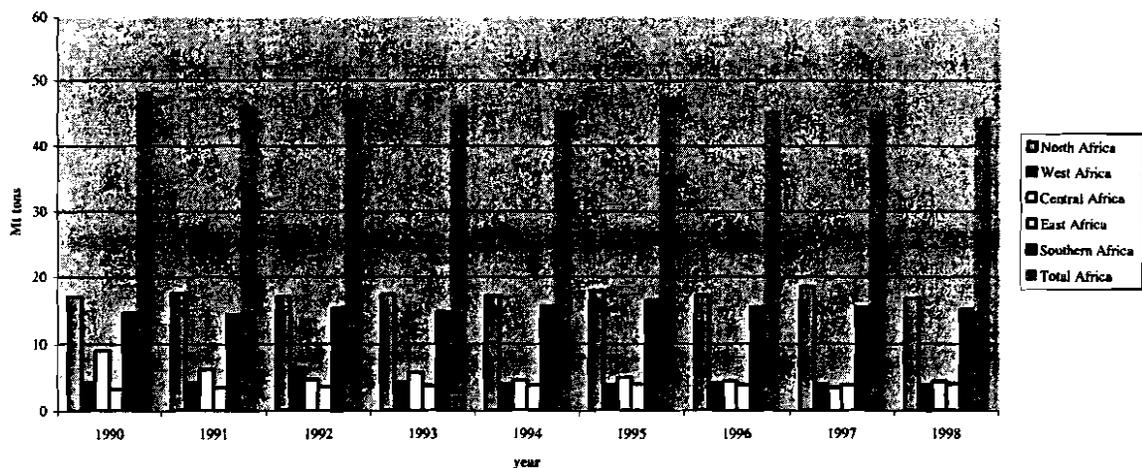
Source: WMO (2003)

Climate change is caused by an increase of green house gases (GHG) in the atmosphere. These gases reach the atmosphere as a result of activities of our everyday life: the use of energy from fossil fuels (coal, oil and gas), in industrial processes, transportation, and in the home. But greenhouse gases also come from agricultural production and deforestation (UNFCCC, 2005). Although Africa contributes very little to GHG emissions, the region is most vulnerable to the impacts of projected changes since widespread poverty limits its response and adaptation capabilities. Six major GHGs cause global warming, but indicators used here relate to Carbon dioxide (CO₂) and Methane (CH₄), which account for 50 and 18 per cent respectively, of the overall global warming effect arising from human activities.

Figure 3.11 shows the per capita CO₂ emissions in the five sub-regions of Africa, from 1990 to 1998^{iv}. North Africa accounted for the most emissions followed by Southern Africa. Only South Africa and Libya had emission levels above the world average. As economies develop and industrialize, historically they have made greater use of energy, including fossil fuels. Those with lower per capita GDPs also tend to have lower per capita emissions (UNFCCC, 2004). This trend is observed in the case of African countries. Most African countries have low per capita GDPs, and correspondingly low per capita emissions. Those with relatively higher per capita GDPs or that benefit from the exploitation of significant reserves of fossil fuels also have higher per capita emissions, as is the case with South Africa and Libya.

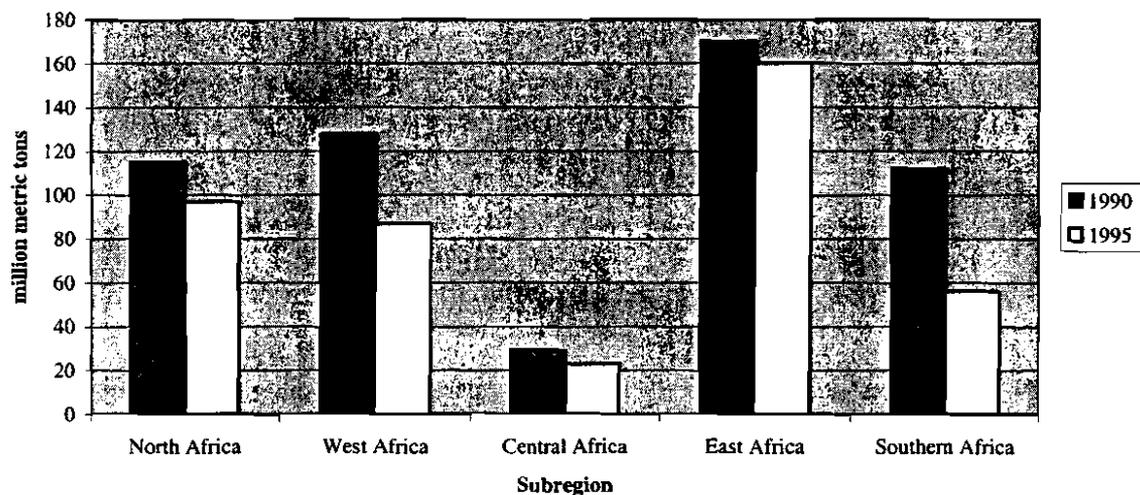
A clear trend is difficult to establish for the region between 1990 and 1998. Trends are also difficult to establish at sub-regional levels. However in North, West and East Africa, the 1998 emissions were less than those of 1990, while in Southern and Central Africa, emission levels were higher in 1998 than in 1990. Therefore Africa has mixed results in relation to meeting the MDG target of reducing CO₂ emissions.

Figure 3.11. CO₂ Emissions per capita (MT tons)



Another common emission in Africa is methane. This is principally emitted from herbivores as a by-product of enteric fermentation, and from the decomposition of manure under low oxygen or anaerobic conditions. Other sources include agricultural and forest soils, savanna burning, forest and grassland conversion to other land uses, solid waste disposal sites and sewage facilities. Figure 3.12 shows the level of methane emissions in 1990 and 1995. The highest emissions were observed in East Africa. During this period, a reduction in emissions was observed in all sub-regions. In East Africa, Ethiopia had the highest emission levels both in 1990 and in 1995. This is not surprising, given that the country has the highest herbivore head count in the sub-region. In 1998, methane emissions from the municipal dump in Addis Ababa were estimated to be more than nine giga-grammes.

Figure 3.12. Emissions of methane in million MT



Apart from a vulnerable agricultural system, Africa's high sensitivity to climate is exacerbated by other factors such as widespread poverty, recurrent droughts and floods, an immediate daily dependence on natural resources and biodiversity, a heavy disease burden, and the numerous conflicts that have engulfed the continent. Further complications have been introduced by an unjust international trade system and the debt burden. Already Africa is experiencing extreme climate weather events such as drought, storms, floods and wild fires at increasing frequency. The environment action plan of NEPAD observes that natural disasters cause considerable human suffering and economic damage in the region (New Economics Foundation, 2004b).

2. Air quality

The JPOI emphasizes the need for cooperation at the international, regional and national levels to reduce air pollution, including acid deposition and ozone depletion. NEPAD has identified air quality as an increasingly important issue over the past few decades

particularly in large urban areas. Unsustainable patterns of consumption and production of energy resources by industry, transport and household sectors have, in particular, been the leading sources of key indoor and outdoor air pollutants. Although the industrial sector accounts for an important share of air pollution, the transportation sector is increasingly being recognized as the highest polluter in key African cities (UNEP, 2005a). Vehicular emissions in Africa are associated with the increasing number of old cars on African streets (Box 3.8). A major concern in the transportation sector is the use of leaded petrol, which is responsible for increased blood lead concentrations and corresponding neuropsychological and developmental effects, particularly in children. Other sources of air pollution in Africa include forest/savanna fires and desert sandstorms. Indoor air pollution in both urban and rural areas is also a problem. Indoor air pollution arises from the use of biomass fuels, coal and paraffin in open fires or poorly functioning stoves.

Box 3.8

Pollution from stack emissions and second hand vehicles

In Egypt, deteriorating air quality is linked to industrial emissions and traffic density. Suspended dust (measured as PM10 and TSP) is the major air pollution problem in the country. Annual average concentrations of PM10 range between 100 and 200 $\mu\text{g}/\text{m}^3$ in urban and residential areas and between 200 and 500 $\mu\text{g}/\text{m}^3$ near industrial areas. Daily average concentrations of more than 6 times the Air Quality Limit (AQL) value for Egypt are being recorded occasionally (2 to 3 per cent of the time) in the urban areas of Cairo. The concentration levels of SO_2 have also been observed to exceed the AQL values in industrial areas and during some occasions in the big cities. Both the long term (annual averages) and the short-term (1-hour average) AQL levels have been exceeded.

In Zambia, sulphur dioxide is particularly a problem in Kitwe due to the smelting of copper and roasting of cobalt among other industrial activities. The World Health Organization (WHO) and Environmental Council of Zambia (ECZ)'s air quality guidelines are often exceeded. The high level of stack emissions is mainly due to the age of the equipment and lack of proper maintenance.

In Uganda, most of the vehicles imported into Uganda are second hand. In 1971, Uganda had 44,310 vehicles and by 1999, the number had increased to 186,244, a fourfold increase in less than 30 years. Furthermore, among the oil companies operating in Kampala City and surrounding towns, only one distributes unleaded fuel.

And in Kenya, a 2002 study sponsored by UNEP and conducted by the Jomo Kenyatta University of Agriculture and Technology, showed that lead levels in soils were 6,000 times higher in comparison to WHO standards in some areas of Nairobi. High levels of lead were also found in food items: mean value 20 fold in maize, two fold in water and 2.5 fold in milk, compared to the WHO recommended levels.

Source: APINA/SEI (2004)

Pollutants from these various sources include carbon monoxide (CO), nitrogen oxides (NO_x), volatile organic compounds (VOCs), Sulphur dioxide (SO₂), suspended particles of less than 10 microns (10µm) in diameter (PM10) and lead (Pb) (APINA/SEI, 2004). Figures 3.13 and 2.14 show that generally, slight increases were registered in the level of pollutants in 1995, from the 1990 levels^{vi}.

Figure 3.13. Emissions of Common Anthropogenic Pollutants, 1990 ('000 MT)

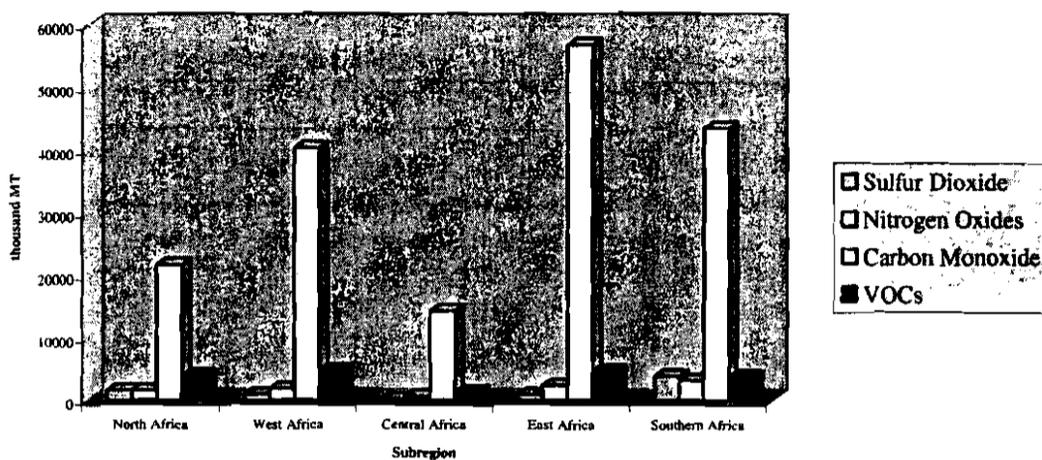
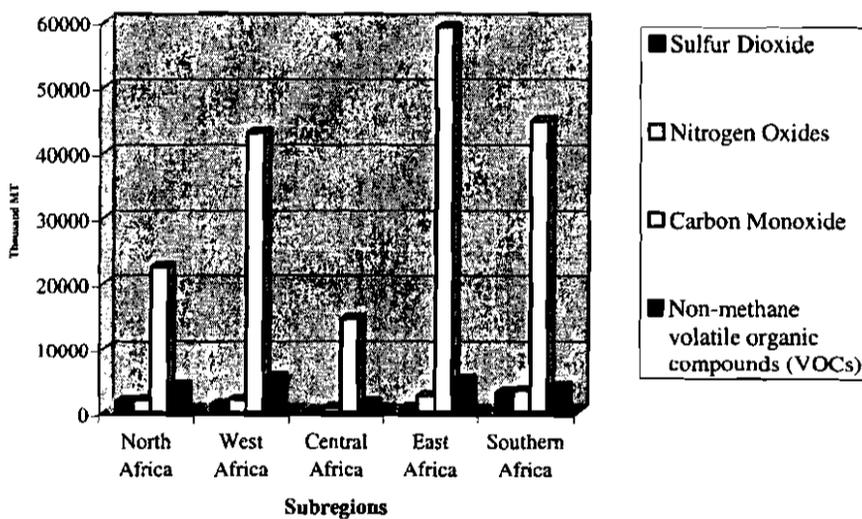


Figure 3.14. Emissions of Common Anthropogenic Pollutants, 1995 (in '000 MT)



Women and young children are particularly exposed to high levels of indoor air pollution for several hours each day, increasing the risk of acute respiratory infections, which is one of the leading causes of infant and child mortality on the continent. (APINA/SEI, 2004). Apart from health effects, air pollution also results in negative environmental

impacts such as acid rain deposits adversely affecting vegetation, soils, water and infrastructure. Pollutants such as sulphur dioxide have corrosive effects. In Mufulira town on the Copperbelt of Zambia, the lifespan of roofing sheets on houses was reduced 12-fold, making home maintenance more costly by at least US\$0.6 million (APINA, 2003).

3. *Land*

Approximately 22 per cent of Africa's land area is under forest (650 million ha), 43 per cent is characterized as extreme deserts (1 274 million ha), and 21 per cent (630 million ha) is suitable for cultivation. By 1999, it was estimated that about 200 million ha (32 per cent of the suitable area) had actually been cultivated. At the same time, it was estimated that 30 per cent of the total land area (892 million ha) were being used as permanent pasture. The direct dependency of most Africans on land, and the heavy economic dependence of many African countries on agricultural and mineral resources, create a unique regard for land in Africa, as well as unique production pressures and competition for resources (UNEP, 2002a)

Land degradation: In Africa, an estimated 500 million ha of land have undergone soil degradation since about 1950, including 65 per cent of the region's agricultural land.^{vii} Over the past 30 years, soil structure has been damaged, nutrients have been depleted and susceptibility to erosion has increased. This is as a result of increasing application of chemicals, use of inappropriate equipment and technologies, commercial mono-specific plantations and inefficient irrigation systems. In Africa's dry lands, 319.4 million hectares of land were degraded in the 1990s due to water and wind erosion, chemical deterioration and physical deterioration.^{viii}

Although land degradation is a physical process, its underlying causes are firmly rooted in the socio-economic and cultural realms in which land users operate. Poverty and population pressure are key factors leading to land degradation. Population pressure leads to land shortages. Improper agricultural practices, for instance, occur only under constraints such as the saturation of good lands under population pressure which leads settlers to cultivate too shallow or too steep soils, plough fallow land before it has recovered its fertility, or attempt to obtain multiple crops by irrigating unsuitable soils (Marcoux 1998). Other issues, such as inequitable land access, tenure policies, alternative income-generating opportunities and labor constraints are additional important determinants of land degradation. Box 3.9 illustrates the cost of soil erosion and forest depletion in Ethiopia. For example, about half of Rwanda's farmland shows evidence of moderate to severe erosion. Two-thirds are acidic and exhausted, but continuously cultivated because farmers have nowhere else to go and cannot afford to let their land lie fallow. Partly because of the recent history of genocide, displacement and repatriation, forested areas have been reduced by almost half in less than a decade.^{ix}

Prolonged land degradation in Africa's dry lands has led to desertification. Two thirds of the continent is desert or drylands. In Africa, desertification, poverty, migration and

food security are closely and directly linked to each other. While desertification can lead to famine, malnutrition, under-nourishment, economic and social instability and migrations, these can, in turn, cause or increase desertification. In addition, poverty contributes to land degradation in dry lands by inducing women and men to exploit the natural resource base in an unsustainable manner. Degradation then lowers productivity and incomes, thereby increasing poverty and further exacerbating pressure on the natural resource base (Marcoux 1998). In Kenya, desertification affects 80 per cent of the land area supporting a population of about 10 million. The affected communities suffer from widespread and acute poverty – 80 per cent of the population in these areas lives below the poverty line, (Biodiversity and Conservation Network, Kenya, 2005).

Box 3.9
Economic valuation of soil degradation and forest depletion in Ethiopia

In economic terms, soil erosion in 1990 was estimated to have cost (in 1985 prices) nearly Birr 40 million in lost agricultural production (i.e. crop and livestock) while the cost of burning dung and crop residues for fuel was to the tune of Birr 650 million. Thus in 1990, approximately 17 per cent of the potential agricultural GDP was lost because of physical and biological soil degradation. Likewise, the permanent loss in value of the country's soil resources caused by soil erosion in 1990 was estimated at Birr 59 million. This, precisely, is the amount by which the country's soil "capital" should be depreciated in the National Accounts or which should be deducted (as capital depreciation) from the country's Net National Income (NNI). The Ethiopian Forestry Action programme (EFAP) on its part estimated the full value of forest depletion in 1990 to have been about Birr 138 million or some 25 per cent of the potential forestry GDP of Birr 544 million. (IUSS is approximately Birr 8.7, September 2005).

Source: Malifu (2005)

4. Forests

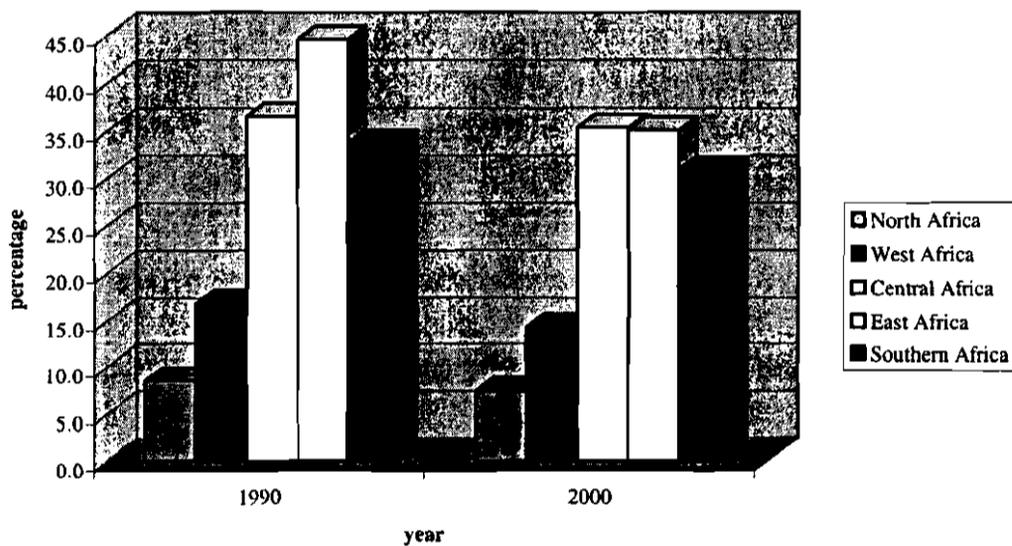
The total forest cover in Africa was estimated to be slightly less than 650 million hectares in 2000 - equivalent to 17 per cent of the global forest cover, and approximately 22 per cent of Africa's land area. However, there are sub-regional variations. Africa's forest cover makes up approximately 45 per cent of the land area of Central Africa, constituting 37 per cent of the total forest cover for Africa. In contrast, only eight per cent of the land area of countries in North Africa has forest cover and most of this is in Sudan (UNEP, 2002). Forests contain 70 per cent of the earth's terrestrial biodiversity and as such are among the world's richest and most diverse ecosystems (UNEP, *et. al*, 2003b). They also provide a wide range of ecological, social and cultural services and have great economic significance.

Forest resources are central to food security and livelihoods of the poor. Low-income rural people rely heavily on the direct consumption of wild foods, medicines and fuels;

especially for meeting micronutrient and protein needs. An estimated 350 million poor people rely on forests as safety nets or for supplemental income. Farmers earn as much as 10 to 25 per cent of household income from non-timber forest products. For example, bush meat is the main source of animal protein in Central Africa. In addition, the poor often harvest, and sell wild plants and animals in order to buy food (Scherr, White and Kaimowitz 2004 in Molnar *et al.*, 2004).

Unfortunately, Africa's forests are under threat. Moreover, Africa has the fastest rate of deforestation anywhere in the world. Forest loss between 1990 and 2000 was more than 50 million hectares, representing an average deforestation rate of nearly 0.8 per cent per year over this period (UNEP, 2002a) (see Figure 3.15).^x At this rate, the MDG target of increasing the proportion of land area covered by forest will not be met. Only a small proportion of the total forest area is legally protected. It is estimated that closed humid forests comprise only about 13.8 per cent of total protected areas in Africa with much of the 26, 300,000 hectares of biodiversity-rich tropical evergreen broadleaf forests in Africa remaining unprotected (UNEP *et. al.*, 2003c). For example, in Kenya the area covered by forest has decreased from 14 per cent in the 1960's to less than 1 per cent now. Guinea has lost 80 per cent of its forest forever, and in several other countries, a number of factors identified in Box 3.10 have led to the loss of forest cover.

Figure 3.15. Trends in forest area as a percentage of total land area by subregion



Box 3.10

Factors of deforestation in several African countries

In Sudan, deforestation is attributed to consumption of forest products and expansion of agricultural land area. Demographic pressure and climatic conditions leading to frequent bush fires, demand for forest products (especially fuelwood), overgrazing, mining and clearance for agriculture are significant factors of deforestation in Senegal. Conversion of land to grow cocoa, coffee and cotton, mismanagement of existing forests, fire and grazing by cattle are some of the causes of deforestation in Togo. A study of the forest sector conducted in Benin identified the following problems: an inadequate institutional framework (with corruption and non-application of forest legislation), poor levels of public participation, poor management of the forest resources, and a lack of vision for the forest sector. As a result there is itinerant agriculture on burnt forest land, extensive grazing, including that caused by transhumance from neighboring countries, and selective and uncontrolled felling of valuable and threatened species. At the same time there is high and increasing demand for timber, firewood and charcoal.

Source: <http://www.un.org/esa/forests/documents-unff.html#4>, 17 August 2005

In addition to its ecological impacts, deforestation also results in communities losing their livelihoods and vital energy sources (UNEP, 2002a). Underlying causes of deforestation are complex and varied. For example, pressures to use forestland for agriculture and grazing, and to exploit forest products at an unsustainable level, may themselves be rooted in poverty; and in some places owners may face pressures to sell forest land for building development.^{xi}

5. Biodiversity

Africa has rich and varied biological resources (terrestrial and aquatic) forming the region's natural wealth on which its social and economic systems are based. These resources also have global significance for the world's climate and for the development of agriculture or industrial activities such as pharmaceuticals, tourism, or construction. The humid tropical forests of equatorial Africa are among the most productive ecosystems in the world. However, even the arid areas of Africa, harbor many plant and animal species. There are 25 internationally recognized biodiversity hotspots. Six of these are in Africa namely: the Mediterranean Basin Forests, the Western Indian Ocean Islands, the Cape Floristic Region (South Africa), the Succulent Karoo (shared between South Africa and Namibia), the Guinean Forest, and the Eastern Arc Mountain Forests (Eastern Africa) (UNEP, 2002a).

A key biodiversity-related target contained in the JPOI is for countries to achieve a significant reduction in the current rate of loss of biological diversity, by 2010. However, Africa's biodiversity is under threat from four main sources: natural habitat loss, loss of species or subspecies, invasion by alien species, and lack of recognition of indigenous knowledge and property rights. The ultimate causes of habitat loss in Africa

are human population growth and the resulting demand for space, food and other

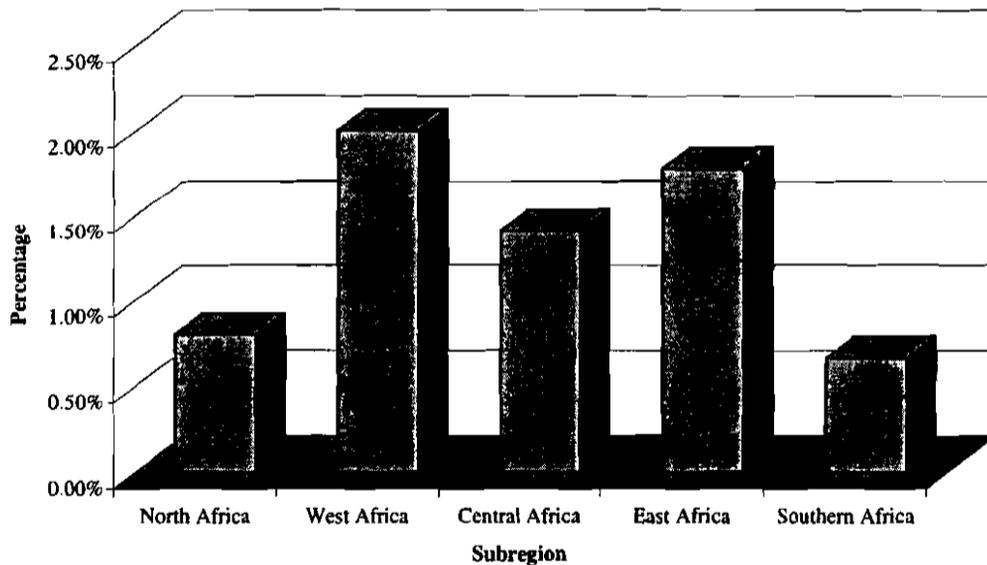
**Box 3.11
Wildlife loss in Kenya**

It is estimated that in the last 20 years Kenya has lost over 50 per cent of its wildlife population due to the combined threats of habitat loss and poaching. The consumption of bush meat, which was traditionally a subsistence activity among rural communities, has also taken its toll as an estimated 500,000 animals are killed annually due to snaring for both subsistence and commercial purposes. Snaring is an indiscriminate method of killing wildlife and results in death and injuries of non-target animals as well. While rural poverty is an important parameter in the trade, inadequate law enforcement and weak laws contribute significantly to this problem.

Source: IBU diversity and Conservation Network Kenya, 2005.

resources; widespread poverty; a dependence on natural resources and economic pressures to increase exports, particularly agricultural produce, timber and mineral products. Species loss is mainly a result of the loss of natural habitats, illegal hunting for food, medicinal, or commercial use and national and international trade (UNEP, 2002a). Box 3.11 illustrates the loss of wildlife in Kenya and Figure 3.16 reflects the degree of this loss by sub-region in Africa.^{xii}

Figure 3.16. Percentage of wildlife threatened (1992-2002)



The rural poor rely directly on ecosystem services for clean and reliable local water supplies. Ecosystem degradation results in less water for people, crops and livestock; lower crop, livestock and tree yields; and higher risks of natural disaster. (McNeely and Scherr in Molnar *et al*, 2004). In more than two-thirds of agricultural regions in landscape mosaics with less than 60 per cent area cropped, there will often be significant biodiversity still conserved under local management regimes. In this regard, the JPOI notes that the loss of biological diversity can only be reversed if the local people benefit from the conservation and sustainable use of biological diversity, in particular in countries of origin of genetic resources.

6. Water

Freshwater resources: Africa is generally endowed with abundant water resources. It has big rivers, large lakes, vast wetlands, and limited but widespread groundwater. Much of this is located in the Central African sub-region and in the island countries. Africa has 17 rivers with catchments areas greater than 100 000 km²; and it has more than 160 lakes larger than 27 km², most of which are located around the equatorial region and sub-humid East African Highlands within the Rift Valley. Lake Tanganyika alone could meet the basic water supply needs of 400 million people with less than 1 per cent yearly withdrawal of its waters. Furthermore, groundwater represents 15 per cent of Africa's water resources with the major aquifers located in arid zones of the northern Sahara, Nubia, Sahel, Chad Basins and Kalahari (Lake and Soure, 1997 in ECA, 2001a).

However, the distribution of water resources in different regions of the continent is highly variable in time and space (Baah-Nuakoh and Twerefou 2005). The variable and uneven distribution of water resources in Africa combined with the region's rapidly growing population, and the current state and pace of development and urbanization, pose significant challenges to meeting water needs. In spite of this, the region withdraws only 3.8 per cent of its water resources for agriculture, industrial and human consumption. And, in spite of its food security problems, only a small proportion of Africa's irrigation potential has been tapped, with North Africa accounting for the lion's share (Box 3.12). Consequently, it is estimated that by 2025, up to 16 per cent of Africa's population will be living in countries facing water scarcity, and 32 per cent in water stressed countries (ECA *et al*, 2002) (Table 3.1 and Map 3.1). Furthermore, water bodies are being depleted due to poor waste management, agricultural and industrial discharges.

Table 3.1

Dynamics of water use, renewable water resources and water availability by sub- regions of Africa

Sub Regions	Available Water Resources km ³ /year			Water Use km ³ /year			Water Use in Relation to Water Resources %		Per capita Water availability 10 ³ m ³ /year	
	local	inflow	total	1950	1995	2025	1995	2025	1995	2025
Northern	41	140	181	43.0 34.6	110 78.0	144 94	61 43	80 52	0.62	0.32
Western	1088	30	1120	2.3 1.7	26.0 20.1	52 32	2.3 1.8	4.6 2.8	4.9	2.1
Central	1770	80	1850	0.5 0.18	2.5 1.4	14 9.0	0.14 0.08	0.76 0.49	27.2	12.0
Eastern	749	29	778	3.7 2.8	50.4 41.0	83 59	6.5 5.3	10.7 7.6	3.6	1.5
Southern	399	86	485	6.5 5.0	26.4 19.1	43 28	5.4 3.9	8.9 5.8	5.3	2.8
Continent	4050	-	-	56.0 45.0	215 160	331 216	5.3 4.0	8.2 5.3	5.2	2.4

Source: ECA, 2003

Box 3.12**Irrigation in Africa**

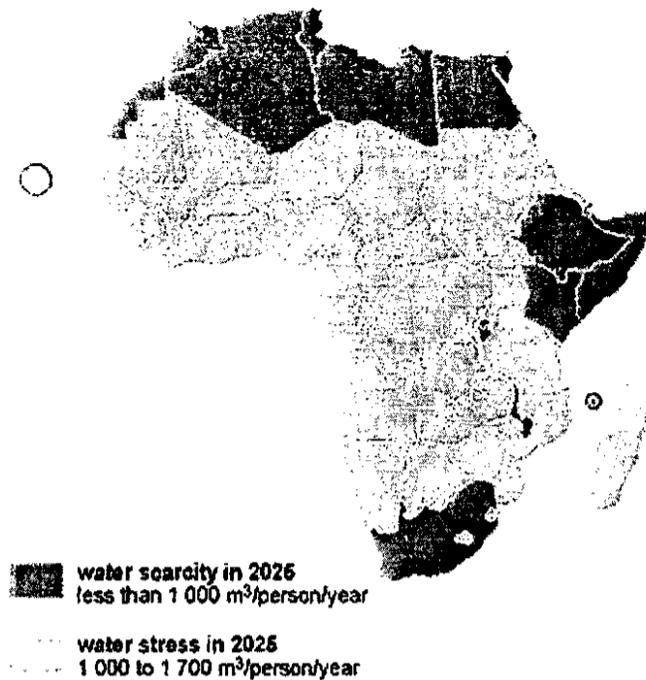
In North Africa, expansion of irrigated areas is expected to continue in some countries such as Morocco and Tunisia to supply internal and external markets. Between 1990 and 2003, Tunisia recorded increases in irrigated land as a percentage of arable land as follows: 1990: 6.2 per cent (330,000 hectares); 1995: 6.9 per cent (330,000 hectares); 1996: 7.8 per cent (380,000 hectares); and 2003: 8 per cent (385,000 hectares). The objective is to further increase this value to 8.38 per cent (400,000 hectares) by 2006 (Ennabli, 2005).

In Ghana, irrigated agricultural land remained fairly stable between 1990 and 2002, occupying an average of 0.3 per cent of the total land area (Baah-Nuakoh and Twerefou, 2005).

Irrigation in Zambia is under-developed, despite the country having about 45 per cent of the water resources of Southern Africa. Of the 39 million hectares of arable land, only about 50,000 hectares was irrigated in 1994 increasing to 100,000 hectares in 2002. This interprets to less than 0.005 of per cent of arable land.

Source: Aongola, (2005)

Map 2.17 Water stress and water scarcity in the year 2025



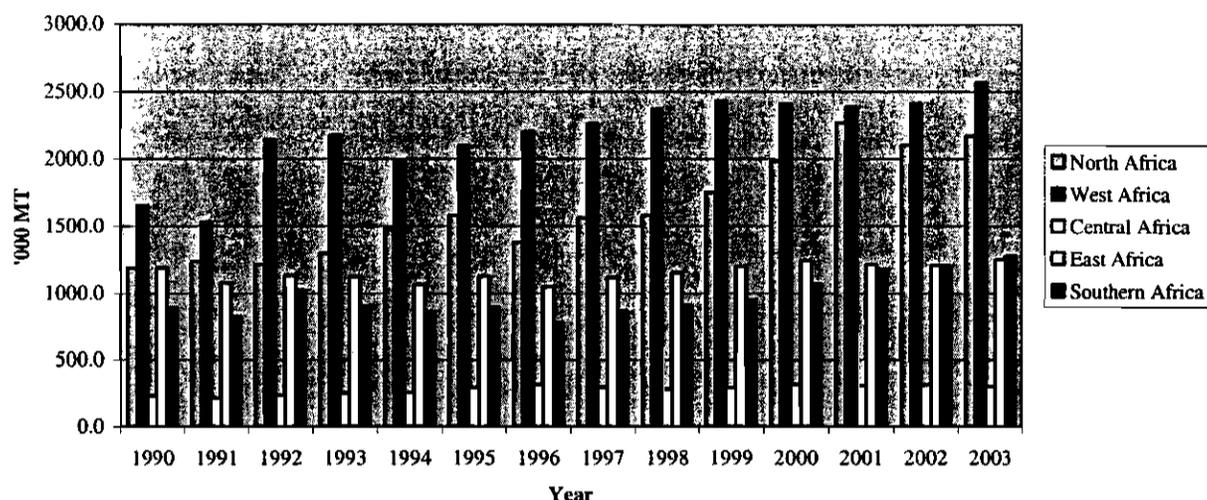
Source: Johns Hopkins 1998 in GEO, 2000, <http://www.grid.unep.ch/geo2000/english/img61a>

7. Coastal and marine environment

Oceans, seas, islands and coastal areas form an integrated and essential component of the Earth's ecosystem and are critical for global food security and for sustaining economic prosperity and the well-being of many national economies, particularly in developing countries (JPOI, paragraph 30). The African coastal zone supports a diversity of habitats and resources, encompassing mangroves, rocky shores, sandy beaches, deltas, estuaries and coastal wetlands, coral reefs and lagoons (UNEP, 2002^a). These ecosystems contribute significantly to the livelihoods of coastal communities and to national economies. These resources also have intrinsic value including shoreline stability, beach enrichment, nutrient generation, recycling and moderation of pollution.

The economic activities in the coastal and marine environment range from fishing, agricultural activities, tourism, oil and mineral mining and infrastructure development. According to the NEPAD Action Plan for African Fisheries and Aquaculture Development, Africa currently produces 7.31 million tons of fish each year. Of these 4.81 million tons is from marine fisheries, and 2.5 million tons from inland fisheries. Figure 2.17 shows fish production by sub-region in Africa. Aquaculture has risen, but slowly, and only in Egypt has growth achieved rates of increase seen in other parts of the world, rising from 85,000 tons in 1997 to over 400,000 tons in 2004^{xiii}.

Figure 3.17. Total Fishery Production in all Fishing Areas (in'000 MT)



Coastal areas in Africa are experiencing rapid population growth due to the highly diverse and attractive resources of the coastal and marine environments. It is estimated that over 40 per cent of Africa's population derives its livelihood from coastal and marine ecosystems and resources – a percentage that will continue to increase with current migration and demographic patterns. According to FAO (2001), more than half the coastal zones in most regions are already moderately to highly at risk of being threatened from human activities. In Africa, the figure stood at 52 per cent. The World Bank estimates that by 2025, the coastal zone from Accra to the Niger Delta could be an unbroken chain of cities with a total population of 50 million along 5000 km of coastline^{xiv}.

These activities result in various forms of resource degradation. Pollution, resulting from direct discharges and spillage of both solid and liquid wastes, is a common occurrence in the coastal and marine environment. Other forms of resource degradation are removal of coastal natural vegetation such as mangroves, destruction of offshore barriers such as coral reefs. This affects oyster-farming, artisanal fishing and marine fish production (ECA 2001a). Due to over-fishing by foreign fleet and destructive harvesting methods, the region is also experiencing a decline in its fish stock. This loss, combined with population growth, imposes a negative impact on the levels of per capita fish consumption in sub-Saharan Africa, and, increasing food insecurity. The expected impacts of climate change and sea level rise in particular, will exacerbate the present problems. These phenomena could impair future development and use of low-lying areas and coastal zones and cause setbacks in Africa's efforts to achieve sustainable development (GOOS, 1998, in ECA, 2001a).

III.5 Institutional sustainability

Institutional sustainability is an imperative for achieving sustainable development in Africa. The preceding sections demonstrate the linkages and interdependency between the economic, social and environmental dimensions of sustainable development. Therefore, the attainment of sustainable development requires a balanced integration of these three dimensions. But this needs to be done within an environment of well-defined and responsive institutional and strategic frameworks. Against this backdrop, this section discusses institutional arrangements at global, regional and national levels, for coordinating the implementation of the sustainable development agenda in the region that takes into account the JPOI, MDGs, ICPD-PoA and NEPAD. It also briefly touches on international treaties of immediate relevance to sustainable development, as well as governance regimes.

Institutional arrangements at the different levels should be seen as mutually supportive. Regional and sub-regional bodies can help bridge the gap between global agreements in sustainable development, and national priorities and concerns being articulated by national-level institutions. The experiences of local-level institutions help inform policy formulation and implementation processes at the national level.

1. Global level

The United Nations Commission on Sustainable Development (UNCSD) was established by UNCED. Its main function is to monitor progress in the implementation of Agenda 21 and related activities. The WSSD called for the strengthening of UNCSD and emphasized that the body should serve as a forum for consideration of issues related to the integration of the three dimensions of sustainable development.

The UNCSD coordinated the preparations for the WSSD at the global level. At its eleventh session following the Summit in September 2002, it adopted a 10-year programmatic cycle for the review of progress made in the implementation of the outcomes of the Summit, organized around key thematic areas and crosscutting issues. Since then, it has organized review and policy sessions based on the programmatic cycle, with the involvement of all Regional Commissions. Other organs of coordination on issues related to sustainable development at international levels include the Commission on Population and Development, and the Commission on Social Development.

The Millennium Declaration acknowledges a number of international conferences and conventions whose implementation would be part and parcel of efforts made to meet the targets of the MDGs in the medium term, and sustainable development in the long-term. Similarly, the ICPD-PoA states that its implementation must be part of an integrated follow-up effort to major international conferences that preceded it, but which extend to the conferences that took place later, such as WSSD. Hence, institutional mechanisms discussed in this section with reference to a particular international framework, are also relevant to others.

2. *Regional and sub-regional*

At UNCED, it was recognized that regional and sub-regional cooperation is important for the implementation of the outcomes of the Conference. In this regard, the Regional Commissions of the United Nations and other regional institutions were called upon to inter alia, promote the integration of environmental concerns in regional and sub-regional development policies. Regional bodies were also requested to consider improving regional and sub-regional consultative processes to facilitate the exchange of data, information and experience in the implementation of Agenda 21. At the WSSD, Regional Commissions were tasked with facilitating and promoting a balanced integration of the economic, social and environmental dimensions of sustainable development into their work, and into the work of regional, sub-regional and other bodies. Furthermore, it was indicated that this could be done by facilitating and strengthening the exchange of experiences, including national experiences, best practices, case studies and partnership experiences related to the implementation of Agenda 21.

In the context of the mandate given to it, and in conformity with its status as the overall UN regional arm in Africa, ECA has played, and continues to play, an important role in the region regarding the implementation of the international frameworks aimed at sustainable development. In 1997, the Ministers responsible for Economic and Social Development and Planning in Africa established the Committee on Sustainable Development (CSD), now referred to as the Africa-CSD. Since then, a number of institutional strengthening measures have been taken at the Ministerial, Committee and the Commission levels to enable ECA respond adequately to this mandate and, implicitly, the mandates from other related international frameworks.

ECA works in partnership with a number of regional and sub-regional bodies including UN agencies operating at the regional level to support African countries in the implementation of the sustainable development agenda. The African regional bodies include the African Union (AU) and the African Development Bank (AfDB); while the sub-regional bodies include the Regional Economic Communities (RECs).

The AU's mission is to promote accelerated socio-economic integration of the continent, which will lead to greater unity and solidarity between African countries and peoples. The Union is supported by many Organs and specialized Technical committees in the execution of this mission. NEPAD was adopted as a programme of the AU at the Lusaka Summit in 2001^{xv}. African leaders are helping the organization to make it an effective organization, not only by providing it with additional resources, but by ensuring that it conducts its affairs competently, procedurally and transparently. The Union has made key changes in the way it leads the resolution of conflicts and managing peace building in war torn and conflict countries. Key organs of the Union have been reinforced in terms of their mandates, budgets and leadership (Nkuhlu, 2005).

The NEPAD Secretariat was established among other things to coordinate the implementation of the regional framework for sustainable development. With the support of UN Agencies and other development partners, the Secretariat has elaborated Action Plans in key areas. The RECs are the implementing bodies of NEPAD. They have been involved in the design and implementation of programmes and sub-regional projects. Capacity building and enhancement, particularly of RECs, should be pursued to enable these sub-regional institutions contribute effectively to the implementation process. For instance, the African Capacity Building Foundation is conducting capacity building needs assessments for all RECs.

Many African countries have taken steps to create national NEPAD focal points for co-ordination, monitoring and integrating NEPAD programmes and their national development plans at the country level. Examples of these countries include Algeria, Rwanda, Nigeria, Mozambique, South Africa, Senegal, Ghana, Kenya and Gabon. These countries have designated ministers or set up ministries as focal points for NEPAD in their respective countries. The NEPAD Secretariat is supporting the national structures through workshops and other forms of interaction (NEPAD Secretariat, 2004b).

African Civil Society Organizations have over the years, become more involved in sustainable development issues. The Informal Regional Network of African NGOs was launched in 2002 to provide NGOs with the necessary tools to contribute to the work of ECOSOC, operationally and by adding a broad-based NGO perspective to the deliberations of that body. The WSSD process served as a valuable lesson for African CSOs on the need to be better organized in terms of pushing the continental agenda forward. (NESDA/WSSD Civil Society Secretariat, 2003). The Forum for African Civil Society on Sustainable Development (FACS-SD), which was launched in October 2003, is a valuable partner in articulating the needs of Africa, and in paving the way to sustainable development on the continent. The Forum is recognized as ECA's entry point to civil society organizations working on sustainable development-related issues on the continent. With regard to civil society involvement in the NEPAD process, the NEPAD Secretariat continues to interact with civil society groups at various levels. A civil society desk has been established at the NEPAD Secretariat to provide a one-stop focal point for civil society (NEPAD Secretariat, 2004b).

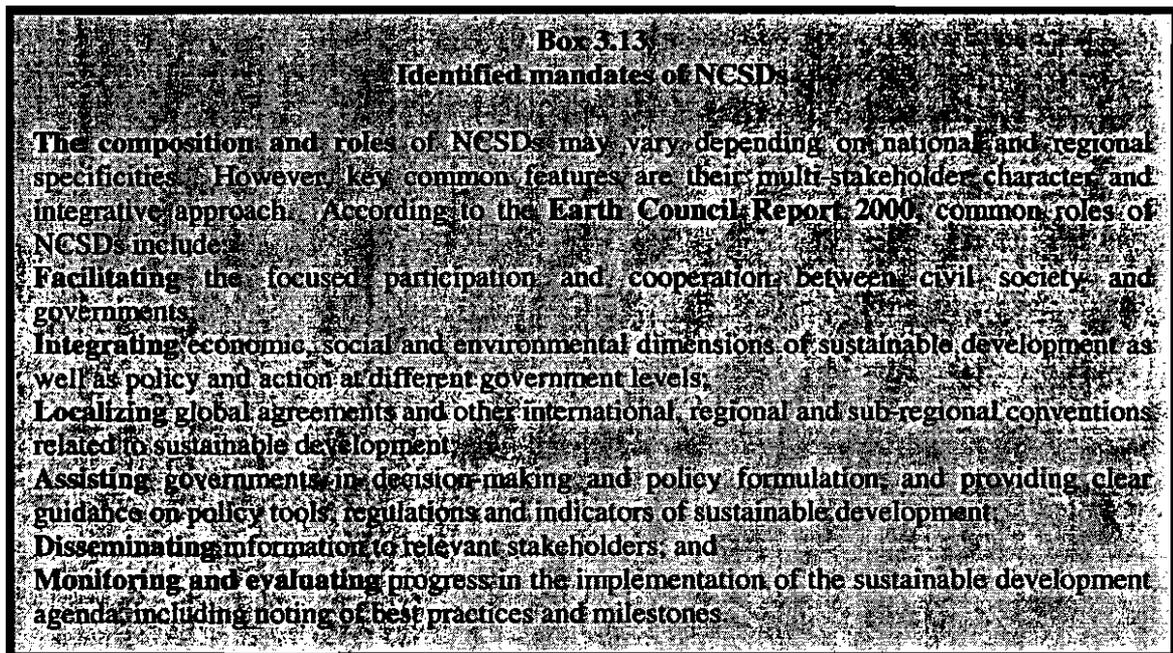
The proper and sustainable operationalization of the respective mandates of the regional and sub-regional bodies calls for capacity strengthening as well as fostering links and partnerships. It is, therefore encouraging to note that UN Offices operating in the region as well as the AfDB, have been working closely with the Commission to enhance regional and national implementation of sustainable development activities.

3. National level

Effective national-level implementation of the sustainable development agenda is key to the attainment of agreed goals and targets. In this regard, Chapter 38 of Agenda 21 invites States to consider setting up national coordination structures responsible for the

follow-up of its programmes, otherwise known as National Councils for Sustainable Development (NCSDs). And, WSSD recommended that States should continue to promote coherent and coordinated approaches to institutional frameworks for sustainable development at all national levels.

NCSDs should have a clear mandate, which takes into account the three dimensions of sustainable development as well as the broad, and cross cutting nature of issues in a holistic and integrated manner (Box 3.13). This mandate should be reflected in the activities of the NCSDs. Furthermore, NCSDs should be located at an appropriate level within the government administrative structure in order to promote consensus building and holistic and integrated development. In keeping with the subsidiarity principle, NCSDs should be decentralized to levels that provide the appropriate setting for addressing sustainable development issues.



ECA recently completed a study that assessed the functioning of NCSDs in its member States. The study revealed that almost all African countries have established NCSDs to coordinate the implementation of the sustainable development agenda. However, there is a lot of environmental bias with regard to institutions established, and their operations. Countries, to varying degrees, have instituted coordinating and collaborating mechanisms as well as decentralized structures, and several more are in the process of establishing these. Stakeholder participation has been institutionalized in most countries. Some success stories have been registered, but setbacks have derailed the implementation process, and many threats are looming. Inadequate capacities (human, financial and institutional) remain the biggest constraint. However, countries are aware of many opportunities that exist, and many African regional and sub-regional bodies as

well as development partners continue to support the efforts of countries in the realization of their sustainable development objectives.

The NCSD study also revealed that African countries have adopted different combinations of policies, strategies and plans, to address sustainable development issues. The variation in combinations is an indication of the different perceptions that countries have of sustainable development. Policies, strategies and plans listed by the survey countries include those addressing national and rural development (Vision 2020s; National and Rural Development Plans); poverty (including PRSPs); environment; natural resources; agriculture; social issues; economic development; and sustainable development in the broad sense. Seventy-five per cent of countries that have adopted PRSPs have included them among their lists of sustainable development strategies. Zambia provides a good example on this subject (Box 3.14).

Box 3.14

Meeting sustainable development goals and objectives through the PRSP, long term vision and sectoral policies and strategies in Zambia

The PRSP is, perhaps, the strategy that came near to the equivalent of a NSSD if it were not for its medium-term nature. The PRSP applies a multi-dimensional perspective to fighting poverty. Top premium is placed in measures designed to stimulate economic growth on the understanding that it is impossible to fight poverty under a stagnant economy. The key sectors identified in the PRSP are agriculture, tourism, mining and manufacturing. Education, health and HIV/AIDS are identified as key areas for increased investment in order for the country to make progress in the sphere of social development. Environment is one of the cross-cutting issues identified. The PRSP also integrates the MDGs. The preparation of the PRSP was broad-based, drawing representatives of major groups from all over the country in the consultations that led to its preparations and in its implementation.

Together with the 5th NDP (National Development Plan), the Government has decided to prepare a National Long Term Vision (NLTV) or Vision 2030. This will set the horizon for developing the medium-term plans and also provide the gravitational pull to achieve long-term objectives. Both the 5th NDP and NLTV have taken planning to the district level in line with the Decentralization Policy adopted by Government in 2003. This policy aims to devolve service delivery from central government to district level. In this way, it is believed, participation of the people in planning and implementation of programmes will facilitate better and sustainable development processes.

Policies addressing various sectors and thematic areas have been developed and are at various stages of implementation. These policies are meant to guide implementation of programmes by various stakeholders and guide expenditure of public finances. However, the level of implementation of these policies varies from sector to sector, but is generally constrained by inadequate institutional capacities, lack of resources and enabling legislation.

Source: Aongola (2005)

Countries are also integrating sustainable development principles and concerns into national development plans. Furthermore, many countries have incorporated or are in the process of incorporating global agreements including the MDGs, ICPD-PoA goals and targets and the JPOI, into their various national development plans and/or sectoral strategies. Actions undertaken by the Southern Africa sub-region are particularly encouraging and should motivate countries in other sub-regions to do the same (Table 3.2).

Table 3.2
Actions to integrate the WEHAB initiative, MDGs and the JPOI into policies, strategies and plans

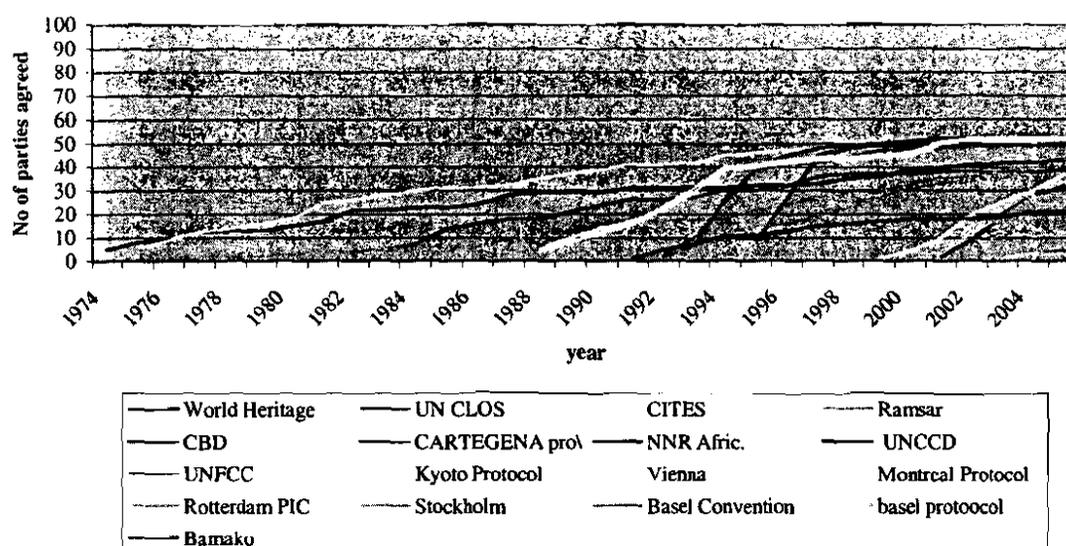
Actions Taken	Countries
Consultations that led to the drafting of response strategies	Lesotho, South Africa, Zimbabwe
Consultations began or underway	Cameroon, Egypt ^w , Kenya
Currently being integrated in national strategies and visions under preparation	Botswana, Mozambique, Nigeria, Swaziland ^w
Already integrated in national and sectoral strategies and national visions	Algeria, Ethiopia, The Gambia, Ghana, Malawi, Mauritius, Morocco, Namibia ^w , Seychelles, Tanzania

^w = Focus on the WEHAB Initiative. Source: ECA, 2005b.

4. International treaties relevant to sustainable development

Many international treaties provide legal frameworks for sustainable development governance at the global level ranging from economic, social and environmental issues. Together, they represent the collective will of States to pursue the path towards sustainable development. But signing the frameworks without political commitment to effectively implement the actions falls short of the international vision to progress towards sustainable development. For example in relation to Multilateral Environmental Agreements (MEAs), in spite of their increasing ratification by African countries, the region's environment continues to deteriorate (Figure 3.18). This may be an indicator of the low level of implementation of these agreements.

Figure 3.18. Number of parties signing international conventions, 1974-2005



5. Governance regimes

In the case of governance, more countries are increasing space for popular participation in electoral processes; giving more rights to minority and marginalized groups (e.g. women, children, disabled and elderly); making governance institutions more inclusive along ethnic, religious, racial and gender lines; promoting commitment towards macro-economic stability, accountability, resource mobilization, reform of financial and monetary institutions, and trade liberalization; adopting reforms that facilitate private sector development such as macro-economic stability and transparency, political stability, and peace and security; and embracing conflict resolution mechanisms. All these are institutional developments, which, if strengthened, will create beneficial linkages to policies, programmes and strategies focused at the achievement of sustainable development.

But most of these institutional and strategic developments happened just recently or are just happening, and fall largely outside the period covered by the indicators used for analysis in this report. It is therefore expected that these developments will set the platform for Africa's future concerted effort for progress towards sustainable development. But the lessons learned from country experiences indicate that there is a need for effective institutional empowerment, capacity building and resources (see Box 3.15 on Zambia). As long as institutions exist only in name without being operationalized, Africa's progress towards sustainable development will remain doubtful.

Box 3.15

An example from Zambia on institutional challenges

During the years of central planning up to early 1990, there existed a planning commission in the name of National Commission for Development Planning (NCDE). NCDE was abolished in 1994 and with it went all the capacity and experiences on planning amassed over three decades. In its place are institutions including the Policy Analysis and Coordination Division (PAC) at Cabinet Office and Development Coordinating Committees at national (NDCC), provincial (PDCC) and district (DDCC). These were established to improve coordination of development activities and provide an establishment framework to manage and report on development programmes from national to district levels. DDCCs and PDCCs have been relatively well established in the country with the support of donors. However, it is the NDCC that has not been functional, therefore defeating the whole idea of building linkage from national to district levels. In addition, the capacity of districts is constrained by lack of resources, human resources capacity and the legal mandate for district strategic planning.

Source: Aongola (2005), p.

III.6 Linkages

Linkages operate in complex vicious and virtuous ways that impact differently on development. The report of the Commission for Africa (2005: 15-16), for example, highlights ways in which various factors causing under-development (political, structural, human and environmental) interact, often in a complex and inter-locking cycle. For example: there can be no development without peace and security; at the same time, development, which reduces poverty and inequality, is a prerequisite for maintaining peace and security. Equally, a weak and poorly educated workforce cannot contribute to strong economic growth, but strong growth is needed to generate the funds to invest in health and education. Addressing these vicious circles often requires a comprehensive “big push” on many fronts at once. This points to the need to explore the status of indicators in various sectors and tease out the linkages among different factors in a particular sector and across sectors.

The linkages between the dimensions of sustainable development are well demonstrated when strategies for meeting different development challenges are discussed. In this section a number of examples are provided on selected sectors, or across sectors, and an attempt is made to devise simple comparative indices taking the linkages into account.

1. Selected examples

Summarizing the regional perspectives from the thirteenth session of the Commission on Sustainable Development (CSD), the International Institute for Sustainable Development (IISD) reported that CSD raised the following the key issues: the challenges faced in

achieving the MDGs for water, sanitation and human settlements; the importance of partnerships; pressures caused by rapid urbanization in developing countries; and the need for capacity building, technology transfer and financial support (IISD, 2005). Other issues raised include those relating to agricultural, industrial and domestic water demand, water use and efficiency; good governance; integrated management of water resources, water stress, wastewater treatment and reuse, trans-boundary water issues, the need to scale up sanitation programmes, the growth in urban slums, and security of land tenure. This indicates recognition of the linkages across various sectors.

In dealing with health issues, especially the challenges posed by malaria, it is argued that ministries of health should concentrate on their stewardship role by strengthening their planning, analytical, and public health expertise. Adequate human and financial resources should be directed at anti-malaria interventions and the development of rationale for persuading other governmental agencies to join in this effort. Ministries such as agriculture, trade, mines, education, and finance are likely partners in malaria control. Such inter-sectoral collaborations are strengthened greatly when elements of the private sector, such as philanthropic organizations and various industries (such as oil and mining) are included (UN Millennium Project, 2005a). Sustainability requires strategies designed to eliminate transmission in those sites that potentially generate wealth or that may promote social development. Wealth-generating sites include those that are devoted to tourism, mining, manufacturing industries and port facilities; while social development sites are schools and administrative centers (UN Millennium Project, 2005a). Moreover, instruction on appropriate malaria-related issues (prevention and treatment) should be incorporated into the curricula of health-related schools (those devoted to medicine, nursing, or sanitation) and schools devoted to agriculture, water resources, and civil engineering. In addition, such material should be included in primary, secondary, and vocational schools (UN Millennium Project, 2005a).

It is, therefore, clear that the range of sectors required for involvement in meeting the challenge posed by malaria is wide. The sectors mentioned in this brief example include health, agriculture, trade, mining, education, and finance, tourism, industry, transport and public administration. They reflect a rich mix of policy and programmatic linkages that would normally be required to meet any identified development challenge.

Poverty is the prime mover of the vicious cycle that stifles men and women's aspirations (UNIFEM, 2004). The poor have less education, less health care and more exposure to HIV/AIDS and unsafe living conditions, all of which make it more difficult for them to improve their conditions. The gender dimension shows that women suffer all this as well as discrimination, and this increases their burden immeasurably. In fact, there are seven key constraints to women's efficient role as resource managers: heavy labor burdens; economic constraints; land tenure bias and legal injustices; lack of institutional support; technological inadequacy; policy and power inequalities; and natural resource degradation (ECA, 2001b).

These constraints play a major role in many African women's daily activities. The heavy burden of fetching water and fuel wood is on women. It is a highly demanding task which reduces the time they have left to spend on farming, income-generating activities, and family care, while exposing them and their families to health risks (ECA, 2001b). The tasks increase the demand for child labor and adversely affect child welfare, leading to child morbidity and mortality. Consequently, providing solutions to these development constraints would require comprehensive policy mixes. For example, policies reducing the proportion of time that women spend on fuel wood and water collection would contribute to the transition to increased agricultural productivity and efficient management of natural resources; the enhancement of the status of women if they are simultaneously implemented alongside those on food security, sustainable management of natural resources, and gender equity, equality and empowerment (ECA, 2001b)

Elsewhere, in this report, it has been demonstrated that, in general, countries with high fertility rates, high population growth rates, high rates of urbanization, low life expectancy, high infant mortality rates, and high maternal mortality, are the same countries with deep-seated poverty. This suggests that these factors, as expected, are cross-linked.

Linkages go beyond any particular sector. In the case of the social sector, the inter-linkages extend to the environmental and economic sectors. For example, in the Sahel region of West Africa, pressures on natural resources are unprecedented in history. Forest and woodland areas are declining by an estimated 1 per cent per year, while population grows at 2.8 per cent per year. Some of the consequences of this inter-linkage are the growing lag between food production and food needs, and increasing environmental degradation (ECA, 2005b). This calls for policies and programmes aimed at striking a balance between increased agricultural production and sustaining the natural ecosystems.

In agriculture, low productivity, deteriorating terms of trade, and increasing population with a labor force in agriculture still around 70 per cent have deepened poverty in the continent. On the other hand, increasing population pressure, expansion of cultivation into marginal lands, and increased user fees for basic social services have resulted in accentuated land degradation (Tutu, 1992).

The fact that Africa continues to depend on primary products most of which are not processed and whose prices continue to fall relative to manufactured products, implies that the continent's ability to earn foreign exchange for development continues to fall; food insecurity continues to exacerbate; and increased exploitation of the natural resources without significant in-depth processing leads to their fast depletion, environmental degradation and inability to increase employment.

The downward slide or stagnation in many areas of sustainable development will continue to bedevil Africa unless concerted effort is made to adopt and implement policies, programmes and strategies that are simultaneous and consider appropriate linkages. Successful efforts should consider appropriate policy and programme linkages to increase consumption enhance health, education, and citizenship rights; reduce inequality, appropriately upgrade and conserve the capital stock (including the environment); advance knowledge; and build durable and efficient institutions (ECA, 2002).

2. *Indices*

In this section, an attempt is made to devise simple indices to enhance the comparative discussion of countries in the region as they grapple with sustainable development challenges. The indices largely stress the linkages among the three dimensions of sustainable development. Following Agenda 21, frameworks that seek to integrate economic, social, and environmental indicators, and take into account the precepts of sustainable development, became more popular^{xvi}. For example, the OECD promoted the development of the Pressure-State-Response (PSR) framework for the state of the environment report. This was primarily in response to its Council's request to integrate environment into economic decision-making and to help member countries improve on their collective performance in environmental management (OECD 1993)^{xvii}. According to the OECD, the PSR is based on the concept of causality "human activities exert pressures on the environment and its quality and the quantity of natural resources [state]. Society responds to these changes through environmental, general economic and sectoral policies [response]. The latter form a feedback loop to pressures through human activities. In a wider sense, these steps form part of an environmental (policy) cycle which includes problem perception, policy formulation, monitoring and policy evaluation" (OECD 1993 p. 5).

The PSR framework distinguishes three types of indicators, viz; indicators of environmental pressures, (i.e. human activities, trade and consumption exerted on the environment, including the quantity and quality of natural resources); indicators of environmental conditions relating to the state of the environment and to the quality and quantity of natural resources; and indicators of societal response reflecting collective and individual efforts in tackling environmental problems and concerns.

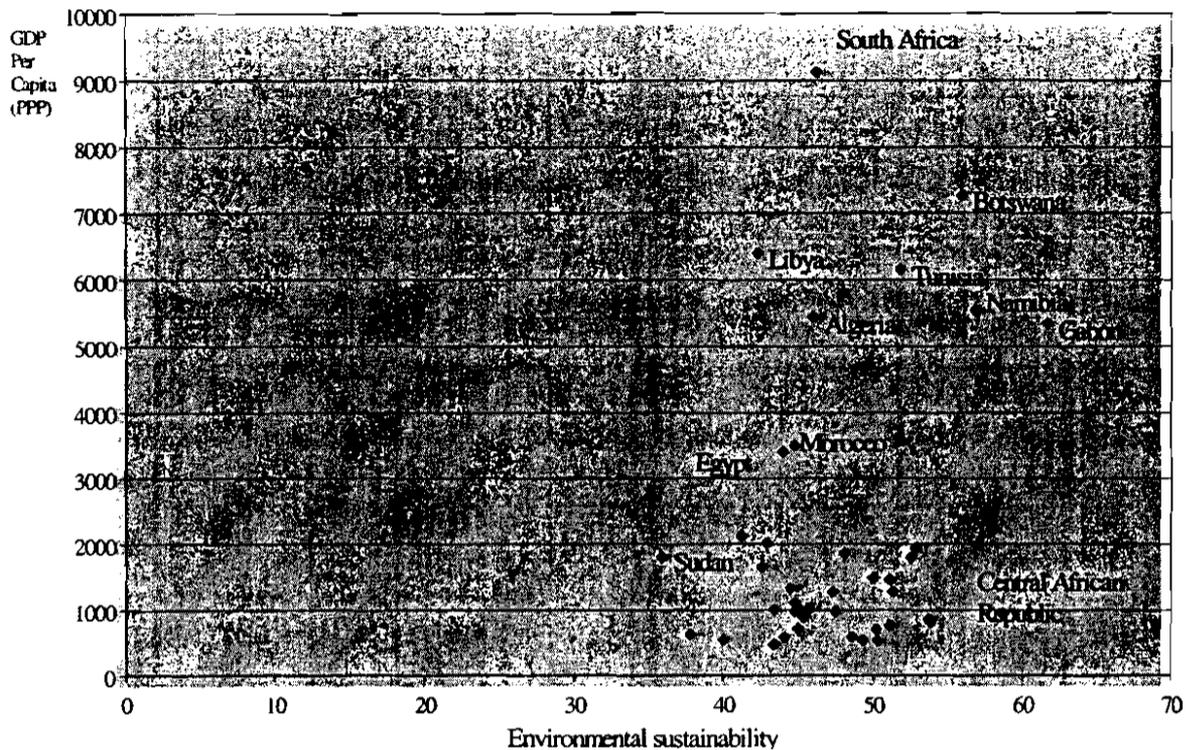
Other examples include the Environmental Sustainability Index (ESI) and the Sustainable Development Index (SDI)^{xviii}. The former was developed jointly by Yale Center for Environmental Law and Policy, Yale University, and the Center for International Earth Science Information Network, Columbia University. The latter was produced by the Millennium Project of the American Council for the United Nations University as a supplement to its well-known State of the Future Index. The selection of the ESI and SDI for review is primarily because of their relevance, statistical robustness and technical capacity to integrate the dimensions of sustainable development. Moreover, their frameworks include indicators and sub-indices for most of the African

countries. The ESI for year 2005 is statistically rigorous focusing on quantification of environmental issues. The review highlights the frameworks and methodologies, briefly presents indicators and results for African countries, and pinpoints the strengths and weaknesses of each one of them.

Examining the components of the ESI, on the average, the African countries scored very low on reducing human vulnerability, and low on social and institutional capacity. In other words, the progress of countries towards achieving environmental sustainability in Africa is generally hampered by human vulnerability, and lack of social and institutional capacities to foster effective response to environmental challenges. Countries need to invest in these spheres so as to improve their environmental sustainability. Interestingly, African countries have scored above average on global stewardship component of the ESI, primarily because of their low contribution to pollution and emissions, and high participation in international environmental agreements.

Mapping environmental sustainability against economic performance reveals some interesting contrasts. The economic performance in Africa measured in terms of GDP per capita (PPP), is generally low. Most of the African countries are clustered below 2000 (PPP\$) GDP Per capita, yet at this cluster the countries vary considerably in terms of environmental sustainability (Figure 3.19). Below this level of income, the ESI values range between 58.7 for the Central African Republic and 35.9 for the Sudan. The Republic of South Africa has the highest income level in Africa, yet its ESI is much lower than that of Gabon and the Central African Republic. These results indicate lack of clear relationship between income and environmental sustainability. Notwithstanding these results, sustained economic growth is highly important for institutional and capacity building.

Figure 3.19. Relationship between economic performance and environmental sustainability



In this chapter, attempts have been made to use the HDI, HPI (international), the Overall Sustainability Index (OSI) to bring convergence to the discussions being made on issues such as poverty. The common trait among all the indices is a lack of data. For example, not all countries are covered in the HDI and the HPI, and as far as ECA in-house indices are concerned, all of them, except the one on regional integration, have been developed using fewer than the 53 member States in Africa.

As presented in Chapter II, using two or more of a number of selected variables in combination, five simple indices have been developed (Annex 3.1) and summarized in Table 3.3 for selected countries. The findings show that the North African countries (excluding Mauritania and Sudan) together with selected sub-Saharan countries such as Seychelles, Mauritius, and South Africa, consistently appear among the top performers. On the other hand, Chad, Eritrea, Ethiopia and Somalia are consistently among the low performers.

Table 3.3
Performance on selected indices introduced in Chapter 2: The lower the index the lower the pressure (ranging from 0 to 1)

Indices				
PPSI	STBI	SEI	PSTBI	SETBI
Top 10 (Low pressure) Countries				
Seychelles(.075) Mauritius (.075) Tunisia (.113) South Africa(.113) Zimbabwe(.132) Swaziland(.151) Algeria(.170) Morocco(.189) Egypt(.226) Libya(.226)	Libya(.038) Seychelles (.047) Tunisia (.057) Egypt (.085) Mauritius (.094) Algeria (.094) Morocco (.142) South Africa (.226) Cameroon (.255) Gambia (.292)	Seychelles (.028) Libya (.038) Mauritius (.066) Algeria (.104) South Africa (.104) Tunisia (.113) Equatorial Guinea (.132) Egypt (.142) Djibouti (.208) Morocco (.217)	Seychelles (.075) Tunisia (.088) Mauritius Algeria (.101) Libya (.145) Egypt (.157) Morocco (.170) South Africa (.170) Botswana (.182) Cameroon (.277)	Libya (.031) Seychelles (.044) Tunisia (.088) Mauritius (.094) Algeria (.101) Egypt (.113) South Africa (.176) Morocco (.189) Equatorial Guinea (.226) Gabon (.321)
Bottom 10 (High pressure) Countries				
Sierra Leone(.755) Comoros(.764) Benin(.792) Ethiopia(.821) Somalia(.868) Congo(.887) Burkina Faso(.887) Niger(.934) Chad(.962) Eritrea(.972)	Congo (.736) Chad (.736) Liberia (.745) Sierra Leone (.745) D R Congo (.754) Mozambique (.774) Togo (.774) Eritrea (.802) Ethiopia (.849) Somalia (906)	Comoros (.792) D R Congo (.792) Liberia (.811) C A Republic (.821) Eritrea (.821) Niger (.877) Somalia (.877) Burkina Faso (.906) Chad (.991) Ethiopia (.991)	Burundi (.717) Uganda (.730) Togo (.742) D R Congo (.742) Congo (.767) Ethiopia (.780) Chad (.805) Sierra Leone (.824) Eritrea (.868) Somalia (.906)	Sierra Leone (.717) Togo (.723) C A Republic (.730) Burundi (.748) Eritrea (.767) Liberia (.767) D R Congo (.780) Chad (.824) Ethiopia (.893) Somalia (.912)

Population Pressure on Sanitation Index (PPSI); Sanitation TB Index (STBI); Sanitation Energy Index (SEI); Population Sanitation and TB Index (PSTBI); and Sanitation Energy and TB Index (SETBI). Figures between brackets show index values. *Source: Data extracted from SDR Database, ECA 2005.*

These findings support the results discussed in earlier sections. The five North African countries and South Africa usually perform better than most of the countries in the rest of Africa, while countries in the lower ranks usually include those largely from Central, East and West Africa. Overall, one may conclude that lack of change or marginal

changes in development indicators are due to development efforts being partly thwarted by high population growth rates. This constraining pressure is augmented by political instability, natural disasters such as drought, conflicts and the scourge of HIV/AIDS.

Annex 3.2 provides the indicators used in this sub-section. These indicators will contribute to the benchmark indicators set at or around 2002 that will be used in monitoring and evaluation, as well as tracking progress in future reviews. They will also provide the primary foundation for the development of further indices, and the construction of an African Sustainable Development Index (ASDI) in the future.

III.6 Conclusions, recommendations, policy implications and the way forward

1. Social sustainability

The findings so far made in this thematic area reflect a stagnant, and, sometimes, declining levels of quality of life and the social environment. Very few countries show positive signs of progress in status of indicators; and this signals that there is need for concerted effort to effectively implement policies, programmes, strategies and related instruments that have already been adopted to facilitate sustainable development or, where these do not exist, the need for their formulation, adoption and aggressive implementation. This is an imperative if African countries have to achieve the targets set in the MDGs and related international and regional frameworks. Moreover, countries have also made concerted efforts to adopt and implement population and reproductive health policies. But the expected outcomes of such policies and programmes are often largely thwarted by HIV/AIDS, the persistence and resurgence of TB and malaria, as well as deepening poverty.

Therefore, in dealing with the environmental, social and economic dimensions of sustainable development, a number of issues should be dealt with; and in doing so, the following would be useful pointers to the way forward in the social sector:

- Treatment of all the three dimensions of sustainable development as equally important;
- Taking an inter-sectoral approach in dealing with identified challenges;
- Identifying all interested stakeholders and involving them in the planning, policy-making, programming and implementation processes;
- Adopting policies, programmes, strategies and related instruments with a focus to achieving sustainable development;
- Making concerted effort to implement policies, programmes, strategies and related instruments after they are adopted;

- Establishing and building capacity of institutions for implementation, monitoring and evaluation;
- Building databases for monitoring, evaluation and impact assessment;
- Setting up coordination mechanisms to reduce duplication of effort and create beneficial linkages;
- Promoting political will and commitment, including good governance; and
- Promoting useful national, regional and international partnerships.

2. *Economic sustainability*

The findings on economic sustainability reveal that although some selected countries have experienced notable economic growth rates, the situation for Africa as a whole is still poor. In support of this, information from the ADB African Development Report of 2004 shows that many African countries have faced difficulties in sustaining high growth rates, resulting in great variability in economic growth rates from year to year. ECA's 2005 Survey of Economic and Social Conditions notes that investment in Africa is generally low. It barely exceeded 20 per cent of GDP during 2000-2002. The low level of investment is partly due to the low savings rate in the region. On average, Africa had a savings rate of 21.1 per cent of GDP during 2000-2002. The low level of domestic savings deepens dependency on external aid and renders African countries vulnerable to the volatilities of FDI and ODA flows.

It is hoped that the debt forgiveness by the G-8 to 14 African countries and Nigeria's debt forgiveness by the EU, will pave the way for all African countries debts to be forgiven. It is also hoped that undue conditionalities will not be placed in the way of access to the funds. The commitment of the OECD countries to increase their level of ODA to developing countries will be another contribution to the sustainable development of Africa.

3. *Environmental sustainability*

The analysis shows that Africa's environment is continuously being degraded. Africa is increasingly experiencing climatic variability and extreme events such as floods and droughts. Furthermore, Africa is most vulnerable to the impacts of climate change because widespread poverty limits its adaptation capabilities. Air pollution is on the increase due to the use of obsolete technology in industry, the number of old vehicles on African roads and the use of biomass and other fuels in open fires, or poorly functioning stoves.

An increasing number of African countries are facing problems of land degradation and desertification mainly caused by climatic variability and poor land management practices. Africa's forests are under threat across the entire continent. Africa has the fastest rate of deforestation anywhere in the world. Africa's biodiversity is also under threat from natural habitat loss, loss of species, invasion by alien species, and lack of recognition of indigenous knowledge and property rights.

The variable and uneven distribution of water resources in Africa combined with the region's rapidly growing population, current state and pace of development and urbanization together pose significant challenges to meeting water needs. The low levels of development and exploitation of the water resources in spite of the growing demand, compound this. As a consequence, water scarcity and stress are projected to increase. The coastal and marine environments of Africa are continuously being degraded because their highly diverse and rich resources attract a rapidly growing population, that exploit these resources in an unsustainable manner.

4. Policy responses

Countries have adopted and are implementing environmental action plans as well as strategies addressing land degradation and desertification, biodiversity and climate issues. Some countries have also adopted Integrated Water Resources Management (IWRM) and Integrated Coastal Area Management (ICAM) plans. Legislation has also been enacted to support the implementation of the respective strategies and plans. Education and sensitization as well as institutional strengthening programmes are continuously being implemented.

In the area of environmental planning, countries have institutionalized and are implementing Environmental Impact Assessment (EIA), Strategic Environmental Assessment (SEA) and Environmental Information Systems (EIS) programmes. Some have begun implementing Natural Resource Accounting (NRA) and using economic instruments to facilitate progress towards sustainable resource management. Additionally, countries are implementing climate services such as extension services for agriculture, observation networks for the planning and management of water resources and climate prediction facilities for forward planning of many economic activities.

Community Based Natural Resources Management (CBNRM) programmes, are increasingly being adopted to promote the sustainable management of forest and biodiversity resources. This entails ensuring that communities fully participate in the planning and management of natural resources from which they derive their livelihoods. Many success stories have been registered in the implementation of such programmes. Furthermore, some initiatives to promote fair and equitable sharing of benefits from the utilization of forest genetic resources have, to some extent, been taken within the framework of the Convention of Biological Diversity (CBD). For example, the Huta of Botswana have negotiated a receipt of eight per cent of all royalties on an appetite-suppressing medicine derived from a root collected and used in their traditional gathering area.

In recognition of the transboundary nature of environmental resources, countries are increasingly adopting and implementing regional approaches and initiatives to resource management. Many River Basin Organizations (RBOs) have been formed and these are implementing programmes of transboundary significance. In the area of climate

services, regional centers have been established and adaptation strategies to climate variability are being adopted. In a bid to enhance air quality, the Air Pollution Impact Network for Africa (APINA) was formed in 1997 to provide a coordinated framework for addressing the region's air pollution problems. African governments have also made good progress in meeting their commitment under the Dakar Declaration to ban leaded gasoline by the end of 2005. Within the framework of the environmental initiative of NEPAD, programmes focusing on priority environmental issues in Africa have been prepared to enhance the regional implementation dimension and ensure a coordinated approach to addressing environmental problems.

African countries are parties to many regional and global environmental Conventions. The revised version of the African Convention on the Conservation of Nature and Natural Resources of 1968 was adopted in Maputo in 2003. The Abidjan and Nairobi Conventions were adopted for the protection and development of the marine and coastal environments of West and Central, and Eastern African States, respectively. The Conventions are in the process of being revived under the auspices of the NEPAD Coastal and Marine Secretariat (COSMAR). African countries are Parties to relevant MEAs such as the Convention on International Trade in Endangered Species (CITES), United Nations Convention to Combat Drought and Desertification (UNCCD), the Convention on Biological Diversity (CBD), and the United Nations Framework Convention on Climate Change (UNFCCC), and their respective Protocols. Countries have been meeting their reporting obligations under the various Conventions and are at various stages of implementing their respective strategies and action plans.

5. Challenges

In spite of the policy responses undertaken by African countries to address environmental problems, many challenges remain. The institutional and legal frameworks for environmental management are still inadequate. For example, institutions dealing with land matters are many and policies are often fragmented and do not address the broad spectrum of land use in a holistic and integrated manner. There is also fragmentation in the administration of the coastal zone, given the diverse resources, activities and interest groups, thus resulting in haphazard planning and uncoordinated development of the coastal zone. Integrated Coastal Area Management (ICAM) is inadequate or nonexistent in many parts of Africa. In much of Africa, issues of access to genetic resources and equitable benefit sharing are still to be addressed at the policy and legislative levels. Inadequate financial, technical and human resources have been major setbacks in the implementation of national and regional programmes. For example, there is an acute shortage of climate scientists in Africa and skills in IWRM are inadequate. Environmental protection is generally considered to be of low priority, therefore resources provided are correspondingly low. Another important challenge is the low level of awareness on the part of local communities regarding the impact of their activities on environmental resources, and their weak participation in the implementation of programmes.

African countries, to varying degrees have institutionalized environmental planning and management tools, but due to inadequate capacities, their application is weak. A fundamental challenge in the forestry sector is for society to place a proper value on forests (reflecting their non-market, public good, outputs as well as financial returns), and to ensure that wider national development policies take full account of the potential contribution of forests. In the water sector, the inadequate use of economic instruments is a limiting factor in promoting the sustainable use of the resource, and the involvement of the private sector. Access to up-to-date and timely data and information for environmental management is also a limiting factor. Inadequate research and monitoring capabilities and facilities have been major constraints in acquiring the necessary data and technical information for effective policy formulation and planning. Access to appropriate technology is a major challenge, given the low technological development of the region and low level of technology transfer from developed regions.

The unchecked population growth rates place increasing demand on environmental resources. Conflicting and competing demands for limited space and resources, are likely to increase given burgeoning population growth with its accompanying impacts. The adoption of alternative livelihood strategies to reduce the dependency on extractive modes of resource utilization has not proceeded at the desired pace. The granting of land rights to women, given their important role in sustainable forest management and meeting the growing fuel wood needs of local communities, are also major challenges.

With regard to transboundary management of environmental resources, a major challenge is the lack of or weak harmonization of legal and regulatory frameworks among participating countries. This is particularly a problem for RBOs. Furthermore, RBOs are faced with problems such as dwindling political commitment, insufficient financial resources, administrative, managerial and technical problems, which have dampened their enthusiasm, and contributed, to the reduction of donor support. As regards regional environmental agreements, it has been observed that these agreements have been difficult to operate, largely due to lack of adequate and sustainable financial and human resources. The Abidjan and Nairobi Conventions were developed in the 1980s under the auspices of UNEP's Regional Seas Programme. However, the Nairobi Convention took 11 years to come into force and neither convention succeeded in establishing a fully operational Regional Coordinating Unit. Their revival under NEPAD COSMAR is, therefore timely.

Africa's capacity constraints have not allowed it to maximize its potential in the development of international instruments. In view of the fact that representation by most of the countries is often thin, African delegations frequently find it difficult to participate fully and negotiate the various aspects of the issues under consideration at each meeting (ELI, 2003). Given the significance of biological resources for the livelihoods of Africans and their potential to enhance socio-economic development of the continent, the access and benefit sharing provisions of the CBD is quite pertinent. However, a major challenge for Africa is to effectively address the interlinked issues of genetic resources, traditional knowledge, trade, and Intellectual Property Rights (IPRs).

particularly in light of the provisions of WTO's Trade Related Intellectual Property Rights (TRIPs) agreement and the implications of the agreement, particularly as regards the patenting of life forms, to genetic resources and traditional knowledge. These concerns are yet to be adequately considered in the relevant agreements.

In relation to meeting their reporting obligations under the UNFCCC, many African countries still find it difficult to maintain stable national teams of experts and to sustain the collection and reporting of information on energy balances, for example, or to make estimates of site-specific emission factors. They also have to contend with applying the often-complex methodologies required for the preparation of inventories. In addition opportunities to exchange information with other countries and gain access to regional and international sources of data are relatively limited. Furthermore, many African countries do not have the institutions and capacity needed to address the many complex issues dealing with climate change. This is often conveyed in the national communications of many African countries (UNFCCC, 2004). Finally, environmental issues have not been adequately mainstreamed into development planning and this inhibits progress towards sustainable development in Africa.

6. Recommendations

Countries should improve intersectoral coordination for environmental management and strengthen human resources and institutional capacity for policy formulation and implementation, and for the enforcement of legislation. For effective transboundary management of resources, participating States should harmonize their policies and legislation.

Given the role of population factors in environmental degradation, countries should adequately integrate population concerns in environmental policies and strategies. Countries should decentralize government administration and strengthen political processes at the local level. Furthermore, participatory approaches to facilitate dialogue and exchange of knowledge and information on Natural Resource Management should be enhanced. This will increase the knowledge base of communities, promote practices, which are compatible with the environment, create awareness and foster partnerships among policy makers and civil society.

Criteria and indicators for sustainable environmental management are recognized as an important framework for assessing the state and trends in environmental resources in order to ensure proper environmental planning and management. Countries should therefore develop and apply these indicators. This should be combined with the enhancement of technical and institutional capacities for environmental monitoring and prediction, to enable countries better analyze existing vulnerabilities and problems. For example, the establishment of improved early warning systems, the transfer of new and improved technologies and the strengthening of the adaptive capacity of communities and countries that are specifically vulnerable to climate vulnerability and climate change are key.

Given the diversity of resources and actors in the utilization and management of environmental resources, countries should adopt/strengthen integrated resource management approaches (e.g., IWRM and ICAM) for their sustainable exploitation. Governance regimes of such resources should also be improved to ensure a more systematic planning and coordinated development.

To enable African countries to fully meet their obligations under the MEAs, developed country parties should support developing country parties through bilateral and multilateral assistance in line with the spirit of relevant Conventions. For example, in order to meet the JPOI target of achieving, by 2010, a significant reduction in the current rate of loss of biological diversity, provision of new and additional financial and technical resources to developing countries is pertinent. Additionally, Africa's capacity should be strengthened to enhance its negotiation leverage with a view to ensuring that its main concerns such as the recognition of traditional knowledge and customs as intellectual property are included in relevant international agreements.

Reversing environmental degradation calls for more sustainable consumption and production patterns. However in the case of Africa which suffers from under-consumption of food, housing, energy, transportation and other basic needs, the goal should be to increase consumption while conserving resources and protecting environmental systems to maximize long-term development.

African countries should establish innovative and sustainable financing mechanisms for environmental management through the mobilization of local, national and regional resources; innovative partnerships with the private sector, local governments, external agencies, with full and meaningful participation of the donor community.

Given the link between environmental resources and the socio-economic development of Africa, adequate integration of the environmental pillar of sustainable development into the development process is necessary, if the region is to meet its sustainable development goals.

7. *Institutional arrangements*

African countries, to varying degrees, have made progress in establishing institutions and putting in place the necessary instruments and other relevant processes to facilitate the implementation of the sustainable development agenda. But these institutions do not adequately fulfill the role of NCSDs and a lot remains to be done to strengthen them, particularly with regard to eliminating the environmental bias and addressing the three dimensions of sustainable development in a holistic and integrated manner. However, the support that regional bodies and development partners provide to African countries in meeting their sustainable development goals is, indeed, encouraging. With the reinvigoration of political will on the part of governments and development partners to

commit to sustainable development issues, and the emphasis placed on regional implementation and the integration of the three dimensions of sustainable development at WSSD, it is foreseen that an increasing number of countries will establish institutions and coordinating structures and processes that adequately respond to the requirements of sustainable development.

The following are recommended:

- The effective implementation of international agreements and recommendations on sustainable development institutions, policies and strategies calls for new and better ways of doing things. It requires accountability on the part of governments including the management and allocation of resources for development. This can only be realized if the political will exists to effect the necessary changes and undertake relevant actions to promote sustainable development.
- Cooperation and collaboration among the various regional and sub-regional actors is imperative to building synergies among interventions and ensuring that implementation is realized in the most effective and efficient manner. Capacity building and enhancement, particularly of Regional Economic Communities (RECs), should be pursued to enable these sub-regional institutions contribute effectively to the implementation process.
- The Africa-CSD is an important link between national-level action and global-level processes on sustainable development. In this regard, the participation of all member States at meetings of the regional body is very important to ensure that all members have equal opportunities to express issues of concern, contribute to discussions and arrive at the same level of understanding on issues tabled.
- ECA and partners should collaborate and coordinate efforts in assisting countries to establish or strengthen (as appropriate) NCSDs. The name, mandate, location and organizational structures of newly established NCSDs should allow for horizontal and vertical linkages, and ensure that the three dimensions of sustainable development are appropriately addressed. In restructuring and strengthening NCSDs, it should be ensured that structures and achievements of existing ones are built upon and continuity assured.
- African countries should sensitize all actors including policy makers and the general public about international treaties: their importance, implications and requirements for effective implementation, with a view to garnering the necessary commitment and support. Furthermore, countries should establish regional platforms to discuss common issues of concern with a view to adopting common positions at international fora and influencing international negotiations towards addressing Africa's concerns.
- New and additional resources required for the effective implementation of the sustainable development agenda are considerable and are above the capabilities of African countries. In this regard, the provision of appropriate and adequate development assistance to African countries is pertinent.
- Governments and relevant organizations are urged to reinforce existing follow-up mechanisms. Multidisciplinary expertise should be utilized in implementation and

follow-up. Partnerships and cooperation in capacity building, information exchange and experience- sharing should be strengthened.

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ANNEXES

ANNEX 3.1. CALCULATION OF INDICES

Countries were ranked according to each selected variable. Then for each index value per country, the average of the rankings for the variables included in the calculation of the index was divided by the number of the countries. The resulting index ranged from 0 to 1; the lower the index, the less the pressure that was determined to exist for a country, and the opposite was true when the index was high.

The rankings are:

- RSAN02 Ranking by improved access to sanitation (highest = 1, lowest = 53)
- RPOP0004 Ranking by overall population growth rate (lowest = 1, highest = 53)
- RTBP02 Ranking by TP prevalence rate (lowest = 1, highest = 53)
- RENC02 Ranking by energy consumption per capita (highest = 1, lowest = 53)

The indices are:

- PPSI Population pressure on sanitation index = $((RSAN02 + RPOP0004)/2)/53$
- STBI Sanitation TB index = $((RSAN02 + RTBP02)/2)/53$
- SEI Sanitation energy index = $((RSAN02 + RENC02)/2)/53$
- PSTBI Population, sanitation and TB index = $((RSAN02 + RPOP0004 + RTBP02)/2)/53$
- SETBI Sanitation, energy and TB index = $((RSAN02 + RTBP02 + RENC02)/2)/53$

Annex 3.1: Table 1 Rankings by variables

COUNTRY	SROECA	RSAN02	RPOP0004	RTBP02	RENC02
Algeria	3	5	13	5	6
Angola	4	38	39	13	19
Benin	5	37	47	9	30
Botswana	4	24	2	18	11
Burkina Faso	5	48	46	15	48
Burundi	2	31	45	38	50
Cameroon	1	16	17	11	26
Cape Verde	5	22	33	19	25
Central African Rep	1	41	9	29	46

COUNTRY	SROECA	RSAN02	RPOP0004	RTBP02	RENC02
Chad	1	52	50	26	53
Comoros	2	46	35	6	38
Congo	1	50	44	28	28
Cote d'Ivoire	5	27	14	45	23
D R Congo	2	40	38	40	44
Djibouti	2	15	23	53	7
Egypt	3	6	18	3	9
Equatorial Guinea	1	11	30	22	3
Eritrea	2	50	53	35	37
Ethiopia	2	53	34	37	52
Gabon	1	31	17	10	10
Gambia	5	11	40	20	34
Ghana	5	9	24	24	21
Guinea	5	47	26	27	36
Guinea Bissau	5	33	43	16	31
Kenya	2	16	27	50	27
Lesotho	4	30	1	25	32
Liberia	5	43	10	36	43
Libyan Arab Jam	3	3	21	1	1
Madagascar	2	35	37	21	41
Malawi	4	18	29	34	40
Mali	5	20	42	42	51
Mauritania	3	22	41	48	13
Mauritius	4	2	6	8	5

COUNTRY	SROECA	RSAN02	RPOP0004	RTBP02	RENC02
Morocco	3	8	12	7	15
Mozambique	4	41	22	41	24
Namibia	4	38	11	30	12
Niger	5	48	51	14	45
Nigeria	5	29	28	39	20
Rwanda	2	24	31	44	42
Sao Tome	1	45	25	12	18
Senegal	5	13	33	31	22
Seychelles	2	1	7	4	2
Sierra Leone	5	28	52	51	35
Somalia	2	44	48	52	49
South Africa	4	7	5	17	4
Sudan	3	34	19	23	29
Swaziland	4	13	3	47	16
Tanzania U R	2	18	20	32	39
Togo	5	33	36	49	33
Tunisia	3	4	8	2	8
Uganda	2	24	49	43	47
Zambia	4	20	15	46	17
Zimbabwe	4	10	4	33	14

Annex 3.1: Table 2 Indices by country

COUNTRY	SROECA	PPSI	STBI	SEI	PSTBI	SETBI
Algeria	3	0.151	0.566	0.274	0.396	0.478
Angola	4	0.292	0.519	0.585	0.352	0.547
Benin	5	0.519	0.642	0.623	0.623	0.692
Botswana	4	0.538	0.642	0.462	0.604	0.553
Burkina Faso	5	0.689	0.698	0.783	0.629	0.692
Burundi	2	0.189	0.142	0.217	0.17	0.189
Cameroon	1	0.226	0.038	0.038	0.157	0.031
Cape Verde	5	0.887	0.594	0.906	0.686	0.698
Central African Rep	1	0.075	0.047	0.028	0.075	0.044
Chad	1	0.113	0.057	0.113	0.088	0.088
Comoros	2	0.387	0.311	0.132	0.396	0.226
Congo	1	0.075	0.094	0.066	0.101	0.094
Cote d'Ivoire	5	0.585	0.585	0.67	0.654	0.711
D R Congo	2	0.453	0.387	0.387	0.365	0.321
Djibouti	2	0.311	0.255	0.396	0.277	0.333
Egypt	3	0.792	0.434	0.632	0.585	0.478
Equatorial Guinea	1	0.17	0.094	0.104	0.145	0.101
Eritrea	2	0.245	0.396	0.33	0.277	0.333
Ethiopia	2	0.311	0.311	0.283	0.358	0.34
Gabon	1	0.226	0.085	0.142	0.17	0.113
Gambia	5	0.689	0.632	0.67	0.73	0.717
Ghana	5	0.755	0.745	0.594	0.824	0.717
Guinea	5	0.651	0.774	0.623	0.742	0.723
Guinea Bissau	5	0.472	0.66	0.821	0.497	0.73

COUNTRY	SROECA	PPSI	STBI	SEI	PSTBI	SETBI
Kenya	2	0.132	0.406	0.226	0.296	0.358
Lesotho	4	0.358	0.472	0.538	0.44	0.56
Liberia	5	0.717	0.651	0.764	0.717	0.748
Libyan Arab Jam	3	0.462	0.642	0.472	0.497	0.503
Madagascar	2	0.481	0.292	0.425	0.447	0.409
Malawi	4	0.764	0.491	0.792	0.547	0.566
Mali	5	0.972	0.802	0.821	0.868	0.767
Mauritania	3	0.717	0.462	0.604	0.579	0.503
Mauritius	4	0.443	0.491	0.547	0.509	0.579
Morocco	3	0.594	0.66	0.33	0.698	0.522
Mozambique	4	0.406	0.623	0.406	0.585	0.585
Namibia	4	0.387	0.679	0.472	0.541	0.597
Niger	5	0.5	0.745	0.811	0.56	0.767
Nigeria	5	0.736	0.755	0.792	0.742	0.78
Rwanda	2	0.519	0.387	0.443	0.465	0.415
Sao Tome	1	0.113	0.226	0.104	0.182	0.176
Senegal	5	0.962	0.736	0.991	0.805	0.824
Seychelles	2	0.434	0.415	0.33	0.484	0.415
Sierra Leone	5	0.821	0.849	0.991	0.78	0.893
Somalia	2	0.726	0.481	0.538	0.566	0.44
South Africa	4	0.679	0.528	0.717	0.585	0.61
Sudan	3	0.33	0.623	0.349	0.509	0.522
Swaziland	4	0.887	0.736	0.736	0.767	0.667
Tanzania U R	2	0.66	0.538	0.594	0.516	0.472

COUNTRY	SROECA	PPSI	STBI	SEI	PSTBI	SETBI
Togo	5	0.868	0.906	0.877	0.906	0.912
Tunisia	3	0.5	0.538	0.594	0.478	0.541
Uganda	2	0.358	0.642	0.208	0.572	0.472
Zambia	4	0.594	0.774	0.613	0.654	0.667
Zimbabwe	4	0.934	0.585	0.877	0.711	0.673

ANNEX 3.2. SELECTED INDICATORS FOR 53 AFRICAN COUNTRIES IN 2002

SROECA	ECA Sub-region: 1 = Central Africa; 2 = East Africa; 3 = North Africa; 4= Southern Africa, 5= West Africa
SANT02	Overall access to improved sanitation in 2002
SANU02	Urban access to improved sanitation in 2002
SANR02	Rural access to improved sanitation in 2002
POPT0004	Overall population growth rates for the period 2000 - 2005
POPR0004	Rural population growth rates for the period 2000 - 2005
POPU0004	Urban population growth rates for the period 2000 - 2005
TBP02	TB prevalence rates in 2002
ENC02	Energy consumption per capita in 2002

COUNTRY	SROECA	SANT02	SANU02	SANR02	POPT0004	POPR0004	POPU0004	TBP02	ENC02
Algeria	3	92	99	82	1.51	0.16	2.47	51	41.11
Angola	4	30	66	16	2.83	1.64	5	280	9.65
Benin	5	32	58	12	3.18	1.81	4.92	139	4
Botswana	4	41	57	25	0.13	-0.84	1.04	322	29.15
Burkina Faso	5	12	45	5	3.17	2.72	5.25	302	1.38
Burundi	2	36	47	35	3.03	2.67	6.42	492	1.15
Cameroon	1	48	63	33	1.88	0.26	3.44	245	5.22
Cape Verde	5	42	61	19	2.39	0.47	3.92	327	5.27
Central African Rep	1	27	47	12	1.33	0.45	2.53	389	1.47
Chad	1	8	30	0	3.42	2.9	5.02	373	0.37
Comoros	2	23	38	15	2.65	1.72	4.39	97	1.96
Congo	1	9	14	2	3.02	2.09	3.84	379	4.66
Cote d'Ivoire	5	40	61	23	1.63	0.84	2.6	601	6.39
D R Congo	2	29	43	23	2.79	2.07	4.35	533	1.61
Djibouti	2	50	55	27	2.07	-0.8	2.64	961	36.85
Egypt	3	68	84	56	1.91	1.86	1.97	38	33.32

COUNTRY	SROECA	SANT02	SANU02	SANR02	POPT0004	POPR0004	POPU0004	TBP02	ENC02
Equatorial Guinea	1	53	60	46	2.31	0.48	4.32	349	104.39
Eritrea	2	9	34	3	4.26	3.74	6.34	476	2.21
Ethiopia	2	6	19	4	2.44	2.14	4.07	486	1.03
Gabon	1	36	37	30	1.67	-2.82	2.57	230	29.21
Gambia	5	53	72	46	2.84	2.87	5.76	331	2.94
Ghana	5	58	74	46	2.14	1.27	3.2	370	6.85
Guinea	5	13	25	6	2.17	1	4.41	376	2.8
Guinea Bissau	5	34	57	23	2.99	1.78	5.38	306	3.63
Kenya	2	48	56	43	2.2	0.32	5.17	741	4.93
Lesotho	4	37	61	32	0.09	-0.07	0.81	371	3.52
Liberia	5	26	49	7	1.37	0.26	2.66	480	1.62
Libyan Arab Jam	3	97	97	96	1.97	-0.44	2.35	21	122.87
Madagascar	2	33	49	27	2.78	2.5	3.54	340	1.68
Malawi	4	46	66	42	2.25	1.76	4.83	470	1.89
Mali	5	45	49	38	2.98	1.96	5.15	583	1.05
Mauritania	3	42	64	9	2.97	-0.4	5.13	656	17.94
Mauritius	4	99	100	99	0.97	0.58	1.48	137	46.97
Morocco	3	61	83	31	1.48	-0.06	2.64	99	15.31
Mozambique	4	27	51	14	2	0.2	5.34	539	5.42
Namibia	4	30	66	14	1.39	0.62	3.01	414	24.98
Niger	5	12	43	4	3.39	2.7	5.84	295	1.49
Nigeria	5	38	48	30	2.24	0.68	4.06	507	7.76
Rwanda	2	41	56	38	2.38	0.39	11.8	595	1.66
Sao Tome	1	24	32	20	2.16	2.18	2.14	260	9.71
Senegal	5	52	70	34	2.39	0.97	3.86	431	6.49

COUNTRY	SROECA	SANT02	SANU02	SANR02	POPT0004	POPR0004	POPU0004	TBP02	ENC02
Seychelles	2	100	100	100	1.01	0.51	1.52	41	105.31
Sierra Leone	5	39	53	30	4.07	2.92	5.91	754	2.91
Somalia	2	25	47	14	3.2	2.39	4.71	755	1.32
South Africa	4	67	86	44	0.78	-0.32	1.62	317	101.52
Sudan	3	34	50	24	1.93	0.41	4.35	350	4.52
Swaziland	4	52	78	44	0.18	0	0.75	645	14.43
Tanzania UR	2	46	54	41	1.95	0.34	4.97	462	1.93
Togo	5	34	71	15	2.72	1.81	4.41	704	3.33
Tunisia	3	80	90	62	1.1	0.21	1.6	27	34.77
Uganda	2	41	53	39	3.4	3.31	4.06	588	1.46
Zambia	4	45	68	32	1.73	1.3	2.5	610	9.81
Zimbabwe	4	57	69	51	0.65	-0.04	1.94	468	16.41

ENDNOTES

i The initiatives include a review of national housing policies (Namibia), introducing programmes on the provision of basic urban services (Nigeria) and introduction of legislation and policies on housing rights, access to land and secure tenure (Tanzania, South Africa and Namibia) (SDD, 2005).

ii Data on maternal mortality are the scantiest among all the sets of data on quality of life indicators used in this analysis. This is largely because it is difficult to collect this type of data. If conditions on a woman's pregnancy and immediate post-pregnancy periods are not closely monitored and observed, accurate direct information on maternal mortality cannot be collected.

iii The percentage of underweight children is a good indicator on hunger and closely related to poverty.

^{iv} Source: Carbon Dioxide Information Analysis Center (CDIAC), Environmental Sciences Division, Oak Ridge National Laboratory: 2001.Global, Regional, and National CO2 Emission Estimates from Fossil Fuel Burning, Cement Production, and Gas Flaring: 1751-1998, NDP-030 (Available online at <http://cdiac.esd.ornl.gov/ftp/ndp030/>). CDIAC, Oak Ridge, Tennessee.

^v Sources: Carbon Dioxide Information Analysis Center (CDIAC), International Energy Agency (IEA), Netherlands Institute for Public Health (RIVM), accessed from

http://earthtrends.wri.org/pdf_library/data_tables/cli1_2003.pdf on 29/06/05

^{vi} Source: The Emission Database for Global Atmospheric Research (EDGAR) Accessed from http://earthtrends.wri.org/pdf_library/data_tables/cli4_2003.pdf on 29/06/05; and the Emission Database for Global Atmospheric Research (EDGAR) Accessed from

http://earthtrends.wri.org/pdf_library/data_tables/cli4_2003.pdf on 29/06/05.

vii http://www.ifad.org/events/wssd/gef/GEF_eng.pdf, 12-09-05

viii http://www.ifad.org/events/wssd/gef/GEF_eng.pdf, 12-09-05

ix http://www.ifad.org/events/wssd/gef/GEF_eng.pdf, 12-09-05.

x Source: FAOSTAT Data 2005.

xi <http://www.un.org/esa/forests/documents-unff.html#4>, 17 August 2005.

^{xii} Sources: United Nations Environment Programme-World Conservation Monitoring Centre (UNEP-WCMC), Ramsar Convention Bureau, United Nations Educational, Scientific and Cultural Organization (UNESCO), World Conservation Union (IUCN), Convention on International Trade in Endangered Species of Wild Flora and Fauna (CITES)

^{xiii} Source: FAOSTAT Data 2005.

^{xiv} http://www.acops.org/African_Process/Importance.htm, 05-09-05.

^{xv} <http://www.africa-union.org/home/Welcome.htm>, 19-08-05.

^{xvi} IISD Compendium IISD Compendium of Sustainable Development Indicator Initiatives. <http://www.iisd.org/measure/compendium/>

^{xvii} Organization of Economic Cooperation and Development. 1993. OECD Core Indicators for Environmental Performance Review. Paris: OECD.

^{xviii} The Environmental Sustainability Index (ESI) is developed by Yale University and Columbia University. The ESI for year 2005 is statistically rigorous and focuses on quantification of environmental issues. The Sustainable Development Index is supplementary to the 2001 State of the Future Index, developed by the Millennium Project of the American Council for the United Nations University.

Part Two

LAND BASED RESOURCES



FROM ASSESSMENT TO LAND BASED RESOURCES FOR SUSTAINABLE DEVELOPMENT

To achieve sustainable development, there ought to be a trade-off between economic optimization, management of natural resources stock and provision of optimal social goals (Sembajwe, *et al*, 2005). This calls for a multi-criteria analysis aimed at balancing the dimensions of sustainable development. In doing so, it is recognized that the political priorities may vary from region to region, and, possibly from country to country.

The Novartis Foundation for Sustainable Development (2004) states that although the most significant ecological issues are of truly global importance, industrial and developing countries still have different problems. For example, for the majority of people affected by environmental problems in developing countries, lack of sanitation and sewage facilities, polluted drinking water, urban air pollution, shrinking water resources, and eroding top soil are most pressing problems. By contrast, in industrial countries, where such problems have mainly been solved, the public focuses instead on issues such as depletion of the ozone layer as well as the accumulating carbon dioxide in the atmosphere and its potential impact on climate change.

Therefore, land-based resources constitute the most important component of the challenges of sustainable development faced by developing countries. In particular, in an environment of poverty, human beings fall back on land-based resources for sustenance. Unfortunately, unsustainable utilization of such resources perpetuates the poverty situation, and even aggravates it, throwing increasing numbers of the population into the vicious cycle of poverty (the poverty trap).

In this context the ECA (2001) stated that “people are both producers and consumers of social and economic goods and services. Low economic growth that does not match the pace of increase of population numbers puts more pressure on the limited capacity of governments to provide for basic socio-economic needs. Consequently, the population has to increase its utilization of land as the basic, accessible route to food security. Yet, if good land, marginal lands as well as forest and water resources are used unsustainably, the consequence is low productivity, food insecurity and deepening poverty” (ECA, 2001).

In this first issue of the SDRA we have, therefore, chosen to focus on land-based resources. This focus provides the premise for considering the linkages of the pillars of sustainable development in general, and of land-based resources, in particular (especially policy linkages), which are of special interest to Africa. Cross-cutting issues such as poverty, gender, health and conflict will be used in assessing the impact of sectoral policies and programmes on human well-being.

While Part I of this report focused on the assessment of sustainable development utilizing an array of indicators, Part II is devoted to public-private partnership/participation in land policies and land resources; management of water resources for food security; management of energy resources in harnessing other land-based resources; and management of mineral resources.

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Chapter IV

LAND TENURE AND LAND REFORM

Management of Land and Natural Resources in Africa

IV.1 Introduction

Africa is well endowed with land and natural resources, including farmland, rangelands, forests, wildlife, minerals and water. Harnessing these resources is crucial to achieving the socio-economic development. Yet the continent continues to fail in its quest to use these resources in an efficient, equitable and sustainable manner for poverty reduction and wealth creation. The fragility of Africa's environment (climate, soils, droughts, disease, etc.) coupled with increasing human population, migration and urbanization, have led to changes in land use patterns and land tenure. For instance, the move to increase food production to meet the demand for food and food variety brought forth by population and urbanization has led to the expansion of crop cultivation, commercialization, reduced land fallow periods and the blocking of animal migratory routes.

These changes in land use patterns have, in turn, resulted in decreased access to water, soil erosion, land degradation, overgrazing and deteriorating rangelands, deforestation, as well as land and resource-related conflicts. And as land use patterns have changed, so has the pattern of land tenure and land ownership, which has seen an evolution from communal and open access ownership to private ownership with an increasing trend towards land sales. More and more, land and land resources are now being governed by modern systems of tenure, away from customary systems. Yet, customary systems of tenure remain dominant across Africa.

Unfortunately, the changing dynamics of land use, land ownership and land tenure have not always been accompanied by appropriate reforms in the policies, laws and institutions that govern land and property rights in order to ensure that issues related to equity, efficiency and sustainability are maintained in land ownership and land use. On the contrary, Africa has been an arena for experimentation on land reforms since the colonial period with few completed and successful cases documented so far (ECA, 2004). It is hoped that the current wave of land reform initiatives, which are often occurring under the umbrella of political and economic reforms emanating from democratization will result in better outcomes. But Africa must capitalize on the lessons learned from years of reform in order to ensure that this new wave of reforms will help to establish the needed changes in land rights, legal and institutional frameworks for successful outcomes.

This chapter examines the issues and challenges that Africa faces in managing its land resources under the current land tenure systems. It then examines Africa's efforts in addressing these challenges, examining the possibilities of moving towards better land reforms. At this juncture it is pertinent to briefly highlight land resources linkages to the MDGs.

IV.2 Linking land resource to the MDGs

Land resources are central to the three pillars for achieving the MDGs, namely Development, Human Rights and Security. Land and complementary production factors such as technology, markets and credits are crucial to ensuring that the majority of families who depend on land and land resources contribute to and benefit from growth and *development*. Land rights are directly linked to the establishment and respect for *human rights*, especially for previously excluded groups such as women, pastoralists and indigenous people. Land is also key to peace and *security*, since the majority of conflicts around the world are related to the use and control of land and land resources. Conflicts are a major impediment to economic development and sound environmental management, not to mention human survival. The following table 4.1 illustrates the importance of land and resource rights in achieving the MDGs.

Table 4.1
Linkages of Land to the MDGs

MDG Goal	Linkage to land and resource rights
Goal 1 Eradicating extreme poverty	Secure rights to land when coupled with other services, can ensure that poor households enhance agricultural production and the use of other land resources to increase income, hence reducing poverty
Goal 2 Achieve universal primary education	Disputes related to land can cause displacement of families, denying them access to public services, such as education. And, by enhancing production of land resources, improved land rights can help provide income vital for paying school fees and reducing child drudgery, and hence vital to increasing school enrollment and attendance
Goal 3 Promote gender equality and empower women	Secure land rights for women help to increase ownership and access to land as well as other support services. In developing countries, women currently own only 2 per cent of all land and receive less than 5 per cent of support services. In addition to empowering women economically, land rights help to improve the social and political status of women, contributing to the reduction in child mortality (Goal 4) and maternal health (Goal 5).
Goal 6 Combat HIV/AIDS, malaria and diseases	Generally, women who lack inheritance rights usually become economically disadvantaged following the death of a spouse. As a result they are forced to enter into other (sometimes, risky) relationships making them vulnerable to HIV/AIDS infection as (for example see Gupta, 2000) Economic and social empowerment of women through secure land rights not only serves to prevent risky behavior responsible for HIV/AIDS infection, but to also reduce malnutrition, food insecurity and susceptibility to other diseases.

MDG Goal	Linkage to land and resource rights
Goal 7 Ensure environmental sustainability	Sound natural resources management calls for redress in the imbalance of power, wealth, knowledge and access to resources such as land. Insecure land rights force the poor to adopt short-term strategies with detrimental effects on resource degradation.
Goal 8 Develop a global partnership for development	Empowering the poor and other marginalized groups through secure land rights facilitates their participation in social, economic, and political decisions and policy processes at the local, national and global

Source: ILC (2005).

IV.3 History of land tenure in Africa

Land tenure is derived from the broader notion of natural resource tenure, which determines the terms and conditions under which natural resources are held and used. Tenure is a social construct that defines relationships between individuals and groups of individuals based on defined rights and obligations (ECA, 2004; Bruce, 1986; Moyo, 1995; Shivji *et al.*, 1998). Some commonly known concepts relating to land tenure include (see ECA, 2004):

- *Freehold land*: mainly a western concept denoting a situation where rights to land include the control, management, use and disposal of land.
- *Leasehold land*: involves a contractual arrangement between the owner of land (lessor) and the user (lessee) over a specified period of time
- *Statutory land* allocations: where the state allocates land and land rights based on statutory provisions
- *Customary system* of tenure: where land rights are controlled and allocated based on traditional practice

Prior to the arrival of Europeans, land in most parts of Africa was owned communally, with members of a certain community having rights of access to the land. While the levels of status and wealth depended on one's ability to attract dependants and followers, access to land was guaranteed to all members of the community. 'Strangers' were also welcome to settle and acquire rights accorded to other members of the community, subject to adherence of rules binding the community. As a result, customary tenure facilitated a livelihoods framework that supported rural multiethnic communities in Africa.

The earliest land tenure reforms date back to the conquest of Africa by Europeans, seeking to extract resources and force political domination. As such the history of land tenure reform differs based on the colonial experience of African countries, but there are significant similarities. In all cases, Europeans colonized Africa through a wide range of methods, including military conquest, unjust treaties and agreements, and unequal trade

and development. The clear lack of understanding of Africans and their communities by colonial governments led to the distorted perception and consequent application of customary tenure systems. They perceived African communities to be tribal entities, failing to recognize the heterogeneity of such communities. They, for instance, viewed migrants as strangers with no traditional rights of access to land. With regard to land rights, they perceived customary rights to be markedly different from private rights and misunderstood the role of customary authorities tasked with allocating land.

Due to their perception that Africans were ignorant of land concepts that colonial governments alienated communal lands to white settlers on the basis of freehold tenure, introducing a new dimension to land ownership, mainly privatization. This was meant to provide colonial settlers with supreme rights of access and ownership to land and natural resources. And just as privatization introduced rights to access and ownership to colonial settlers and some African landlords, so did it deny land rights to certain members of the African societies. In many instances, Africans were removed from high potential agricultural areas and settled in the worst lands. Their land rights were held in trust by state institutions, which to many Africans did not have legitimate authority.

With privatized land being governed by statutory law based on European laws of the colonial masters, and communal lands being governed by modified customary law, Africa saw the birth of *legal dualism*. Indeed, at the time of independence, most African governments inherited a dual, unequal and hierarchical system of land tenure, with freehold and leasehold land rights given superior recognition and treatment to customary rights (Shivji *et. al*, 1998). This situation persists in Africa today, posing a challenge to land reform efforts.

Unlike colonial governments, most post-colonial governments changed land ownership, according the state supreme right of ownership to land. Post-colonial African states continued to deny legal recognition to customary land rights. And while communities living under customary rights regimes could relate under customary rights, occupation was by permission of the state. If and when the state desired the land, communities were removed without adequate consultation, compensation and recourse under the law. As a result, customary land rights were fragile and the resulting land tenure was insecure. This exacerbated inequalities and injustice.

By owning communal lands and refusing to legally recognize customary land rights, African states adversely affected the ability of customary tenure systems to provide tenure security to African communities. In addition, some intricacies of African communities did not allow the system to provide tenure security to all members of the communities. In particular, divisions along class, social and gender lines saw these systems create unequal and inequitable access to- and use of land. In many cases, inheritance rules discriminated against women and weaker members of society.

The perceptions regarding the insecurity of customary systems and the non-transferability (through markets) of land under these systems led to the aggressive

justification for private or state ownership of land, particularly as African countries went through a transition to market economies. With market economies emphasizing ownership of marketable goods, customary law became limited in enforcing rules and practices of the market economy. African countries adapted to the new system, by relying heavily on statutory law as the tool to enforce the new rules and practices, usually at the expense of vulnerable groups, especially secondary members of communities and secondary land rights owners.

Increased population density and commercial agriculture complicated an already complex land tenure system. Land scarcity led to competition for land and the demand for long-term rights and increasing land values. In parts of East and West Africa where nomadic pastoralism and transhumance are most constrained, control of land by families lend itself to a system of sedentary and intensive agriculture and livestock grazing patterns.

IV.4 Land tenure and the management of land resources: Issues and challenges

1. Land tenure, agriculture and food security

Africa is dependent on land based resources e.g. agriculture, forestry, water, mining, wildlife/tourism for meeting its food security and achieving sustainable development. Agriculture (crops, livestock, fishery, etc.) is directly linked to food availability and indirectly through food access provided by agricultural incomes. Forestry, mining and tourism are important avenues for food access through income earned from these sectors and energy (forestry, mining) necessary for food preparation. But these resources also pose a threat to food availability through their competing demand for land. When harnessed, water is vital in complementing other land resources, e.g. agriculture to produce food or provide employment income. Clean water is also a vital input to food preparation.

African agriculture is dominated by small-scale farmers who have been gravely affected by policies that have long favored large-scale export crop operators through e.g. price controls, marketing barriers, regulated information flow, credit etc. As a result, small and medium size holders use low levels of modern agricultural technologies and are not well integrated into national and international markets. And current trends towards globalization are further complicating the issues affecting smallholders in Africa, exposing them to further risk of being marginalized.

Globalization facilitates access to international financial markets, information, new production methods and technologies. Just as international markets, transnational corporations and development partners have influenced land tenure and land reform in the past, globalization has the potential to impact current land tenure systems. Market integration, facilitated by globalization influences land use and agriculture through

market driven production systems and increased vertical regulation of commodity chains. The severe rules of operation imposed by globalization, coupled with falling prices of key agricultural commodities, have seen a trend towards the exclusion of smallholders of traditional export crops, with consequent increase in the gap between the rich and the poor. This is likely to see an increase in large farms involved in the production of export crops with consequent land concentration among the rich as smallholders go out of business (Barraclough, 1999).

As globalization leads to changes toward large-scale agricultural operations, this could lead to an increase in land values. History shows that as land becomes valuable, the weak are pushed off the land by the more powerful (Berry, 2001). This was true during the colonial times across Africa as people were pushed into reserves to make way for large scale export agriculture. Many authors (Berry, 2001; Bernstein, 2002; Moore, 2001; Fortin, 2005) further note that instead of facilitating growth and reducing inequality, globalization has often led to the displacement of the poor from the land they previously operated, leading to conflicts.

The adverse impacts of globalization and the neglect of smallholders in Africa can partly be mitigated by addressing the fundamental challenges that constrain optimal use of land and land resources to improve African agriculture. These challenges include unbiased land use regulation, unequal land distribution, and insecurity of land tenure.

Land use regulation has the tendency to protect private landholdings particularly large-scale farms that produce agricultural exports at the expense of small-scale customary lands used mainly for food crops. Indeed, most African government policies are misguided in assuming that most export production occurs on large-scale farms. On the contrary, evidenced shows that smallholders dominate coffee production in Kenya, Uganda, Tanzania, Rwanda and Ethiopia. As a result of this biased land use regulation, small and medium size African farmers, have until recently, been left out in land policies and laws that have focused on the needs of large scale farmers.

Unequal land distribution has hampered agricultural development by limiting land access to many needy Africans, particularly due to years of distorted land distribution. In many parts of southern Africa, this inequality sees the majority of land in the hands of a few large scale/estate owners. IFAD (2001) highlighted this disparity in Southern Africa, where small holders only held 13 per cent of the land area while 67,000 commercial farmers owned 86 per cent of the total agricultural land. And in Zimbabwe for instance, 13,335 large and medium scale commercial farmers control 37 per cent of the land in communal lands while 2.1 million smallholders had 50 per cent of the land. Beyond the quantity of land, the disparity relating to the quality of agricultural land is telling, with the majority of smallholders in these and other countries relegated to poor quality and at times marginal lands characterized by poor soil fertility, low and variable rainfall, and a high propensity for drought.

Constraints relating to *insecure land tenure and non-transferable nature of land* continue to be a disincentive to many African households and the agribusiness community, discouraging them from making needed investments in agriculture. Land and resource tenure determines who owns resources and why, as well as how land is transferred and adjudicated. As such, tenure security is important for the management of natural resources, including agricultural land. The ECA (2004) asserts the importance of placing the control of productive land in the hands of poor households and increasing tenure security for these lands with a view to reducing livelihood vulnerability.

Tenure insecurity implies that land rights holders face the risk of losing property rights to land and associated income at some point in the future (e.g. Belsey, 1995; Feder, 1988). Secure, well-defined land rights are important for household asset ownership, productive development and factor market functioning by increasing the expected benefits from productivity enhancing long-term investments, and hence the owner's willingness to invest (Deininger, 2003). Secure land rights provide an important sense of safety from eviction, reducing expenditures on mechanisms for defending rights and reducing land conflicts. As a result, this can increase the demand for land-related investments, including agriculture. Increased tenure security and the ability to transfer land increases the value of land and land investments even if the landowner is unable to personally use the land. Tenure security increases access to credit, where appropriate credit markets exist, increasing the likelihood of land/agricultural investments.

It is now recognized that different forms of land tenure have mechanisms that provide various levels of land tenure security. For instance inheritable usufruct rights provide more security than open-access regimes. But, long-term leases can provide levels of tenure security comparable to titled individual ownership. Studies that point to the superiority of land titles without taking into account differences in land quality and household characteristics may indeed overestimate the impact of titles on agricultural investments. This is especially so since rich farmers, in many instances, hold better quality land and are more likely to acquire titles (Deininger, 2003).

Bruce and Migot-Adholla (1994) cautioned against overemphasizing the role of land tenure security in the use of credit and consequential improvements in agriculture. Results from Kenya indicate that other constraints to the provision of credit, including limited funds in the banking system; the small magnitudes and hence high transaction costs/unprofitable nature of agricultural loans to smallholders; and high risk in agricultural loans due to e.g. climatic risks, must be addressed in complement to improvements in land tenure security.

In addition to alleviating the constraints in the credit markets, it is vital to address broader constraints relating to inadequate use of modern agricultural technologies, low levels of infrastructure, processing and market access as part of an integrated strategy to boost agricultural investment and growth. Without these necessary improvements, enhanced tenure security alone will have minimal impacts on agricultural investment and growth.

2. *Common property resource management*

Forests, pasturelands and some wildlife resources are dominated by common property resources, which are used by a collective group. The nature of these resources and their use make them difficult to partition among users. The survival of the livelihoods of the users over time is determined by the ability to distribute the risks associated with using these resources among a range of users, as well as the equitable distribution of benefits (Bruce and Mearns, 2003).

Yet common property/pool resources are difficult to control and manage. In many African countries, the state is involved in forestry management, although there are multiple users to these resources. State management has often failed to respond to the needs of local users and communities and calls have been made to devolve centralized state management systems to smaller units, communities or households. In some cases community institutions and conventions govern pasture and forestry resources while in other cases there is open access similar to the 'tragedy of the commons' described by Hardin (1994), where access by individuals without rules leads to overuse and degradation of these resources. Open access resources often need user incentives for their sustainable use and management.

The challenge facing governments in the management of pasture, forestry and wildlife resources is the choice between individualizing the resources through partitioning or strengthening community institutions for better governance of these resources. All too often, in the absence of viable community management, individualization of resources has been chosen as an answer, in spite of the problems associated with sub-dividing these resources.

Though simpler in design, individualization excludes many traditional users, especially the poor, from accessing the partitioned resource. Community management systems, on the other hand, are traditionally protective of access rights for the poor, women and pastoralists as well as other minority groups. With outside pressures continually undermining common property resources and forcing them to either reinforce existing systems or partition resources to different users, it is important to keep in mind that a move from community to individualized type tenure and management for pastoral or forest resources may have adverse effects on the poor (Markakis, 2004; Rugadaya, 2005). Particularly, this move could interfere with the ability of disadvantaged groups to derive their livelihoods from these basis resources.

Common property is sometimes misinterpreted as the opposite of private ownership (Bruce and Mearns, 2003). On the contrary, it is similar in objectives to private property in the sense that it aims to increase security of tenure and reduce externalities by internalizing costs and benefits within the community. Common property management is, however, more complex than individual property management and could sometimes display the problems of collective action.

To address these problems, it is important for the state to empower communities through legal provisions, institutional arrangements and social capacity for decision-making and the enforcement of these decisions, rules and regulations. Crucial to empowering communities is first, the need for robust property rights that create incentives for the development of resources. Obviously this is true for individual and community property. Secondly, there must be a mechanism for checks and balances to ensure that household/individual and property rights are maintained within the group. Thirdly, the state should relegate authority for the management of these resources to the community and only play a facilitative role.

Finally, it is important to recognize that social values are an intrinsic element in the management of natural resources, preserving access and distributing to the rural poor. It is therefore important to ensure that indigenous systems, including customary tenure, that contribute to the sustainable use of natural resources are recognized and supported.

It is important to acknowledge the multiple and overlapping uses of common property resources in customary tenure systems. For instance, a forest can be used primarily for timber but may have secondary uses such as woodcutting, beekeeping and pasture. And lands inhabited by wildlife are in many instances the same lands used by pastoralists for grazing. It is therefore important to have 'rights of way' to recognize these overlapping uses. In situations where some uses are not sustainable, there must be incentives to exclude the users through compensation and provision of alternative livelihood options. The collapse of some institutions of common property due to conflicts within the group points to the need to enhance conflict management skills, and dispute resolution mechanisms (Bruce, 1999). An account of some of the issues related to pastoral land tenure and resource access is shown in Box 4.1.

3. *Linking land tenure and water resource management*

Discussions relating to land tenure and natural resources management would be incomplete without highlighting the importance of- and the interlinkages between land tenure, water rights and water management. Land and water are arguably two of the most important resources for man's survival. Water is a vital element to the productive capacity of land. Indeed in most parts of the world where climate constrains production, it is water that is the main limiting factor, not land *per se*. On the other hand, land use has a major impact on the quality and quantity of water. For instance, deforestation and poor agricultural practices on slopes are responsible for high rates of (lower watershed) run-off of surface water leading to flooding, low river flows and increased sedimentation (Hodgson, 2004). As such, any decisions pertaining to land use can have an impact on the hydrological cycle of water.

Box 4.1
Pastoral tenure and resource access

Impacts of past policies

Misguided government policies that were supported by some multilateral institutions and donors in the past have been partly responsible for some failures in the management of pasture resources. Most of these policies were based on narrow assumptions and perceptions, such as "Groups cannot control the access and use of resources by members within the group." The sustainability of pastureland can be achieved simply by balancing the number of livestock against the long run carrying capacity of the rangeland, and that "Resources are divisible" and so conflict would be minimized by individualization of the resource.

Unfortunately, the policies and programs that ensued were mainly in favor of individual ownership, failing to take into account the ecological viability and risks associated with these resources. Pastoralists mainly depend on access to large and diverse pieces of land in order to track forage, the flexibility and mobility of livestock is a key component of this system. Assigning rights of ownership and access exclusively to a small group of individuals can therefore adversely affect the livelihoods of pastoralists by making them more vulnerable to drought.

In addition, this leads to unequal distribution of assets and thus incomes, favoring those who own higher quality tracts of land, mainly the richer, more powerful members of society. Privatizing pastoral lands also negatively affects the ecosystem by creating rigidities, which results in overgrazing due to overuse of small pieces of marginal lands. Another negative outcome is illegal tracking of forage, which leads to more resource use conflicts.

Pastureland management and conflict

Historically, conflict has always been an integral part of pastoral and agro-pastoral production systems (Hendrickson *et al.* 1998). It is important to examine ways of preventing and dealing with conflict when it arises in order to prevent it from escalating into larger conflicts or even civil war. Lessons from flexible tenure systems that allow negotiation of boundaries and access by multiple legitimate users can be insightful (Leach *et al.* 1999).

Towards better systems of managing pastoral resources

Facilitating better management of pastoral resources starts with the understanding that these resources have a high degree of ecological variation over time and space, making them more feasible when used in common. Instead of rushing to adopt individual style property ownership regimes, it may be best to strengthen, reconstitute or adapt customary rules over land tenure and land resources and vest property rights in a group. This is especially viable if: a) the resources are defined at a broad level including a range of landscape and variable ecologies, and b) if a group of users who can sustainably use the resource is identifiable (in terms of scale and non-diversity of social group).

There is no progress in the management of pastoral resources including fixing of boundaries of common property to pasture land, particularly in the face of new developments that threaten the survival of pastureland, including the encroachment of better pastoral lands by agricultural use, peri-urban development and transhumant conservation projects. The options available for dealing with these developments depend on population density, migration in and out of the pastoral areas and availability of alternative sources of livelihood, e.g. supplementary income earning activities.
Source: Bruce and Mearns (2003)

Increased knowledge of the linkages between land and water management have led to the realization that decisions made regarding these resources should be made in an integrated manner to minimize adverse effects of poor management of one resource on the other. Indeed Agenda 21 calls for the integration in the management of these resources at the catchments or sub-catchments level (UNCED, 1992). Unfortunately, little achievements have been made in the integration of land and water allocation and administration. This is due to many factors, including the inadequate legal mechanisms to facilitate the integration of land and water rights partly because water rights are viewed as subordinate to land rights, not meriting attention and inclusion in the discussions surrounding land rights.

Another reason for the lack of integration is that land and water rights fall in the domain of two distinct sets of disciplines, with aspects of water law and water policies falling under the domain of water law and water specialists (hydrologists etc) while land rights and policies are studied by land lawyers, land economists etc. And even at the policy level, governments and international agencies have not made adequate efforts to integrate these two sectors (Hodgson, 2004). As a result of the failure to adequately integrate land and water related issues in decision-making, many of the laws and policies relating to these resources are formulated in isolation of each other. And except for a few cases where integrated watershed management is promoted, institutions that are tasked with the management of land and those for water operate in isolation.

Water resource management decisions are made at the basin level, while land use planning takes place within administrative boundaries (at regional and local levels). The administrative boundaries relating to land do not usually follow those of river boundaries and hence it is not surprising that water and land use planning decisions are not made in harmony. Yet any land use decisions, whether for agriculture, industry, commercial or residential, involves the diversion of water. Similarly, any changes in water use (e.g. construction of dams) have implications for land use in a certain area. And with regard to ground water, land use has tremendous implications on the quantity and quality of groundwater through effects on infiltration rates, soil retention capacity and sub-surface transmissibility (Hodgson, 2004). But again, boundaries of aquifers do not fall in line with those of surface water basins, nor with the administrative boundaries of the state. This makes it difficult to synchronize the planning of land and water resources.

The integration of land and water management should be seen in the broader context of strengthening both land use planning and water management. One way to strengthen the linkages is to include and address issues of land and water rights in the conventional watershed management projects. Often, beneficiaries of either water rights or land rights are not conferred these rights simultaneously, raising the question of whether these projects can indeed meet their objectives of, for instance, better land management without secure land or water rights. Box 4.2 illustrates the significance of coordinating land and water rights and administration for irrigation purposes.

Box 4.2

Coordinating land and water rights for irrigation

Since investments in irrigation usually involve large amounts of capital, it is unrealistic to expect irrigation developers to get involved without a reasonable level of assurance provided through adequate and secure land and water rights. Yet often, national agencies and development partners do not take into account the complex nature, or the interactions of land and water rights. This is partly because irrigation is often approached from a technical standpoint, often using top-down approaches that do not investigate ex-ante socio-economic impacts on households.

Adequate and secure water rights, which are concerned with the abstraction and use of water from its natural source, are vital for successful irrigation projects hence operators of irrigation projects must acquire water rights. From the point of abstraction, water is usually conveyed to irrigated plots through irrigation canals or pipes. Since these canals and pipes are not natural sources of water, owners of land adjacent to them do not necessarily have rights to use the water, unless there is a formal grant or arrangement according these rights. Such an arrangement is however difficult to accord or manage unless to the abstractor, of the natural source of water. The rights accorded to the irrigator include rights to water and a service i.e. delivery of water and maintenance of the schemes. In situations where a state agency is tasked with delivering water in return for payment by individual farmers, insecurity of rights to water arise due to the imbalance of bargaining power between the agency and the individual. For instance, if the agency does not deliver the water to the user, how does the farmer ensure that the state agency is sanctioned?

Insecurity of land tenure for irrigators is common in areas where people have been resettled in irrigation schemes usually funded by the state. In most of these cases, the state controls the irrigated land and other production and marketing decisions with a view to meeting a specific objective such as maximizing production for exports or food security. For operators, land rights relating to access and control of such land are insecure and are conditional upon compliance of rules of operation (e.g. payment of fees for maintenance of irrigation). The state holds the right to expel those who do not comply, hence the land rights are insecure. In addition, these land rights are usually non-transferable. Problems are compounded by situations where irrigated lands were formerly held under customary tenure. If these lands are transferred to private irrigators, e.g. under concession arrangements, the original users of the land could be excluded. If they are not able to operate these irrigated lands, with use rights being transferred to 'outsiders' including non-citizens. Compensation for original users of the land is usually low and decided without consultation of the beneficiaries.

In the context of irrigation, it is clear that land and water rights should be taken into account and addressed simultaneously, including issues of land and water reforms, and gender issues in order to avoid failure in meeting the objectives of irrigation projects. Sources: Hodgson (2004); Effen (1992); Merry *et al* (2002).

4. *Land tenure, gender relations and natural resource management*

Women constitute a big proportion of Africa's rural population. For instance, 93 per cent of Malawi's female population and 80 per cent of Mozambique's women live in rural areas. And of the 65 per cent of Zimbabweans who live in communal areas, 85 per cent are women (Byers, 2001). Examining the linkages between gender relations, land, natural resource management and livelihoods is therefore vital. Indeed, the importance of women in the management of land and natural resources cannot be overemphasized. Not only do women produce, manage, prepare and provide food, they also hold and transmit local/cultural knowledge and skills relating to food, agriculture and natural resource management (ECA, 2004).

In fact women are often regarded as closer to- and the keepers of the environment, yet under many land tenure systems, women do not hold primary rights to land: they do not own nor control land and natural resources (Shivji, 1998) but mainly gain access to either common or private property resources such as forests, lakes or farmlands through a male relative (e.g. husband, father, brother etc.). This situation mainly arises from the predominance of a patriarchal system in Africa, which defines gender and power relations, putting women and children in minority positions. And even if matrilineal systems in some parts of Africa where women have limited access to, and control over, land, female-headed households (for example in Malawi) mainly occupy the smallest land holdings. These circumstances in which women take care of the environment without adequate land rights, much needed for sound management decisions, not only puts them at a disadvantage, but also predisposes the environment to the risk of degradation.

One characteristic of gender relations in rural Africa is the apparent division of labor between men and women. Generally, women's tasks are centered on labor provision while male tasks are more decision-making oriented. In terms of crop production, women are generally involved in weeding, transplanting and post-harvest activities, while men do land clearing, burning and plowing. Men and women both take part in seeding and harvesting. Women produce most secondary crops.

Regarding livestock production, women are involved in taking of small animals and ruminants, but also take care of certain aspects of large animals (herding, providing water and feed, cleaning stalls, milking, milk processing and marketing (ECA, 2004). Women are also involved in fishing (in shallow waters and coastal lagoons), food and fuelwood gathering, processing, storage, food preparation and fetching water. Table 4.2 shows that while women are responsible for only 33 per cent of the 'recorded' workforce in Africa, they make up 70 per cent of the agricultural work force and are primarily responsible for most aspects of food processing, marketing and preparation as well as fuelwood and water collection.

Table 4.2
Contribution of African women to family livelihoods

Activity	Percent
General workforce	33
Agricultural workforce	70
Labor to produce food	60-80
Processing of food stuffs	100
Housing water and fuelwood collection	90
Food storage and transport	80
Hoeing and weeding	90
Harvesting	60

Source: FAO (2002)

FAO (1996) cited land as one of the main obstacles to increasing agricultural productivity and the incomes of rural women. Security of tenure in private, communal and other forms of land ownership can encourage women to invest in the land, adopt environmentally sustainable farming practices (Juma and Ojwang, 1996) and better take care of other resources (forests, lakes, rivers, etc.). Tenure security would provide women with control over decisions regarding the use of land including decisions relating to the choice of crops, agricultural technology and marketing. Land reforms geared toward providing women tenure security and control over land are slowly being formulated, but their implementation is slow. For example, women received only 20 per cent of the land during the recent Zimbabwe land reforms (ECA, 2004). More must be done to ensure that land policy reforms are accompanied by the appropriate mechanisms that allow for the implementation of laws and programs to guarantee women's rights to land. This includes ensuring that laws related to inheritance, marriage and property rights are harmonized with land related laws.

5. *Land and natural resource conflicts*

External shocks to land tenure and land use in Africa emanate from, for example, increased human population, increased animal population, drought, migration, commercialization and urbanization. These factors in turn lead to changes in land use patterns with outcomes such as the expansion of crop cultivation, reduced land fallow periods, blocked animal migratory routes, decreased access to water, land degradation and desertification, overgrazing and deteriorating rangelands. In addition to changes in land use, there are consequential changes in land tenure, particularly the evolution from

customary tenure and open access lands to private ownership as well as increase in land sales. These changes in land tenure and land use have led to increased conflicts.

The forms of land tenure disputes are two-fold: activity led and actor-related disputes. *Activity-led disputes* include agricultural, pastoral fishing disputes (Maiga and Diallo, 1998). Agricultural based disputes relate to the demarcation, ownership, and inheritance of land, particularly when boundaries are not marked or when they disappear, as a result of unclear terms of renting land or vague customary rules of inheritance. Pastoral-related disputes and conflicts arise from the weakening of customarily held rights of pastoralists due to the relative superior treatment of private ownership, especially after the independence of many African states. Fishing disputes, on the other hand emanate from unclear boundaries, land ownership and inheritance rights. *Actor-related disputes* arise between individuals, and are usually tied to an activity led dispute.

Most frequently, disputes occur between village communities however, although they originate from individuals, who solicit their communities for support. Actor-related disputes also occur between individuals and communities, as in the case of people returning to villages from public service, refugee camps etc. to seek land rights similar to those for the locals. Disputes also happen between decentralized institutions, especially during policy implementation due to undefined boundaries for performing activities.

The causes of land tenure disputes in Africa include unsuitable land legislation especially in countries lacking a comprehensive land policy, or where ambiguous land and other complementary laws do not address issues relating to overlapping land rights, claims to land and property rights. Land administration in Africa contributes to land disputes by being dysfunctional and inaccessible to the majority of Africans. This is particularly true in situations where corruption is rampant, increasing the transaction costs of land transactions and dispute resolution. Land grabbing and land invasions, common to many parts of the continent are also a cause of land disputes.

The general breakdown in law and order, common to Africa due to bad governance, corruption, and civil war also contribute to, for example, the laxity in land use planning, eventual demolition of houses and increased land disputes. In addition to these governance and institutional factors, land disputes are fueled by socio-economic needs of the population and the scarcity of natural resources especially in the face of increasing population (Maiga and Diallo, 1998).

6. Impacts of HIV/AIDS mitigation on land

As shown in Table 4.3 below, HIV/AIDS has implications for land tenure, particularly as families are forced to cope with the disease and eventual death of family members. Coping strategies range from extreme cases where families are forced to abandon land or are forced out of their lands (Mullins, 2001). The former strategy occurs especially when both parents die leaving orphans to either move in with relatives or turn to the streets, with begging becoming their main source of livelihood. Forcible removal mainly occurs

when widows fall victim to discriminatory or ambiguous land rights regimes, which prevent them from controlling land left to them by their husbands. In common property resources where the ability to use the resources is vital to maintaining rights to resources, HIV/AIDS can have

Table 4.3
Responses to the effects of HIV/AIDS from afflicted families

Reaction	Method	Effect
Abandon the land	Family is unable to use it and just leave the land idle	Infected and siblings move in with relatives
Rent out the land	Family formally or informally rent out the land	All or portions of land are given to others who can more easily work it in order to get cash and to avoid having a productive resource lying idle (for example in sharecropping arrangements)
Lend the land	Family lend out the land to those capable in their community	Family members use part of the and
Sell the land	Distress sale at depressed price to meet medical costs	Informally sell the land in order to get cash and to avoid having productive resource lying idle
Forcibly take the land	Family members take land by force from those who cannot work it	This situation is faced by many widows who can be left completely impoverished, others just as they begin to fall ill themselves

Source: Mullins, 2001

detrimental negative effects to land rights as affected and afflicted households are excluded from access and control of these resources. For those who already have secure rights, debilitating diseases such as AIDS can render them unable to use land and land resources as the ability to mobilize labor and capital is reduced by illness and associated costs. Mullins (2001) notes that it is common for such families to result to distress land sales due to lack of cash, labor and skills to use the resources. Mitigation for HIV/AIDS can be greatly enhanced by ensuring that land reform takes into consideration the effects of this pandemic on families, households and communities, with a view to increasing security of tenure for afflicted families so that they a) do not lose their land from forcible eviction following the death of the head of the household; and b) can lease part of their land following loss of labor or skills as a result of a death of a household member, or to earn capital to cope with the disease.

IV.5 Land reforms to enhance natural resource management

1. Current reforms geared towards alternative land rights in Africa

Most land reform agendas are driven by either efficiency or equity objectives, or both. For instance, trends towards shifting from customary use rights to private (individual or group) often aim to improve efficiency by removing constraints (e.g. limited transfer rights) associated with customary ownership of land. On the other hand, land redistribution aimed at addressing inequalities and giving productive assets to the landless and land-poor farmers has both equity and efficiency motives.

Understanding the dynamics associated with different types of land rights is crucial to any land reform efforts, particularly in identifying the most suitable types of reform processes to undertake. Ngaido (2005) provides a useful framework for analyzing and valuing alternative land rights, defining the benefit derived from changing land rights as the discounted net present value of increased productivity per hectare (PV) plus the collateral value per hectare (CV). The costs include the transaction costs per hectare (TC) and taxes per hectare (T). Table 4.4 summarizes this analysis.

Table 4.4
Characteristics and associated values of alternative land rights

Characteristic	Land reform process					
	Maintaining customary rights	Registering land rights	Titling land rights	State ownership/redistributing land rights	Subsidized landownership	Market-based land access
Role of the state	None or limited intervention			Strong state intervention		
Objective	Improving bundle of rights			Reducing imbalances in landownership		
Land rights	Customary use	Registered private use	Titles	Registered use rights (titles)	Limited titles	Titles
Tenure security	Yes	Yes	Yes	Yes	Yes	Yes
Sales	Limited	Yes	Yes	Very limited	Yes	Yes
Rental and sharecropping	Yes	Yes	Yes	Limited	Yes	Yes
Credit access	Informal/parastatal	Yes	Yes	Cooperative/parastatal	Yes	Yes
Composition of land value	Value of benefits of land (VP)	Value of benefits and collateral minus transaction costs (VP+CV)-TC	Value of benefits and collateral minus transaction costs and taxes (VP+CV)-(TC+T)	Value of benefits minus transaction costs VP-TC	Value of benefits and collateral accruing from subsidy plus the contribution from the owner minus transaction costs and taxes [s(VP+CV)+ic(VP+CV)]-(TC+T)	Value of benefits and collateral minus transaction costs and taxes (VP+CV)-(TC+T)

Source: Ngaido (2005)

Customary land rights in countries such as Botswana, Malawi, Mali, Morocco, Niger and Zambia are characterized as follows: a) they provide easy access through group membership and networking; b) members share risks (costs and output); and c) there are informal methods for obtaining credit and preventing loss of land.

Customary land rights, therefore, offer access to land and security of tenure to many poor households. However, in so far as customary land rights provide limited access to formal credit and input markets, and as long as there are limited sales (outside the group), customary land rights are viewed as an impediment to investments in agriculture by limiting opportunities for productive exchange and access to credit. Yet as far as poor resource farmers are concerned, customary rights help them reduce risks associated with formal financial and land markets, particularly through informal mortgages and land rental (usually sharecropping arrangements). It is worth noting that under many customary systems, women hardly gain control of the land. The value associated with customary rights is the net present value of current and future productivity of the land (PV).

Registered customary land rights provide an important step in the shift away from customary systems to titling. Under this system, practiced in many countries of North Africa and some sub-Saharan African countries (central African Republic, Kenya, Mali and Niger), registration of customary lands boosts the possibilities for right holders by increasing land transactions in both formal and informal land markets and increases access to formal credit institutions.

In many cases, registration involves low transaction costs with simple local process for defining boundaries for individual and group lands as opposed to conventional, expensive cadastral surveys. By recording transactions at local level, this move serves to reduce land-related conflicts. In terms of the value associated with registered customary land rights, the registration process transforms the composition of the costs and benefits from the customary system (net present value of land productivity) to the sum of discounted net present value (PV) plus collateral (CV) minus the transaction costs associated with registration (TC). Once again women's rights are not always ensured in this system.

Previously advocated as the optimal solution for granting tenure security and land access, *land titles* often involve high transaction costs, particularly the cost of cadastral and formal legal procedures. Therefore, while land titling may benefit farmers of high-value commodities, it is usually not practical for poor resource farmers. Indeed, it is now well accepted (e.g. ECA, 2004; Bruce and Migot-Adholla, 1994) that land titling does not usually provide the intended benefits of these programs, particularly since the links between land titling and tenure security; credit availability and investments; have not been well established in Africa. And it is still unclear whether women actually benefit from these programs.

While some titling programs succeeded, e.g. in Tunisia where subsidized titling was accompanied by irrigation and the introduction of high value crops, evidence from Botswana, Swaziland and Zambia show that titling often works in favor of landowning elites and private agribusiness at the expense of small-scale producers (Ngaido, 2005). And in Cote d'Ivoire, titling resulted in the eviction of migrant laborers operating under rental/sharecropping arrangements. The value of land rights from titling is equal to the present value of the land minus plus collateral minus both the transaction costs and taxes associated with the land.

Redistributive land rights aim to reduce inequalities in landowning emanating from previous imbalances either from land concentration by local elites or foreigners. Examples include Algeria, Guinea-Bissau, Ethiopia, Libya, South Africa, and Zimbabwe. As confiscated land initially becomes state land, redistributive rights provide limited opportunities for sale and rental, hence the value of these rights is the present value of benefits minus transaction costs (VP-TC). Limited transfer rights may lead to insecurity, e.g. in some parts of Ethiopia where insecurity emanates from the fear among inefficient users that they may lose their land rights. Yet, in other parts of Ethiopia where there is regulated land rental, redistributive rights have proved to fulfill both efficiency and equity objectives by providing more land access to women and younger, more productive households.

In cases where land redistribution occurs in developed agricultural areas, for example, along the Senegal River after irrigation with more productive lands being transferred to project beneficiaries, inequalities may be maintained or enhanced since redistribution often follows prior ownership rights. This was the case in Mauritania where irrigation occurred for lands owned by more powerful and wealthy elites turning poor farmers into laborers.

The recent reforms in southern Africa encouraging *market-based land policies* [willing buyer-willing seller] were aimed at facilitating equity and efficiency in the agricultural sector while avoiding the negative effects of land confiscation on the economy. Unfortunately, evidence from South Africa, Namibia and Zimbabwe show that the white population acquired more land under these market based policies than disadvantaged black farmers. As a result, many governments in southern Africa are revisiting the option of confiscation.

Subsidized market based reforms vary from the conventional market based reforms in that land right holders are given financial support by governments or donors to pay for part of the cost of acquiring land. It is envisaged that, if well targeted, such programs can benefit women and poor people. Unfortunately, in reality these programs for example, in South Africa and Zimbabwe, have been slow and in instances when the financial support is high, beneficiaries are quick to sell their land, making a profit comparable to the subsidy. The result of such an exercise therefore might result in unintended land concentration, exacerbating land inequality (Ngaido, 2005). In order for these reforms to

work, accompanying laws and regulation must be put in place to avoid unintended outcomes.

2. *A comprehensive reform agenda: integrating land tenure, institutional and regulatory reform*

Getting Africa on a path of successful land reform that facilitates efficient, equitable and sustainable use of its land and natural resources requires the understanding of the intended beneficiaries of land reform programs and their environment (e.g. their capabilities, constraints, opportunities) in order to apply the appropriate reforms to the land rights, land markets, legal processes and land administration. In addition, it is important to engage in holistic reforms which address all aspects and processes including the capability of governments to undertake the necessary reforms required to reach a successful outcome. Partial reforms of e.g. policies without accompanying legal and administrative reforms or appropriate human and financial capacity have often fallen short of their objectives. Box 4.3 presents the case of Sahel, where a clear attempt was made for comprehensive land reforms, addressing issues of law, institutions and governance.

a. *Reforming customary rights and local institutions*

Simple non-expensive registration programs for customary rights can help transform these rights into legally recognized rights with a view to improving efficiency by enhancing tenure security and land transfer (e.g. land sales) and facilitating access to credit and other inputs for rights holders. It is, however, necessary to also invest in and reform local institutions, for example, by improving recording systems to facilitate cadastre.

b. *Improving land rights gained from redistribution*

The majority of current land redistribution programs result in restricted land rights with rights holders denied the right to sell land. Although it is important to ensure that such programs do not result in mass land sales leaving land owners destitute, it is equally important to recognize the need to allow these rights to evolve into either private property (individual or group), with a view to facilitating movement out of e.g. inefficient farmers who wish to quit farming and invest the capital in other ventures.

c. *Addressing constraints in market-based reform programs*

To address the problem that has prevented successful market-based programs, Ngaido (2005) calls for a change in the valuation system by making a distinction between improved and non-improved lands. This would reduce the price of unimproved lands, making them more affordable for, say, acquisition by governments for redistribution as in southern Africa, or to poor resource farmers who wish to buy land. At the same time this would allow sellers to recover the cost of their investments.

Box 4.3

The Praia declaration: addressing land tenure challenges in the Sahel

The Praia Declaration was adopted following a regional conference on land tenure and decentralization problems, held in Praia, Cape Verde, in June 1994. The aim of this memorandum was to address challenges that were identified by a wide range of stakeholders, including government representations, farmer organizations, civil society and development partners. The identified challenges include:

- Inaccessibility of laws, regulations and institutions governing land;
- Lack of recognition of local legitimate institutions governing land;
- Limitation of existing laws/regulations to address the complex realities with respect to land;
- Poor land use planning which does not take into account the diversity in land quality;
- Marginalization of women, pastoralists, sharecroppers, migrants, refugees etc. and
- Land conflicts, mainly emanating from the constraints mentioned above.

The Declaration aimed to provide a framework and guidelines on legislation that ensures secure and equitable land rights, equitable access to land natural resources especially for marginalized groups, land use planning to facilitate sound environmental management and protect livelihoods, provision of information, training and raising awareness for users of legislation.

An evaluation of the implementation status of Praia nine years after its inception points to some successes. *Legal and institutional reforms* for land and natural resources management were formulated in Chad, Burkina Faso, Gambia, Mali, Mauritania, Niger and Senegal. Efforts were also made to package information in local languages and disseminate it to the stakeholders. For instance, in Niger public meetings were used for disseminating information while public broadcasting in local languages was the medium used in Mali and Mauritania. In Gambia and Mali, for example, the law was translated into many local languages.

With regard to addressing the challenges related to *marginalized groups*, Niger ensured that women constituted one third of the members of land Commissions, who participate in, for example, land allocations during the piloting of the 'Enforcement of the Land Legislation and Sustainable Management of Natural Resources'. In Chad, women associations were encouraged during an awareness raising campaign called the Participatory Communication Project (PCP). Women associations acquired plots of land, including plots in irrigated areas of SODELAC. Efforts to address pastoral issues were initiated in Burkina Faso, Mali and Mauritania through legislative reforms aimed at recognizing pastoralism as a crucial economic activity and a viable source of livelihood, protecting pastoral mobility, ensuring access to vital developmental resources, and promoting traditional methods of natural resource management. In Burkina Faso, efforts were made to address challenges affecting migrants, starting with the events of Tabou in 1999, and catalyzed by the 2002 Ivorian. These efforts include discussions surrounding access to land and other forms of assistance to assist in the reintegration of returnees.

In spite of these achievements, the implementation of the Praia Declaration is slow, in particular as it relates to ensuring adequate participation in formulating laws. In many instances, the State is still interfering with local land administration. And in spite of gains made in providing information, there is still ignorance even among the judiciary with regard to the land laws. Overall institutions for implementation remain weak.

Lessons from the implementation of the Praia Declaration point to the importance of instituting preliminary measures to a comprehensive review of laws and institutions as opposed to piecemeal reviews; involvement of actual stakeholders, not just NGOs, who may not always represent communities and supporting institutions.

Source: Toure (2003)

d. Decentralized land administration

Decentralization increases local people's influence through close contacts with the administration. Reforms geared toward elected authority for local land administration would lead to responsiveness to local interests and needs. The government however must play a role in providing a broad framework and principles, rules of tenure and access and ensure transparency and accountability of these institutions. Debate should be encouraged at local, national and sub-regional levels to enhance decentralization programs (Winter, 1998). Facilitating learning from different initiatives underway, for example, *gestion de terroir* common based resource management system, conflict resolution mechanisms, forest management, wildlife management would be useful as well as public consultations in the drafting of new tenure codes, parliamentary debate etc.

e. Enhancing mechanisms for land and natural resource dispute resolution

To settle land disputes, African countries depend on a mixture of customary and statutory laws as well as alternative mechanisms. The effectiveness of any dispute resolution mechanism depends on the ability to think ahead and anticipate conflict. This calls for early warning and strategic planning, incorporating short and long term goals. (Maiga and Diallo, 1988) provide a summary of how conflict and dispute resolution can benefit from an integrated approach with the coordination of national and international partners. They point to the importance of placing land and property rights issues on peace making agendas to avoid the failure of peace initiatives and a relapse into conflict. In addressing displacement and return of populations, Kamungi *et al.* (2005) emphasize short-term capacity building efforts to enhance institutions handling refugee repatriation and integration.

The importance of strengthening mechanisms for dispute resolution by increasing the participation of internally displaced persons (IDPs) cannot be underestimated. Resettlement for displaced persons and resettlement programs should be reviewed to reduce conflicts among different land uses. Programs for civic education aimed at enhancing peaceful co-existence could be useful. Education and advocacy on land tenure issues should also be harnessed in order to facilitate a long-term comprehensive land policy reform that facilitates devolution and decentralization of land administration and management.

Institutional, legal and policy responses to conflict should aim for comprehensive programs for correcting injustices through well-established forms of redress. This starts with embedding the rights of customary land in the constitution and putting these rights at par with statutory land. Improved land registration and affordable mechanisms for demarcating boundaries are essential, so are law reforms geared toward recognizing the rights of communities to natural resources such as water, forests, wildlife, minerals, fisheries, rangelands, protecting them from being overridden by private rights of land ownership after e.g. titling.

In addition, Africa should explore ways of protecting indigenous intellectual property rights over genetic resources in their habitat in accordance with the Convention of Biological Diversity. In this regard, laws should be enacted to ensure equitable sharing of wealth created from natural resources, facilitating poverty reduction and including minority communities in national development. Trends toward improving good governance are a welcome sign that land administration, particularly local administration and management, will slowly start to address inefficiency and corruption in land administration (Lumumba, 2005).

IV.6 Conclusions

The efficient, equitable and sustainable management of Africa's natural resources depends on land tenure, institutions and regulation of land and land resources. This chapter examined the constraints that affect the management of some of these resources, including farmlands, common property resources such as pasturelands and forestry as well as water resources.

With regard to agriculture the main constraints include biased land use regulation, unequal land distribution and insecurity of land tenure. In addition, the complexities introduced by globalization, particularly the intensity of the forces of global capitalism in resource allocation in Africa, demand that land reform take note of the new playing field. In particular, land reform must aim to address the structural causes of inequality, recognizing that land issues are linked to processes of change in the local and global arena.

Specificities of common property resources such as pastoral lands and forests make them more viable when managed under common property management tenure regimes. While it solves equity related constraints, this type of resource management needs policies and regulations that ensure that this system allows for efficiency and sustainability objectives to be achieved.

The challenges involved in water management are exacerbated by the lack of coordination between land rights, water rights and management decisions pertaining to these two resources. Improving water management requires an integration of water and land decision-making processes to avoid adverse effects of the poor management of one resource on the other.

In spite of the significant contribution of women to agricultural production and the management of natural resources, this chapter shows that women often do not have the necessary rights of access and control of the land. This is a significant constraint to achieving equitable, efficient and sustainable resource management. Reforms that are geared toward recognizing women's rights to land (including changes to property ownership and inheritance) are much needed.

Activity and actor-led land and natural resource conflicts are a cause for concern in Africa. Causes of land scarcity such as population growth may lead to disputes, particularly in the face of poor land legislation and the lack of a comprehensive and integrated land policy. Dysfunctional land administration has also contributed by not providing dispute resolution mechanisms to mitigate and resolve disputes. As a result, land disputes have often escalated to full-blown conflicts in Africa in recent years.

In order for HIV/AIDS affected and afflicted households to have viable options to mitigate the impacts of HIV/AIDS on agriculture and natural resource management, land reform must ensure that land rights for women, orphans, households and communities are addressed in land reform processes.

Most reforms for land rights are geared towards improving equity, efficient and sustainability objectives in natural resource management. Examining alternative benefits and costs of alternative land rights regimes is however vital to a successful land rights regime.

In addition to land right reforms, institutional and regulatory reforms that aim to reform customary rights and local institutions; improve land rights gained from redistribution; address constraints in market-based reform programs; decentralize land administration; and enhance mechanisms for land and natural resource dispute resolution are vital.

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Chapter V
HARNESSING LAND AND WATER RESOURCES
FOR FOOD SECURITY

The Case for Public-Private Partnership

V.1 Introduction

In the area of food and agriculture, Africa is characterized by a weak public-private trade and investment partnership at regional level and unable to fully bring available arable land and renewable water resources under sustainable management and reliable water control and management systems and to minimize risks and uncertainties in agricultural production and ensure its sustainability. Indeed, the issue is not so much the expression of political will but a question of commitment to translate, in a sustained manner, the political will into concrete actions that will bring food and nutritional security to Africa.

For instance, within a period of less than 12 months, the Assembly of Heads of State and Government of the African Union (AU) met in Maputo, Mozambique in July 2003 and in Sirte, Libya in February 2004 to discuss agriculture under the New Partnership for Africa's Development (NEPAD). The Summit of 2004 on agriculture and water was an opportunity to get firm commitment to initiate and promote the concept of a regionalization process of national agricultural economies, and regional public-private trade and investment partnership in harnessing land and water resources in African agriculture. This would lead to strategic agricultural commodities, free and sectoral development and investment zones, and government-based incentives to help integrate the continental economy and market around strategic agricultural commodities, and to supply regional and global markets with high value added agricultural products.

The aim of this chapter is to advance the concept of public-private trade and investment partnership as a tool for harnessing land and water resources to ensure food and nutritional security by utilizing more arable land in the river valleys where renewable water resources can be brought more easily under sustainable management and reliable control system. It is kept in mind throughout the paper that there are policy implications that go beyond the area of public-private trade and investment partnerships that are not fully dwelt with here, as well as other limitations and constraints.

V.2 The need for public-private partnership

Taking *land* as an example, it has its own unique characteristics associated with problems in its efficient use, exchange, and development, all of which demand reform (Galal and Razzaz, 2001). These include its fixed location, heterogeneity, requirement for bulk financing for acquisition and development, and demand derived from the demand for the products and flow of services it helps to generate. Land characteristics, associated problems, impacts, and recommended reforms are shown in Table 5.1.

Table 5.1
Land characteristics, associated problems, impacts, and recommended reforms

Characteristics of Land and Real Estate Assets.	Associated Problems	Impacts	Nature of Reforms
1. Fixed in location	<ul style="list-style-type: none"> Negative/positive externalities, resulting from actions by neighbours and government. Government residual control (powers) over ownership and use of land could lead to opportunistic behaviour 	<ul style="list-style-type: none"> Over/under investment, and government exposure to contingent liability Risk of asset or income expropriation, especially for informally held assets, reduces incentives to trade and investment. 	<p>Rights, Information, Contracting, and Enforcement (RICE)</p> <ul style="list-style-type: none"> Introduce and enforce rules to protect property rights and assess the social costs and benefits of land use regulations. Adopt mechanisms to enhance the credibility of government commitment (e.g. legalize and enforce full compensation and fair resolution of disputes).
2. Heterogeneous.	<ul style="list-style-type: none"> Information asymmetry, ill defined property rights, and high transaction costs 	<ul style="list-style-type: none"> Inefficient exchange and loss of productive and allocative efficiency, especially where transaction costs are fixed and high. 	<ul style="list-style-type: none"> Establish and register rights to land and real estate, and reduce cost of compliance. Publicize information in registries and market trends. Strengthen implementation agencies.

Characteristics of Land and Real Estate Assets.	Associated Problems	Impacts	Nature of Reforms
3. Bulky investment.	<ul style="list-style-type: none"> • Inability to finance the acquisition and development of land and real estate through own savings, making lack of term finance a problem. • Where term finance is available but capital markets underdeveloped, exposure to real estate cycles through credit risk, interest rate risk, and collateral risk. 	<ul style="list-style-type: none"> • Under investment where liquidity is constrained or risk premium is high. • Financial crises driven by real estate cycles. • Lack of access to collateral by the poor, who may be more efficient users. 	<p>Finance and Risk Management.</p> <ul style="list-style-type: none"> • Provide a regulatory regime to allow the development of mortgage finance. • Assist the poor in using land and real estate as collateral. • Enable institutional investors (e.g., pension funds) to invest in asset backed securities. • Strengthen the ability of financial institutions to better assess and manage risk of lending for land and real estate.
4. Derived demand.	<ul style="list-style-type: none"> • Policy and tax distortions in input markets of agriculture (e.g., fertilizer), housing (e.g., cement) and finance (e.g., interest rate). • Policy and tax distortions in output markets of agriculture (e.g., cotton) and housing (e.g., rent control). 	<ul style="list-style-type: none"> • Misallocation of resources. • Policies aimed at making the poor better-off may actually have the opposite effect (rent control). 	<p>Market Structure and Fiscal Policy.</p> <ul style="list-style-type: none"> • Remove /phase out price controls, subsidies, differentiated taxation, excessive tariffs on agricultural products. • Remove/phase out rent control and interest rate subsidies. • Use targeted subsidies to help the poor.

Source: Galal and Razzaz, 2001

1. Fixed in location

Land is fixed in location as are the permanent improvements on it (Galal and Razzaz, 2001). Fixed location exposes owners to positive and negative externalities resulting from uncompensated actions by neighbours or government. For example, owners can suffer substantial uncompensated losses from changing land use regulations that could erode the value, use, or yield of their asset. Lack of credible commitment by governments not to take arbitrary actions, absence of due process and full compensation, widespread rent-seeking behaviour by public agents, and spatial uncompensated externalities all reduce the incentives for landholders to invest (e.g., planting trees or upgrading houses) as much as they would have under a more predictable regime. Buyers and lenders are likely to value assets less than they would have otherwise to discount for these risks.

The importance of credible government commitment follows from the combination of locational characteristic of land and the residual control of power enjoyed by all governments, at the national and local levels. Governments can, indeed, influence what owners can or cannot do with their assets through zoning policies and land use controls, licenses and permits, price controls, and most drastically, uncompensated expropriation (nationalization, land ceiling acts, etc.). Even where property rights are established and assigned, these rights have little value in the absence of enforceability and adjudication. In the case of informal settlements, lack of secure tenure often derives from loose enforcement of property rights to begin with, and then an inability of the legal system to recognize the *de facto* possessor rights of settlers or users.

2. Heterogeneity

The heterogeneity of land derives partly from its fixed location: each parcel of land is unique. But heterogeneity also derives from endogenous quality attributes such as soil quality, slope, etc., for agricultural land. Finally, rights, privileges, and powers over land can vary significantly from one asset to another (rights of owners and tenants, liens, residual controls by local government, etc.).

These heterogeneous features create an asymmetry of information, whereby the owners tend to know more about these assets than the buyers or lenders. Because buyers and lenders find it costly to collect this information, they tend to attach higher risks to owning land or using it as collateral than would be the case if the information was collected and made available to the public. To deal with the information problem, governments create institutional mechanisms for registration and exchange of property. But these arrangements, while improving the quality of information, often involve extensive bureaucratic and technical procedures with high transaction costs. The end

result of all of this is limited exchange and less than full utilization and development of land.

3. Bulky investment

Financing the acquisition and development of land requires resources often in excess of most individual household savings and certainly their annual income. Where term finance is lacking, investment in these activities is blocked. A developing country often excludes a significant portion of its potential market participants because of poor access to credit. This defect reduces the number of participants in the market, the number of transactions that take place, and thereby amount and quality of information in the market. Welfare is also reduced when due to lack of credit, poor participants are unable to bid away land from wealthier participants who might be less efficient landholders. Finally, the use of real property as collateral has the direct effect of reducing the likelihood of default on a loan and therefore has the potential of reducing interest rates, reflecting lower risk, and thereby increasing the affordability of credit to lower income groups. An increase in the number of collateralized assets may increase the flow of capital to financial markets and help to spur development in other sectors.

4. Derived demand

Because the demand for land is derived from the demand for the products and services it produces, distortions in product and service markets have bearing on the value and flow of benefits from the land. Government interventions in the form of price controls or subsidies of outputs and inputs in these markets, as well as rent control, taxation, and tariff policies, increase or diminish the value of land. Where these distortions are pervasive, serious misallocation of resources is inevitable.

In the market for agricultural products, price controls on crops, high tariffs on imported inputs (e.g., fertilizer, seeds), or taxes on domestic products of these inputs have the effect of reducing the value of and return from land. Labour and capital will be diverted from agriculture to other activities, and agricultural output will be less than optimal. Policy intervention in the opposite direction would encourage excessive use of and investment in land, resulting in waste of scarce resources. Policy interventions in the industrial sector have similar effects. In financial markets, government policies on interest rate subsidies, and underdeveloped mechanisms for saving mobilization all limit the development of private mortgage lending, and hence access to credit. All these market distortions cause misallocation of resources, and require appropriate policy instruments to create remove the distortions and generate ideal conditions for investment.

In the case of *water*, allocation mechanisms tend to queue users, to restrict water transfer and water trading, and to charge prices that do not adequately reflect the water's scarcity value. Shah and Zilberman (1992) develop a conceptual framework for analyzing the economics of transition from queuing systems to water markets. The framework is especially applicable to prior appropriation system. The analysis relies on Caswell and Zilberman's (1986) and Dinar and Zilberman's (1991) irrigation choice models. These models assume that agricultural production has a constant return to scale. They concentrate on the choice of water and irrigation technology and assume that output is a function of effective water and irrigation technology. Effective water is water that the crop uses. Evapotranspiration (ET) is a common measure of consumptive water use.

Effective water is a function of applied water and can be strongly influenced by irrigation technology, especially in areas where applied water losses due to deep percolation and runoff are more likely to occur. Modern irrigation technology (for example, drip and sprinkler) can improve the uniformity of water application and thus increase the efficient delivery of water to the plant's root zone, thereby increasing the proportion of effective water to applied water. Irrigation scheduling prevents over-irrigation that may occur with simple gravitational technologies such as flood or furrow irrigation. The gains associated with modern irrigation technologies increase as environmental conditions become less favourable to traditional irrigation technologies. For example, sandy soil or uneven land leads to substantial deep percolation or runoff losses.

Modern technology increases yields and is likely to save water but involves higher investment costs. Caswell and Zilberman (1986) and Dinar and Zilberman (1991) argue that modern technologies' yield-increasing and water-saving effects are likely to offset the higher investment costs as water price becomes higher. Under traditional appropriation system, the farmer undertakes expense to move water from the canal or stream to the field but does not pay for the water's scarcity value. Thus, one assumes water's marginal price to be zero (or close to it). Therefore, profit-maximizing farmers use water at a level where the value of marginal product of applied water is zero or very close to it

Water markets establish a water price. Farmers apply water at a level so that the value of marginal product of applied water is equal to water price. If water price is positive, then water use per acre declines relative to the prior appropriation system where water price is zero. Thus, introducing water markets should increase the amount of land that a given volume of regional water can serve. The introduction of a water market may expand irrigated land to include all farm land in the region.

This suggests that transition from a water rights regime to a water market increases economic efficiency. This is true if the transition from one system to another does not entail adjustment costs. However, the prior appropriation system and the zero scarcity value of water it entails permit establishing a very inexpensive water conveyance system requiring little monitoring, especially if all land belongs to farmers who have water rights. Transition to a water market may require expanding conveyance systems, improving measuring and metering, and increasing monitoring and protection of water flows. If the efficiency gain from operating the new system is smaller than the adjustment costs of the transition, then the transition is not totally efficient. Indeed, lack of demand, low commodity prices, or a high initial water to land ratio may mean the amount of land that farmers optimally can utilize under a market system is not much bigger than the amount they utilized under the prior appropriation system. In this case, the prior appropriation system is more efficient than a market one, given transition costs. That may be why the system was established in the first place. Over time, as demand for commodities produced with water increases and their prices rise, or as adjustment costs improve due to better technology, water markets are likely to become more efficient, and one can justify transition. This transition is necessary if Africa is to ensure food security to its population because the food demand is high. Yet for the transition to be possible, high investment is required. This can best be generated by promoting public-private partnerships.

V.3 The Concept of public-private trade and investment partnership

The “new partnership” in NEPAD implies that African leaders will commit themselves to setting up a partnership for development, inspired by a shared vision of Africa as nations network into a unified continental economy and market. The partnership will depend on the following conditions:

- *Africa's* continued contribution to the global economy through the exploitation of its markets, investment opportunities and human and natural resources;
- The contribution of each African *nation* to the regional and global economy using its comparative advantages; and
- The optimal contribution of each *strategic commodity* to broad-based economic growth with food security, poverty reduction, equity and better environmental management.

The partnership should be organized in such a way that it facilitates:

- Scaling up existing national production capacities with good prospects for regionalization to achieve economies of regional scale and scope;
- Merging production capacities to achieve economies of regional scale and scope; and
- Setting up new production capacities.

These conditions will help generate a Public-Private Trade and Investment Partnership (PPTIP) at regional and international levels, and the setting up of African Transnational Corporations (ATNCs). This will help to pool public and private sector resources in a mix where transnational corporations will be based more on regional private sector resources mobilization and managed along private sector principles; and generate companies managed on regional, rather than national, levels and which will have regional brands, research, development.

Then business and investment opportunities among African *willing* states, partnering agreements and tools can be generated to strengthen the partnerships. Such partnering agreement and tools must be inspired by a shared vision of Africa as nations network into a unified continental economy and market. The tools include, but are not limited to:

- ATNCs, African Sectoral Development Zones (ASDZs) and Africa Free Development Zones (AFDZs) generated through a merger of existing production capacities and setting up new ones to capture cross-border efficiencies;
- Sectoral Programme of Action (SPA) linked to a Sectoral Peer Review Mechanism (SPRM) to help guide ATNCs, for example, and bind willing states and partners in governments, business communities and civil society groups to a programme of action while holding each other legally accountable; and
- Regional Corporate Tax (RCT) and regional programme of government-based incentives to be managed to ensure, for instance, the profitability of ATNCs and to harness partnership, business and investment opportunities.

Since the Assembly of Heads of State and Government of the African Union (AU) met in Maputo, Mozambique in July 2003 and in Sirte, Libya in February 2004 to discuss agriculture under the New Partnership for Africa's Development (NEPAD), the outcome and the follow-up activities of major policy decisions made at these meetings have not resulted, so far, in notable changes in Africa's development. Food insecurity is rampant and the contribution of agriculture to sustainable development is limited.

Yet, the Africa continent is endowed with considerable human and natural resources to enable the region attain substantial agricultural production and food sufficiency, apart from taking the agricultural produce up the value chain by setting up processing facilities, and tapping existing and new markets. This will significantly increase its share in global trade.

Despite all these resources, however, Africa faces many challenges in the agricultural sector and its market is substantially serviced by agricultural imports. For example, African agriculture and food imports reached US\$22 billion in 2002; annual food aid demand reached US\$1.7 billion while African agricultural trade accounted for only 4 percent of the world total (FAO, 2003). Dependence on food aid and agricultural imports is tantamount to exporting jobs and income. This denies Africa the opportunity to spur its development from well managed and efficient utilization of its agricultural markets, related investment opportunities and human and natural resources.

While it is recognized that water and arable land constitute scarce resources and key constraints to sustainable agricultural production and development in all continents, it is a paradox that Africa is making use of only 1.6 percent of its available water (Figure 5.1). Indeed, only 4 percent of Africa's renewable water resources go into irrigation compared to 40 percent in Asia (FAO, 2003). Yet, according to FAO (2003) about 874 million hectares of Africa's land is considered arable i.e. physically suitable for agricultural production. But only 8 percent of arable land in the continent is under irrigation (40 percent of that in North Africa).

With these low rates of water and arable land utilization, the use of yield-enhancing inputs, such as improved seeds, breeds or fertilizer, is often not economic. For instance, fertilizer use in Africa amounts to about 9 kg/ha of arable land per year to produce, on the average, 990 kg/ha of cereals. The average East Asian farmer uses about 241 kg of fertilizer per ha to produce about 4300 kg/ha of cereals. Farmers in the high-income countries, on average, use 125 kg per ha to produce 4000 kg/ha of cereals (FAO, 2003).

Against this background, every major agricultural drought in Africa translates into a disaster and food insecurity. According to FAO, some 30 countries had over a fifth of their population undernourished and in 18 of these, over a third of the population by the end of the 1990s. In 2003; 23 out of 53 countries experienced food crisis. FAO estimates that 26 per cent of Africa's population of 832 million is undernourished. Nearly 38 million people are facing food emergencies while about 207 million people in Africa are chronically hungry, a number that is growing in absolute terms. The average food intake was estimated to be 2360 kcal/person/day in 1997-99 for Sub-Saharan Africa against 2921 for East Asia. FAO estimates that the number of food

insecure will reach 205 million by 2015. In 2005, over 20 million Africans were affected by food crisis across the continent, a situation that the United Nations Secretary General calls “unacceptable”.¹

In the paragraphs that follow, we focus on arable lands in river valleys that are suitable for food and agricultural production and which have a greater chance of ensuring reliable water control and management systems. As test cases, we also focus on River Niger and rice as a strategic commodity.

V.4 PPTIP and the Case of Niger Basin and Rice

The concept of PPTIP and Africa’s agricultural development process is applied within the Comprehensive Africa Agriculture Development Programme (CAADP) process with concentration on Pillar 1. Under Pillar 1 of NEPAD/CAADP, more areas are to be brought under sustainable land management, under reliable water control and management systems.

In this section, for illustration purposes, we concentrate on the Niger Basin as a unit for providing opportunities for partnership, business and investment. In the case of arable land which requires shared water resources, PPTIP will depend on the attitude of the riparian states. PPTIP should be conducted bearing in mind that all competing and complementary uses of water are considered in a system framework to derive maximum regional wealth, subject to the existing treaties, conventions and agreements, where they exist, and filling gaps where there are lapses.

PPTIP is advocated while recognizing that the Niger Basin Authority (NBA) was established for basin-wide integrated water resources management, thereby ensuring a productive partnership among riparian states and minimizing the risk of regional conflicts resulting from the allocation of water among competing uses in riparian states. It is also recognized that the Economic Community for West African States (ECOWAS) is an appropriate institutional set-up to promote business, investment and partnership opportunities among its member States to increase sub-regional development. PPTIP will ensure that agriculture optimally contributes to regional development creation capacities through the Niger Basin, subject to equitable distribution among riparian states.

According to FAO (2003), the irrigation potential for the Niger River Basin is estimated at 2,816,510 hectares. The Basin is located in Western Africa and covers 7.5% of the continent, spreading across about ten countries (Guinea, Cote d’Ivoire, Mali, Burkina Faso, Benin, Niger, Cameroon, Nigeria, Algeria, and Chad); there are almost no renewable water resources in Algeria and Chad.

Within Mali, the River Niger is partially regulated through dams. The Sélingué dam on the Sankarani tributary is mainly used for hydropower, but also allows for the irrigation of about 60000 ha under double cropping. Two diversion dams, one at Sotuba just downstream of Bamako, and one at Markala, just downstream of Ségou, are used to irrigate the area of the Office du Niger (equipped area of about 82000 ha).

According to FAO, double cropping in this area would only be possible if the Fomi Dam, planned on the Niandam River in Guinea, were constructed to provide a supplementary and regular amount of water.¹¹ The Basin in Mali is, in addition to rice, suitable for sugar, cotton and horticulture production, and intensive livestock production using crop by-products (rice, cotton, sugar cane). ATNCs would mobilize interested and willing African governments, businesses and civil society groups organized along commodity-lines (rice, sugar cane, cotton, livestock etc.) or service-lines (credit, fertilizer, transport, processing, marketing, packaging, water control and distribution) to bring the estimated 2.8 million hectare in the Niger Basin under production to supply regional markets. But to make this a successful endeavour, there would be need for operational public-private partnerships that are viable with appropriate policy mechanisms to ensure trust and accountability. Public-public partnerships and African business communities working without concerted public support have led to failures in the past. Even where some public effort has existed some constraints have been pointed out. This is clearly illustrated by the Mali rice project despite some successes achieved (See Box 5.1). The need for multi-sectoral planning and harmonization is well reflected.

Box 5.1

Some challenges facing the rice irrigation project in Mali

Of major concern are the technical risks associated with soil degradation as a result of salinization, in addition to the impact of a wide range of rice diseases. Agricultural credit still suffers from years of lax behavior in the past during which farmers rarely repaid their loans. Even today, despite the increased income and production security generated from rehabilitation and higher yields, the level of unpaid loans remains very high, with the risk of declining use of essential inputs and appropriate machinery.

Source: World Bank, 1996

Currently, due to the weak investment partnership, African business communities prefer to undertake importation of rice, that is financially less risky, rather than embracing regional production activity by bringing the available arable land under rice production. In 2002, imports of rice by sub-Saharan Africa were estimated to be 44 percent of total demand (about 5.3 million tons, down nearly 8 percent from a year earlier record of 5.75 million tons with the decline explained by a 4 percent increase in continental production to 7.5 million tons). Table 5.2 taken from RCS-2001 in www.ers.usda.gov gives more details.

The supply-demand relation in the rice sector must be reversed by taking maximum advantage of low wage rates, available arable land and renewable water resources in the continent. This would enable Africa not only to supply regional rice markets, but also to supply world rice markets.

Table 5.2: World rice trade (milled basis): Export and import of selected African countries per calendar year ('000 tons)

Country	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Production												7500
Exports												
Egypt	159	209	135	268	160	328	201	426	320	500	550	650
Imports												
Cote d'Ivoire	169	309	386	187	341	291	470	520	600	550	650	650
Nigeria	296	440	382	300	450	350	731	900	950	1200	1600	1200
Senegal	434	333	399	252	406	604	575	600	700	637	750	750
South Africa	360	360	431	415	448	481	573	529	514	525	550	550
Partial Total	1259	1442	1598	1154	1645	1726	2349	2549	2764	2912	3550	3150
Others Imports											2200	2150
Total SSA Imports											5750	5300

Figures for 2001 and 2002 were projected as of November 2001.

Source: World Grain Situation and Outlook, Foreign Agriculture Service, USDA.

Integrating the interests of all riparian and concerned non-riparian states could create a viable and credible solution to creating more regional development from the production of rice using the shared water resources from the Niger River. Under this option, the goal of maximizing regional wealth creation capacities will be pursued in partnership, to promote business and investment opportunities to ensure that water resources from the Niger River are managed in an integrated manner within the IWRM framework. To this end, attempt will be made to maximize the contribution of each and all strategic commodities and services that can be produced within the Niger Basin.

With conscious harmonization of organizational, institutional and legal frameworks in willing States, it would be possible to integrate rice production structures to constitute an African Rice Development Zone (ARDZ) headquartered, for instance, in the valley of Niger (located, for example, in Mali which has shown commitment to provide incentives to ensure security of access to water and land resources and allow business communities to invest in a secure environment). Then branches will then be located in Nigeria and other riparian states as appropriate. Willing African States across the continent would then enable their business communities to form ATNCs aimed at achieving economies of regional scale for producing rice, and supplying regional markets as well as global markets with high quality rice, rice by-products and related inputs and services.

This type of partnership can be extended to other river basins in the region. Harmonized organizational, institutional and legal frameworks would be vital for such partnerships to succeed.

V.5 Policy implications

Operational and successful public-private partnerships would require harmonized policies embracing many sectors. For example in the land area the following would be given special consideration:

1. Rights, Information, Contracting, and Enforcement

One of the most basic, albeit critical, areas of reform a government can undertake is to develop effective property rights regimes. This includes: the constitutional protection of property; the laws and regulations defining rights and obligations to property; the means of assignment of rights to property; and the institutional arrangements which register and enforce such rights. Such a regime has the public good elements of non-excludability and non-rivalry.

The problem of externalities can in principle be minimized by modalities that internalize the costs and benefits to the producers of externalities (e.g., impact fees), and/or by regulations on growth, density, and separation of uses (Fischel, 1989). Similarly, the problem of government commitment can be resolved at least partially by instituting measures that make it difficult and costly for government to renege (e.g., constitutional guarantee of property rights, laws ensuring full compensation, mechanisms for resolving conflicts fairly). For both actions to work, it is important that property rights are well-established and enforced.

In carrying out the above reforms, two considerations have to be kept in mind. First, regulatory measures for dealing with negative externalities may be too rigid, risking imposing more costs than generating benefits. Separation of uses, green belt regulations, and density regulations are all prone to overkill (Fischel, 1989; Dowall, 1998). Second, the fear of government opportunistic behaviour has to be balanced with the recognition that government residual control over land is not, in and of itself, undesirable from an efficiency point of view. After all, governments need to acquire right-of-way for network infrastructure and acquire land for public uses and environmental protection. Governments are also the residual claimants of tax delinquent property, abandoned property, and toxic sites. What is undesirable is government behaviour that is not rule-bound and not subject to a due process which allows for recourse and compensation in the case of loss. In other words, while government, by definition, has residual control, how it goes about exercising such control has to be perceived as well defined as being fair by citizens and all actors, in this case, in public-private partnerships.

2. Finance and Risk Management

Overcoming the bulkiness of investment and managing risk associated with land requires financial and capital markets. While operational development efforts tend to focus on establishing primary and secondary mortgage lending intermediaries, less attention is given to the broader macro and regulatory reforms needed to ensure their sustainability. Priorities and sequencing will vary depending on the initial conditions of the macro economy, institutional development, the banking sector, and capital markets developmentⁱⁱⁱ. Most reforms in this area would involve the undoing of bad regulations such as interest rate ceilings and state monopolies. But reforms will also have to tackle the issue of how to extend market financing to lower income groups. Innovations in mobilizing savings, lowering transaction costs, micro lending, credit enhancement methods, and design of subsidy schemes need to be examined in the context of reform.

3. Market Structure and Fiscal Policy:

Finally, supply and demand for land can be highly distorted by policies which artificially depress or inflate supply or demand. Different land uses (agriculture, housing, commercial) are subject to different regulatory and tax structures, creating incentives and disincentives to convert from one use to another which have little to do with allocative efficiency. Regulation should carefully attempt to reduce market distortions, not only for land, but for the markets of the goods and services they produce. These reforms include price liberalization of inputs and outputs in the agricultural sector, and the phasing out of rent control, interest subsidies, and differentiated taxation.

V.6 Limitations and constraints

No country can take on all commensurate reforms simultaneously. First, initial conditions vary from country to country: the degree of informality, wealth distribution, the state of capital market development, the extent of market distortions, and property rights and contract enforcement define the reform agenda. Second, the scope of reforms is far-reaching, covering a wide range of sectors of the economy such that it might not be administratively possible to carry out all reforms simultaneously, even if they were desirable. Third, reforms are likely to touch vested interests of bureaucrats who benefit from the ambiguity of rules; banks, developers, and speculators enjoying market power and/or insider information; and recipients of untargeted subsidies who stand to lose their entitlements.

These constraints are not easy to overcome in practice, but they can be minimized. With respect to the initial conditions, it is imperative that the reform process starts with a comprehensive diagnosis, even if implementation is to be phased in over time. Comprehensive diagnosis involves defining the problem and the deficiencies in the three dimensions of the analytical framework outlined in the previous section. This diagnosis will help to sort out the priority areas for reform. For example, if the analysis reveals that the country's financial sector is highly developed and there is no problem in the access or cost of mortgage finance, the critical problems may then lie in the areas of property rights and market distortions. Accordingly, efforts should be focused on the latter. The next question is one of sequencing, given the country's administrative capacity. Here, there is no optimal path to prescribe. But reformers could decide the desired course of action, depending on the pockets of strength in government, the key bottlenecks facing the exchange and use of land.

Perhaps the most difficult constraint is likely to be the political opposition to reforms. One way of dealing with this constraint can be found in the framework developed elsewhere to deal with privatization and state-owned enterprise reform (Bureaucrats in Business, 1995). According to this framework, reforms are likely to take place when three conditions are met: political desirability, political feasibility, and political credibility. Political desirability occurs when the leadership finds it attractive to adopt the reform, either because of a crisis or a shift in power. Political feasibility attains when the executive branch is able to force the reform, gain support in parliament and/or buy the support of reform opponents. Political credibility is necessary because reform involves making promises to compensate the losers and winners, which only occur in the future. In land reform, increasing the desirability of reform could involve efforts to highlight the costs and benefits of the current regime to potential supporters. Compensating the losers may be one effective mechanism for improving the feasibility

of reform. Credibility may be possible if the political leaders at the highest level are engaged in the reform process.

Throughout, it is important to remember that successful implementation requires more than just issuing new laws or regulations. It requires changes in incentives, institutions, and behaviours. To give but two examples, while it is important that property rights are well-defined and established, it is equally important that they be exercised. Establishing, registering, and updating property rights to land and real estate would clearly reduce the asymmetry and reduce transaction costs, but as a public good, such provision of information suffers the typical problems of concentrated costs and dispersed benefits (unlike typical public goods, however, excludability is feasible, making cost recovery, and even generating net government revenues a reality in many developed and developing countries). Accordingly, the role of government engagement is indispensable. The second example concerns the collection of accurate information about all land and updating it. This is a daunting task, which many countries start but rarely accomplish. In this regard, there is rich empirical experience on how to reduce the cost of collecting and updating such information, how to utilize the private sector, and how to turn land registries from “silos” of closely held information, to service providers to prospective developers, buyers, and investors. Developing and disseminating this knowledge is crucial for better provision of this vital public good.

Going beyond national interests, is the need for collaboration and cooperation that links up States in sub-region and regional entities for optimizing development opportunities. The Regional economic communities (RECs) have a vital role to play in promoting sub-regional and regional public-private partnerships for development, including ensuring food security.

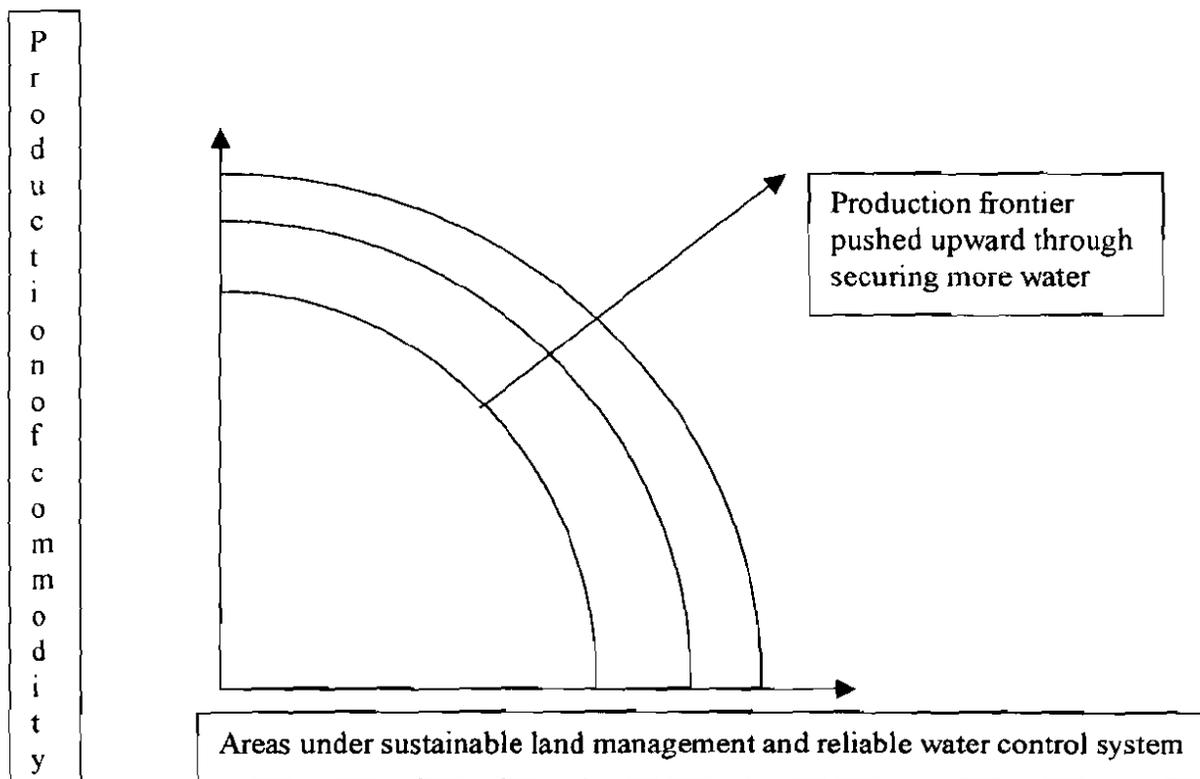


Figure 5.1: Maximize the contribution of rice economy within Mali to regional wealth creation capacities

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Endnotes

¹ During his visit to Niger in August 2005, Secretary general Kofi Annan was quoted as follows:
"The President and I had a very good meeting. We discussed the situation in the country. We discussed the food crisis in Niger and in the region, and measures that ought to be taken to ensure what has happened this year does not happen in the future. But quite a lot of it requires regional cooperation. At the same time, we will be looking forward to taking steps for the longer term to ensure food security. We've discussed certain measures we intend to work on with the government, and with neighbours, and I hope we will be able not only for today, [but for] tomorrow as well."

² www.fao.org/docrep/W4347E/w4347e0i.htm.

³ According to Renaud (1997), six major groups of housing finance systems can be identified: Undeveloped systems (Sub-Saharan Africa), missing systems (Former Soviet Union, Central and Eastern Europe, China, Vietnam), fragmented and unstable systems (Latin America), segregated but stable systems (East Asia, Middle East, India), sound and integrated systems (South East Asia, Malaysia, Thailand, etc.) and advanced systems (Europe and North America).

Chapter VI

HARNESSING ENERGY RESOURCES FOR SUSTAINABLE DEVELOPMENT IN AFRICA

VI.1 Introduction

Despite a fairly adequate endowment with energy resources, Africa is lagging behind other developing regions in terms of access to reliable and affordable commercial energy supplies, in particular electricity, required to put the whole continent on the path of economic growth and sustainable development. With slightly over 13 per cent of the world's population, Africa accounts for only 3 per cent of the world's total commercial energy consumption.

According to a report of the International Energy Agency (IEA)ⁱ, sub-Saharan Africa has the lowest electrification rate of any major world region with 24 per cent of its population electrified in 2002. More than 500 million Africans are still without access to electricity. This means that more than 83 per cent of the Africa's population living in rural areas has no access to electricity, of which more than 92 per cent live in rural sub-Saharan Africa. This situation may have worsened since most of African least-developed countries (LDCs) have been facing low or stagnant growth in securing modern energy services over the last five years.

Yet, Africa is endowed with fairly abundant energy resources in the form of fossil fuels (oil, gas and coal), hydropower, uranium, biomass and other renewable energy sources (solar, wind, geothermal power, etc.) that could be harnessed to provide various modern energy services that could play an essential role in its efforts to alleviate poverty throughout the continent, thereby helping meet the Millennium Development Goals (MDGs). But, Africa has so far failed to mobilize the required resources for the development of its commercial energy resources. For example, only 7 per cent of Africa's hydropower potential is currently being used, contributing to some 18 per cent of the total amount electricity produced. Large amounts of natural gas associated with oil production operations are being wasted through flaring and venting instead of being valuably used for power generation and industrial processes.

Africa could greatly benefit from the development of its hydropower and natural gas resources for producing commercial energy supplies required for its social and economic development in an environmentally sound manner and for fostering regional energy cooperation and integration. African petroleum producers without refining capability which have been more concerned with meeting demand for crude

oil on the international market should strive to provide reliable and affordable supplies of petroleum products to their populations through negotiating processing contracts with, and paying processing fees to, refineries with a regional scope.

Harnessing available energy resources to ensure the provision of commercial energy supplies necessary for fuelling economic growth and poverty reduction should rank high on the policy agenda of African leaders. An important step in the right direction has already been taken by the adoption of the New Partnership for Africa's Development (NEPAD), which includes a well-articulated energy programme. The NEPAD Energy Programme seeks to (i) significantly increase access to commercial energy supply for Africa's population; (ii) improve the reliability and lower the cost of energy supply to productive activities in order to enable economic growth of 6 per cent per annum; and (iii) integrate transmission grids and gas pipelines so as to facilitate cross-border energy flows (<http://www.uneca.org/nepad>)

VI.2 Linking energy and sustainable development

1 *Understanding the linkages between energy and sustainable development*

According to the Brundtland Commissionⁱⁱ, sustainable development has been defined as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs". The report of the Commission adds: "Sustainable development requires meeting the basic needs of all and extending to all the opportunity to satisfy their aspirations for a better life".

It also describes sustainable development as "a process of change in which the exploitation of resources, the direction of investments, the orientation of technological development and institutional change are in harmony and enhance both current and future potential to meet human needs and aspirations".

For energy, this means ensuring that future generations will have the services energy provides. This requires extracting and using existing energy resources efficiently while developing new forms of energy and associated technologies over the longer term. The emphasis is therefore on ensuring energy availability rather than on maintaining use of a particular form of fuel.

Although no specific chapter in Agenda 21 deals with energy, it recognizes that "energy is essential to economic and social development and improved quality of life" in its Chapter 9 on "Protection of the Atmosphere". It highlights the fact that current patterns of consumption and production of energy are not sustainable, especially if demand continues to increase. Agenda 21 stresses the importance of using energy resources in a way that is consistent with the aims of protecting human health, the atmosphere, and the natural environment. It also recognizes that environmentally

sound energy approaches are necessary “to control atmospheric emissions of greenhouse and other gases and substances.”

The ninth session of the Commission on Sustainable Development (CSD-9) held in April 2001 explicitly focused on energy and clearly recognized its critical role and its linkage with the three supporting pillars of sustainable development: social, economic and environmental. CSD-9 also contributed to a shared understanding of the energy challenges ahead and the significance of energy in terms of its central role in achieving the goals of sustainable development. In this regard, it recognized that the main goal of energy for sustainable development should be poverty eradication and that access to energy is critical to economic and social development, and alleviation of poverty.

The World Summit on Sustainable Development (WSSD) held in Johannesburg in 2002 provided the opportunity for broadening the understanding of the concept of sustainable development, particularly with regard to the important linkages between poverty, the environment and the use of natural resources. In this regard, the WSSD calls for “improving access to reliable and affordable energy services for sustainable development sufficient to facilitate the achievement of the Millennium Development Goals, including the goal of halving the proportion of people in poverty by 2015, and as a means to generate other important services that mitigate poverty, bearing in mind that access to energy facilitates the eradication of poverty.” (JPOI, II.9)

2. Linking energy to the three pillars of sustainable development

a. Energy and economic dimension of sustainable development

Energy production and use is strongly linked to the economic dimension of sustainable development, which is economic growth. Energy is essential for creating jobs, developing industries, enhancing value-added economic activities and supporting income-generating activities. Fuels are essential for heat-using processes, transportation and many industrial activities. Electricity is an essential input to modern productive activities as well as communication and service industries. Energy must be available at all times, in sufficient quantities and at affordable prices, to support the goals of sustainable development.

Interruptions of energy supply can cause serious financial, economic and social losses. Due to deferred investments in power generation projects, many countries, especially in sub-Saharan Africa, are faced with power rationing and frequent shedding, leading many industries and businesses to lose their competitiveness through purchasing and operating private generators. High-energy import bills are currently one of the largest sources of foreign debt and balance-of-payments deficits for many of the poorest countries. In addition, investments made in high-cost centralized conventional energy systems have contributed to the growth of foreign debt of many developing countries.

Attention to energy security is critical because of the uneven distribution of both fossil fuel resources and the capacity to develop other energy resources. Development of indigenous energy resources and diversification of energy supply (energy supply mix) can reduce long term dependence on imported oil and can lower national debts, thereby improving economic conditions and benefiting the poor.

b. Energy and the social dimension of sustainable development

Energy is directly related to the most pressing social issues which affect sustainable development: poverty reduction, and access to basic human needs, including food, water, health care, education, shelter and employmentⁱⁱⁱ. Energy plays a critical role in satisfying such basic needs as adequate food, shelter, clothing, water, sanitation, health care, education, and access to information. Means to reduce poverty such as health, income generation, food, water and habitat systems all require appropriate and sustainable energy supply to be developed. Therefore, access to energy is a vital dimension of poverty and development.

In this regard, it is widely recognized that the energy use patterns of the poor, especially their reliance on traditional biomass fuels, tend to keep them in a poverty cycle. Increased income would not by itself address their needs and concerns, which include reducing physical labor for household chores, having access to safe drinking water, and reducing the need for women to collect cooking fuels. Improving access to adequate, reliable and affordable modern energy services for the poor is the most appropriate way of addressing these needs and concerns.

As indicated above, the Johannesburg Plan of Implementation recognizes the importance of improved access to reliable and affordable energy services in facilitating the achievement of the MDGs, including the goal of halving the proportion of people living on less than US\$ 1 per day by 2015, and the link between access to energy services and poverty reduction. Table 6.1 below highlights and summarizes the contribution of energy services to achieving the MDGs.

It is worth noting that there is a gender dimension of poverty. Of the estimated 1.3 billion people in the developing world living on less than \$1 per day, 70 per cent are women. Because women and girls spend most of their time and physical energy to the drudgery of gathering firewood and water, they often have no opportunities for education and other productive activities. They are thus trapped in "a vicious cycle" of poverty since energy available to them is not supportive of the development and income generation needed to alleviate poverty. Greater access to electricity, and modern fuels and efficient end-use technologies for cooking can enable people to benefit from short- and long-term improvements in their quality of life.

Table 6.1
Role of energy services in achieving the MDGs

Goal (s)	Direct and indirect contribution of energy services to achieving the MDGs
To halve extreme poverty	<ul style="list-style-type: none"> • Access to energy services facilitates economic development, including micro-enterprise, increased productivity from being able to use machinery, income-generating and livelihood activities beyond daylight hours from lighting, and locally owned businesses creating employment in local energy service provision and maintenance, fuel crops, etc. • Access to clean and efficient fuels reduce the large share of household income spent on cooking, lighting and space heating. Access to modern energy services can also assist in bridging the “digital divide” from ICT
To reduce hunger and improve access to safe drinking water	<ul style="list-style-type: none"> • Energy services can help improve access to pumped drinking water and cook food since the majority of staple foods (such as rice, grains and green bananas) need cooking before they can be eaten and need water for cooking. • Energy services can also improve productivity throughout the food chain (tillage, planting, harvesting, processing, transport, etc.), and reduce post harvest losses through better preservation (for example, drying and smoking). • Energy for irrigation helps increase food production and access to nutrition. • Clean water helps improve health. • Increased health and nutrition open up opportunities for employment and income generation.
To reduce child and maternal mortality; and to reduce diseases	<ul style="list-style-type: none"> • Energy services are needed to provide access to better healthcare facilities, including lighting operating theatres, refrigeration of vaccines and other medicines, sterilization of equipment and transport to health centers/clinics. • Electricity in health centres enables night availability, helps retain qualified staff and allows equipment use, including vaccination and medicine storage for prevention and treatment of diseases and infections. • Access to energy services can help in the provision of nutritious cooked food, space heating and boiled water thereby contributing towards better health. • Access to modern energy services can also help improve health condition of women and children because (i) gathering traditional fuels and preparing food exposes young children to health risks and reduces time spent on child care; and (ii) excessive workload and heavy manual labor (carrying heavy loads of wood fuel and water) may affect a pregnant women’s general health and well-being.
To achieve universal primary education; and to promote gender equality and empowerment of women	<ul style="list-style-type: none"> • Energy services reduce the time spent by women and children (especially girls) on basic survival activities, such as gathering firewood, fetching water, cooking inefficiently, crop processing by hand, manual farming work, etc. • Good quality lighting in households permits home study. • Lighting in schools allows evening classes and helps retain teachers, especially if their accommodation has electricity. • Reliable energy services offer scope for women’s enterprises.
Environmental sustainability	<ul style="list-style-type: none"> • Access to cleaner, more efficient fuels will reduce greenhouse gas emissions, which are a major contributor to climate change. • Efficient use of energy helps to reduce local pollution and improve conditions of poor people

Source: Adapted from DFID Report on Energy for the Poor (2002)^v

c. *Energy and environmental dimension of sustainable development*

The production and use of energy is a major source of environmental degradation in the immediate and long term, and represents the single most severe threat to sustainable development, particularly to developing countries. Its impact can be localized (desertification, acid rain, fumes and air pollution) or global (Ozone layer depletion, or global warming).

The combustion of fossil fuels (oil, coal, natural gas) used to power industries, transportation, and electric power plants is the most important source of emission of greenhouse gases (GHGs). Oil and gas exploration and development have also serious environmental impacts, in particular through gas flaring and GHG emissions associated with oil production. GHGs are responsible for global warming with consequences such as climatic changes leading to flood, drought, etc. The implementation of the Kyoto protocol will help mitigate these negative effects.

Indoor pollution due to burning firewood and other biomass fuels for cooking in poorly vented traditional kitchens constitutes a threat to human health, especially women and children in developing countries. Fumes from cooking fires contain dangerous amounts of toxic substances and can also lead to respiratory problems. Measures such as replacing solid fuels for cooking with gaseous or liquid fuels could have significant environmental benefits at the local, community, regional and global levels, with attendant benefits for health and productivity. If properly managed, biomass from agriculture and forests may also offer the prospect of fulfilling a dual role by combining sustainable development in rural areas and climate change mitigation.

Energy production from large hydroelectric dams is also a source of concern. Key environmental questions have to do with displacement of existing settlements due to inundation of the reservoir area, disruption of the culture and sources of livelihood of local communities and threat to biodiversity. This has prompted a strong controversy around the development and the financing of such hydropower projects. But well-designed hydropower projects can be developed in an environmentally-friendly, socially responsible and economically viable manner.

VI.3. Africa's energy resources

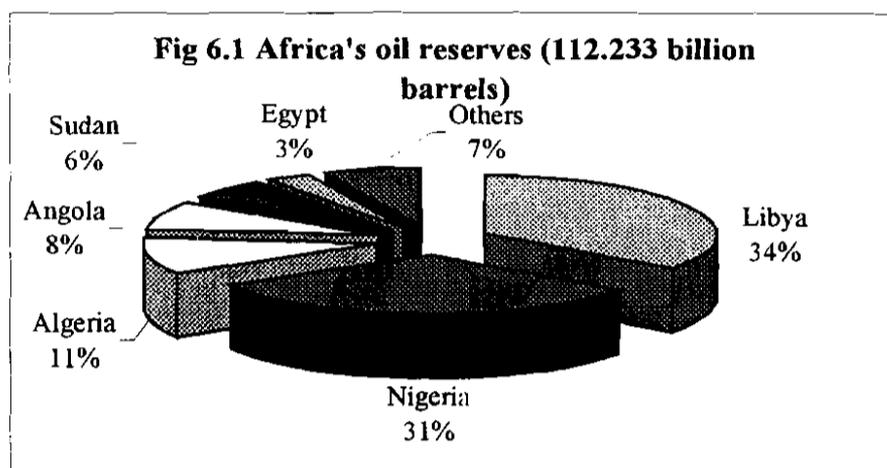
Africa's energy resources include fossil fuels (oil, natural gas and coal), hydroelectricity, uranium, biomass and other renewable energy sources (solar, wind, geothermal energy, etc.).

1. Petroleum/Oil resources

Africa's oil proven reserves were recently estimated at 112.233 billion barrels, representing 9.4 per cent of world's total reserves^v. Libya, Nigeria, Algeria, Angola

and Sudan have the most important oil reserves, accounting for 90 per cent of Africa's total oil reserves with about 101.3 billion barrels. Libya and Nigeria have the largest oil reserves totaling 74.381 billion barrels (39.126 billion barrels and 35.255 billion barrels respectively), accounting for more than 66 per cent of Africa's total reserves. North African countries (excluding Morocco) have combined oil reserves estimated at about 55 billion barrels, representing about 49 per cent of Africa's total.

Oil reserves in sub-Saharan Africa are due to increase in new discoveries from deep-sea exploration activities in Angola, Equatorial Guinea, Sao Tome & Principe and Nigeria. Figure 6.1 below shows countries with the largest oil reserves.

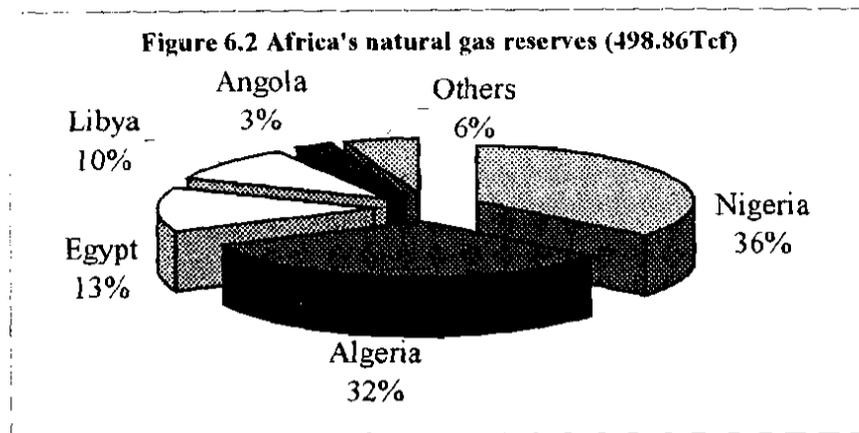


Source: BP Statistical Review, Year-End 2004 & US Energy Information Administration

2. *Natural gas resources*

Proven natural gas reserves were recently estimated at 498.860 trillion cubic feet (14,126 billion m³) representing 7.84 per cent of world's total reserves^{vi}. Nigeria, Algeria, Egypt, Libya and Angola have the most important gas reserves totaling 463.643 Tcf (13,129 billion m³) and accounting for about 94 per cent of Africa's total reserves. Nigeria and Algeria have the largest gas reserves totaling about 340Tcf (178.52 Tcf and 161.74 Tcf respectively), accounting for more than 68 per cent of Africa's total reserves. North African countries (excluding Morocco) have combined gas reserves estimated at about 280.71 Tcf, representing about 56.5 per cent of Africa's total gas reserves.

A number of African countries are also endowed with natural gas reserves, which are not associated with oil production, the so-called non-associated gas. These include Ethiopia, Mozambique, Namibia, Rwanda / Democratic Republic of Congo (DRC) and Tanzania. Gas reserves in sub-Saharan Africa are increasing with new discoveries from deep-sea exploration activities in Angola, Equatorial Guinea and Nigeria. Figure 6.2 below shows the five countries with the largest gas reserves.



Source: SODIGAZ, January 1, 2005 and USDOE – Energy Information Administration

3. *Coal reserves*

Africa's coal recoverable reserves, estimated at 50.336 billion metric tons (55.486 billion short tons) according to data from the above international energy database, are almost entirely of bituminous type (99.6 %), representing 5.5 per cent of the world's total coal recoverable reserves and 10.4 per cent of the world's bituminous coal reserves^{vii}.

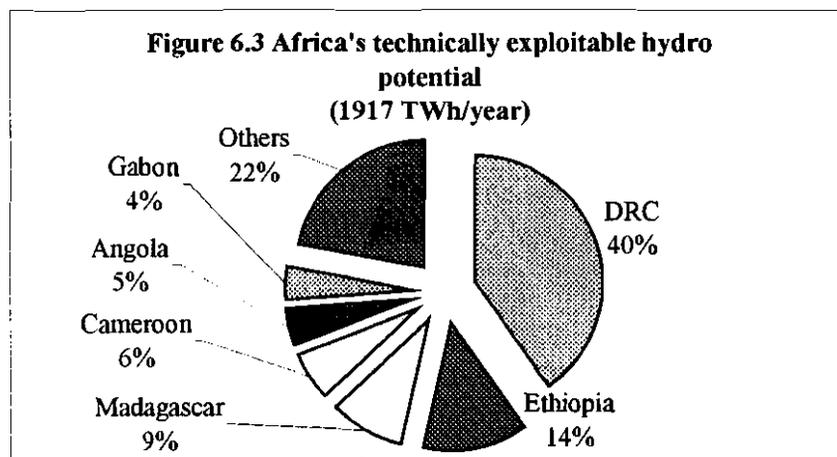
With estimated 48.75 billion metric tons (53,738 billion short tons) of recoverable bituminous coal reserves, South Africa accounts for over 97 per cent of Africa's total coal reserves and 10 per cent of world's total bituminous coal reserves, while Zimbabwe ranks second with about 501 million metric tons (553 million short tons) representing 1 per cent of Africa's coal reserves. The two countries account for a total of about 49.25 billion tons (54.3 billion short tons) representing 98 per cent of Africa's total coal reserves. Other countries with significant coal reserves include Mozambique, Swaziland and Tanzania having combined reserves estimated at about 620 million metric tons (683 million short tons). The five countries accounts for more than 99 per cent of Africa's total.

4. *Uranium*

Africa has significant uranium reserves, which were estimated at 613.1 thousand metric tons in 2003^{viii}, representing 18.7 per cent of world's reserves. The largest recoverable reserves are in South Africa, followed by Namibia and Niger with combined total reserves of 554.4 thousand tons representing 90.4 per cent of total Africa's reserves. Other countries include Algeria, Central African Republic, Malawi, Somali and Gabon with combined reserves estimated at 65.1 thousands tons.

5. *Hydropower*

Africa's technically exploitable hydropower capability is estimated to be in excess of 1,917 TWh/year (1 TWh = 10^3 GWh) representing about 12 per cent of the global total. The economically exploitable capability is estimated to be of at least 1,100 TWh/year^x. The Democratic Republic of Congo (DRC) is particularly blessed in this regard, thanks to the Congo River. Its technically exploitable potential is estimated at 770 TWh/year representing 40 per cent of Africa's total hydropower potential. Other countries with an important technically exploitable potential include Ethiopia with 260 TWh/year, thanks to the Blue Nile and its tributaries, Madagascar with 180 TWh/year, Cameroon with 115 TWh/year, and Angola with 90 TWh/year.



Source: Compiled from various sources

6. *Other renewable energy sources*

Other renewable energy sources that could be exploited and developed to help ensure the provision of decentralized electricity supply and delivery of other modern energy services include solar, wind, geothermal and biomass. Biomass energy, in the form of wood, charcoal, agricultural residues and animal wastes, provides the bulk of energy supply in most sub-Saharan African countries accounting for more than 90 per cent of total primary energy consumption. Biomass has the potential to be modernized to produce cleaner and more convenient fuels (e.g. biogas, ethanol) and electricity in rural areas.

Africa is endowed with abundant and evenly distributed solar radiation due to the fact that it straddles the Equator. The average solar radiation is roughly estimated to be between 5-6 kWh/m² across the continent with the highest figures in the Sahelian region of West Africa. Although no comprehensive assessment of solar energy potential has been carried out so far, it is estimated that all African countries could develop this energy source for many applications.

Wind regime is less evenly distributed than solar radiation. It is estimated that countries located along the Atlantic Ocean (Morocco, Mauritania, Senegal, Namibia and South Africa), along the Indian Ocean (Mozambique, Somalia) or the Red Sea (Egypt) have a high wind power potential.

Geothermal energy resources are mostly located along the Rift Valley in Eastern Africa. According to the United Nations Environment Programme (UNEP), Africa has a potential of up to 7,000 MW of untapped geothermal energy resources. Countries with significant geothermal potential include Kenya (> 2,000 MW), Ethiopia (>1,000MW), Uganda (450MW), and Djibouti (230-860 MW). However, only Kenya has so far been developing its geothermal potential for electricity production.

VI.4 Current patterns of primary energy production and consumption

1. Primary energy production and consumption by source

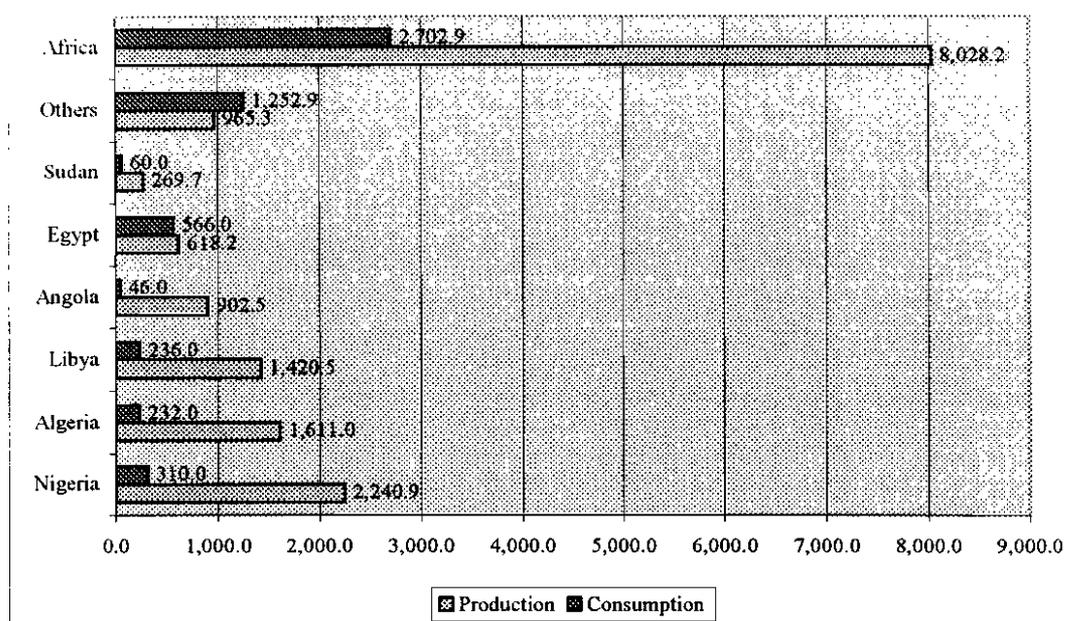
Primarily energy is defined as energy in the form of natural resources, such as wood, coal, oil, natural gas, natural uranium, wind, hydropower, geothermal energy, and sunlight. Fossil fuels in the form of crude oil / petroleum, natural gas, and coal constitute the bulk of commercial primary energy production. Primary energy production from renewable energy sources is still considered as marginal except for hydropower and traditional biomass fuels.

a. Petroleum production and consumption

Africa's total crude oil production amounted to slightly more than 8 million barrels per day (401 million tons) in 2003 representing about 11 per cent of world's total. Nigeria remains the largest producer of crude oil in Africa with 2.24 million barrels per day in 2003. The combined crude oil production of Nigeria, Algeria, Libya, Angola and Egypt totaled about 6.8 million barrels per day (339.7 million tons) in 2003 representing about 85 per cent of Africa's total production.

Africa's total petroleum consumption amounted to about 2.7 million barrels per day (135 million tons) in 2003 representing about 3.3 per cent of the world's total consumption. Egypt was the largest consumer with 566 thousand barrels per day, followed by South Africa with 484 million barrels per day and Nigeria with 310 million barrels per day.

Figure 6.4 Africa's crude oil production and consumption, 2003
(Thousand Barrels per Day)



Source: US Energy Information Administration – International Energy Annual 2003

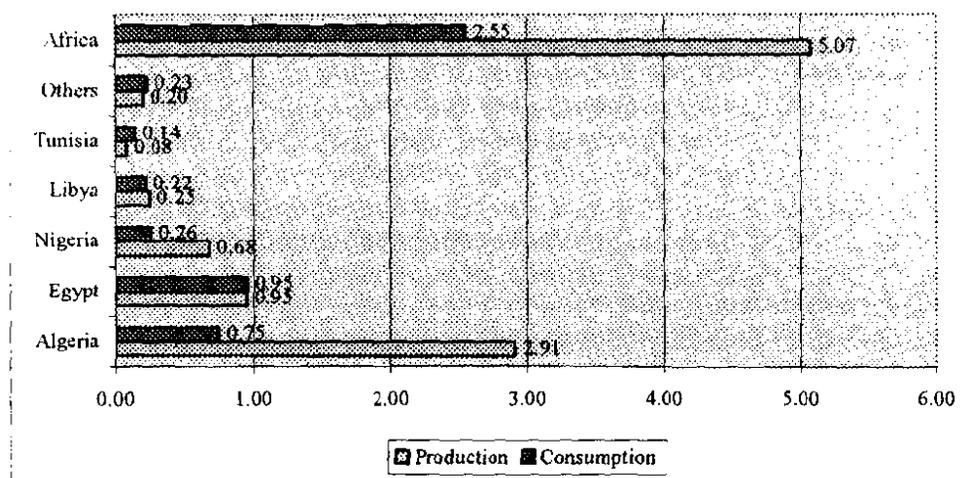
According to Figure 6.4 above, Africa's crude oil consumption represents a small proportion of its crude oil production. This means that that Africa is first and foremost a net energy exporter with only one third of its crude oil production consumed locally in 2003 (2.7 MMb/d for 8.MMb/d).

b. Natural gas production and consumption

Africa's total natural gas production amounted to slightly above 5 trillion cubic feet (142 billion m³) in 2003, representing 5.3 per cent of the world total. Algeria has been consistently the largest gas producer in Africa with 2.91 trillion cubic feet (82 billion m³) produced in 2003 representing about 58 per cent of Africa's total. The combined production of Algeria, Egypt, Nigeria and Libya totaled 4.79 trillion cubic feet (135.6 billion m³) representing 94.5 per cent of Africa's total.

Africa's total natural gas consumption amounted to 2.55 trillion cubic feet (72 m³) in 2003, representing 2.67 per cent of the world's total natural gas consumption. Egypt has been the largest gas consumer in Africa with 954 billion cubic feet (27 billion m³) consumed in 2003. Egypt was followed by Algeria with 753 billion cubic feet. The combined natural gas consumption of Egypt, Algeria, Nigeria, Libya and Tunisia totaled 2.3 trillion cubic feet (65 billion m³), which is about 91 per cent of Africa's total.

Figure 6.5 Africa's natural gas production and consumption, 2003 (Tcf)



Source: US Energy Information Administration – International Energy Annual 2003

According to Figure 6.5 above, which gives the volumes of natural gas produced and consumed by some major African gas producers, Africa is first and foremost a net energy exporter with only about 50 per cent of its natural gas production consumed locally in 2003 (2.55Tcf vs 5.07 Tcf).

c. Coal production and consumption

Africa's total coal production amounted to 244.7 million metric tons representing 5 per cent of the world's total. South Africa was the largest coal producer with 239.3 million metric tons in 2003 representing about 98 per cent of Africa's total coal production. Zimbabwe ranked second with about 3.4 million metric tons, while Botswana followed with 898,000 metric tons.

Africa's total coal consumption amounted to 183.8 million metric tons in 2003 representing 3.7 per cent of the world's total. South Africa was the largest coal consumer with 170.3 million tons, followed by Morocco with 5.26 million tons and Zimbabwe with 3.20 million tons. The consumption of the three countries accounted for more than 97 per cent of Africa's total.

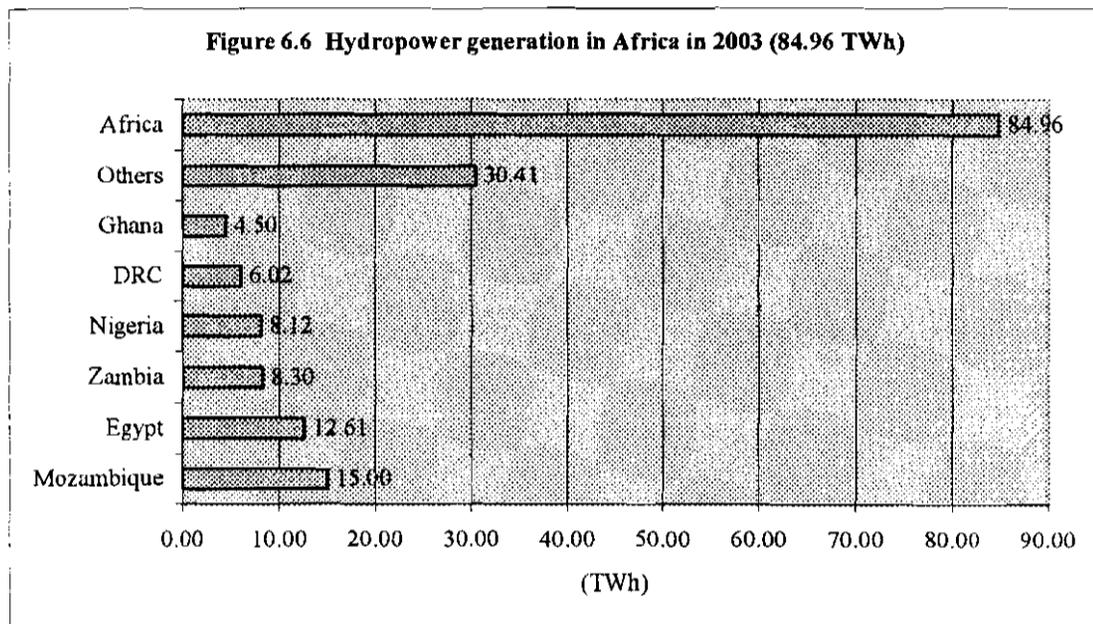
d. Uranium production

South Africa, Namibia and Niger have the largest recoverable reserves and are also the sole producers of uranium with Niger as the first producer with 2,918 metric tons, followed by Namibia with 2,689 tons and South Africa with 1,093 tons. South Africa is the only African countries consuming uranium fuels for its nuclear power plant near Cape Town.

e. Hydropower production

Africa's hydropower potential has remained largely underdeveloped. It is estimated that only 7 per cent of the technically exploitable hydropower capability has been developed so far. Total hydroelectricity installed capacity in Africa amounted to about 21.14 GW representing 2.94 per cent of the world's total by 1 January 2003 (US Energy Information Administration, June 2005).

Total hydroelectric power generation amounted to 84.96 TWh in 2003 representing 3.20 per cent of the world's total. Hydropower thus contributed to 18 per cent of Africa's total electricity generation. The first six countries with significant hydro generation include Mozambique, Egypt, Zambia, Nigeria, DRC and Ghana and totaled 54.55 TWh in 2003 representing 64 per cent of Africa's total hydroelectric power generation. Figure 6.6 below shows the major producers of hydropower in 2003.



Source: US Energy Information Administration – International Energy Annual 2003

f. Other renewable energy sources

Wind power is only developed in Morocco and Egypt where wind-based electricity production totaled 385 GWh and 412 GWh of electricity in 2001 and 2002 respectively (IEA, 2004)

Geothermal power potential is only developed in Kenya where its Olkaria geothermal power plants totaled electricity generation of 480 GWh and 386 GWh in 2001 and 2002 respectively.

Power generation from biomass has been developed in agro-processing industries, in particular sugar processing industries, where bagasse fuelled cogeneration systems are used to produce electricity and process heat. It is estimated that electricity from bagasse-based cogeneration systems represents 40 per cent of total electricity production in Mauritius.

2 *Aggregated primary energy production and consumption*

In 2003, Africa's total primary energy production amounted to slightly more than 30 quadrillion BTU or quads (756 MToe) representing about 7.2 per cent of the world's total. On the other hand, Africa's total primary energy consumption amounted to 13.327 quadrillion BTU (335.84 Mtoe) representing about 3.2 per cent of the world's total. This represents a per capita commercial primary energy consumption of about 395 koe compared with 1.25 toe for Latin America (excluding Mexico). This also shows that Africa is a net exporter of energy given that its primary energy consumption represented only about 44 per cent of its total production.

Six countries overwhelmingly dominate Africa's primary energy production. These are Algeria, South Africa, Nigeria, Libya, Egypt and Angola. Their combined primary energy production accounts for more than 88 per cent of Africa's total. However, except South Africa and Egypt, which consume more than 80 per cent of their primary energy production, the four other countries consume less than 25 per cent of their primary energy production. This is mainly due to the fact that the two countries have a strong economy supported by a well-developed industrial sector, while the economy of the other countries relies on export of primary energy commodities. For example, Algeria and Nigeria are the largest producers of hydrocarbons (oil and gas), but their primary energy consumption is less than 20 per cent of primary energy production.

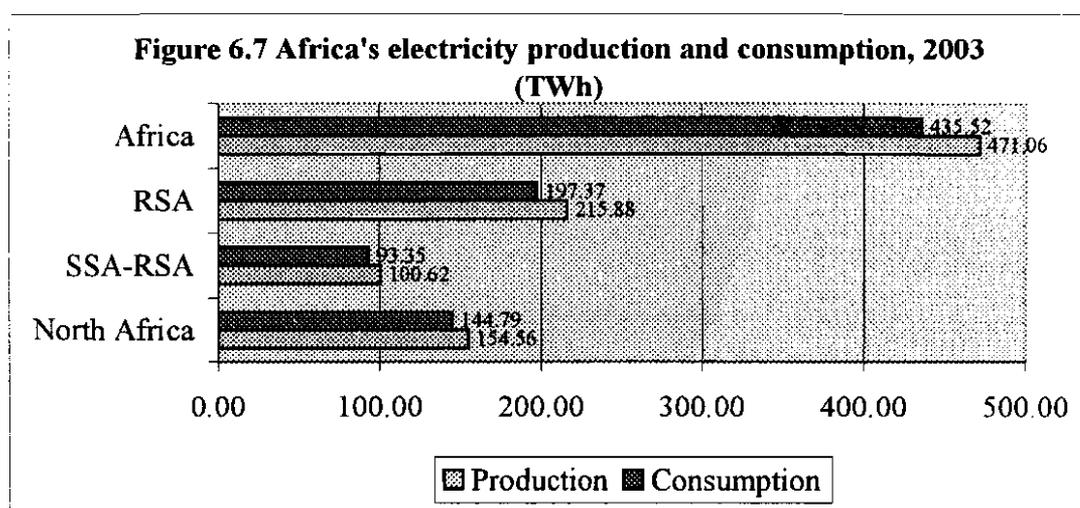
3 *Electricity production and consumption*

The African power sector is characterized by small systems with 20 out of the total 53 countries having a minimum installed capacity of 500 MW. By end of 2002, Africa had total installed capacity of 103 GW (103,000 MW)^x, of which the five North African countries of Algeria, Egypt, Libya, Morocco and Tunisia accounted for about 35 per cent with 36.5 GW and South Africa alone accounted for 39 per cent with 40.5 GW, the remaining forty seven (47) sub-Saharan African countries accounted for a mere 26 per cent with 27 GW.

The African power sector is also overwhelmingly dominated by conventional thermal power plants due to large coal-fired power plants in Southern Africa and large oil- and gas-fired power plants in North Africa and Nigeria. Thermal power installed capacity represented more than three-quarters of the Africa's total installed capacity. Hydropower accounted for 20 per cent, while nuclear power accounted for 2 per cent

in 2002. The combined installed capacity of countries in the North Africa and Southern Africa regions accounted for 77 per cent of the total by end 2002.

Figure 6.7 shows electricity production and consumption for the main Africa's sub-regions, namely: North Africa and sub-Saharan Africa (excluding South Africa). South Africa is represented separately. It can be noted that North Africa and South Africa overwhelmingly dominate the Africa's power sector accounting for close to 80 per cent of the continent's total electricity production and consumption.



Source: Adapted from energy database of the U.S. Energy Information Administration

Total electricity production amounted to 471 TWh in 2003, of which the five North African countries accounted for close to 33 per cent (155 TWh), South Africa (RSA) accounted for about 46 per cent (216 TWh) and the remaining 47 sub-Saharan Africa totaled about 100 TWh (21%).

Total electricity consumption amounted to 435.5 TWh in 2003, of which the five North African countries accounted for about 33 per cent with 145TWh, South Africa accounted for about 46 per cent with 197 TWh, while the remaining 47 sub-Saharan African countries had a combined total electricity consumption of 91.35 TWh (91,350 GWh) representing only about 21 per cent of Africa's total.

Table.2 below shows that average per capita electricity consumption is very low of 512 kWh/hab. compared with the world average of about 2,340 kWh/hab. Furthermore, with almost half of Africa's population (440 million and 850 million for Latin America and Africa respectively), Latin America recorded an average per capita electricity consumption of more than three times Africa's average with 1,752 kWh compared to 512 kWh for Africa in 2003.

Table 6.2
Africa's net electricity consumption for 2002-2003 (TWh)

Region	2002			2003		
	El. Cons	Pop.	Per Cap	El. Cons	Pop.	Per Cap
Africa	419.81	831.29	505	435.51	849.45	512
North Africa	140.03	147.02	952	144.79	149.68	967
SSA	279.78	684.27	409	290.72	699.77	415
RSA	192.20	44.76	4294	197.37	45.03	4383
SSA-RSA	87.58	639.51	137	91.35	654.74	140

Source: Adapted from energy database of the U.S. Energy Information Administration

VI.5 Options for converting energy resources into useful energy and energy carriers

A part from some energy resources that can be used in their original forms (primary energy) (e.g., natural gas, coal, wood, solar radiation), most others need to be transformed into energy carriers (useful energy) such as liquids and gaseous fuels or electricity that are required by the consumers to provide energy services.

While all energy resources can be converted into electricity through appropriate power generation technologies, only fossil fuels (e.g., oil, natural and coal) and biomass (energy crops, agricultural residues, animal wastes, agro-industrial and municipal wastes, etc) can be transformed into liquid and/or gaseous fuels.

1 Options for converting primary energy into liquid and gaseous fuels

a. Crude Oil/Petroleum refining

Crude oil or unprocessed petroleum is not very useful as an energy source when it is extracted through the oil wells. Crude oil needs refining to be converted into petroleum products. As crude oil is made up of a mixture of hydrocarbons, which have different boiling points, the core refining process is simple distillation aimed at separating the crude oil into its "fractions", such as gasoline, kerosene, jet fuel, diesel fuel, and residual fuel.

The process consists in heating crude oil and putting it into a still – a distillation column- and different products boil off and can be removed at different temperatures according to their boiling points. The lighter products – liquid petroleum gases (LPG), naphta, and so-called "strait run gasoline"- are recovered at the lowest temperatures. Middle distillates – jet fuel, kerosene, kerosene, and distillates such as diesel fuel - come next. Finally the heaviest products (residual fuel oil) are recovered. The simplest refineries stop at this point^{xi}.

However, such refineries are inefficient and have a large proportion of residual fuel oil as output. In many cases, additional processing is needed downstream of the distillation process to improve the overall refinery output of higher value petroleum products such as high octane rating gasoline and low sulphur diesel fuel. This is of particular relevance today as many African countries have committed to phasing out leaded gasoline while continuing to need high quality unleaded gasoline. This would also be of particular importance if countries have to comply with some environmental regulations imposed to air pollution from diesel vehicles in the transport sector.

The total crude oil distillation capacity is slightly above 3 million barrels per day for crude oil production of over 8 million barrels per day in 2003. All North African countries have refining facilities accounting for 54 per cent of this capacity, while South Africa alone accounts for 16.5 per cent of this capacity without being a crude oil producer. In sub-Saharan Africa, some countries like South Africa, Côte d'Ivoire and Kenya have more efficient refineries than oil producing countries and have succeeded to become regional suppliers of refined petroleum products. Some of the new petroleum producing countries do not have refining facilities to process part of their crude oil for the domestic market. This is the case of Equatorial Guinea and Chad.

b. *Natural gas processing*

Contrary to crude oil, which needs to be refined before it can be used as fuel, natural gas is the end product. Natural gas is gathered from individual wells, processed locally, and then moved via pipeline to the market/consumer. Minimal "refining" is done in the so-called "gas processing plants" near the production to remove water, hydrocarbon liquids, helium, carbon dioxide, hydrogen sulfide, etc.

Natural gas can also be converted into high value refined petroleum products such as diesel, naphtha and liquefied petroleum gas through a process called *Gas-to-liquids (GTL) technology*. It is worth mentioning that Sasol, the South African Synthetic Fuel Company, and Chevron have developed a new technology for converting natural gas to liquid fuels through gas-to-liquids (GTL) technology.

Chevron Nigeria and the Nigeria National Petroleum Corporation (NNPC) have awarded a contract to KBR, a subsidiary of Halliburton, for engineering and construction of a GTL facility at Escravos in Nigeria in April 2005. The facility will have an output of 34,000 barrels per day of GTL-derived diesel, naphtha and liquefied petroleum gas (LPG) for export.

c. *Coal Processing*

Coal is a fossil fuel extracted from the ground by deep mining, coal mining (open-pit mining or strip mining). Coal is primarily used as a solid fuel to produce heat through combustion. When coal is used in electricity generation, it is generally pulverized and

then burned. The heat produced is used to create steam in a boiler, which is then used to spin a turbine-generator to generate electricity. But coal can also be converted to synthesis gas (syngas) through gasification or to synthetic fuels (synfuel) through liquefaction.

Gasification of coal has been used by Sasol in South Africa for petrochemical needs. It is also a more environmentally friendly energy supply option as the produced synthesis gas (syngas) burns hotter and cleaner than conventional coal, can spin a more efficient gas turbine rather than a steam turbine, and makes capturing carbon dioxide for later sequestration much easier.

Coal can also be converted into liquid fuels like diesel or gasoline by several different processes. A coal-to-liquids (CTL) process developed by Sasol in South Africa involves gasification of coal to produce synthesis gas (a balanced purified mixture of CO and H₂ gas) and condensing syngas using Fischer-Tropsch catalysts to make light hydrocarbons which are further processed into gasoline and diesel. Sasol and China are considering the installation of two 80,000 barrels per day using CTL technology in China.

d. Modernized Biomass Fuels

Biomass energy has the potential to be “modernized”, i.e., produced and converted into more convenient forms such as gaseous and liquid fuels, process heat or electricity. Process heat may be produced by direct combustion of biomass using bagass in sugar mills to produce heat and electricity through the co-generation process. Partial gasification of biomass can produce a combustible gas called “producer gas” that can be burned directly in a boiler, furnace or kiln to provide heat, or used to run a dual fuel diesel for shaft/electrical power applications.

Biomass can be converted into biogas, a methane-rich combustible gas, through a biological conversion process called *anaerobic digestion*. Biogas can be burned directly providing energy for cooking and lighting, or used indirectly in a dual fuel engine to produce electricity or shaft power. Biogas is most commonly produced using animal manure, mixed with water, which make the slurry introduced in the digester. The nitrogen-rich effluent released from the digester after biogas production is usually used as fertilizer

Sugar containing biomass crops (e.g., sugarcane) can be converted into ethanol, a liquid fuel, by a biochemical process called fermentation. Ethanol can also be produced from starch containing biomass (e.g., cassava, corn, or potatoes) which involves first conversion of carbohydrates into water-soluble sugars before fermentation. Although ethanol production from sugar containing biomass can be considered as a well-established technology, research continues to find alternative production processes using less valued feedstock. Indeed, some of the biomass crops used as feedstock for ethanol production are high value staple foods in most SSA

countries. Ethanol has proved to be an alternative source of liquid fuels for the transport sector in Zimbabwe, Malawi and Kenya.

2 Options for converting energy resources into electricity

Electricity can be produced from almost all energy resources using the most relevant power conversion technologies. Electricity can be produced in centralized and grid-connected power plants or by decentralized (distributed) power generation systems.

a. Centralized electricity generation with connection to the national power grids

Electricity production in power plants involves turbines driven by steam, water, wind or other fluids as intermediate energy carrier. Steam used in thermal power plants is produced from burning fossil fuels and biomass fuels in boilers, from nuclear fission in nuclear power plants, from geothermal sources in geothermal power plants, or from solar energy in solar thermal power plants. Hydroelectric power plants use water flowing directly through the turbines to power the generators, while wind generators use wind to turn turbines that power a generator.

Advanced, clean fossil fuel technologies are being generalized as a means of reducing greenhouse gas (GHG) emissions thereby contributing to achieving sustainable development objectives. In this regard, the natural gas-fired gas turbine/steam turbine combined cycle has become the thermal power technology of choice in regions having ready access to natural gas. This is due to low unit capital cost, high thermodynamic efficiency and low pollutant emissions (clean fuel technology). Another clean fuel technology that is being promoted is the coal-integrated gasifier/combined cycle (CIG/CC) that could achieve pollutant emissions as low as for natural gas combined cycles^{xii}.

An advanced technology that could make it possible for electricity derived from plantation biomass to compete with coal in power generation is the biomass integrated gasifier/combined cycle (BIG/CC). In addition to plantation biomass, which must address potential conflicts with food production, less costly biomass residues can be used.

b. Distributed generation for rural electrification

For smaller amounts of electricity, diesel/petrol generators and renewable energy technology (RET) systems are used. This is particularly important for rural electrification programmes where decentralized electricity generation can most of the time represent a more cost-effective solution than grid extension for rural electricity supply. Current technology developments make efficient decentralized power generation systems possible using renewable energy technologies (RETs). These

distributed generation systems can produce electricity near to the consumers, or even in their own premises (e.g. solar systems).

c. Decentralized micro-grids powered by diesel generators

Diesel generators have been used for power generation and distribution in isolated and remote areas for decades, and provide important experience in the operation of decentralized power systems. Diesel generators of 10 kilowatts (kW) or less are used to power individual homes and communications systems, while larger generators of several hundred kilowatts or more can power a whole village or small town. While diesel generators are relatively inexpensive to install, with capital costs of US\$ 400 to US\$ 1,000 per kilowatt, they are expensive to operate.

High operating costs mean that most villages or small towns that rely on diesel generators can operate the system for only a few hours a day. Maintenance and high fuel costs have been long-standing problems with diesel generators. The systems are often in remote locations, and the difficulties of purchasing imported spare parts and fuel have often made them unreliable.

d. Distributed Generation using Renewable Energy Technology (RETs)

Energy from solar, wind and micro-hydropower schemes has become attractive in regions where the solar radiation, wind regime, or hydro resources are suitable. The costs per kWh of electricity generated by micro-hydropower can be as low as 20-30 cents, depending on the site, 90 cents for PV solar systems, and 40-90 cents for small wind generators. Developments in renewable energy technologies (RETs) have greatly expanded the options for supplying electricity in rural areas.

- *Small hydropower*

Hydropower converts falling water into electrical energy or mechanical energy. The amount of power provided by falling water is a function of the vertical distance the water drops (the head) and the volume of the water passing through the turbine. Small hydro systems require a turbine, generator, water-flow controllers and a structure to house the equipment. Small hydro is now a mature technology that has been greatly improved by electronic load controllers, low cost turbine designs, the use of electronic motors as generators, and the use of plastics in pipe work and penstocks. It is an attractive alternative to diesel systems in rural and remote areas of developing countries as a means of achieving rural electrification.

Since the early 1980s, substantial efforts have been made to develop indigenous appropriate approaches to small hydro development. Many micro-hydro projects under 100 kW of installed capacity are of "run-of-river" type systems that require less extensive civil works and employ locally

manufactured equipment. Well-planned small hydro systems have minimal environmental consequences and a project life of 20 to 30 years.

- *Wind power*

Wind energy systems convert the kinetic energy of moving air masses into mechanical or electrical energy. Two types of wind machines can thus be distinguished: windmills, which produce mechanical energy used mostly for pumping water in rural areas; and wind turbines, which generate electricity for households, villages or for connection to the utility grid. Generating electricity from the wind is a mature technology and can be competitive economically with most fossil fuel applications. The intermittent nature of the wind regime remains a major drawback of wind energy, but wind power can be integrated into the electrical grid or used in mini-grid, often with other energy sources, such as solar or diesel generators.

Small wind turbines with only two to three moving parts are mechanically simple, rugged, reliable and last up to 50 years. They require virtually no maintenance and can be used off-grid for pumping and treating drinking water, irrigation, telecommunications, homes, schools, clinics or for supplying larger village power systems. A village wind power system that provides up to 500 kWh per month ranges in cost from US\$15,000 to US\$25,000, with larger systems prices as high as US\$150,000^{xiii}.

- *Solar power*

Solar radiation can be directly converted into electricity using semiconductor materials called photovoltaic (PV) modules. Three types of PV modules are under commercial production: monocrystalline modules are the most efficient, polycrystalline modules are less efficient but less expensive to produce; and thin-film modules, normally used for running consumer devices, are half as efficient as the best cells but far less expensive. Thin film PV modules offer the advantage of providing lightweight and unbreakable panels on flexible substrates that can be integrated with the roof. Solar PV technologies can operate for up to 30 years.

PV systems are a reliable, renewable, environmentally safe, and increasingly cost-effective technology for generating electricity for a wide range of applications to households and communities in the developing world. PV modules can power small systems, such as simple fluorescent lighting for individual homes, and they can be linked to run large-scale water pumps, communications equipment for schools, and appliances that benefit communities as a whole. The total costs of a PV system depend on many factors aside from the basic hardware. However, the costs of PV array are a significant factor and will typically constitute 30 per cent to 50 per cent of the

total capital outlay, with the balance-of-system (BOS) components contributing a similar amount.

Costs for typical configurations were estimated in 2001 as follows: (i) a *small solar home system* to power two or three fluorescent tubes, a radio and a black and white television would require a 50 Wp module and support structure, battery, wiring, and controls, and costs 350 to US\$ 700; and (ii) a *PV-powered vaccine refrigerator* would require a 200 Wp, a well-insulated case, a high-performance battery, along with cables and controllers, and cost 2,000 to US\$ 5,000.

- ***Biomass-based power systems***

Efforts are being made to develop small-scale power systems using biomass energy sources such as wood, agro-industrial residues and agricultural wastes. Electricity can be produced from biomass through the following processes (i) by direct combustion and production of steam used to run a steam turbine connected to a generator; (ii) after thermo-chemical gasification into producer gas used in an internal combustion engine; or (iii) after biological conversion into biogas used in an internal combustion engine. Biomass power plants range in size from 4-5 kW to as large as 50 MW and have tremendous potential in developing countries. Biomass is also an excellent source of power for remote village applications.

- ***Fuel cells***

Power from fuel cells is created through an electrochemical process with (no moving parts) that uses hydrogen (usually derived from natural gas) and oxygen to produce a DC (direct current) current, heat, water and carbon dioxide. There presently four types of fuel cells being developed for electrical power generation: (i) phosphoric acid fuel cells; (ii) molten carbonate fuel cells; (iii) solid oxide fuel cells; and (iv) proton exchange membrane fuel cells. Phosphoric acid fuel cells have a 40 per cent energy efficiency and are presently on the market mostly in the 200 kW range. Molten carbonate fuel cells and solid oxide fuel cells produce high temperatures and have 60 per cent efficiency. Proton exchange membrane fuel cells operate at lower temperatures and are used for small-scale operations^{xiv}. The main barrier to fuel cells is the cost which range from US\$1,000 to US\$1,150 per kW with operating costs estimated at US\$0.10/kWh.

The International Finance Corporation (IFC) of the World Bank has awarded a US\$3 million grant to IST Holding (PTY) Ltd and Plug Power Inc., to install 400 fuel cells in remote locations and cities of South Africa over the next three years. Plug Power will produce the five-kilowatt (5 kW) fuel cell systems,

which IST will import, distribute, install and maintain. The project is worth a total of US\$14 million.

- ***Hybrid systems***

Hybrid power systems are those that use more than one generation technology. Hybrid systems can include any combination of renewable and fossil fuel generation technologies or different renewable sources, such as wind, solar and small hydro, which are normally combined with battery storage. Hybrid systems are capable of providing reliable “grid quality” AC power sufficient to support standard appliances, such as refrigerators.

In the case of a smaller wind turbine in the 5-100 kW range supplying electricity to a small, localised micro-grid systems; a diesel generator set is often used as a backup for periods when wind speeds are low, because wind energy production tends to be highly variable. Wind/diesel or wind/solar/diesel hybrids systems can provide electricity 24 hours per day and are ideal for village mini-grid applications

VI.6 The challenge of ensuring energy supply for sustainable development in Africa

1 Improving access to modern energy services for poverty alleviation

According to a report of the International Energy Agency (IEA)⁸⁶, sub-Saharan Africa has the lowest electrification rate of any major world region with only 24 per cent of its population electrified in 2002. While electrification rates will approach 100 per cent in the Middle East, North Africa, East Asia and Latin America by 2030, they will remain relatively low and half the population of sub-Saharan Africa will still be without electricity by 2030. Table 6.3 below shows the estimated electrification rates by Region for the period 2002-2030.

Sub-Saharan Africa is also characterized by heavy reliance biomass fuels, which include wood, charcoal, straw, agricultural residues and dung. The extensive and inefficient use of traditional biomass fuels for energy purposes is both a characteristic of poverty and its persistence. According to IEA projections, the number of people relying on traditional biomass fuels will grow from just 2.4 billion in 2002 to over 2.6 billion in 2015. The share of India and Africa together in the total number of these people will grow from just over half to 58 per cent. The proportion of the population using traditional fuels will remain highest in sub-Saharan Africa.

Table 6.3
Estimated Electrification Rates by Region for the period 2002-2030 (%)

	2002	2015	2030
Africa	36	44	58
<i>Sub-Saharan Africa</i>	24	34	51
<i>North Africa</i>	94	98	99
South Asia	43	55	66
East Asia and China	88	94	96
Latin America	89	95	96
Middle East	92	96	99
Total developing Countries	66	72	78

Source: World Energy Outlook 2004: Energy and sustainable Development

Therefore, it appears that heavy reliance on traditional biomass fuels and limited access to modern energy sources such as electricity and petroleum-based fuels (LPG and kerosene) cannot help poor people escape from poverty. Lack of access to reliable and affordable modern energy services has been identified as the most critical sustainability challenge facing the continent, particularly in sub-Saharan Africa. Countries that do not use modern forms of energy efficiently cannot realize their potential for creating wealth nor lift their populations out of poverty. Therefore, any effort to achieve the objective of energy for sustainable development in Africa would aim at improving access to modern energy services for the poor in sub-Saharan Africa, particularly in rural areas

a. Meeting household basic energy needs

As noted above, the large majority of poor households in rural sub-Saharan Africa are still relying on traditional biomass fuels for activities that require heat and on human and animal power for mechanical tasks (mainly agricultural activities and transport). Human energy is expended for household work (gathering and preparing biomass fuels, cooking, fetching water, and washing cloths), agriculture and small-scale industry. Although most of the rural poor have no access to electricity, many have small-battery operated devices, such as radio, and electric torches. Therefore, renewable energy technologies (RETs) could help rural poor households move up the so-called “energy ladder”?

The “energy ladder” is a common concept used in household energy analysis, which implies that, as incomes rise and opportunities for using better technologies become available, people’s preferences shift from traditional biomass fuels and inefficient cooking stoves to modern energy carriers and more convenient and energy-efficient

end-use technologies that convert energy carriers into useful services. This means that people move up the energy ladder as their incomes grow.

In the past, many attempts to meet the energy needs of poor people have concentrated on their household requirements, such as cooking and lighting. These have often been referred to as "*consumptive uses*", even though lighting allows people to undertake income-generating activities (productive work) for extended hours, and cooking might include the processing of food for sale. However, the most financially sustainable decentralized energy supply options to rural communities are likely to be those that provide mechanical power or electrical energy for productive enterprises ("*productive uses*").

Renewable energy technologies that can be used to meeting household cooking needs, include: improved cooking stoves, solar cookers, and biogas. Even though producer gas is a clean cooking fuel, its use has not been promoted in most SSA countries. Programmes for promoting and disseminating improved cooking stoves have been launched in sub-Saharan Africa since the 1980s but have had mixed results. If improved charcoal cooking stoves targeting urban households have been successful, like the Kenya ceramic *Jiko*, efforts to disseminate improved stoves for burning unprocessed biomass have somehow failed.

Biogas is a clean-burning methane-rich fuel gas and is the only biomass-derived modern energy carrier for household applications with which there is widespread experience. Biogas can be used directly in conventional low-pressure gas burners for cooking and heating purposes. It can also provide lighting when used in mantle lamps. Experience of promoting small scale biogas technology in Africa at the household level has generally not met expectations, due partly to high capital costs and non availability of feedstock (animal manure and water) for the biogas digester. It is estimated that a family-sized digester would require an investment of US\$ 300-500 and a minimum of two cows.

Rural households also need modern energy sources for lighting. As noted earlier, climbing the energy ladder for lighting means shifting from kerosene to gas lamps and finally to electric lights. Biogas can provide improved lighting than kerosene lamps, but electricity is much preferred because it can improve the quality of life by providing energy for both lighting and powering radio/TV. Because of the small amounts of electricity required, the most appropriate RETs for meeting household needs is solar PV technology through solar home systems (SHSs).

b. Meeting community energy needs

Rural communities need energy services for many different activities and for many different sectors within the community, households, schools, medical centres, micro-enterprise development, and agriculture. Considering the energy needs of the community as a whole when planning energy supply can result in solutions that meet

energy demand for most of households more efficiently and cost-effectively. RETs that can be considered for providing energy services to community needs include solar PV lighting, cooling and pumping systems, mini-grid supplied by RET-based power system, biomass gasifier/engine systems and windmills for water pumping.

Modern energy services are needed to provide access to better medical facilities for maternal care, to enable night availability and help retain qualified medical staff, and to allow vaccination and drugs storage for the prevention and treatment of diseases and infections. Increased health would help open up opportunities for employment and income generation for the rural poor.

Lighting in schools allows evening classes and help retain teachers especially if their accommodation has electricity. Access to energy (electricity, gas) provides the opportunity to use modern equipment for teaching and carry out laboratory tests. Electricity also enables access to educational media and communications (ICTs) in schools thereby increasing education opportunities and allowing distance learning. Literacy can improve people's employment prospects and increase in household income.

Improved access to modern energy services can help purify water or pump clean ground water locally thereby reducing time spent by women and girl children fetching water. Provision of modern energy services for irrigation helps increase food production and access to nutrition. Access to clean water help improve health. Increased health and nutrition help open up opportunities for employment and income generation, including for the rural poor.

c. Framework for improving electricity access through rural electrification^{xvi}

A framework for governments' intervention in promoting rural electrification in Africa may be drawn from a workshop organized by the Global Environment Facility (GEF) in Marrakech, Morocco in September 2000 which considered off-grid, mini-grid and grid-connected options to promote rural electrification in Africa.

In its traditional role, a government agency or utility department commonly implemented rural electrification programmes according to a master-plan that was often inefficient, not sustainable, and entirely based on grid extension. In its new role, government enables markets by:

- regulating providers and distributors;
- monitoring and enforcing the quality of service by setting standards and certifying equipment;
- protecting the consumer from dangerous equipment and abusive business practices;
- building capability in the off-grid energy service industry;
- raising awareness in remote communities; and

- designing well-targeted subsidies.

The information and regulatory requirements of government's emerging role is substantial. The traditional centrally controlled approach is being displaced by a variety of institutional arrangements that are being employed to give the private sector explicit and transparent incentives to provide rural energy services within a sustainable business practice. Rural electrification authorities in countries with reformed power sectors are awarding contracts or concessions for rural energy service to the lowest cost (lowest subsidy) provider.

Governments could encourage PV market expansion by ensuring a transparent, supportive institutional and regulatory framework. This can be done by rationalizing import duties and taxes, as well as incentive or subsidy structure, so as to put PV equipment on an equal footing with other means of supplying electricity to rural communities. Subsidies should be applied to access costs (connections), not to operating costs (ongoing consumption).

Governments may wish to support the development of small hydropower projects through:

- *Public loans:* Loans on more favourable terms than can be obtained in the private market. Part of the financial package might be provided in the form of a grant;
- *Power purchase agreements:* The government power utility can be instructed to purchase power from small hydro developers at a favourable price. This will secure the income from the project and is necessary for arranging limited recourse project financing;
- *Guarantees:* the government may guarantee the payback of loans. This reduces lender's risk and thus the developer's loan costs; and
- *Tax relief.*

2 Reducing inefficiencies in energy production and supply

The analysis of the patterns of energy production and consumption has revealed that there are serious inefficiencies in the way energy resources are extracted and converted to useful energy and energy carriers. These inefficiencies need to be addressed in order to ensure that harnessing energy resources can significantly contribute to sustainable development.

It was noted that Africa is endowed with relatively abundant commercial energy resources, but these resources are unevenly distributed within regions and often located far from the main energy demand centers. For example, the Democratic Republic of Congo (DRC) alone accounts for more than 40 per cent of Africa's total hydropower potential, but this potential cannot be easily developed due to the small size of domestic energy market. It will need to be developed in a regional context

thereby calling for increased regional cooperation and integration in order to benefit from economies of scale and facilitate the mobilization of capital investment.

Africa is also characterized by serious inefficiencies in the exploitation and processing of its oil and gas resources. While gas flaring/venting represents less than 3 per cent of gross gas production in Algeria and Egypt, it represents about 50 per cent of gross gas production in Angola and Nigeria. This is mainly due to lack of adequate markets for natural gas in sub-Saharan Africa as well as energy infrastructure such as power transmission lines and gas pipelines that could contribute to promoting cross-border gas-based energy trade. Measures considered to promote the use of natural gas include developing regional projects such as the West African Gas Pipeline (WAGP) Project, which aims at transporting Nigerian gas to Ghana with supply en-route to Benin and Togo for use in power stations and industrial processes.

Sub-Saharan Africa (excluding South Africa) has also inadequate crude oil refining facilities and most petroleum producing countries are not in a position to process part of the crude oil they produce to satisfy domestic demand for petroleum products. New petroleum producing countries such Equatorial Guinea and Chad do not have any refining facilities at all. This leads to the paradoxical situation whereby sub-Saharan African oil producing countries are obliged to import refined petroleum products for local consumption. Countries without refining facilities may consider entering into negotiations with countries having adequate refining capabilities so that part of their crude oil can be processed upon payment of processing fee.

This is in line with NEPAD energy initiative, which recognizes that the small market sizes and low purchasing power have been the major barriers for African countries to universal access to modern energy services for development. The strategy to promote the development of the African energy infrastructure would therefore aim at capitalizing on regional markets rather than country-specific coverage thereby generating the economies of scale necessary to lower transaction costs and increase competitiveness.

This is why most of the regional economic communities (RECs) have been promoting the creation of sub-regional power pools, such as the Southern African Power Pool (SAPP) in the SADC region, the West African Power Pool (WAPP) in the ECOWAS region, the "Pool Energétique d'Afrique Centrale" (PEAC) in the ECCAS region, and the East African Power Pool (EAPP) in Eastern Africa and the COMESA region.

3 *Overcoming barriers to sustainable energy development*

From the assessment of Africa's resource base and the current patterns of energy production and consumption, it appears that increasing access to affordable and reliable energy services for domestic uses and productive activities is probably the most critical challenge facing African countries in achieving the objective of energy for sustainable development. This is particularly true for many countries in sub-

Saharan Africa where improving access to reliable and affordable energy services is a prerequisite to achieving the Millennium Development Goals (MDGs) and ensuring the necessary conditions for economic growth and sustainable development. To address this challenge, African governments, particularly in sub-Saharan Africa, need to take policy measures and appropriate actions aimed at overcoming a number of barriers, including

a. Lack of an adequate policy and institutional framework

Many African countries, particularly in sub-Saharan Africa (SSA), lack an adequate institutional, policy, legal and regulatory framework that could help them address their particular energy problems. For example, many countries are facing the problem of attracting private sector participation in the operation and management of their energy enterprises. Though there is a general trend to deregulation and privatisation of the energy sector, most countries have not put in place the required governance in terms of legal and regulatory framework for the sector. Therefore, there is need to formulate an attractive energy policy and put in place an adequate institutional, macroeconomic, legal and regulatory framework that will help attract private capital and managerial resources in the energy sector. Appropriate incentives, a conducive business environment and attractive fiscal policies are all ingredients to attract private investors in the sector.

b. Difficulties of access to financing for energy development projects

Investments in the development of the energy sector are highly capital intensive. Mobilization of the resources required for financing power development, and oil and gas reserves exploration and development is becoming a hard task due to lack of creditworthiness of many African countries and the high risk perceived by investors for doing business on the continent. Therefore, countries will increasingly need to meet a set of requirements, among which are political stability and a sound legal, regulatory and macroeconomic framework in order to dispel the risk associated with private investment in Africa and to be able to compete for FDI with other parts of the world.

c. Uneven distribution of energy resources calling for energy cooperation and integration

Even though Africa is endowed with abundant energy resources in the form of oil and gas, coal, hydropower, biomass and other renewable energy sources, the reserves are unevenly distributed within regions and often occur at long distances from the main energy demand centres. For example, the most interesting hydropower potential is located on the Congo River in the Democratic Republic of Congo and in other countries in Central Africa region, which do not have the requisite industrial base to justify its development. This potential can only be developed in a regional context with associated power transmission and distribution networks. Therefore,

rationalizing the territorial distribution of existing but unevenly allocated energy resources through, among other things, increased regional cooperation in the expansion of existing networks of electricity transmission lines and gas pipelines, would help improve reliability and security of supply while minimizing costs and environmental impacts.

d. Inadequate approaches to address the problem of rural energy supplies

Sustainable modern energy provision in rural areas is hindered by numerous factors including: (i) lack of choice of the form and quality of energy to be supplied due to limited energy services providers; (ii) problems of depletion of biomass resources in some densely-populated areas; (iii) limited dissemination of renewable energy technologies (RETs) as alternative options; (iv) low income level and irregular income streams of the rural people that reduces significantly their purchasing power and their ability to afford the energy service even when available; and (v) scattered villages that increase investment and transactions costs of rural electrification projects. Therefore, there is need for new approaches to ensuring modern energy supplies to rural areas.

e. Lack of appropriate strategy for renewable energy technology (RET) development

A variety of renewable energy technologies (RETs) that can convert renewable energy sources into more useful and convenient forms (gaseous and liquid fuels, electricity, heat or shaft power) are commercially available. Their modular nature and the fact that they are more evenly distributed than conventional energy resources render RETs ideal candidates for providing decentralized energy services. Therefore, promoting RETs' contribution to sustainable development will require that appropriate institutional, legal, regulatory and fiscal framework be put in place to address some of the barriers that are hindering their widespread dissemination.

VI.7 Linkages between energy and some critical sustainable development issues

1. Energy access and the MDGs

According to the World Bank^{xvii}, the links between energy and poverty take many forms. Modern sources of energy improve living standards by helping to create jobs and boosting productivity. They can also improve living conditions by providing better lighting of homes, cleaner fuels for cooking and heating, and cleaner emissions from energy-consuming industrial plants.

Use of modern energy sources (e.g. electricity, natural gas, petroleum products and coal) is strongly correlated with economic growth and with human development in the area of health, education and life expectancy. Countries that do not use modern forms

of energy efficiently cannot realize their potential for creating wealth nor lift their populations out of poverty.

In September 2000, the UN General Assembly adopted the Resolution on the United Nations Millennium Declaration setting up the Millennium Development Goals (MDGs) to reduce poverty. In April 2001, the Ninth Session of the UN Commission for Sustainable Development (CSD-9) stated that: "To implement the goal accepted by the international community to halve the proportion of people living on less than US\$ 1 per day by 2015, access to affordable energy services is a prerequisite."

Furthermore, the World Summit on Sustainable Development (WSSD) recognized that energy plays a critical role in underpinning efforts to achieve the MDGs and improving the lives of poor people across the world. Although the Millennium Development Goals (MDGs) do not make any specific reference to the role of energy to reduce poverty, access to energy services is a crucial element in achieving the goals.

The link between access to energy services and poverty reduction can be highlighted as follows:

- *Halving poverty by 2015* will not be reached without energy to increase production, income and education, create jobs and reduce the daily grind involved in having just to survive.
- *Halving hunger* will not come about without energy for more food production throughout the food chain (ploughing, planting, harvesting, processing and marketing).
- *Improving health and reducing death rates* will not happen without energy for refrigeration of vaccines and other medicines needed for the prevention and treatment of diseases and infections in health centers/clinics and for vaccination campaigns.
- *Supplying safe water* will not be possible without energy for pumping and clean fuels for boiling water.
- *Gender equity in education* cannot be achieved as long as girl children are drawn from school to collect ever-scarce traditional fuels for family subsistence.

Therefore, it is generally recognized that improving access to energy will generate opportunities for economic growth, enhanced education, better health care, more training and employment, as well as higher productivity in business, thereby contributing to sustained poverty reduction.

2. *Energy, Agriculture and Food Security*

According to the Food and Agriculture Organization (FAO)^{xviii}, Africa had and still has more countries with food security problems than any other region. Of the 44

countries with poor or critical food security in early 1990s, 30 were in Africa. At the time, it was estimated that the number of chronically undernourished in sub-Saharan Africa would rise from 180 to 300 million by 2010 if appropriate measures were not taken to reverse the present trends.

This situation is due to fact that agriculture practices in sub-Saharan Africa (excluding South Africa) continue to be based to a large extent on animal and human energy. Insufficient mechanical and electrical energy is available for agriculture so that the potential gains in agricultural productivity through the deployment of modern energy services are not being realized. The direct energy needs include energy required for land preparation, cultivation, irrigation, harvesting, post-harvest processing, food production, storage and the transport of agricultural inputs and outputs. Indirect energy needs are in the form of sequestered energy in fertilizers, herbicides, pesticides, and insecticides (FAO, 2000).

It is widely recognized that "energizing" the food production chain has been an essential feature of agricultural development throughout recent history and is a prime factor in helping to achieve food security. Sub-Saharan African countries have lagged behind industrialized countries and other developing regions in modernizing their agriculture through utilization of more adequate energy inputs. Therefore, there is need for a transition to sustainable energy systems in order to accelerate the growth of basic food production, harvesting and processing.

For Africa, an energy transition would be characterized by a move from the present levels of subsistence energy usage based on human labour and fuelwood resources, to a situation where households, services and farming activities use a range of sustainable and diversified energy sources. Obvious benefits are greater resilience in the production system, higher productivity, improved efficiency and higher incomes to farmers. Environmental degradation, driven primarily by poverty, would be minimized.

However, the energy transition in rural areas will not occur under a "business-as-usual" situation. A concerted effort is needed on the part of the many actors influencing energy supply and demand patterns. One challenge is to reduce the barriers facing rural energy development, which arise from lack of policy and programme coordination between the rural and agricultural sectors, and the energy sector institutions. The rural sector continues to remain outside energy assessment and planning, which are normal practice for industry, commerce and transport. This is due to the small impact rural energy has on the national energy balance.

Therefore, promoting food security through increased agricultural production would inevitably involve increases in energy inputs for water supply and management, plant nutrients, agro-processing and community lighting. Indeed, all stages of the food chain require energy provision in one form or another. For example, mechanical energy is needed for irrigation and mechanized farming; heat is needed for cooking

food while electricity is required for conservation and agro-processing. Renewable energies such as biomass, solar and wind could make a significant contribution to the sustainability and productivity of these processes.

Renewable energy technologies (RETs) applied to agriculture include:

- Small-scale hydropower for electricity generation;
- Wind mill operated pumps for irrigation and water supply for livestock;
- Biogas plants producing energy for cooking and lighting;
- Solar photovoltaic (PV) systems producing electricity for lighting and refrigeration;
- Solar PV operated pumps for irrigation and water supply for livestock;
- Solar energy technologies for cooking (cookers) and heating (water heating systems);
- Geothermal energy for greenhouse cultivation; and
- Biomass conversion systems for producing liquid and gaseous fuels (ethanol, biogas, etc.).

Another important energy-agriculture nexus issue is that agriculture is both an energy supplier and an energy user. Residues from wood and agro-industries, purposely grown biomass and municipal solid wastes may play a major role in many African countries. Indeed, the provision of locally sourced energy through the exploitation of energy crops in modern biomass systems could give an attractive means of stimulating rural economic development, while at the same time offering an option for improved energy supply.

Biomass-to-energy conversion (bioenergy) systems have the potential to provide clean and more convenient liquid and gaseous fuels for the households and the transport sectors, as well as to generate electricity. Agriculture can thus make a major contribution to climate change mitigation by CO₂ substitution since biomass is a carbon-neutral energy source over a short time scale. Biomass offers the prospect of fulfilling a dual role by combining sustainable development in rural areas and climate change mitigation.

Large-scale production of bio-energy would initially require the use of agricultural and forest residues, and eventually, dedicated energy crop plantation. However, long-term bioenergy exploitation, through dedicated plantations, may have adverse effects on soil quality, fertility and biodiversity. There also are potential conflicts with other land uses, particularly between food crops and energy crops.

3. *Energy and Water*

There are close linkages between water and energy. These include the linkages between the need for access to water to produce energy (hydropower, water use for



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steam production in thermal power plants as well as water use for cooling in thermal power plants), and the need for energy to get access to water (lift ground water from an aquifer, pump water in pipes and desalinate brackish or sea water) and to treat wastewater.

Energy and water are both derived from natural resources and hydropower contributed to 18 per cent of total electricity generation in Africa in 2003. Water supply (extraction, treatment, distribution and use) involves mechanical and electrical energy derived from all types of fuels, both non-renewable and renewable (including human and animal power).

Large amounts of energy are thus needed for pumping water from the source to the tap in big cities; it is estimated that average power costs of water supply in developing countries are in the range of 0.03-0.05 Euros per m³, representing about 20 per cent of the direct (variable) costs of water treatment and supply (WEC, 2004). Large amounts of energy are also needed for sewage treatment depending on the chosen treatment process and water quality standards.

In rural areas where there is no water supply system, women and children bear the burden of walking long distances to fetch drinking water for every day household needs. In areas where groundwater-pumping system is required, renewable energy (wind mills, solar PV pumping systems or human powered hand-pumps) may be used.

Finally, energy needed for water desalination also depends on the treatment process chosen (reverse osmosis, distillation) and it is estimated that approximately 3.5 kWh of electricity are needed to treat one cubic metre of desalinated water. In this regard, North African countries are considering using solar energy for water desalination as an alternative to fuel-based-electricity.

There are also numerous opportunities to be more efficient and sustainable in the use of both water and energy resources through joint assessment, planning and action within and across all sectors. For example, the United Nations Symposium on Hydropower and Sustainable Development held in Beijing, China from 27-29 October 2004, underscored in its Beijing Declaration “the importance of an integrated approach to dam construction, bearing in mind that other than generating electricity, dams often perform multiple functions, including supplying water for irrigation, industrial production, and residential use, as well as flood prevention and habitat maintenance”. It also noted with concern that “demands for water in these areas are already on the rise, and competition for water resources is most likely to intensify in future.”

The Beijing Declaration also included an important statement on promoting hydropower development that is environmentally friendly, socially responsible and economically viable. In this regard, the Beijing Declaration “calls upon Governments to put in place procedures that emphasise the need to plan hydropower developments

in a river basin context and in the context of the full range of alternatives for energy production, and that planning should give due weight to environmental and social factors, as well as economic and financial factors”.

4. *Energy, health and the environment*

Although energy's potential for enhancing human well-being is unquestionable, conventional energy production and consumption are closely linked to environmental degradation that threatens human health and quality of life and affects ecological balances and biological diversity. Poor air quality resulting from solid fuel use for cooking and heating has significant health and environmental impacts at the household, local, regional and global levels. It is associated with increased sickness and premature death.

The World Health Organization (WHO) estimated in its World Health Report 2002 that indoor air pollution from household use of solid fuels resulted in 1.6 million deaths annually. WHO also estimates that indoor air pollution is a leading health risk in developing countries, claiming more lives than malaria and causing nearly as many deaths as are caused by dirty water and poor sanitation.

In the World Energy Assessment (UNDP/UNDESA/WEC, 2000), it was indicated that four types of health effects were likely to occur from indoor air pollution:

- Infectious respiratory diseases such as acute respiratory infections and tuberculosis;
- Chronic respiratory diseases such as chronic bronchitis and lung cancer;
- Adverse pregnancy outcomes such as stillbirth and low birth-weight in babies born to women exposed during pregnancy; and
- Blindness, asthma, and heart disease (less evidence to date).

On the other hand, the combustion of fossil fuels (coal, oil and, to a lesser extent, natural gas) is responsible for releasing pollutants in the form of sulphur and nitrogen oxides, carbon monoxide and suspended particulate matter. Ozone is formed in the troposphere from interactions among hydrocarbons, nitrogen oxides and sunlight. Energy-related emissions from fossil fuel combustion, including in the transport sector, are major contributors to urban air pollution, which is thought to be responsible for about 800,000 deaths annually around the world (UNDP/UNDESA/WEC, 2004).

Fossil fuel combustion produces more carbon dioxide (CO₂) than any other human activity. This is the biggest source of anthropogenic GHG emissions that are changing the composition of the atmosphere and could alter the global climate system, including the amount and pattern of rainfall. Although climate change is a global phenomenon and industrial countries are the principal source of GHGs, the

negative effects will mostly be most severe in developing countries and will be felt by poor people^{xix}, particularly in sub-Saharan Africa.

The linkages between energy use and health impacts are recognized in the Johannesburg Plan of Action (JPOI) whereby the chapter on “Health and Sustainable Development” calls for reducing respiratory diseases and other harmful impacts of air pollution by “supporting efforts for the reduction of emissions through the use of cleaner fuels” and “assisting developing countries in providing affordable energy to rural communities, particularly to reduce dependence on traditional fuel sources for cooking and heating.”

5. *Energy and gender*

In Africa, particularly in sub-Saharan Africa, women are the primary users and providers of biomass fuels. Much of their day is spent on high energy activities such as collecting fuelwood and fetching water, processing and cooking food, as well as other household chores. The time spent travelling long distances to collect biomass fuels cannot be used for income-generating activities. In urban areas, poor people have to purchase cooking fuels, and they spend a high proportion of their income on fuels.

Therefore, the energy-poverty nexus has distinct gender characteristics. It is estimated that, of the approximately 1.3 billion people living in poverty, 70 per cent are women, many of whom live in female-headed households in rural areas. The gender dimension of energy and poverty appears in many ways. In households, for example, the gendered division of labour generally allocates to women the responsibility of household energy provision related to their sphere of influence in the household, in particular activities centred on the kitchen^{xx}.

This responsibility for household energy provision affects women’s health disproportionately to men’s. For example, lung and eye diseases due to longer hours of exposure to smoke and particulates in smoky kitchens mostly affect women than men. Fuel collection also reduces the time women have available for contributing to other income-generating and leisure activities, and girls are frequently kept away of school to assist their mothers. Women are also responsible for a number of other survival tasks needed to sustain the household such as water collection, food processing and cooking. Many of these tasks are demanding in terms of both human energy and time; the preparation of many staple root crops and grains takes upwards of an hour of vigorous pounding.

Achieving gender equity and addressing this challenge of energy poverty would require improved access to affordable, environmentally sustainable and reliable energy supplies in order to improve women’s status, provide them with more opportunities for income generation work, and also improve their general health and living conditions. However, it may be noted that electricity is not the best form of

energy for meeting every need. For example, it is not the cheapest means of cooking, and it can have a low efficiency in providing process heat for many production processes. Thus, biomass is likely to remain the main energy carrier for these types of applications. Table 6.4 below illustrates how different forms of energy can contribute to women's practical, productive and strategic needs.

Table 6.4
Possibilities for improving the position of women through energy access

Energy Form	Women's needs		
	Practical	Productive	Strategic
Electricity	<ul style="list-style-type: none"> - pumping water : reducing to haul and carry - mills for grinding grains; - lighting improves working conditions at home 	<ul style="list-style-type: none"> - increase possibility of activities during evening hours; - provide refrigeration for food production and sale; - power for specialized enterprises such as hairdressing and internet cafes 	<ul style="list-style-type: none"> - make streets safer: allowing participation in other activities (e.g. evening classes and women's group meetings) - open horizons through radio, TV and internet
Improved biomass (supply and conversion technology)	<ul style="list-style-type: none"> - improved health through better stoves - less time and effort in gathering and carrying firewood 	<ul style="list-style-type: none"> - more time for productive activities - lower cost of process heat for income generating activities 	<ul style="list-style-type: none"> - control of natural forests in community forestry management frameworks
Mechanical	<ul style="list-style-type: none"> - milling and grinding - transport of water and crops 	<ul style="list-style-type: none"> - increase variety of enterprises 	<ul style="list-style-type: none"> - transport: allowing access to commercial and social/political opportunities

Source: Clancy J.S., Skutsch, M. and Bathelor (2003)^{xxi}

VI.8 Policy implications

Africa is endowed with significant energy resources that could be harnessed to ensure adequate modern energy supplies needed for fuelling economic growth and sustainable development. To make this happen, there is need for to take policy measures such as those listed below.

1. *Establishing an adequate institutional, policy, legal and regulatory framework*

Governments could consider putting in place an adequate institutional structure as well as a strong and effective legal and regulatory framework that would help create a conducive business environment for private sector participation in the development, operation and management of the energy sector.

Past institutional, policy, legal and regulatory frameworks have failed to create the necessary conducive environment for attracting investment required to finance energy resources development projects. This problem is directly linked to the current power sector reforms and the liberalization of the energy markets. Most African countries have not formulated revised their national energy policy so as to adapt it to the reforms of the energy sector taking place around the world. This has largely contributed to the underdevelopment of Africa's energy resources have remained largely underdeveloped. There is thus need for Governments to give adequate attention to the development of appropriate legal and regulatory structures, with enforcement mechanisms, that (i) provide clear rules of the game for all players in emerging energy markets; (ii) define clearly the responsibilities and obligations of the new private businesses; and (iii) protect business and investor interests while safeguarding the public and consumers.

2. *Financing energy resources development projects*

Governments could meet a set of requirements among which are political stability and a sound legal, regulatory and macroeconomic framework in order to dispel the perception of high risk associated with private investment in Africa.

Investments in the development of energy resources are highly capital intensive. Africa needs to be able to compete for foreign direct investment (FDI) with other regions of the world for financing power development, and oil and gas reserves exploration and development. However, due to lack of creditworthiness of many African countries and the high risk perceived by investors for doing business in Africa, the task becomes extremely difficult.

3. *Improving oil sector governance and its contribution to sustainable development*

Governments could endeavour to improve governance of the oil sector so that revenues generated through oil exports can contribute to poverty alleviation and sustainable development within oil producing countries.

The most striking paradox of Africa's energy situation is that the continent accounts for about 6 per cent of the world's primary energy production but consumes only about 3 per cent of the world's primary energy consumption. This means that Africa is mainly exploiting its commercial energy resources for the benefit of other regions without any significant impact on the socio-economic development of the continent.

4. *Addressing the issue of petroleum supplies*

Governments of oil-producing countries without adequate refining facilities could consider negotiating processing agreements with refineries technically capable to

process part of their crude oil so that they can satisfy their domestic demand for petroleum products.

Governments of oil-producing countries could also consider participating in the construction and operation of regional refineries designed to process crude oil for supplying sub-regional markets in petroleum products.

In the oil sector, oil producers are increasing crude oil production without having the refining capacity to process part of it for their domestic consumption. Generally, there is inadequate refining capacity in sub-Saharan Africa and most of the refineries are technically unable to match the domestic demand mix for petroleum products. This means that even oil-producing countries are compelled to export crude oil without any value addition and to import refined products at high prices on the international market to meet their domestic needs.

5. Promoting regional energy cooperation and integration

Regional economic communities could encourage member countries to fully cooperate in the development of energy resources under regional energy cooperation. Integration schemes are the most cost-effective ways of ensuring cheap and abundant energy supply for all as recommended by the New Partnership for Africa's Development (NEPAD).

Africa's commercial energy resources are unevenly distributed within regions and have remained largely underdeveloped. Rationalizing the territorial distribution of existing but unevenly allocated energy resources through, among other things, increased regional cooperation in the expansion of existing networks of electricity transmission lines and gas pipelines, would help improve reliability and security of supply while minimizing costs and environmental impacts.

6. Addressing the problem of rural energy supplies

Governments in sub-Saharan Africa could consider adopting and implementing policy measures aimed at significantly improving access to modern energy services through decentralized energy systems thereby achieving the MDGs and reducing the prevailing energy poverty, particularly in rural areas.

In sub-Saharan Africa, rural population still rely heavily on traditional biomass fuels to meet their domestic energy needs. But, they need to have access to adequate, reliable and affordable modern energy services in order to improve their living conditions and to contribute to the national economic growth and sustainable development... There are technological options that could help produce cleaner and more convenient fuels from biomass to meet poor people's demand for modern energy supplies. In addition, decentralized electricity generation through distributed

generation may present a cost-effective alternative to grid extension for rural electrification programmes.

7. *Devising an appropriate strategy for renewable energy technology (RET) development:*

Governments could consider promoting access to RET-based modern energy services by providing households and small businesses with access to capital, via loans that typically include: flexible repayment schemes, fee schedules that match customer income streams, and longer loan repayment terms. Access to finance should be made available not only to end users, but also all the way along the service chain to organizations that help to manufacture, install and maintain the energy services.

A variety of renewable energy technologies (RETs) that can convert renewable energy sources (biomass, solar, wind, and small hydro) into more useful and convenient forms (gaseous and liquid fuels, electricity, heat or shaft power) are commercially available. Their modular nature and the fact that they are more evenly distributed than conventional energy resources render RETs ideal candidates for providing decentralized energy services. But, this requires that existing institutional, technical, financial, legal and regulatory barriers be properly addressed.

8. *Adopting a holistic perspective of the energy problems by policy makers:*

Governments could consider launching awareness raising campaigns on the importance of adopting a holistic approach in the formulation and implementation of energy policies and strategies aimed at improving energy services provision.

For most policy-makers and the public at large, energy means electricity in many African countries. But, petroleum products provide the bulk of energy used by the transport sector, while traditional biomass fuels (firewood, charcoal, crop residues and animal dung) are the main source of energy for the majority of people living in rural and peri-urban areas. Biomass-based fuels are expected to continue to be the main source of energy for domestic needs in rural and peri-urban areas in sub-Saharan Africa, and depletion of forest resources and high population growth rates may ultimately lead to what has been termed the “other energy crisis”.

9. *Addressing the issue of linkages between energy, agriculture and food security:*

Governments should recognize the potential of bioenergy and renewable energy sources in general to assist both in the provision of energy services in the rural areas and in the transition to more sustainable energy systems.

Africa had and still has more countries with food security problems than any other region in the world. Therefore, there is need for a transition to sustainable energy

systems in order to accelerate the growth of basic food production, harvesting and processing in order to improve food security. Such a transition will involve moving from the present levels of subsistence energy usage - based on human labour and fuelwood resources - to a situation where households, rural services and farming activities use a range of sustainable and diversified modern energy supplies. In this regard, the exploitation of energy crops in modern biomass systems could give an attractive means of stimulating rural economic development, while at the same time offering an option for improved energy supply

10. Adopting an integrated approach to water resources development and management:

Governments should consider to pay attention to the importance of an integrated approach to dam construction, bearing in mind that other than generating electricity, dams often perform multiple functions, including supplying water for irrigation, industrial production, and residential use, as well as flood prevention and habitat maintenance.

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ⁱ World Energy Outlook 2002 – Chapter 13: Energy and Poverty

ⁱⁱ World Commission on Environment and Development: Our Common Future. Oxford/New York, 1987

ⁱⁱⁱ World Bank Report, 1997

^{iv} DFID, 2002: Energy for the Poor: Underpinning the Millennium Development Goals

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^x Excluding Reunion which is located in Indian Ocean and belongs to France.

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Chapter VII

IMPROVING PUBLIC PARTICIPATION IN THE SUSTAINABLE DEVELOPMENT OF MINERAL RESOURCES IN AFRICA

VII.1 Introduction

This chapter articulates some of the challenges of public policy in the minerals industry and reviews some practices for enhanced public participation in the environment, social and economic aspects of the mining cycle, from procurement of goods and services to equity participation and benefits sharing. It discusses the potential challenges in the way of barriers to and opportunities for increased participation and what this entails in terms of improving policies, legal and regulatory frameworks. The entry points to broadening participation include, at the macro-level, tools such as the Poverty Reduction Strategy (PRS) and, at sectoral level, minerals clustering. Artisanal and small-scale mining merits special attention because of its low entry barriers and potential for income generation and job creation, especially in rural areas.

The chapter provides analytical material to contribute to the debate on sustainable mineral resources development in Africa, and to a better understanding of the concept of public participation in the minerals industry in the continent. The notion of sustainable development seeks to introduce into policy and project analysis, points of views previously marginal to the methods of economic evaluation, which dominated decision-making. It seeks to incorporate into such analyses environmental and social costs, which used to be treated as externalities. It also seeks to broaden the concept of potential benefits and beneficiaries beyond what was previously conventional.

"Public participation" and "Sustainable development" have become central and interconnected terms in present day development discourse. Notionally, the State is the representative of the people and it is expected to represent their interests. However, reality shows that things are not often that simple. There are usually a variety of competing interests and points of view. Sometimes, segments of the population, particularly local communities, have been disenfranchised and have become passive spectators of the development process. This has been particularly evident in the case of extractive industries, including mining. Thus, in the context of this chapter, the term "public", while intended to cover as broad a range of groups and interests as possible, aims to focus on those stakeholders who are normally excluded in the development process.

The chapter draws from a stand-alone publication entitled “Improving Public Participation in the Sustainable Development of Mineral Resources in Africa” and a policy paper titled “Mainstreaming Mineral Wealth in Growth and Poverty Reduction Strategies” (Pedro, 2004).

VII.2 The macro-economic and policy context: Emerging issues

1. *A dichotomy on the economic and social development account of the minerals industry*

The schools of thought on mining are divided between those who argue that mineral resources are a curse and scholars who consider mineral resources an endowment that can promote growth and development in developing countries. These two contrasting views are briefly expounded below.

The critics of mining reason that most mining in developing countries is a capital-intensive enclave industry, foreign-owned, operated largely by expatriates and using inputs (especially equipment) purchased abroad. Others point to the link between the scramble for mineral resources and conflict. They indicate that illicitly exploited mineral resources such as diamonds and coltan have fueled several civil wars in Africa. Some scholars state that output, income and employment multipliers in mining are lower than in other sectors, particularly manufacturing and agriculture. This view is reflected in studies by Auty (1991, 1998, 1999 and 2001), Moore (2000), Power (2002), Ross (1999, 2001 and 2002), Sachs and Warner (1995), Shaffer (1986), and Snider (1996) who argue that the richer the mineral resources endowment, the greater the likelihood of decelerating economic growth (Figure 7.1). They further observe that the record of oil and mineral rich States in alleviating poverty is worse than States with similar levels of income, but little or no oil and mineral wealth.

These scholars suggest that the pattern of underperformance in mineral economies could be linked to several factors including the Dutch Disease¹; corruption and rent seeking; exposure to economic shocks due to lack of diversification and the declining and cyclical nature of commodity prices; lack of local capacity to predict the magnitude of government revenues and foreign exchange earnings and hence to plan expenditure and investment; lavish social and infrastructure spending; and the enclave nature of mining. They further contend that in many developing countries, abundance of mineral resources can accelerate the route to poverty because, in many cases, human capital creation and accumulation is neglected, governments are not responsive to the needs of the poor, social infrastructure is weak, economic policy is dysfunctional, public income is squandered by the elite in power and those close to it, and wars of attrition and conflicts are common. Above all, they state that growth levels are low; growth and spending are not pro-poor and inequality is very high.

In the opposite camp, a group of scholars (Ahammad and Clements, 1999; Clements and Johnson, 2003; Davis, 1998; Davis and Tilton, 2002; Goodland, 2002; Wright and Czelusta, 2004) point out that the reported negative outcomes of mineral economies are case-specific; minerals are not to blame for problems of corruption and rent seeking; and that economic performance is mixed and heterogeneous.

On the finite nature of mineral resources, others emphasize the relative nature of the concept and state that technology and economics dictate what constitutes a resource or a mineable deposit. Hence, with evolution of technology, the boundaries of what can be economically exploited and the longevity of mineral resources can thus be expanded. They further argue that it is important to think in terms of mining districts rather than single mines; in mining districts, mining lasts for many decades and sometimes even hundreds of years more than any other industrial activity, as evidenced in mining districts such as Johannesburg, in South Africa, Kiruna/Malmberget in Sweden, Cornwall in England, and Bingham Canyon, in USA. They further indicate that several mining centers have evolved into urban settlements of immense significance to Africa (e.g. Johannesburg).

On the lower growth theory, they argue that there is no consistent statistical evidence showing that mineral dependence leads to either faster or slower economic growth and that without such evidence, the successes and failures of mineral economies remain idiosyncratic and should not inspire any broad generalization on development patterns. Some contend, for example, that among African mineral economies, there are fast growing and well-performing economies like Botswana. Others say that South Africa was developed on the strength of its mining industry and that mineral resources are an important component of the natural and total capital of many countries (Table 7.1) which provide an opportunity for growth that, if excluded, would result in even lower growth rates for many African countries. They note that, in Africa, other sectors, such as agriculture and manufacturing, are not knowledge-driven nor are they globally competitive or performing better than mining. They cite, for example, Norway as an example of a country that in the 1960's lagged behind (in GDP per capita) its neighbors Denmark and Sweden, but after the discovery of oil in 1969, not only caught up with these neighbors 15 years later, but it forged ahead (Larsen, 2005).

Figure 7.1
Growth performance over the 19970-1990 versus resource intensiveness of economic activity in 1970



Growth above expectations	Singapore Republic of Korea Hong Kong Taiwan Israel Syria Tunisia Brazil Turkey Egypt Congo Mexico Japan	Indonesia China Paraguay Trinidad & Tobago Uruguay Burundi India Norway Portugal	Cameroon Algeria New Zealand Cyprus	
Growth below expectations	Colombia Finland Morocco Pakistan Canada Austria Italy Belgium United Kingdom Argentina Burkina Faso Guatemala France Sweden Spain Germany	United States Thailand Denmark Rwanda Bangladesh Mali Greece Jordan Australia Switzerland Ecuador Benin Central African Republic Sierra Leone Chad	Gabon Kenya Sri Lanka Malaysia Dominican Republic Ireland Mauritius South Africa Philippines Costa Rica Honduras Nigeria El Salvador Senegal Zimbabwe Netherlands Malawi Venezuela Togo	Chile Gambia Iran Iraq Mauritania Sudan Oman Ivory Coast Peru Ghana Uganda Jamaica Bolivia Saudi Arabia Zambia Nicaragua Madagascar Guyana
	0	Low	Medium	High

Resource Intensiveness

Source: Davis and Tilton (2002)

Table 7.1
Mineral resources assets for selected countries in US\$
per capita and per cent of natural and total capital (1994)

Country	Value in US\$ per Person	Per cent of natural capital	Per cent of total capital
Saudi Arabia	67910	94	39.5
Venezuela	14960	72	13.7
Papua New Guinea	2980	40	7.6
Mauritania	1640	32	7.0
Trinidad & Tobago	9310	77	6.9
Norway	20090	66	6.6
Jamaica	2630	85	6.0
Chile	5580	39	3.9
Mexico	3860	58	3.5
Australia	9080	26	3.1
Congo	960	22	3.1
Ecuador	1970	17	2.9
Malaysia	3230	27	2.6
Namibia	1860	26	2.6
Canada	6750	18	2.0
Bolivia	640	11	1.9
Colombia	1380	23	1.6
South Africa	1340	32	1.6
China	420	16	1.1
Indonesia	670	9	1.1
Netherlands	2250	54	1.1
Brazil	910	13	1.0
United States	3180	19	0.8
Peru	430	9	0.7
Botswana	570	10	0.6

Source: Davis and Tilton (2002)

2. *Daunting challenges of public policy in the minerals industry*

Mineral resources have attributes that make them difficult to manage and pose daunting public policy challenges. They are finite and unevenly distributed; they are location-specific and must be exploited where they occur and at the right time; mineral wealth is transient; large-scale mining is often capital-intensive rather than labor intensive; yet, the political, social, economic, cultural and environmental consequences and impacts of mineral exploitation can be long-lasting.

One of the major challenges of sustainable development in the context of non-renewable resources (such as minerals) is to use the wealth it creates as an engine of growth and development and sustain it long after the minerals have been depleted. This is a challenge relevant to most African mineral-producing countries and it is linked to:

- Creating a viable, integrated and diversified mining industry throughout the value chain; sustaining mineral wealth without compromising other forms of land use and environmental, social and cultural considerations; and ensuring an enabling environment that encourages mineral wealth creation (**the creation challenge**).
- Investing transient mineral revenues to ensure lasting wealth; deciding how much ought to be saved; how much should be invested and in what area (**the investment challenge**).
- Distributing benefits from mining equitably; balancing and managing conflicting local and national-level concerns and interests; and deciding what form the allocation should take to promote pro-poor growth (**the distributional challenge**).
- Ensuring sound systems of governance and a stable macroeconomic policy, which curbs rent-seeking and corruption; addresses issues such as the Dutch Disease and externalities such as unstable commodity prices, while enhancing public interest in wealth conservation (**the governance and macro-economic challenges**).

Auty suggests that the policy responses to the challenges a given mineral economy faces (Table 7.2) need to take into consideration the stage of development of the economy in a minerals cycle, that is, whether the economy is at a nascent, youthful, early mature or late mature stage of the cycle². To this, one should add the local context, capacity to manage and restructure the economy, and the learning curve process followed by a country. Larsen (2005) indicates that while policy features might be replicable, institutions to implement them require time to build. In addition, he argues that even when institutions can be mimicked and replicated, there is no universal recipe.

For mineral companies, the greatest challenge is to link sustainable development to financial success (MMSD 2002). Accordingly, for them to meet the sustainable development imperative, they need to go beyond their traditional responsibilities to employees, shareholders, and regulators. Among many other measures, they are required to engage in meaningful partnerships with local communities and government, foster stakeholder participation, and integrated life cycle planning in all activities including for a post-mining scenario.

How to optimize the trade-off between environmental damage and the potential benefits to local and national economies constitute the main challenge for environmental management (MMSD 2002). A key principle that needs to be observed is the “polluter-pay” principle. In this respect, and consistent with the need to internalize costs, polluters should pay for prevention, clean up, and remediation. Mine decommissioning should be planned for in a continuous manner and should include promotion of alternative forms of livelihoods for miners, relocation of mining communities and restoration of land and structures for alternative uses after mine closure.

Table 7.2
Policy responses to a minerals-driven cycle

Stage	Character	Macro effects	Policy response
Nascent	Mineral investment flow	Exchange rate pressure	Create rent tax Build capital funds Establish revenue stabilization funds Grant central bank independence
Youthful	Rapid mineral expansion	Exchange rate appreciation Dutch disease effects	Sterilize windfall Rents. Expand domestic Absorptive capacity
Early-Mature	Slowdown of output mineral	Growing tax and Foreign exchange constraints	Substitute new tax sources. Encourage domestic saving Promote sectoral diversification
Late-Mature	Decline in mineral Output	Persisting tax and Foreign exchange shortages Rising unemployment	Depreciate real exchange rates Boost skills acquisition

Source: Richard Auty³

At the community level, the challenge is to maximize the benefits and avoid or mitigate the adverse impacts of mining, including HIV/AIDS. Successful outcomes can only be achieved where, through participatory processes, the different social, environmental, and economic goals and expectations of all stakeholders, including affected communities, are negotiated in a balanced manner taking into account the local context. This requires appropriate processes for participation and dialogue and adequate capacity and access to information for all (MMSD 2002).

Another key and very difficult challenge is how to apply sustainable development principles in practice in the minerals sector. This process requires the development and refining of relevant tools and benchmarks at all stages of the mining cycle. These include legal and regulatory issues, ownership, production, consumption, trade, environmental liability, associations and contracts, impact assessment of mining operations, life-cycle thinking and analysis, and mine decommissioning. Many of these tools are already available and are being used, but there is need to align them adequately to current societal-oriented development paradigms. Monitoring and evaluation is an area that requires particular attention. There is need to develop adequate indicators of sustainable development in mining that can be measured in a cost-effective and reliable manner. To that effect, all key actors in the minerals sector have to be committed to explicit and well-understood goals and objectives that should be part of the benchmarks. In addition, to move the process of translating the goals and objectives into practical actions, there is

need for leadership and capacity building at company, government, labor, civil society and local community levels (MMSD 2002).

3. *Shifting development paradigms in the minerals sector*

Africa's leaders have long been preoccupied with enhancing the contribution of the minerals sector to the economic and social development of the continent. In the 1960's and 70's, in line with the prevailing strong national sovereignty assertion that followed the end of colonialism, the dominant thinking was that this development could be achieved only if the state had significant or, indeed, full ownership of mining enterprises. That thinking led to the nationalization of large private companies, which operated during the colonial period. In a number of countries, such as Ghana, Guinea, and Zambia, the State took over control of the industry. Hopes were raised that the nationalized sector would be the engine of growth and rapid industrialization, which would provide more significant economic benefits to the nation and improve livelihoods of the people. However, among others, the following factors contributed to the stagnation and, even, decline of the nationalized mining industry: Political interference in business decisions; lack of or inadequate respect for managerial and technical expertise; low reinvestment leading to capital consumption; inability to access finance; and depression of mineral prices.

By the late 1980's, much of Africa's mining industry was in a state of crisis and under-performance. This forced government attitudes to change. There was a fundamental paradigm shift and redefinition of the role of the state, from 100 per cent ownership and control, to deregulation and almost complete withdrawal. Many African countries embarked on a radical reform process with the aim of attracting foreign direct investment to rehabilitate their moribund minerals and mining sector. To this end, state enterprises were privatized and efforts and resources were deployed to improve the investment climate. New mineral policy, legal, regulatory and administrative frameworks more favorable to private investors were formulated and established. Emphasis was put on security of tenure and strengthening of mineral rights. Comprehensive packages of incentives for the mining investor in terms of reduced taxes and royalties were also approved. Associated with a rise in mineral prices, this resulted in a mining boom (Table 7.3), increased foreign direct investment and associated influx of mining capital, technology and skills.

Table 7.3
The impact of mining reforms in selected countries

Country	Mineral exploration expenditure (US\$M)		Value of mining production (US\$ Million)		Value of mineral exports (US\$ Million)	
	Before refo	After refo	Before refo	After refo	Before refo	After refo
Argentina	<3	150	340	1.310	70	700
Chile	15	250	2.400	7.500	2.300	6.900
Peru	10	200	2.000	3.900	1.900	3.600
Tanzania	<1	35	53	350	53	350
Ghana	<1	N.D.	125	700	125	650
Mali	<1	30	<1	242	<1	230

Source: Modified from Miguel J. Schloss (2005)

However, by the late 1990s and at the start of the 21st Century, critics started to argue that the resource boom and the ensuing efficiency gain and rise in export earnings in many mineral economies in Africa were producing questionable welfare gains and development outcomes. They considered most reforms narrow-minded and more geared towards attracting foreign investment and promoting exports and less towards fostering local development. It was further argued that the reforms were sectoral-centred and did not take into consideration macro-economic objectives that could spur broader developmental objectives. In this regard, it was observed that there were no specific provisions in many African laws and regulations to promote linkages (backward, forward and lateral) between mining and other sectors of the local economy, local beneficiation, value addition, and creation of a vibrant local private sector that could participate in the mineral boom.

Others pointed out that although the benefits of mining to certain national economies could be evident, local costs (environmental impacts and social and cultural disruptions) associated with mining, especially to local communities, were not being adequately compensated for. Criticism was also vented on the magnitude of special incentives offered to mining companies, which arguably reduce the share of rent on which African governments depend to fund their social and development programmes. There is also the argument that mining has not fulfilled its poverty reduction role and poverty reduction has not been mainstreamed into mining policies.

The fact that most of the reform process was government-centered has also been a cause of concern. It has been argued that as a reflection of asymmetrical power relations, processes for communication, consultation and decision-making would tend to favor bipolar initiatives (government and private sector) and outcomes and would not be sufficiently representative and participatory. Thus, development outcomes could be narrow-minded and only take into consideration government and mining companies' perspectives, without due regard to the views and aspirations of local communities and civil society at large.

In response to new pressures on the minerals industry for an equitable share of benefits and maximization of local impacts for sustainable development, the minerals industry has started searching for a new social contract that could result in integrated development and increased social well-being, livelihood security and reduced vulnerability of poor communities.

New contractual arrangements and legal instruments to facilitate mine equity participation by local communities and other stakeholders, as well as new revenue (derived from royalties, income tax, land tax and lease rents, etc) distribution mechanisms for sharing, at local level, portions of centrally collected rents, are being considered as responses to the challenges posed by this new development paradigm. With the same objective, tri-sector-partnerships involving government, the private sector and local communities are being tested to improve government, private sector and local community relations and the social and development outcomes of mining at local level. The same applies to public participation to secure consent for government and industry actions.

Some mining companies are departing from their previous approaches to development and community relations, variably characterized as "Strictly business", "We do the best we can", "Benevolent benefactor", "Manage and measure" and "Practical partnerships". They are adopting "less instrumentalist and more holistic" corporate social responsibility charters and development approaches (The Sensitive New Age Miners) that have a better potential to significantly uplift and empower local communities (Cheney *et al*, 2001). Also, there seems to be a broader understanding that sustainable development in the mining sector means that mineral development around the globe should be sustainable in environmental, economic and social terms, taking into consideration market dynamics, technological innovation, community involvement, health and safety, environmental impacts, and institutional setups.

Thus, it is beginning to be understood by the corporate world that successful mining companies and industries will be assessed according to a triple bottom line, namely financial success, contribution to social and economic development, and environmental stewardship. This principle guided the Global Reporting Initiative (GRI) in preparing the mining and metals sector supplement of its reporting guidelines. The GRI guidelines for mining were completed in 2004 and contain social, environmental and economic indicators that cover the following, among many others aspects: (i) revenue capture, management and distribution; (ii) R&D expenditures broken down by type, such as waste management, product stewardship, and acid rock drainage; (iii) value-added disaggregated to country level; (iv) compensation payments to local communities; (v) total materials used other than water; (vi) initiatives to use renewable energy sources and to increase energy efficiency; (vii) total amount of land owned, leased, or managed for production activity or extractive use; (viii) employee benefits beyond those legally mandated; (ix) description of equal opportunity policies or programmes; (x) description of policies, guidelines, and procedures to address the needs of indigenous people; and (xi)

description of programmes to support the continued employability of staff and manage career endings.

Compliance with the GRI guidelines⁴ represents a big challenge, particularly to junior and medium-scale mining companies who proliferate Africa. The indicators are very complex. Measuring them, and reporting accordingly, require resources that might not be accessible to the lower and middle-tier mining companies. It is not surprising therefore that Anglo American PLC, Anglo Gold Ashanti, BHP Billiton Ltd and Newmont Mining Corporation are some of the few world leading mining companies that use the GRI guidelines to prepare their corporate reports. An equally important challenge is to develop capacity at the level of governments and other regulatory agencies to monitor the implementation of companies' compliance to the GRI guidelines.

VII.3. The importance of Africa's extractive industry

Africa is richly endowed with minerals and its share of the world's minerals market is significant (Table 7.4). Africa provides 59 per cent of the world's platinum, 62 per cent of its aluminum silicate; more than 50 per cent of vanadium and vermiculite; more than 50 per cent of diamonds, palladium and chromites; and more than 20 per cent of gold, uranium, cobalt, and manganese. Half the world's reserves of chromites, diamonds, PGMs, vanadium, manganese and gold are found in Southern Africa. South Africa is the world's leading producer of chromites and ferrochromium, gold and platinum, and the world's second leading producer of ferromanganese, manganese ore, palladium, rutile, vanadium and zircon. Botswana is the leading world producer of diamonds by value and second (21.7 per cent of world production) in terms of volume, behind Australia (22.1 per cent of world total). The Guinea massif contains one of the world's most important bauxite concentrations. Africa's share of world production of bauxite in 2002 was around 11 per cent, with Guinea, the second largest world producer, accounting for 96 per cent of Africa's production. Africa produces about 30 per cent of the world phosphate ore. Morocco accounts for 60 per cent of Africa's production, contains 75 per cent of the world's known phosphate resources, and is the third largest world producer behind the US and China. The continent also produces about 17 per cent of the world's uranium with Niger producing about 49 per cent of Africa's share in 2002. Africa's heavy mineral sands reserves (mainly rutile and ilmenite) and production are also of world standard.

Of the US\$3.55 billion dollars spent in 2004 on non-ferrous mineral exploration worldwide by 1138 companies, Africa accounts for 16 per cent, only beaten by Latin America and Canada with 22 per cent and 20 per cent respectively⁵. The difference with Latin America and Canada reflects more risk perceptions rather than endowments. Africa's share is likely to increase.

The United States Geological Survey (USGS) 2005-2007 outlook for the production of bauxite, copper, gold, iron ore, lead, nickel, platinum, palladium, silver, zinc, diamond, ilmenite, phosphate rock, coal, and uranium indicates that Africa's share of the global

production will not change significantly from 2002 reported figures⁶. This position is likely to continue in the long-term as supply-side considerations such as environmental regulations, newly developed mining sites, more favorable tax and legal environments and improved transport infrastructure are shifting more mining and refining activities to developing countries (Sohn, 2005).

Mineral consumption patterns in Africa reflect the low level of industrialisation of the continent. There is little mineral beneficiation and value addition of minerals before their export and local consumption is minimal, even in the case of the most industrialized country in the continent, i.e. South Africa. In 2002, Africa was a net exporter of aluminium, copper, nickel, zinc and iron ore⁷. Africa's share of the world consumption of steel, aluminium, copper, lead, nickel, silver, tin, and zinc varies between 1 and 3 per cent. For all those metals, South Africa accounts for more than 50 per cent of Africa's consumption.

Table 7.4
Africa's share of world mineral production of selected commodities in 2002
(Million metric tons unless otherwise specified)

Commodity	World	Africa	Africa per cent
Aluminium	31.1	1.37	4.4
Bauxite	141	16	11.3
Chromite	13.5	7.22	53.33
Cobalt	52.7	24.87	47.2
Copper	13.7	.54	4.00
Gold (tons)	2,570	619	24.1
Iron ore	1,080	50	4.6
Steel	865	15.9	1.8
Lead	2.93	.14	4.9
Nickel	1.34	.06	4.9
Platinum group minerals (tons)	423	249.57	59.0
Manganese	8.39	2.65	31.6
Zinc	8,380	242	2.9
Diamonds (million carats)	140	77.33	55.24
Phosphate rock	134	39.2	29.3
Coal	3,670	226	6.2
Uranium (thousand metric tons)	45.2	7.74	16.7

Source: Adapted from the USGS (2002)

At a low level of development, the importance of the natural resources sector in relation to the total economy is greater than it is at a higher level of development (ECA, 2001). Therefore, not surprisingly, the extractive industry (including oil and gas) plays a crucial role in several African economies. In fact, Africa is more dependent on extractive industries than any other region, except the Middle East (Scott Pegg, 2003). The extractive industry constitutes Africa's largest export category. It accounted for more

than 50 per cent of Africa's export and 65 per cent of all FDI during the 1990s (Gary and Reisch, 2004). Even if oil and gas are excluded, the minerals sector still dominates the domestic economy, government revenues, and total export earnings in many African countries (Table 7.5), accounting for 50 per cent or more of the total export earnings in seven, ranging from 84.7 per cent in Guinea to 50 per cent in Sierra Leone (World Bank, 2002). In some countries (such as Botswana) the contribution of mining to GDP is as high as 34 per cent.

Table 7.5
Mining contribution to exports in selected African countries

Country	Percentage contribution of mining to exports 1990-99
Guinea	84.7
DRC	80.0
Zambia	74.8
Niger	70.6
Botswana	70.0
Namibia	55.4
Sierra Leone	50.0
Mauritania	46.0
Central African Republic	42.1
Mali	40.0
Togo	37.7
Ghana	34.0
South Africa	30.0
Morocco	20.0
Tanzania	15.8
Zimbabwe	12.2
Senegal	10.3
Angola	10.0
Gabon	8.1
Tunisia	7.5
Cameroon	7.2
Madagascar	7.1
Sudan	7.0
Burkina Faso	6.9
Egypt	5.8

Source: World Bank and International Finance Corporation (2002)

VII.4. Environment and mining

1. *The increasing scope of environmental obligations*

Environmental considerations have gained increasing importance since the UN Conference on Environment and Development (UNCED) of 1992. This has been

reflected in constitutional and statutory obligations as well as in the establishment of governmental institutions with environmental responsibility in which increasing power is vested. Equally important is the emergence of civil society organizations equipped to emit informed opinion, engage in constructive criticism, and monitor the socio-economic and environmental impacts of the minerals industry. Industry associations, including the International Council on Mining and Metals (ICMM) have heeded to UNCED calls. In some cases, international industry associations have exceeded the policy recommendations of Agenda 21, especially in the area of global environmental management, where the policy focus is now on sustainable development instead of environmental management (Box 7.1).

To guide its members, ICMM have embarked on several projects, including (i) International Chemicals Management; (ii) Peer Review and Technical Policy Development; (iii) Good Practice Guidance in Minerals and Metals Risk Assessment; (iv) Hazard Assessment Models/Tools; (v) Eco-efficiency of Minerals Products; (vi) Materials Stewardship Outreach; (vii) Assessment and Communication of Metals Recycling Activity; and (viii) Life Cycle Assessment (LCA) and Management (LCM) Techniques. ICMM, in collaboration with the United Nations Environment Programme (UNEP), has released a new publication titled **Good Practice in Emergency Preparedness and Response** that covers everything from identifying who does what in an emergency, to training and proper community liaison. The new publication's model emergency plan was developed in line with UNEP's APELL (Awareness and Preparedness for Emergencies at Local Level) process and is a companion volume to UNEP's APELL for Mining (2001). The new publication provides guidance to members on meeting a number of their commitments to ICMM's Sustainable Development Framework. Equally relevant is the Community Development Toolkit, prepared in collaboration with the World Bank.

Most large-scale mining companies are members of ICMM and they have stepped up efforts to adhere to its Sustainable Development Charter and supporting guidelines. Compliance at the level of junior mining companies (which, in general, are not members of ICMM) is at a less desirable level. Worst is the case of artisanal and small-scale mining operators who, in the majority of cases, don't have the necessary means to adhere to rigorous environmental standards and regulations.

Box 7.1
The extractive industry response to UNCED

Industry associations worldwide adopted guidelines for environmental management in the 1990s. By 2002, environmental management had become mainstreamed in industry association policy and activities. For example, the ICMM (earlier known as ICME) produced an Environmental Charter in 1993 and a Sustainable Development Charter in 2000. The Charter contains management principles in four key areas, namely environmental stewardship, product stewardship, community responsibility and general corporate responsibility. ICMM is in full conformity with Agenda 21 recommendation that encourages industry to establish worldwide corporate policies on sustainable development. With regard to reporting annually on their environmental record as well as on their use of energy and natural resources, the ICMM members are only partially in conformity with Agenda 21 recommendations. They have exceeded Agenda 21 recommendations on strengthening partnerships to implement the principles and criteria for sustainable development.

Nevertheless, there is a still divergent interest in dealing with environmental sound production and consumption patterns. The extractive industry is beginning to address issues of risk and hazards minimization. However, items relating to elimination of hazardous waste and to full cost accounting received few policy recommendations. In contrast, there is continued and increased interest in environmental reporting and in broadening stakeholder communication.

In 2000, the corporate world initiated a two-year independent process of research and consultations, the Mining, Minerals and Sustainable Development Project (MMSD), to examine the role of the minerals sector in contributing to sustainable development. The general objectives of MMSD were (i) to assess global mining and minerals use in terms of the transition to sustainable development; (ii) to identify how the services provided by the minerals system could be delivered in accordance with sustainable development in the future; (iii) to propose key elements of an action plan for improving the minerals system; and (iv) to build platforms of analysis and engagement for ongoing cooperation and networking among all stakeholders. The project resulted in a ground-breaking report (MMSD, 2002), with a set of recommendations and an agenda for change, addressed to industry, governments, civil society and other stakeholders.

On the other hand, in 2001 the World Bank launched an extensive review process, the Extractive Industries Review (EIR), of its mandate and role in mining aimed at producing a set of recommendations that would guide future involvement of the World Bank Group in the oil, gas and mining sectors. The discussion was within the context of the World Bank Group's overall mission of poverty reduction and the promotion of sustainable development. The EIR Final Report and recommendations were published in December 2003.

Source: UNCTAD (2003)

2. *The EIA*

One of the most significant tools introduced for enhancing environmental obligations and bringing the environment into decision-making on projects has been the Environmental Impact Assessment (EIA). Prior to its introduction, environmental considerations mainly led to (a) the demarcation of areas - as parks, wildlife or forest reserves - with special regimes of access and for operations therein, (b) the specification of health, safety and sanitation conditions in and around the workplace and dwelling concentrations of the work force and (c) the application of general principles of law such as those imposing obligations not to cause nuisance or injury to neighbours. Public participation has been recognized as an important part of EIA with great potential for contributing to the

sustainable management of natural resources. The most specific context of the operation of EIA is in decision-making about projects.

Legislation providing for EIA often contains general criteria indicating that any activity "likely to significantly affect the environment" must be subject to assessment. Certain categories of projects are specifically identified as requiring such assessment because of their likely impact. Mining generally falls within these categories, though some forms of exploration activity, such as those involving mapping and much of target selection, are not always included unless they are to be carried out in ecologically sensitive areas.

The obligation to directly fund and conduct an EIA is usually imposed on the prospective developer. In the case of artisanal and small-scale mining, this may not be feasible. It may, in such instances, be preferable for the State to organize and pay for the EIA and recover the costs through licence fees or by way of a deduction from the revenue generated by the activity. In South Africa, the National Steering Committee of Service Providers to Small-scale Mining (NSC), which consists of a number of government institutions and non-governmental organizations, funds environmental assessments for selected artisanal and small-scale mining projects. In some regimes, persons and firms engaged in EIAs must be approved by the government institution, which has responsibility for such assessments, even where the study is to be paid for directly by the project sponsor.

3. *Procedures for participation in EIA*

Two key benefits arise from ensuring public participation in the decision on whether or not a project with potentially significant environmental impacts should proceed. Firstly, local knowledge often provides valuable information that might be missed by outside experts. Secondly, it improves the chances of legitimacy of a project, thereby reducing the costs emanating from social tensions that can result from an externally imposed project.

But, there is a downside to an active public participation. The decision-making process could be longer and more expensive. Also, the process may be taken over by groups seeking to shape decisions in directions which may not be sufficiently representative of the general public. The possibility of delay, huge expense or unfavorable publicity, may prompt project sponsors or supporters or government officials to seek to denude the process of substantive content or limit its scope..

Where EIA obligations are imposed, it is now standard for them to include a public participation component. Several African legal frameworks have provisions for public participation. For example, although Tanzania does not have an explicit EIA legislation, its Mining (Environmental Management and Protection) Regulations, 1999 require a project sponsor to publish in Kiswahili and English in a newspaper circulating in the locality of the proposed project, an indication (a) of where a copy of its environmental

impact study may be inspected; and (b) that representations about its application for environmental approval may be made to the licensing authority within a specified period.

On the other hand, Uganda's EIA Regulations, 1998 appear to envisage a broader scope for public participation. Regulation 12 (1) requires the developer to "take all necessary measures to seek the views of the people in the communities, which may be affected by the project during the process of conducting the study...". The developer must (a) publicise the project, its anticipated effects and benefits for at least fourteen days in the mass media and in a language understood by the affected communities, and (b) hold meetings thereafter with the affected communities regarding the project at such times and in such venues as are agreed with leaders of local councils in the area

Lenders to mineral development projects are increasingly putting pressure for project sponsors to commit to and implement public participation processes. For example, the World Bank Group safeguard policies relating to the environment, involuntary resettlement, indigenous people and information disclosure have a bearing on their evaluation of loan applications and on the covenants imposed on borrowers in loan agreements. Indeed, the strengthening of a borrower's capacity to meet environmental, public participation and social obligations required by these safeguard policies is now frequently a significant aspect of lending decisions. Recent reviews of policy, such as the World Bank's Extractive Industries Review and the Review of IFC's Safeguard Policies by its Compliance Advisor Ombudsman (CAO), are bound to lead to a reinforcement of these policies.

The IFC's existing policies require the submission of a Public Consultation and Disclosure Plan (PCDP) for a project with potentially significant environmental and social impact. Such a plan must include an inventory of key stakeholders identified, methods to be used, a schedule of consultation activities and how they fit into the overall project schedule, a budget, an indication of staff and management resources to be devoted to its implementation, a review of previous consultation processes as well as criteria by which its effectiveness is to be assessed.

A number of major commercial banks have begun an initiative by which they commit to apply IFC safeguard policies when they are financing projects with potentially significant environmental impacts whose capital cost is US\$50 million or more. As at 31 May 2004, twenty-five financial institutions (including ABN Amro Bank, Bank of America, Barclays Plc, Citigroup Inc, Credit Suisse Dresdner, the European Investment Bank, HSBC Group, ING Group and Standard Chartered) have adopted what have become known as the Equator Principles, described as "a framework for financial institutions to manage environmental and social issues on project financing".

In 1990 and 1991, respectively, the African Development Bank (AfDB) issued its Environmental Policy Paper and Environmental Assessment Guidelines in an effort to mainstream environmental issues in the bank's lending programmes. In 2001, the guidelines were replaced with Environmental and Social Assessment Procedures (ESAP)

to reflect a more integrated approach in addressing crosscutting themes. The Development Bank of Southern Africa (DBSA) has also issued environmental guidelines for project financing.

It is one thing to express public participation rights in formal instruments and quite another to implement them effectively. There are many fundamental challenges involved in their practical implementation. Among these are the redressing of the weight of existing power relations, especially in relation to marginalized and vulnerable groups; addressing deep-seated authoritarian elements of local cultures and reducing the resource constraints (human and material) of public institutions as well as of those affected by or actively concerned about projects with environmental implications.

Valuable work has been done to assist in planning and implementing effective public participation processes. The IFC's manual, "Doing Better Business Through Effective Public Consultation and Disclosure" is an excellent example. It contains, *inter alia*, guidance notes for identifying consultation possibilities at different stages of a project, a checklist of objectives and actions for improving consultation (Annex D: "Review Checklist for Improved Public Consultation") and another checklist of "Techniques for Public Consultation and Information Disclosure" (Annex E). These provide a range of tools out of which selection can be made for application to specific situations.

4. *Participation in monitoring and enforcement*

The most effective obligations are those, which are legally enforceable. These are imposed by constitutions, legislation or other laws or by agreements, whether in the form of international treaties or contracts under domestic law. Environmental management plans, for example, are usually expressed in the form of undertakings assumed by applicants for permits in agreements with government institutions. The strongest method of enforcement, from the point of view of the legal system, is by way of orders made by a court or other judicial body.

Many legal systems, particularly those influenced by English law, used to have a rule to the effect that a person did not have a *locus standi* to institute an action unless he or she could show a right infringed or an interest prejudiced over and above the general public interest in the matter. The rules of standing have been progressively broadened so as to permit litigation to be instituted to enforce obligations owed to all or many members of the general public. The activism of civil society organizations in exposing violations or alleged violations of national or international norms is a significant development. In this respect, the establishment by Oxfam Australia of a Mining Ombudsman (Box 7.2) is interesting.

Box 7.2

The Role of the Mining Ombudsman in Australia

Over the last few decades, the Australian mining industry has increased its activity in economically developing countries in the Asia-Pacific region, Africa and Latin America. Australian mining operations are therefore increasingly impacting on economically poor and vulnerable communities.

Many communities have complained of human rights abuses and environmental degradation perpetrated by or on behalf of Australian mining companies. Often these communities have no institution that they can access to seek fair and equitable redress and mining companies have been able to disregard their concerns. Such situations have sometimes led to costly legal actions and violent confrontations.

In February 2000, Oxfam Australia set up a Mining Industry Ombudsman to:

- Assist men and women from local and indigenous communities affected by mining whose basic human rights are being threatened by the operations of Australian-based mining companies.
- Assist men and women from local and indigenous communities that are or might be affected by a mining operation to understand their rights under international law.
- Help ensure that the Australian mining industry operates in such a way that the basic rights of men and women from communities affected by mining are better protected.
- Demonstrate the need for an official complaints mechanism within Australia. (A detailed discussion of the need for a complaints mechanism and a framework for it is available in the Mining Ombudsman Annual Report 2003.)
- Demonstrate the need for developing enforceable, transparent and binding extra-territorial controls, which would require Australian mining companies to adhere to the universal human rights standards, no matter where these companies operate.

The Mining Ombudsman receives complaints through Oxfam Australia networks in Asia, the Pacific, Africa and Latin America. The Mining Ombudsman checks all claims through site investigations. Any action taken by the Mining Ombudsman is done in consultation with the community. It is not the role of the Mining Ombudsman to judge individual mining projects, but to ensure companies deal with communities in a fair and equitable manner, which respects the fundamental rights of men and women in affected communities.

Source: Extracted from <http://www.oxfam.org.au/campaigns/mining/ombudsman/index.html>, accessed September 2005.

VII.5. Overview of mineral development benefit streams

I. Forms of benefit

The benefits of mineral development to a host country's economy include fiscal revenues; foreign exchange earnings; land and other property rent; property rates; direct and secondary employment; opportunity to provide goods and services; and access to mine infrastructure (water, light, etc) and other physical infrastructure by local communities; regional development; and transfer and development of technology, skills and knowledge. But, there are also significant costs to local communities and the host nation associated with mining. These are mostly in the form of adverse environmental and social impacts on mining communities including relocation, pollution of water bodies and the atmosphere, pressures on local infrastructure and services due to very rapid increase in population, social tensions caused by large influx of migrant labour, HIV/AIDS and post-mining syndrome manifested as ghost towns, loss of employment, etc.

Table 7.6
Fiscal regimes of SADC States

Fiscal Instrument	Range	SADC average
Tax stability agreements	Yes/No	No
Corporate tax rate (%) (national)	15-60	33
Branch office tax (%)	20-60	36
Income tax credits for foreigners	Yes/No	No
Corporate tax on oil and gas (%)	42-58	Not specified
Minimum corporate tax (%)	0-15	4
Additional profits tax (%)	0-25	5
Tax holidays (years)	0-10	3
Tax treaties	Yes/No	Yes
Deduction of exploration/development costs (years)	1-5	2
Ring fencing	Yes-No	Yes
Losses carried forward (years)	2-Indefinitely	18
Losses carried backward (years)	No	No
Maximum cost deduction	Unlimited	Unlimited
Depreciation (years)	1-25 (LOM)	9
Capital gains tax	0-40	14
Tax on assets	Yes/No	No
Value added/sales tax	0-20	14
Fuel tax	Yes	Yes
Repatriation/dividend/withholding	0-25	14
Import duties	0-15	3
Export duties	0-10	1
Payroll tax	Yes	Yes
Land tax	Yes/No	Yes
Provincial (State) taxes	No	No
Municipal taxes	Property/Services	Services

Source: ECA/SRO-SA (2005)

Direct contribution from mining to central government may come mostly from corporate and dividend withholding taxes, mineral royalties, employee payroll taxes, customs duties on imports, value added tax (VAT) on local purchases, and dividend payments from government shareholding. The magnitude of each of these components varies from country to country (See Table 7.6 for Southern Africa).

The totality of the direct and indirect charges that may be levied on a mining project provides, on the one hand, a measure to evaluate a mine's contribution to a country's economy. On the other hand, it has a major influence on the decision to invest in a particular country. Local community imposts or charges on mining companies (such as property rates, land rent, etc) should be taken into account in designing the central government component of mining fiscal regimes (corporate tax rates, royalties etc). The decision to invest in a mining project depends very much, among other things, on the investor's assessment that the total take by the host country, including all community imposts, provides adequate return on their investments. But, since the host country's take could increase significantly with changes in laws after the project has commenced operations, it is now very common for investors to insist on agreements with the host government, which ensure that the division of benefits is set and remains predictable at least for much of the life of a project. Constancy of policy and fiscal regimes is important in projects with long gestation periods, especially mining.

2. *Local community allocation from national revenue*

Whilst the attention of national policy makers has traditionally focused on the fairness of the allocation of benefits between mining investors and the host country, increasing attention is now being paid to the benefits derived by the communities where mining operations take place. To ensure security and a co-operative atmosphere for mining projects, the local mining communities must receive what they consider to be a fair share of the benefits accruing from mining.

The benefits to the local community may come in various forms. There are benefits in the form of revenues, which accrue to the community merely because of its location, such as property rates and land rents. There are benefits which may come as the community's share of central government revenues from mining. However, there are also non-income benefits such as employment for local residents; assistance to community health and educational institutions; access to the use of mine infrastructure by the general public, etc.

A major concern for mineral policy makers in developing countries relates to arrangements for allocating portions of central government mineral revenues to local mining communities, and the management of monies so allocated. The scheme must first of all identify clearly, by legislation or otherwise, the communities to benefit. It must then specify (a) the components of government revenues from which allocation is to be made – whether from royalties, corporate taxes, dividends etc, or a combination of any of

these; (b) the proportion to allocate; and (c) the groups or institutions within the community to benefit, and their respective shares.

The most important issue to address concerning the revenues that go back to the communities (as indeed for revenues retained by central government) is how to utilize and manage the monies. Accounting for revenues paid to governments from mining projects has become an important issue of governance. In the forefront of keeping this matter on the international agenda are the "Publish What You Pay Campaign" launched by a group of NGOs and the "Extractive Industries Transparency Initiative (EITI)" sponsored by the British government and now supported by a number of governments, multilateral agencies, companies and civil society groups. It should be noted that African governments are timidly embracing the EITI principles and related campaigns.

With regard to local communities that depend substantially on mining, the key issue is to ensure that the local economy does not, in time, grind to a halt once mining stops. This requires proper planning of the use and management of the community's share of mining revenues. A major challenge is to embark on economic diversification in order to avoid the creation of mining communities, which degenerate into ghost towns after exhaustion, is a major challenge. The most optimum use of the revenues is to invest them in ventures that yield a long-term income stream, thus ensuring revenue flows to the community long after mining has ceased. Investing the monies (or a greater part of them) in low risk financial instruments is one option, but it is more preferable to invest in ventures that have linkages with the local economy than in purely financial schemes. Investment in enterprises or schemes that generate of high-level skills for a large number of people in the community is particularly useful.

It must be noted however that for such communities, which are usually very poor, the decision to invest in these optimal ways is not always easy, since pressure for the use of all the revenues on immediate or short-term needs tends to be enormous.

In Ghana, mining revenues, which go to the District Assemblies, like all their other revenues, are spent and managed in accordance with regulations or practice established by each Assembly. However, central government authorities have expressed concern about how mining revenues paid to the traditional authorities are utilized and managed. The sums are normally paid to chiefs as representatives of the whole community, and under a well-functioning customary law system, they would be utilized equitably and managed as agreed among sub-chiefs, elders and advisers on behalf of the constituencies they represent. But the record shows that in a lot of cases things do not work out quite this way. There are many cases where there has been no consensus on the use of the sums, or public disclosure of amounts paid. These concerns can be addressed by specifying the category of uses for the monies (preferably for community capital projects), and publicizing amounts paid widely. The mining companies who often are perceived by the public as not doing enough for the local communities are exercising pressure on the Government to establish clear guidelines for the traditional authorities on how to spend the monies they receive.

The traditional authorities on their part have a lot of complaints about the magnitude of amounts allocated to them and the long time it takes for the monies to reach them after payment by the companies. There are legitimate questions regarding the quantum of revenues and the method of payments. The recipients have argued for direct payment from the central government collector (i.e. the Internal Revenue Service), or even more directly, from the companies, but there is no agreement on this. These complaints by the traditional leaders regarding revenues allocated to their communities in addition to complaints about inadequate job opportunities and skills training for their youth, are what most commonly generate tensions between mining companies and local communities.

3. *New forms of managing mining revenue*

Various schemes for managing host country or community mineral revenues exist in a number of countries. Examples of such schemes are the Alaska Permanent Fund (based on oil revenues); trust funds established in the island of Nauru which are funded from phosphate revenues; and in Chad, for the management of its petroleum revenue.

The Permanent Fund in Alaska, which was established by constitutional amendment in 1976, is funded from a portion (specified by law to be no less than 25 per cent) of all mineral taxes and imposts. The monies in the Fund are invested by an independent Trust and part of the earnings is paid annually as dividends to the citizens of the State. Dividend payments have been made every year since payments began in 1982, and in 2000, a total of just over US\$1.14 billion was paid out to about 582,000 citizens, i.e. about US\$1960 per person. The principal amount of the fund itself is left untouched, thus ensuring that future generations are provided with capital for investments of their choice. The scheme is generally thought to have worked very well up to now.

The second example relates to the island of Nauru phosphate revenues, where several trust funds were established with the Government's share of revenues, with the aim of generating a perpetual stream of income. It appears that the scheme has not been successful (principal amounts have been exhausted) due to a series of bad investment decisions. This example raises the question of whether it would be appropriate in cases like this to impose restrictions by law on the type of investments trustees are allowed to make, as in the Alaskan Permanent Fund.

The scheme for the allocation, management and monitoring of revenues to Chad from the Chad – Cameroon Pipeline Project also incorporates the idea of setting aside portions of government revenues “for the benefit of future generations”. But, there are two other aspects of the scheme which could provide a model for other African mineral projects – (a) allocating a percentage of revenues to fund defined priority sectors of the national economy; and (b) having an oversight committee (with membership from the public service and civil society) to manage and monitor revenues paid into the fund. The project only commenced operations in 2004 and it would be interesting to see how the scheme works out in practice.

Botswana has built a reputation for being one of the most successful African countries in managing its mineral-derived revenue (Box 7.3). The factors underpinning this success include the adoption of a sound macro-economic framework and prudent monetary and fiscal policies, as well as adequate capacity and discipline on the part of the government to implement the policies and manage the revenues (Solomon, 2000).

Box 7.3 Mineral rent use in Botswana

Prior to independence in 1966, Botswana was one of the poorest countries in the world with a cattle-farming based economy. Agriculture accounted for 39 per cent of GDP compared to the current 5 per cent and the manufacturing sector represented 8 per cent of the GDP in 1966 but in the 1990s declined to 6 per cent. Over the same period, the minerals industry (mainly diamonds) contribution to GDP grew from close to zero to around 33 per cent. The share of mineral revenues to State revenues has also risen from zero to 45 per cent in 1998. During the period 1990-1998 minerals accounted for an average of 70 per cent of total exports. The mining industry as a whole employs approximately 12,000 people; the majority of them at Debswana, a diamond mining joint venture company between the government and Debswana.

The Botswana Government has been very successful in extracting mineral rents from equity participation, taxes and royalties. The country has seen three decades of minerals-driven real per capita income growth of more than 7 per cent per annum on average. In 1972, when the first diamond mine was being constructed, the Botswana Government established the Funds for Revenue Stabilization and Public Debt Service, an effort to manage the projected mineral revenue flows. It accumulated sizeable financial reserves which increased almost tenfold between 1984 and 1992 in nominal dollar terms to reach the equivalent of US\$ 3000.00 per capita. By 1993, the accumulated financial reserves were US\$ 4.15 billion, equivalent to 125 per cent of the country's GDP. Around two fifths of the rents were sterilized in offshore investments, mainly bonds, and by mid-1990s, the interest earned had begun to make significant annual contributions to government revenues.

The Government also increased its claims on the domestic banking system in order to dampen the domestic money supply, keeping inflation at an average rate of 1.5 per cent in 1975-1994. The domestic absorption of more than three fifths of the rents underpinned an expansion of public expenditure at a rate which doubled every six years in real terms over the period 1976-1993. Public consumption almost doubled to 30 per cent of GDP when comparing the early 1990s with the early 1970s.

Unlike other sub-Saharan African countries, the expansion of state enterprises was modest. Public investment was principally directed towards correcting for the country's infrastructure backlog and improving education and health provision. Much of the mineral wealth was converted from natural capital into other forms of capital, both physical and human. Current public expenditure also focused on social spending. It rose from 36 per cent in 1976 to 40 per cent in 1992. By the 1990s, rates of infant mortality and literacy compared favorably with other countries at the same level of per capita income.

However, the Government's efforts to use mineral revenues to diversify away from minerals-driven growth have had mixed results, as evidenced by the outcomes of the Selebi-Phikwe Regional Development Project and the Hyundai car manufacturing initiative. Whilst the first project succeeded in establishing an impressive industrial park at the copper mine township of Selebi-Phikwe to create sustainable permanent jobs, the Hyundai initiative was a disaster.

Source: Excerpted from Aury (<http://www.natural-resources.org/minerals/Data/boxfunc/aury1.asp> accessed on 5 September 2005).

4. *Infrastructure provision: A form of spreading benefits*

There may be special arrangements and understandings between mining companies and local communities that can significantly promote development of the communities. These include agreements for general public access to certain mine facilities and infrastructure (power lines, roads etc); assistance in the construction and operation of educational and health facilities; and agreement on preferential employment of local labor and contracting of services from indigenous local companies. Mining companies in the Lake Victoria Goldfields in Tanzania have entered into these types of arrangements with local authorities.

A mining company may also agree to provide some specified infrastructure (road, water plant etc.) for the community, in exchange for tax credits. To be effective, this requires the full approval of the central government. This arrangement – Infrastructure Tax Credit Scheme – exists in Papua New Guinea where up to three quarters of one per cent (i.e. 0.75 per cent) of the value of gross sales of minerals won, may be spent on approved mining community infrastructure projects. The projects are selected and approved by a process that involves the company, local and provincial governments, and the central government.

5. *Tri-sector partnerships can accelerate delivery*

Natural resource companies are in the forefront of attempts to promote what have become known as "Tri-Sector Partnerships". The partners are (a) the company engaged in developing or planning to develop a resource, (b) civil society organizations such as community groups, NGOs, churches, etc. and (c) local and central government institutions. The object is to collaborate in community development projects by identifying and contributing resources each partner is able to bring. Companies are interested in such partnerships as a way of gaining acceptability for their projects by providing some resources without raising unsustainable community expectations or encouraging dependency on it. The partnership seeks to recognize that civil society groups are often more familiar with the community and its needs than others, and can contribute or mobilize participation in a project, based on their local knowledge. The resources of local and central government, whether in the form of money or helping to co-ordinate or expedite a project, can contribute effectively to its realization. Examples of such partnerships are described on the website of Business Partners for Development Natural Resources Cluster (www.bpd-naturalresources.org).

6. *Equity participation: A difficult road ahead*

Ownership of equity interest in mining projects by the state, local mining community or individual citizens of the host nation is one vehicle for participating in the benefits of mining. This could be by way of free equity interest in mineral operations and shareholding.

In cases where the Government is to pay for its shareholding and where the operating company is not publicly traded, determining what a fair price is could lead to disagreements. Even if a valuation method is agreed upon, there could be disputes on the parameters to be used in the relevant formulae. For example, if a discounted cash flow method is chosen, agreement might not be reached on the discount rate and the mineral prices to apply. The matter may then have to be settled by arbitration, expert determination or other dispute resolution mechanisms.

It is often argued that paying for shares in mining projects subjects Government's monies to unnecessary risk. Many commentators have also observed that host Government shareholding in mining companies, even if free, does not offer significant benefit where dividends are not regularly declared. A slightly higher royalty rate, for example, in substitution for free shareholding would, in such a case, be far better specifically if royalty liabilities are computed on the basis of reasonably transparent criteria less easily subject to manipulation. However, in general, mining companies tend to resist high royalty rates because such rates make projects uncompetitive.

Community equity participation in mineral projects is not very common in the developing world. Papua New Guinea, however, has a number of such projects. Among them are gold mining projects in the district of Porgera where the community (comprising local landowners) has a 2.5 per cent shareholding in the operating company, which is majority-owned by Placer Dome; and on the Island of Lihir where the community holds 6.7 per cent of the shares in an operating company owned by Rio Tinto, Newmont and others. The significant points to note here are that (a) shares allocated to the communities were ceded to them by the central government out of its shareholding option, (b) the shares were not free, and (c) payment for them was provided by a loan from a central Government agency to be repaid from dividends. Actually, the communities hold their shares through a state mineral agency, the Mineral Resources Development Corporation (MRDC). The structure of the communities' shareholding has gone through many changes since 1997, but small holdings still remain.

Those who have studied closely these two cases of equity participation have concluded that investments made by the communities have yielded only modest returns compared to royalty payments and wages, which have been far greater (Banks, 2003). To the extent that shareholding leads the community's representatives to access, participate in and develop the culture of business decision-making, it may serve a purpose beyond immediate financial gain. On the other hand, the danger exists that such shareholding can degenerate into mere tokenism, which contributes little significant value to the community. In any case, whatever concessions or payments are made for such equity participation need to be evaluated in terms other than sentimental.

The community of Bafokeng – the Royal Bafokeng Nation (RBN) – in the North West province of South Africa, with a population of some 300,000, provides an example of a community which appears to have done exceedingly well with its participation in mining operations conducted on its land. RBN owns land with very good prospects for platinum

group metals, and collects royalties from two large platinum mining companies owned by Impala Platinum and Anglo Platinum. Through its corporate vehicle, Royal Bafokeng Resources (RBR), the community also has joint-venture mining projects with these companies, and derives substantial revenues from them.

Wholly state-owned mining projects are becoming rather rare in Africa and indeed in most of the developing world. The prevailing view is that most of what the State wishes to achieve by significant ownership in mining projects can be achieved through the regulatory process or policy instruments. This view is based on the assumption that the state has no difficulty attracting private investors, but is unable to raise the required finances and does not have people with the requisite management and technical skills. If, on the other hand a state possesses the required resources, a profitable and purely commercial operation can be achieved.

Codelco, the Chilean state-mining copper company remained state-owned even during the Pinochet regime when most state-owned enterprises were privatized. The company not only operated profitably, but also was able to embark on major expansion projects involving huge investments during the 1980's. Codelco's success has been attributed to the near-commercial autonomy that it enjoyed for many years, unlike most state-owned enterprises, which do experience high levels of government interference often resulting in unprofitable commercial decisions being taken (Auty, 1993). Debswana, the diamond mining company equally owned by De Beers and the Botswana government appears to be a successful case of substantial state shareholding in a mining enterprise (Solomon, 2000).

7. *The black economic empowerment: A model for Africa?*

The recently introduced Black Economic Empowerment (BEE) legislation in the Republic of South Africa deserves a special mention. In October 2002, the Government of South Africa announced its plans to transfer 26 per cent of the country's existing mining assets to black-owned interests over a 10-year period, with an interim 15 per cent achievement within 5 years. The private sector has also undertaken to assist in funding the transfers to black companies. In addition to ownership, the BEE charter for mining also spells out a number of other areas where benefits from mining would be made more available to the black population within specified periods (Box 7.4).

Performance of existing mining companies with regard to the undertakings made by them under the charter is to be measured by means of a "scorecard" (Box 7.4), which awards different levels of credit for various actions. The scorecard also provides that where black participation has been in excess of a set target in one area, such excess may be used to offset shortfalls in other areas of operations. Some of the most important objectives of the BEE, especially the eventual significant black ownership in companies, would, in practice, have been very difficult to achieve if black entrepreneurs were not provided financial assistance to fund transactions. The Industrial Development Corporation (IDC), the New African Mining Fund (NAMF), both of South Africa, and the International

Finance Corporation (IFC) of the World Bank have provided such assistance and indicated a willingness to continue to do so. Another key objective yet to be fully achieved is the expansion of the number of beneficiaries, which critics of the BEE have indicated represent only a very small minority.

Box 7.4
South Africa's Scorecard

South Africa's Scorecard launched in February 2003 complements the October 2002 Mining Charter on Black Economic Empowerment. It provides guidelines for mining companies operating in South Africa on how to measure their progress in meeting the requirements of the mining charter. The essence of the document is a one-page scoring sheet where companies can tick off their compliance against the seven pillars of the charter, which have been laid out under nine headings, namely:

1. **Human Resources Development:** Has the company offered every employee the opportunity to become functionally literate and numerate by 2005? Has the company developed systems through which empowerment groups can be mentored?
2. **Employment Equity:** Has the company established a plan to achieve a target for historically disadvantaged South African (HDSA) participation in management of 40 per cent within five years? Has the company established a plan to achieve the target for women participation in mining of 10 per cent within five years?
3. **Migrant Labour:** Has the company subscribed to government and industry agreements to ensure non-discrimination against foreign migrant labour?
4. **Mine Community and Rural Development:** Has the company co-operated on its own and with the government in formulating development plans for communities where mining takes place and for major labour sending areas? Companies will have to provide a plan and show financial expenditure.
5. **Housing and Living Conditions:** Has the mine, in consultation with stakeholders, established measures for improving the standard of housing, including the upgrading of hostels, conversion of hostels to family units and promoted home ownership options for mine employees? Companies will need to show a progress plan? Similarly a plan needs to be shown for improving the nutrition of mining employees.
6. **Procurement:** Has the mining company given HDSAs preferred supplier status? Has the company shown a commitment to progression of procurement from HDSA companies over a 1-5 year time frame for capital goods, consumables and services and to what extent has the commitment been implemented?
7. **Ownership and Joint Ventures:** Has the company achieved HDSA participation in terms of ownership for equity or attributable units of production of 15 per cent in HDSA hands within five years and 26 per cent within 10 years?
8. **Beneficiation:** Has the company identified its current level of beneficiation? The key issue here is to capture the actual beneficiation activities of a company and to convert that to the same unit of measurement of ownership, such as attributable units of production. The attributable ounces that are beneficiated above the base state may be offset against HDSA ownership targets. Ongoing discussions on the base state for each mineral (of which 59 are mined in South Africa) are ongoing.
9. **Reporting:** Has the company reported on an annual basis its progress towards achieving its commitments in its annual report?

Source: http://www.miniweb.net/events/conferences/2003/mining_indaba/6700.htm accessed on 20 October 2005.

The extent to which the South African BEE for mining can be emulated in other parts of Africa is questionable. South Africa is in a very privileged position. It is blessed with world-class mineral deposits and has a mature minerals industry. This gives it a strong bargaining power to impose tough conditions on mineral investors. African countries that are less endowed and are eager to attract investors might not be able to impose the same

conditions. Furthermore, there are other mining investment destinations outside Africa, especially in Latin America, which are perceived to be more competitive.

8. *Women in mining: Much still to be done*

Of all the disfranchised groups in mining, the case of women is more acute, due to gender imbalances that impact on them more than on men. The key root causes of these imbalances can be discerned in related legislation, policies and programmes that define decision making and power relations, conditions of work, access to assets, goods and services such as education, training, information, and control of resources such as land and capital (e.g. in certain jurisdictions women need the consent of their husbands to apply for loans). Other impediments are of socio-cultural nature, for example stereotypes, prejudice, taboos, beliefs, superstition and traditions that entrench gender roles (Hinton *et al*, 2003).

Traditionally, not many women have found employment in the minerals sector in Africa, particularly in the formal sector (Only 5 per cent in the SADC region). This might have been compounded by the fact that, law, until recently, forbade women to go underground. More women are employed in the artisanal and small-scale sub-sector, with figures reaching almost 50 per cent in certain countries (ECA/SRO-SA, 2005). Feminization of poverty has led more women to search for work opportunities in ASM (Hinton *et al*, 2003).

When employed in mining, women have lower status, little decision-making power, earn less and are less job-secure. Women working in mines are most commonly involved in transporting ore and water, manual crushing and grinding, washing or work perceived to be 'delicate' such as panning, amalgamation and amalgam decomposition. Because this work does not involve digging, they are not always identified as "miners". There are very few women who are owners of ASM mines and generally because of tradition male miners are very reluctant to obey women (Hinton *et al*, 2003).

According to Hinton *et al* (2003), in the extraction of high unit value products, such as gold, men more commonly maintain control of the mine site and often its revenues. Women are more likely to participate in greater numbers and play a more significant role in control of the land, and decisions surrounding its use for low unit value commodities, such as industrial minerals (e.g. while women constitute only 15 per cent of the "miners" in gold ASM operations in Ghana, they are dominant in salt mining in many West African countries). Women's direct participation in artisanal mining generally is inversely proportional to the scale of ASM operations. Thus, they are most prevalent in small family operations where mining takes place to supplement other income (e.g. from subsistence agriculture); and with increasing mechanization, the participation of women tends to decrease.

Notwithstanding, the small number of women miners, many more women's lives have been shaped by the mining industry, with women accompanying their husbands or fathers

to mining areas and other women remaining in their home villages as 'de facto' female-headed households (In Southern Africa, this is a very typical phenomenon in communities that send migrant miners to South Africa). Generally, women in mining communities have suffered because they are not identified as stand-alone stakeholders, but subsumed in larger communities and ending up not being heard. They are often faced with limited income opportunities in and outside the mining sector, thereby reducing opportunities to escape out of poverty. High poverty levels have been found in mining communities regularly masked by nice houses, electricity and water facilities. Privatization and restructuring of mining companies have compounded this problem. When women's income earning opportunities are limited, mine closure and retrenchment create enormous problems for families (Musvoto, 2001).

Women in ASM communities play a critical role in ensuring community stability, cohesiveness, moral and general well being. However, in contrast, they are also victims of sexual abuse, violence and prostitution. A clear reflection of this is the high incidence of HIV/AIDS and other sexually transmitted diseases in ASM communities. Despite the health risks involved at many ASM sites, women work with young babies tied to their backs and toddlers at their side. In cases where alternative childcare or schooling is unavailable or additional supplementation of income is needed, older children accompany women in ASM activities, and often participate by hauling ore and water, breaking rock, and panning, among other things (Hinton *et al*, 2003).

Women empowerment in ASM communities in Africa is still at an early stage. Notwithstanding and encouragingly, some women have organised themselves in associations at national, sub-regional and continental level. Worth mentioning are the African Women in Mining Network, Association of Women in Mining in SADC and the SADC Women in Mining Trust. The road to change requires better understanding at government and other levels of the links between gender equality in mining and human development; commitment to gender mainstreaming in ASM interventions; and appropriate recognition of gender issues in policy frameworks, especially on issues related to entitlements and rights (ECA/SRO-SA, 2005).

Key opportunities for improvement include, but are far from limited to: more research on gender and mining to better inform policies and programmes of assistance to the sector; formal recognition of the gender-differentiated impacts and benefits of the sector; authentic gender mainstreaming in technical assistance and ASM community development programmes; gender sensitivity training of mining authorities; affirmative action for women to be trained in mining and to take up jobs at Ministries of Mines, School of mines and mining companies; undertaking gender audits of ASM projects; undertaking gender audits of community benefits of mining activities and local community allocation from national revenue; strengthening women in mining networks; implementing programmes that provide financing and training for women; addressing the cultural barriers and other stigma through more education and sensitization.

VII.6. Integrating mining into national economies

1. *Localization: A way forward*

As earlier mentioned, the low retention of the benefits from mineral development in developing countries has led a number of commentators to question the wisdom of promoting it in these countries given its considerable environmental and social costs. Promotion of linkages between the mineral sector and other sectors of the economy of host countries maximizes value accruing to the local economy. It increases the proportion of mining revenues that is retained in the country, and enhances income and employment multiplier effects. This may be achieved in a number of ways including offering incentives to miners to embark on local value-addition to mine products; giving incentives to both local and foreign investors to invest in local businesses that produce goods and services required by the minerals industry; and encouraging mining companies to train employees in alternative business skills.

Training of local employees who will eventually replace highly skilled foreign labour (“localization”) is an important element in the effort to improve the skills base while retaining a higher proportion of mining revenues. In order to get mining companies to take localization seriously, regulatory authorities in host countries sign localization agreements with these companies. Most mineral regimes in Africa contain this provision. Immigration authorities are empowered to monitor the agreements, and the granting of work permits to foreign employees of mining companies may be affected by the performance of the agreements. The exercise of such powers in a coherent, objective and transparent manner can contribute to the localization process, but capacity gaps make enforcement of these provisions a key challenge.

2. *Funding: A stumbling block*

The most important global sources for funding mining ventures are capital markets in Canada, Australia, USA, England and the Johannesburg Stock Exchange in South Africa. As a result, most major mines in Africa are currently owned by foreign multinationals such as Anglo American, BHP Billiton, Rio Tinto, Barrick Gold, Goldfields, Randgold, DeBeers, Placer Dome and Harmony Gold (Table 7). The local private sector in most African countries is not yet strong to undertake, on its own, the establishment of mining ventures. On the other hand, accessing global funds by African entrepreneurs is a daunting task. Their funding problems are compounded because, domestically, they are not able to raise the high amounts of initial capital required to finance these ventures or even enter into joint-venture arrangements with foreign investors (ECA/RCID/82, 1998).

For most African countries, providing assistance to indigenous business people through direct grants or soft loans would present an enormous challenge given the pressure on government funds to address many more immediate needs. However, the supply of significant amounts of goods and services to mining companies by indigenous businesses is so central in the effort to more fully integrate mining into the local economy that a

policy to institute such assistance is worth considering. To prevent abuse or misuse during implementation of any such programme of assistance, close monitoring by the appropriate state institutions (government auditors etc.) and transparency are vital. Government could also assist by offering incentives such as tax and duty exemptions, which would raise the viability of the ventures and allow for easier access to financing.

Where the government receives economic aid for the mining sector from bilateral or multilateral sources, part of the funds may be used for such assistance. An example is the programme of assistance organized under the Mineral Development Fund of Namibia. Established in 1996 by an Act of Parliament, the Fund is financed with interests and repayments of loans by persons to whom the Government has lent soft loans granted by the European Union to the Government of Namibia for the mining sector.

The Fund finances a wide variety of mining-related projects – from small and medium-scale mining projects to gemstone cutting and polishing. Thus the Fund makes it possible for Namibian entrepreneurs to participate more fully in the minerals sector of the economy. Financing more down-stream projects such as further processing of mineral products also ensures that greater profits from mining remain in Namibia.

Multilateral arrangements such as those of the African Project Development Facility (APDF) of the World Bank Group's Small and Medium Enterprise (SME) Department and the European Union's Centre for the Development of Enterprise (CDE) offer funding for various forms of technical support which could benefit the development of local industry. The private window of the AfDB could also play a vital role in facilitating SME development in Africa. The challenge of these assistance programmes is sustainability. The revolving fund component needs to be enforced so that the funds can service a larger section of the population.

3. *Foreign exchange control: An interesting tool*

Another policy measure that countries may use to promote greater integration of the minerals sector into its general economy is foreign exchange control. Foreign mining companies often consider such a policy a disincentive to investment. They would like to retain all their export revenues in offshore accounts, and repatriate to the local economy what they consider necessary to fund their local costs. However, rather than grant complete exemption from exchange control, authorities in the host country could institute a policy requiring the companies to justify the proportion of their gross revenues which they would need to retain offshore to pay for their foreign costs and obligations. These would normally include costs of replacing equipment; consumables and spares; expatriate labour; interest and loan repayments; dividends to foreign shareholders; and costs of certain services. Such justification could then be examined carefully and approval given to enable the procurement of only those items which cannot be obtained locally. This would encourage the company to procure greater amounts of local goods and services for its operations, thus reducing the isolation of mining operations from the economy of the country. The approval may be reviewed periodically. The policy has also the desirable

effect of giving the country more access to foreign currency from mining to service other domestic requirements. Where exemption from payment of import duties is generally granted to mining companies, exempting goods which can be obtained locally from that concession could achieve the same effect.

4. *Fostering minerals cluster development: A strategic approach with great potential*

Mineral resources-driven diversification strategies or resource-based industrialization (RBI) are not a new mantra. The vision that mineral resources could be used to catapult Africa to modernization has been articulated in many African plans and development strategies at national and regional levels (e.g. Lagos Plan of Action, SADC Minerals Sector Programme, Mining Chapter of NEPAD, and, most recently, the Africa Mining Partnership).

**Table 7.7
Ownership of selected mines in Africa
(Excluding South Africa)**

Mine	Location	Majority Owner / Donor/ of company
Bulyanhulu	Tanzania	Barrick Gold/Canada
Tulawaka	Tanzania	Barrick Gold/Canada
North Mara	Tanzania	Placer Dome/Canada
Geita	Tanzania	AngloGoldAshanti Ltd/RSA,UK
Yatela	Mali	AngloGoldAshanti Ltd/RSA,UK
Morila	Mali	AngloGoldAshanti Ltd/RSA,UK
Sadiola Hill	Mali	AngloGoldAshanti Ltd/RSA,UK
Obuasi	Ghana	AngloGoldAshanti Ltd/RSA,UK
Iduapriem	Ghana	AngloGoldAshanti Ltd/RSA,UK
Teberebie	Ghana	AngloGoldAshanti Ltd/RSA,UK
Bibiani	Ghana	AngloGoldAshanti Ltd/RSA,UK
Yamfo-Sefwi	Ghana	Newmont/Canada,USA
Wassa	Ghana	Golden Star/USA
Bogoso/Prestea	Ghana	Golden Star/USA
Siguiri	Guinea	AngloGoldAshanti Ltd/RSA,UK
Freda-Rebecca	Zimbabwe	AngloGoldAshanti Ltd/RSA,UK
Chambishi	Zambia	Harmony/RSA
Morila	Mali	Randgold Resources/UK,RSA
Sukary	Egypt	Centamin
Murowa	Zimbabwe	Rio Tinto/UK,Australia
Gope	Botswana	DeBeers,Falconbridge/RSA,UK, Canada
Koidu	Sierra Leone	Diamondworks/Canada
Williamson Diamonds Limited	Tanzania	DeBeers/RSA,UK
Debswana	Botswana	Botswana Government, DeBeers /Botswana, UK,RSA
Namdeb Diamond Corporation	Namibia	Namibian Government, DeBeers/ Namibia, RSA,UK

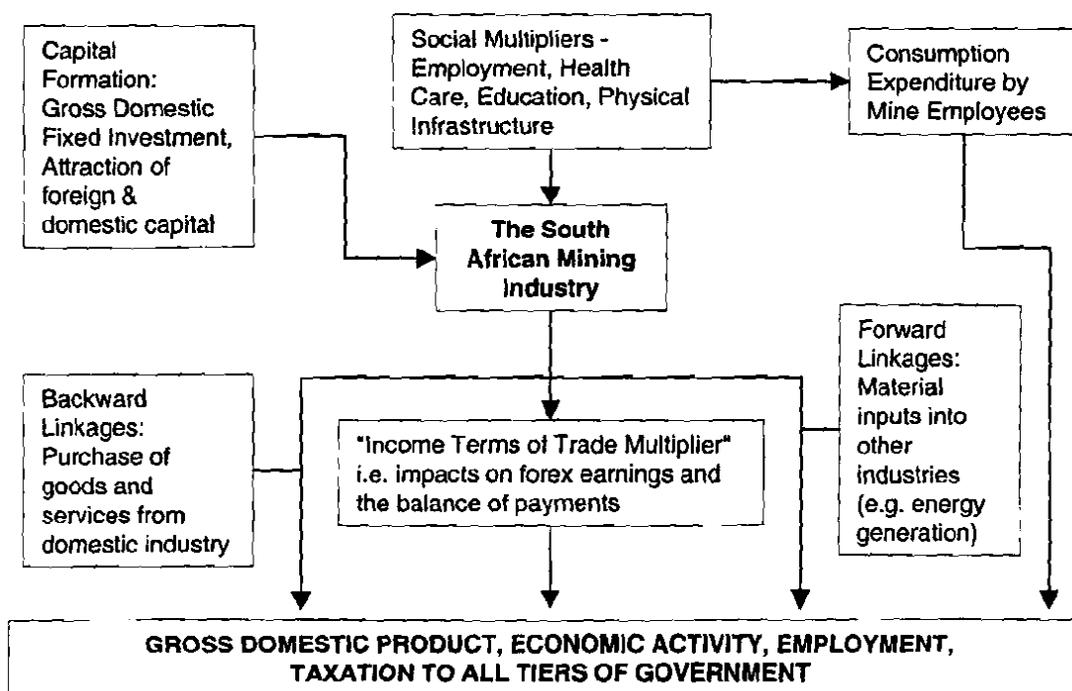
Source: Compiled from Metals Economics Group (http://www.metalseconomics.com/frame_strategic_report.html, accessed on 7 July 2005) and from Mineweb (http://www.mineweb.net/sections/mining_finance/450228.htm, accessed on 8 July 2005)

However, on-the-ground implementation of projects has not been very successful. Some projects were very ambitious and grandiose (e.g iron and steel mill in Ajaokuta, in Nigeria). Others were designed with a very narrow “mining box” mentality and limited to the initial mineral resource factor endowment. Most projects were very capital intensive and dependent on foreign inputs. Reasons for failure of most RBI projects include (i)

inefficiency and poor management; (ii) projects not embedded in the local economy; (iii) tariff escalation, trade barriers and other market imperatives imposed by developed countries on higher-value goods from developing countries; (iv) lack of capacity to innovate due to weak local knowledge; (v) lack of supporting infrastructure; and (vi) lack of local competition.

Promoting clusters at the macro, meso and micro levels offers more potential. In this regard, even small-scale mining can potentially engender multiplier effects and spillovers at local, community and rural levels. The strategy looks at broadening the economic base and developing not only direct “upstream” and “downstream” linkages between mining and other sectors, but also various indirect activities, particularly “sidestream” supply and support activities, and induced contributions to maximize development and social outcomes (Figure 7.2).

Figure 7.2: Direct and indirect impacts of mining in the case of South Africa



Source: ECA (2004), Minerals Cluster Policy Study in Africa: Pilot Studies of South Africa and Mozambique

The strategy includes all industries and services that gravitate to mining, such as financial services, transport, communication, energy, water, engineering and design, other consultancy services, knowledge and R&D centres, providers of capital goods and consumables (ECA, 2004). The key outcomes would be:

- Increasing local upstream support (supplier/input industries) sectors;
- Enhancing downstream industries based on increased local beneficiation and value addition of goods;
- Facilitating lateral migration of mining technologies to other industries;

- Increasing social, human, knowledge and institutional capital (which can be used in other sectors);
- Promoting the development of sustainable livelihoods in mining communities; and
- Creating small-and medium-sized enterprises and a more balanced and diversified economy with greater multiplier effects and potential to create employment.

This approach is based on the concept of integrated spatial and social development where the mining activity serves as an anchor to develop diversified and alternative activities that would be sustainable after the life of the mine. Successful clusters of this type have been developed in South Africa (Box 7.5), Canada, Australia and the Scandinavian countries (ECA, 2004). In an effort to promote more local value addition, the South African Government has recently introduced a bill-The Beneficiation Bill-which imposes obligations on companies to beneficiate specific proportions of their mine output. Two new bills-The Diamond Amendment Bill and the Precious Metals Beneficiation Bill-are expected to be approved in 2006. These bills will introduce beneficiation licenses to serve as disincentives to the export of rough diamonds and precious metals. The bills will also establish a diamond and precious metals regulator as well as a State-funded rough diamond dealer.

For the minerals cluster concept to be brought to fruition at a continental level, it is important to have a shared strategic vision, deliberate and proactive collective action (with governments taking the lead), timely interventions and coordination of public, private and community interests at all levels. There is need to identify, at national and regional levels, areas where such clusters could be developed and devise strategies to facilitate project implementation. The role of regional cooperation and integration in reducing transaction costs, establishing intra-regional synergies, enhancing competitiveness and realizing economies of scale that would catalyse minerals cluster development should not be underestimated. However, for goods, services, capital and other factors to flow freely in regional spaces, there is need to expedite intra-regional harmonization of laws, regulations and fiscal regimes. This is at the core of the SADC Mining Programme (ECA/SRO-SA, 2005). Other critical factors that can spearhead minerals cluster formation are:

- Availability and further development of a local skills base;
- Adequate infrastructure;
- Existence of a critical mass of companies and institutions willing to cooperate, network and share knowledge and information formally (e.g. through industry associations such as Chambers of Mines) and informally;
- Combination of legal requirements and incentives that encourage local outsourcing of goods and services;
- Provision of financial support for the development of small-and medium-scale mining supply and services companies;
- Existence of hives of research and development, innovation, diversification and

- technology diffusion;
- Establishment of targeted human resources development programmes and technical support systems; and
 - Establishment of effective marketing channels, which can improve demand.

Box 7.5 The South African Minerals Cluster

South Africa can be broadly defined as a mineral economy, with the mining sector accounting for approximately 8 per cent of GDP and close to half of the country's exports. South Africa is blessed with an exceptionally large and varied minerals resource base. The country possesses a considerable portion of the world's reserves of alumino-silicates, chromium, gold, manganese, platinum-group metals, vanadium and vermiculite. It is also rich in antimony, fluorspar, phosphate rock, titanium and zirconium. This large resource base has enabled it to play a major global role in the production, processing and export of many primary minerals products, for a considerable length of time. Not only has the minerals sector contributed significantly to the country's Gross National Product (GNP), providing capital for reinvestment and new developments, but it has also provided the impetus for the development of a diverse secondary and tertiary industrial sector as well as an extensive and efficient physical infrastructure.

The total economic impact (direct, indirect and induced) of mining in South Africa for the year 2000 was R142,973.00 million, which represents 16.1 per cent of the national GDP (R888,057.00 million), that is one-sixth of the South African economy. The total economic impact (direct, indirect and induced) of mining in terms of employment is around 1.27 million jobs. This represents 26.9 per cent of total formal sector employment excluding agricultural workers (4,735,269) and approximately 17.2 per cent of total formal sector employment (7,423,000). The mineral industry contributes a greater proportion pro-rata to employment than it does to financial value added by its activities. It is worth noting that the most significant impact in terms of employment is associated with the induced effect. It is also noticeable that the forward linkages are a more significant contributor to GDP than to employment, which is understandable as the downstream industries are less labour intensive.

Value Added Area	Value added to GDP*		Employment	
	Rand (Million)	% of GDP	No of Jobs	% of Jobs
Direct	54,951	6.2	417,045	8.8
Indirect - backward linkages	20,315	2.3	152,947	3.2
Indirect - forward linkages	14,654	1.65	57,651	1.2
Induced	53,053	5.97	646,183	17.65
Total	142,973	16.1	1,273,826	26.9

The discovery of diamonds and gold in the late nineteenth century, their location in an undeveloped interior, and their relative inaccessibility provided the initial impetus for industrialization. The need for heavy equipment, power supply and large organized labour triggered a series of spin-off activities in a diverse range of goods and services in sectors such as transport (rail system), power generation (coal mining), manufacturing, and commercial farming. A more significant legacy of mining in the country has been the emergence of prominent industrial centres and towns, most notably Johannesburg, Kimberley and Richards Bay. The mining industry is characterized by a high degree of technical expertise, a high capacity to mobilize capital, and global recognition as a reliable supplier of consistently high-quality mineral products. In the 1990s new commodities, most notably platinum, and higher value-added mineral processing and manufacturing activities gradually began to supersede gold as the primary source of national revenue. South Africa has subsequently become a major exporter of processed minerals as opposed to its previous role as an exporter of primary commodities. This transition has largely been due to the construction and operation of a number of large-scale capital-intensive mineral beneficiation plants, including Columbus Stainless Steel, Billiton Hillside Aluminium, Namakwa Sands Titanium, Saldanha Steel, and smaller ferrochrome smelters.

Source: Excerpted from ECA (2003), Minerals Cluster Policy Study in Africa: Pilot Studies of South Africa and Mozambique

5. The case of artisanal and small-scale mining (ASM)

Increasing numbers of people have turned to small-scale mining to seek alternative livelihoods. Barriers to entering the ASM sub-sector are significantly lower than those of large-scale mining. The ASM sub-sector is labour intensive⁸ and has great potential to generate rural employment. Thus, it can help reduce migration of the youth from rural to urban areas. Its income-generation potential cannot be underestimated, especially if compared with other rural occupations. Also, ASM has the potential to catalyze SME development, to foster local economic multipliers and micro minerals cluster formation.

However, the sub-sector is plagued with many problems, including isolation from the mainstream of economic development, market failures that hinder access to goods and services, environmental degradation, health and safety hazards, crime, and sub-optimal exploitation of resources due to the use of rudimentary technology. To compound the matter, the sub-sector has suffered from years of neglect, manifested in ambivalent support from governments; indifference from international donors; hostility from large-scale mining, which boiled into conflicts in certain jurisdictions; and, overall, a poor understanding of its potential to reduce poverty.

Many of the problems besetting ASM may be associated with limited capacity including knowledge (Sinding, 2005), gender inequality, lack of assets, and restricted entitlements (e.g. insecurity of tenure on mining titles) of ASM communities. Thus, approaches to handling ASM issues have to be multifaceted. In addition to addressing market and other failures in the provision of affordable/accessible technology and other services to small-scale miners, they should include strategies to facilitate knowledge acquisition, gender mainstreaming, formalization of the sector and development of diversified and alternative livelihoods to ASM (artisan training on alternative skills such as carpentry and brick laying, diversifying income sources and broadening non-mining incomes). This should result, respectively, in some miners abandoning mining altogether; fewer miners per unit of area mined; increased productivity; less harmful impact on the environment; more income for those who prefer to continue as miners; and ultimately less pressure on the resources.

The Yaounde Vision⁹ on ASM provides a good framework for the development of this sub-sector in Africa. The Vision recognizes ASM as a poverty-driven activity and recommends that it should be integrated in PRSPs of African governments. It further urges that the mining policies and laws of member States should be reviewed to incorporate a poverty reduction dimension in ASM strategies. Equally important is the framework provided by the Strategic Plan (2004-2006) of the Communities and Artisanal and Small-scale Mining (CASM)¹⁰, the global forum for knowledge sharing and coordination between the various institutions working on ASM. CASM's vision on ASM is one that:

- Advances integrated rural and regional social and economic development;
- Functions within an equitable and effective legal framework;

- Establishes positive, productive relationships with local communities, as well as large-scale mining companies and government agencies;
- Utilizes environmental responsible techniques;
- Complies with international standards related to child labour and occupational health and safety;
- Provides an acceptable income through increasingly productive mining and processing practices;
- Allows for long-term efficient resource extraction;
- Accesses fair markets and sources of credit; and
- Enhances local infrastructure and services.

To change the ASM sub-sector, there is need, therefore, to mitigate environmental, social and economic impacts that create or exacerbate poverty in ASM communities; integrate ASM into local and regional economic development and land-use planning; promote cooperation for constructive change and build synergies between ASM and large-scale mining; and provide training to small-scale miners in analytical skills, sound business management culture, capabilities and practices. This will help to scale up ASM, facilitate its transformation from a transitory and shock-or-coping-responsive activity into a serious business venture, and change ASM communities from vulnerable and marginal enclaves of unorganized groups of miners and other actors into integrated and functionally sustainable and resilient communities (Figure 7.3). This is a very challenging task to achieve.

6. *Mainstreaming mining in PRSPs: A key, but challenging task*

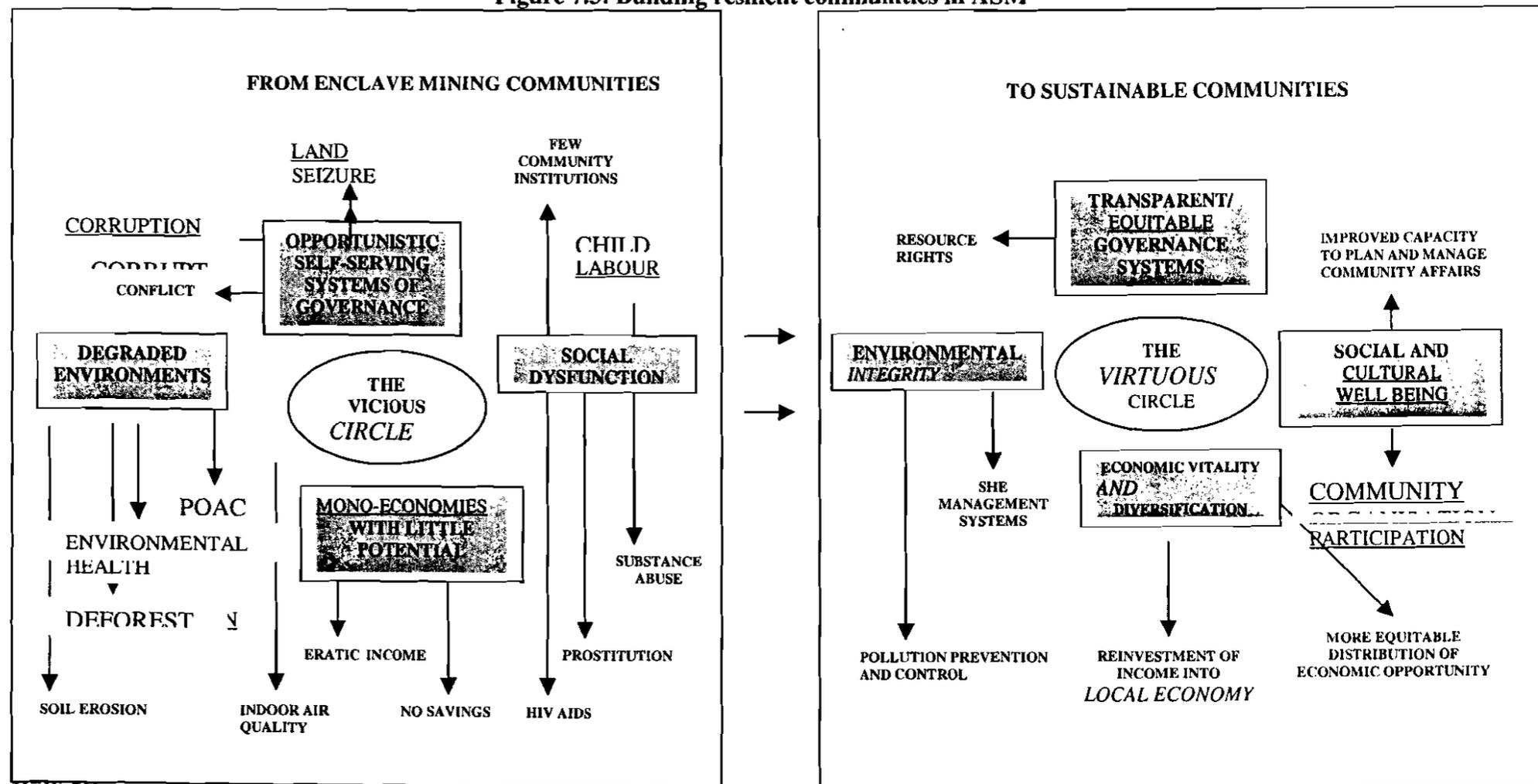
The World Bank sourcebook on “Mining and Poverty Reduction” (Weber-Fahr, *et al*, 2001) provides a comprehensive framework and guidelines on how to integrate mining in PRSPs. However, as noted by many scholars, the current series of PRSPs and Interim Poverty Reduction Strategy Papers (I-PRSPs) in Africa and other developing countries either ignore mining or accord it a fleeting mention with inadequate sector profiling. In addition, the potential contribution of mining to poverty reduction has not been well factored or reflected in the PRSPs and I-PRSPs, even in mineral economies.

Most PRSPs and I-PRSPs do not indicate how revenues from mining will be used to alleviate poverty, and they do not establish any clear link between investment in the sector and the reduction of poverty (Elisabeth Stites (2003). Also, while many countries focus on the extractive sector as a major source of growth, they appear to assume a simple and linear path between economic expansion and poverty reduction. The PRSPs and I-PRSPs do not contain policies or regulatory guidelines to ensure the allocation of financial resources from mining towards priority sectors or pro-poor growth, and fail to stress the fact that growth must be channelled into pro-poor initiatives in order to achieve poverty reduction. Furthermore, they fail to underscore the negative economic, political or social externalities and pitfalls that may arise from a growth strategy that relies solely on mining and lack of awareness of the potential for resource-dependent growth to

exacerbate poverty.

With regard to policy formulation, PRSPs are required to be produced through participatory processes. Reviews of their adoption have raised issues about (a) the representativeness of the civil society groups consulted; (b) their capacity to address policy issues; (c) the extent to which the elected representatives of the people, in Parliament or in local government bodies, are involved; (d) how much effective room for manoeuvre exists for poor developing countries to affect the PRSP content; and (e) what relationship exists between policies articulated in PRSPs and those implemented by governments through budget statements and other policy measures.

Figure 7.3: Building resilient communities in ASM



D (2005), Artisanal and Small Scale Mining and the Millennium Development Goals

Evidence suggests that most PRSPs and I-PRSPs of African mineral economies must now be thoroughly reviewed to address their shortcomings. The shortcomings may be attributed to policy failures, lack of political will, minimum capacity (knowledge gaps, insufficient financial and human resources) in government institutions, hastily-prepared PRSPs and I-PRSPs and poor understanding and uninformed perceptions about the sector, stemming from lack of data on the overall importance and impact of the sector, in particular on (i) sustainability and vulnerability in mining dependent communities (household income and economics); (ii) demographics of mine labour; (iii) direct and indirect cash flows (wages, mineral rents, corporate taxes and other rates and levies, profits and purchases) into communities, local and national governments; (iv) patterns of procurement of goods and services; (v) contribution to physical, human and social capital creation; and (vi) time span of mine derived benefits vis-a-vis the mine life cycle. There is a need for robust and good quality data on mining economies and impacts at local, national and sub-regional levels. African governments and international agencies should therefore, deploy efforts to collect and collate these essential data.

As indicated in the World Bank framework, when integrating mining into PRSP or I-PRSPs, policy-makers should focus on:

- Gathering relevant data to understand actual and potential poverty-related impacts, risks, and opportunities of the mining sector in their country;
- Setting clear objectives and identifying priorities for intervention in a consultative process regarding poverty impacts and the mining sector;
- Identifying the mechanisms to achieve the objectives, including needed changes in policies, laws and regulations; and
- Establishing the necessary institutional arrangements, including authorities, responsibilities and capabilities to implement the mechanisms.

Most African countries are now in the process of preparing their second generation PRSPs. This offers an opportunity to broaden participation. In this exercise, there is need to foster broader consultation and participation through the involvement of local community representatives, local government representatives from mining regions, industry associations, trade unions, non-governmental organizations (NGOs), and other relevant parties. In most cases, the Ministry responsible for mining is better placed to lead the process. In addition, the inputs and participation of medium-and large-scale mining private companies should be sought as they have resources and expertise that can play a vital role in creating sustainable development opportunities within the currency of mining and after it.

VII.7 Policy implications

Mining can create opportunities for growth and development through enhanced revenue derived from export earnings, taxes and royalties; job creation; knowledge, skills and technology transfers; provision of infrastructure and social services (including health, water supply, and education); fostering of clusters of lateral and downstream industries; and SME development to provide goods and services for the mining industry.

However, there are also many negative impacts on the environment, social fabric and the local economy. Mineral resources are physically finite, and unless the wealth that its exploitation generates is effectively deployed, the legacy of mining can be questionable.

Given the current society-oriented development paradigm, mining can only gain acceptance if it improves its social, economic and environmental contribution, with new and evolving governance systems. In this quest, new partnerships, conscious of the need for change, are emerging and being built between governments, the corporate world, civil society, local communities and other stakeholders. Guidelines, protocols, codes of practice, organizational policies and management systems, voluntary undertakings and statements of principle are being drafted and enforced to help effect this transition and improve the social and development outcomes of mining at the local level.

More needs to be done to achieve a lasting change. Policies, legal and regulatory frameworks to facilitate equitable participation by local businesses, communities, women and other stakeholders in mining activities should be in place, as well as tools to improve revenue (derived from royalties, income taxes, land taxes, lease rents, etc) distribution at local level. The key areas that need to be addressed are:

- Gender mainstreaming and empowerment of women in mining;
- Preferential employment of local labour;
- Contracting of services and procurement of goods from indigenous local companies;
- Infrastructure provision to local communities;
- Allocation of benefits from mining to local communities; and
- Community equity participation.

Because each country is different, in developing a framework for facilitating public participation at country level, there is need to consider local context and peculiarities.

The most fundamental lesson from the experiences of mining operations in developing countries over the last two decades is that a stable and profitable project requires consideration of much more than the economic viability of a mineral deposit. Though that remains central, competent project appraisal (both by sponsors and regulators) requires early incorporation of environmental and social impact analysis. Strengthening the capacity of governmental institutions to engage in such integrated assessment is a major challenge.

Adequate government capacity to regulate the sector, enforce laws, and monitor activities on the ground is also required. At company level, the task is to fashion the instruments required to entrench corporate social responsibility into business ethics and implement the re-orientation of corporate culture called for by the new approach. In this respect, the GRI Guidelines for the mining and metals sector provide a good reporting framework that should be broadly adopted by the mining industry. To facilitate implementation and monitor compliance of the guidelines, efforts should be deployed to mainstream them not only at company level, but also within government spheres. Relevant capacity must also be built at those levels.

While enhanced environmental obligations have become a standard feature of the principal mining regimes in Africa, work remains to be done to make their formulation more precise. The establishment of environmental protection or management institutions has also become standard in countries with significant mining activity. The actual resources available to carry out the regulatory mandate need to match the expectations generated by the changes in law. Furthermore, the relationship between newly created institutions with a primarily environmental focus, on the one hand, and older existing institutions, which have traditionally regulated mining, can be reasonably arranged in different ways in the concrete context of particular countries. However, institutional relationships must aim at actualizing the new orientation of mining policy rather than paying lip service to it.

With regard to the allocation of benefits from mining, it is crucial to ensure that a reasonable share goes to those communities close to and disproportionately affected by a mining operation. This is in addition to the traditional focus of attention on allocation between project sponsors, on the one hand, and the host country represented by central government on the other. Government revenue-sharing formulae, tri-sector partnerships as well as Impact and Benefit Agreements (IBAs) with local communities are instruments emanating from the concern about enhancing benefits to affected communities. Particular care needs to be taken with IBAs given the limitations on the capacity of these communities to engage in meaningful negotiations and redistribute benefits equitably within the community. Training in management of revenues could be part of the assistance provided to communities.

Transparency and efficiency in the management of revenue paid to various governmental authorities have become an important part of the mineral policy agenda. Mechanisms for enhancing these are still in the early stages of implementation, but have significant potential for improving the public benefit in many resource rich African countries. Government capacity constraints in this sphere need to be addressed.

One of the mechanisms by which host countries have, in the past, sought to capture mineral rent has been through the setting up of state mining enterprises. Although no longer a preferred instrument, some still exist. In many countries, they have been privatized or dismantled. The decision as to what to do in any particular instance must be made in the specific context, rather than simply dogmatically.

In recent times, it has been more common for the State or a community to take minority interest in a mining project. Sometimes, such interest is paid for either upfront or from dividends when declared. In other instances, no direct payment is made and the allocation is simply part of the overall division of benefits. Here again, it is necessary to assess concretely whether equity participation is mere symbolism (sometimes an expensive one) or yields meaningful benefits. In particular, such participation ought to be compared to other fiscal instruments such as royalties.

The integration of mining into national and regional economies remains one of the biggest challenges of mining policy for most of Africa. This is particularly evident with artisanal and small-scale mining. Achieving effective integration requires long-term planning and investment strategies, which include schemes for financing local ventures, legal measures to promote the procurement of local goods and services, and fiscal incentives to encourage local processing of minerals. At national level, an important strategy tool that should be better seized is the PRSP, especially now that many African countries are embarking in the design of the second generation PRSPs. Equally important is minerals clustering because of its potential to maximize local and regional linkages. However, tariff escalation and trade barriers imposed by developed countries limit the extent to which local beneficiation and value addition can be expanded under a minerals cluster. In this respect, Africa needs to bargain for lifting of these barriers in its trade negotiations with the West.

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ENDNOTES

¹ The effects of the Dutch Disease include (i) high inflation and currency appreciation; (ii) rise in input costs, especially wages; (iii) expansion or shrinking of the non-traded goods and services sector due to growth-inhibiting effects of rising input costs, or growth-promoting effects of higher incomes and demand respectively; and (iv) reallocation of resources (financial and human), from less attractive sectors such as agriculture and manufacturing to the booming minerals sector, with the resulting contraction and loss of competitiveness in those sectors.

² <http://www.natural-resources.org/minerals/CD/docs/unctad/auty2.doc>, accessed on 5 September 2005

³ <http://www.natural-resources.org/minerals/CD/docs/unctad/auty2.doc>, accessed on 5 September 2005

⁴ The GRI is a multi-stakeholder process and independent institution started in 1997 whose mission is to develop and disseminate globally applicable Sustainability Reporting Guidelines. These Guidelines are for voluntary use by organisations for reporting on the economic, environmental, and social dimensions of their activities, products, and services. The GRI incorporates the active participation of representatives from business, accountancy, investment, environmental, human rights, research and labour organisations from around the world.

⁵ MEG, 2005, www.metalseconomics.com/catalog/pages/pdac2005.pdf accessed on 4 July 2005

⁶ <http://minerals.usgs.gov/minerals/pubs/country/2002/africa02.pdf> accessed on 30/6/2005

⁷ <http://minerals.usgs.gov/minerals/pubs/country/2002/africa02.pdf> accessed on 30/6/2005

⁸ ILO (ILO, 1999) estimates that 3.0-3.7 million people are employed directly in small-scale mining in Africa; 6.7-7.2 million in Asia/Pacific countries; 1.4-1.6 million in Latin America; and about 0.4-0.5 million in the rest of the world. Approximately 80-100 million people depend on the sub-sector for their livelihood.

⁹ The Yaounde Vision was adopted during a joint ECA/UNDESA Seminar on “Artisanal and Small-scale Mining in Africa: Identifying Best Practices and Building Sustainable Livelihoods of Communities”, held in Yaounde, Cameroon from 18 to 22 November, 2002.

¹⁰ See www.casmsite.org

CONCLUSIONS, WAY FORWARD AND ECA ROLE

Findings on status of sustainable development

The SDRA presents results that show that the journey towards achieving sustainable development is largely beset with stagnant or worsening status indicators over the observation period. Therefore, there is a need for concerted effort in all countries to aggressively implement or adopt and implement policies, programmes and strategies that are aimed at achieving the internationally agreed upon goals and targets in the medium-term, and sustainable development in the long-term.

The SDRA results have also emphasized the need for serious inter-linked analysis of the four pillars of sustainable development. It is argued that because policies are taken sectorally without any attempt to harmonize them, they tend to be contradictory and inconsistent, leading to under-achievement of objectives. This suggests the need for harmonized development policies, programmes and strategies. Political commitment and actual concerted effort to implement policies, programmes and strategies will be important ingredients in the way forward. It is expected that the NSCDs that are in place in countries will seriously take on the coordination role to facilitate this process, and that in countries where such institutions do not exist, they will be established and supported in their work.

Findings from sectoral areas

Insights from the sectoral chapters confirm the importance of careful multi-sectoral and multi-disciplinary analysis in every policy and programmatic endeavor to ensure that all important linkages are taken into account. Generally, the following recommendations cover all the sectors. These include the need for:

- Public and private investment partnerships;
- Regionalization of development processes;
- Public and private partnerships to maximize business opportunities and to invest revenues in developing infrastructure and in community development activities;
- Involvement of all stakeholders in the process, especially the beneficiary local communities;

- Behavioral change in African civil society groups to develop preferences for consuming indigenous products;
- Making the African state capable of effectively providing for the basic needs of its population;
- Promoting regional/global organizational, institutional and legal frameworks that maximize wealth;
- Development of conflict resolution mechanisms and nurturing of good governance;
- Creation of disaster mitigation mechanisms such as those focused on dealing with drought; and
- Development of sub-regional, regional and international partnerships for development.

Way forward

In dealing with the environmental, social and economic dimensions of sustainable development, a number of issues should be dealt with, including the following useful pointers to the way forward:

- Treatment of all the three pillars of sustainable development as equally important;
- Taking an inter-sectoral approach in dealing with identified challenges;
- Identifying all interested stakeholders and involving them into the planning, policy-making, programming and implementation processes;
- Adopting policies, programmes, strategies and related instruments with a focus to achieving sustainable development;
- Making concerted effort to implement policies, programmes, strategies and related instruments after they are adopted;
- Establishing and building capacity of institutions for implementation, monitoring and evaluation;
- Building databases for monitoring, evaluation and impact assessment;
- Setting up coordination mechanisms to reduce duplication of effort and create beneficial linkages;
- Promoting political will and commitment, including the ingredients of good governance; and
- Promoting useful national, regional and international partnerships.

Role OF ECA

The ECA assists African countries in the implementation of the outcomes of the WSSD and related regional and international frameworks by providing greater coherence and better coordination at country, sub-regional and regional levels. Furthermore, through its

analytical and advocacy work, ECA has produced many reports monitoring and evaluating different elements of sustainable development in a number of areas, including social-economic issues; environmental factors; governance; gender equity, equality and empowerment; trade and regional integration, as well as HIV/AIDS and related diseases such as malaria and TB. Through SDD, the Commission produces reports on population and sustainable development; environmental impact assessment and institutions; agriculture and food security; science and technology; natural resources. These reports contain lessons learned, constraints and recommendations on the way forward to assist member States to strengthen mechanisms for achieving sustainable development.

This edition of the SDRA is aimed at building upon the first ECA Report on "Harnessing Technologies for Sustainable Development". It also adds to the pool of tools and materials the Commission uses for its advocacy work. Recommendations from this report will increase the array of resources available to member States as they adopt and implement policies, programmes and strategies for sustainable development.

**Statistics on sustainable development
dimensions**

Economic dimension

GDP Growth and Distribution ^a							
Subregion/country	GDP (Billion Market prices) (Cmn. Bill. US\$)	Real GDP Growth (at market prices) (%)	Manufacturing (as share of GDP) (%)	Services etc. (as share of GDP) (%)	Agriculture (as share of GDP) (%)	Industry (as share of GDP) (%)	GDP Per Capita (Cmn. US\$)
	2003	2003	2003	2003	2003	2003	2003
North Africa	239.86	4.95	11.64	40.41	16.67	30.98	1400.34
Algeria	64.10	3.88	7.46	16.60	8.60	46.52	2013.60
Egypt	84.40	4.50	...	...	...	...	1249.20
Libya	...	...	...	...	...	...	...
Mauritania	1.13	5.40	7.55	44.21	16.77	26.12	395.96
Morocco	45.82	3.40	17.35	53.49	15.63	30.87	1521.50
Sudan	17.79	6.00	8.00	41.58	30.48	23.10	530.37
Tunisia	26.63	6.50	17.85	46.06	11.88	28.31	2691.40
West Africa	100.12	3.15	7.41	43.24	34.98	20.74	414.67
Benin	3.50	5.58	8.97	50.00	35.68	14.32	520.64
Burkina Faso	4.18	6.50	12.89	50.11	30.98	18.91	345.35
Cape Verde	0.80	5.00	7.96	73.45	6.83	19.72	1697.60
Cote d'Ivoire	5.67	5.60	5.32	...	58.70	12.45	106.69
Gambia The	0.37	6.70	4.82	49.49	27.01	13.12	257.89
Ghana	7.52	5.20	8.60	39.54	35.24	25.22	363.87
Guinea	3.63	1.20	3.82	37.19	23.43	34.74	459.03
Guinea-Bissau	0.24	0.60	9.58	25.08	60.36	12.88	160.25
Liberia	0.44	-31.00	6.57	80.46	52.78	7.72	131.08
Mali	4.35	7.44	2.62	33.70	35.15	23.69	373.00
Niger	2.73	5.32	6.56	43.38	39.86	16.76	232.22
Nigeria	57.62	10.70	3.94	23.90	26.06	47.56	422.26
Senegal	6.48	6.45	12.80	62.04	16.79	21.17	633.27
Sierra Leone	0.83	9.30	...	...	...	...	155.10
Togo	1.76	2.70	9.28	37.05	40.79	22.16	361.81
Central Africa	28.90	4.74	6.91	33.35	25.68	35.76	1874.76
Cameroon	12.49	4.50	8.49	38.22	43.13	16.27	776.44
Central African Republic	1.20	-5.44	...	22.00	56.00	22.00	309.99
Chad	2.61	11.30	11.29	40.12	44.68	13.22	303.92
Congo	3.56	0.80	6.37	33.75	6.18	60.07	948.66
Equatorial Guinea	2.91	14.70	...	2.92	4.60	60.40	5900.10
Gabon	6.06	2.80	4.91	29.81	8.05	62.14	4505.50
Sao Tome and Principe	0.06	4.50	3.51	66.66	17.12	16.22	378.71
East Africa	61.11	1.47	9.72	47.97	29.48	17.96	1056.94
Burundi	0.60	-1.20	...	33.32	51.02	19.78	82.64
Comoros	0.32	2.10	4.19	46.99	41.09	11.92	531.48
Democratic Republic of Congo	13.96	-2.10	15.65	55.25	25.90	18.85	829.47
Djibouti	...	...	...	...	...	...	...
Eritrea	0.75	3.00	10.23	55.66	12.56	22.37	171.00
Ethiopia	6.65	-3.69	...	42.90	37.99	9.94	96.95
Kenya	14.38	1.80	12.06	57.36	13.97	17.38	450.43
Madagascar	5.47	9.79	12.57	50.96	26.77	14.09	324.03
Rwanda	1.68	0.96	10.94	37.44	41.30	21.26	200.57
Seychelles	0.70	-6.30	16.42	69.84	2.65	27.51	8403.80
Somalia	...	...	...	...	...	...	...
Tanzania	10.30	7.10	6.65	35.43	41.32	15.01	286.91
Uganda	6.30	4.72	8.54	42.58	29.66	19.43	249.08
Southern Africa	218.02	2.40	13.14	43.66	13.59	30.77	1742.14
Angola	13.83	3.45	3.81	31.47	8.23	60.30	1022.40
Botswana	7.53	5.41	4.28	43.36	2.36	45.18	4371.70
Lesotho	1.08	3.28	17.59	38.83	16.06	37.08	600.48
Malawi	1.70	4.37	9.85	39.73	36.29	14.31	155.19
Mauritius	5.22	2.74	19.33	55.53	5.38	26.81	4274.30
Mozambique	4.32	7.10	13.92	35.67	24.07	30.21	229.92
Namibia	4.27	3.74	10.95	56.76	9.67	22.80	2120.00
South Africa	165.43	2.81	17.72	58.57	3.36	28.73	3609.70
Swaziland	1.90	2.44	22.71	23.95	7.64	27.35	1721.90
Zambia	4.34	5.10	10.92	45.54	20.69	24.51	416.73
Zimbabwe	8.40	-14.05	13.43	52.88	15.72	21.24	641.24
Total Africa - ECA State	848.01	3.34	9.78	41.73	24.08	27.24	1297.77

Notes:

a. Source of Data: World Bank Africa Database 2005 CD-Rom

Savings and Investment		Trade	ODA			External Debt			Foreign Direct Investment		Private Transfers	
Gross Domestic Savings as share of GDP (%)	Gross Domestic Investment as share of GDP (%)	Trade Balance (Net current US\$)	Net ODA (Million CUK US\$)	Net ODA from all Donors as % of GDP	Debt Service to Exports Ratio of 2003	Total External Debt (net) (Million US\$)	Total External Debt to GDP ratio (%)	Total External Debt to exports ratio (%)	FDI (Net) (Billion US\$)	FDI as % of GDP	Private Transfers (Net current Billion US\$)	Private Transfers as % of GDP
2003	2003	2003	2003	2003	2003	2003	2003.00	2003.00	2003	2003	2003	2003
19.40	27.89	-12323.60	2818.28	1.17	19.47	821.75	61.75	283.73	6.43	0.03	7.86	0.03
36.39	30.05	5654.70	232.23	0.36	19.39	734.67	36.49	105.45	1.60	2.50	0.94	0.01
18.48	23.52	-11481.00	893.76	1.06	11.45	464.52	37.19	130.00	2.13	2.53	2.75	0.03
...
2.19	41.18	...	242.72	21.53	...	...	...	...	0.01	0.62	...	...
19.75	25.30	-3624.80	522.81	1.14	33.63	624.98	41.08	130.89	0.91	1.99	2.64	0.06
13.93	18.16	41.00	621.26	3.49	...	720.90	135.92	921.96	1.09	6.14	0.71	0.04
25.64	29.11	-2913.50	305.50	1.15	13.43	1563.70	58.10	130.37	0.69	2.59	0.82	0.03
5.23	17.28	7016.01	9815.83	9.80	11.96	340.19	117.06	382.91	3.56	0.04	2.82	0.03
7.19	18.94	-352.32	293.73	8.40	11.70	271.91	52.23	296.86	0.08	2.37	0.09	0.03
3.89	18.71	-384.99	451.06	10.79	14.64	146.83	42.52	382.74	0.02	0.38	0.04	0.01
-14.35	20.20	-289.18	143.68	18.02	5.33	771.56	45.45	94.36	0.03	3.83	0.16	0.21
3.99	13.65	-123.00	5381.00	94.89	...	164.20	153.91	583.03	-0.01	-0.11	0.00	0.00
10.05	19.20	-59.50	59.75	16.31	11.54	442.54	171.60	364.70	0.01	3.47	0.00	0.01
9.09	23.00	...	906.68	12.06	6.62	337.51	92.75	240.99	...	...	...	...
7.36	9.91	146.41	237.52	6.54	17.70	404.10	88.03	399.32	0.02	0.52	-0.02	-0.01
1.19	12.40	-1.80	145.20	60.84	18.07	500.33	312.22	787.63	...	...	0.02	0.07
-2.95	8.70	-50.40	106.91	24.18	...	350.35	267.28	806.23	0.00	0.00	0.06	0.14
15.00	23.86	-14.32	527.63	12.14	6.28	277.11	74.29	245.21	0.05	1.18	0.09	0.02
5.03	14.19	-133.69	453.30	16.60	7.74	179.94	77.49	484.49	0.02	0.88	0.03	0.01
30.74	23.09	9602.00	317.59	0.55	10.69	256.21	60.68	125.13	3.25	5.63	1.68	0.03
8.05	20.06	-946.44	449.59	6.93	8.11	406.89	64.25	142.44	0.06	0.90	0.49	0.07
-11.14	14.36	-148.51	297.37	35.93	48.98	242.25	156.18	575.19	0.02	2.54	0.10	0.12
5.33	18.90	-228.25	44.82	2.55	2.06	351.19	97.06	215.33	...	...	0.09	0.05
22.28	25.84	5329.70	1296.75	4.49	9.67	896.42	116.93	396.19	1.07	0.04	-0.07	0.00
17.10	16.98	225.40	883.91	7.08	13.02	411.11	52.95	205.03	0.22	1.72	0.08	0.01
3.87	6.01	11.10	49.86	4.14	0.36	342.14	110.37	793.66	...	...	...	...
22.07	55.00	-387.80	246.92	9.47	8.37	174.71	57.49	271.02	0.73	27.92	0.04	0.02
47.40	22.86	1732.80	69.60	1.96	18.92	2281.90	240.54	307.47	0.32	9.06	0.00	0.00
29.00	26.02	1539.90	21.27	0.73	...	375.83	6.37	7.59	-0.16	-5.47	0.00	0.00
45.31	23.90	2229.00	-10.68	-0.18	...	...	...	...	-0.04	-0.73	-0.20	-0.03
-8.76	30.10	-20.70	37.67	63.20	...	...	...	...	0.01	13.42	0.00	0.01
0.79	16.11	-2122.86	6557.84	10.73	18.23	992.58	103.15	642.15	0.68	0.01	1.18	0.02
4.26	15.30	-93.80	224.20	37.65	82.67	169.03	204.53	2110.90	0.00	0.00	0.01	0.01
-1.72	11.76	-32.80	24.49	7.68	6.80	469.45	88.33	360.59	0.00	0.31	0.02	0.07
22.53	9.68	3088.50	252.13	1.81	13.02	723.48	87.22	183.58	0.10	0.73	-0.57	-0.04
...	...	...	77.81	...	...	...	...	...	...	...	...	...
-62.95	22.44	-444.20	307.26	40.94	10.09	143.27	83.79	280.01	0.01	1.48	0.29	0.39
1.05	20.46	-1457.60	1504.40	22.62	8.18	106.21	109.55	603.86	0.01	0.21	0.50	0.07
7.74	12.93	-1178.10	483.47	3.36	15.21	211.66	46.99	179.52	0.06	0.42	0.55	0.04
8.92	17.89	-189.81	539.46	9.85	...	...	...	...	0.01	0.23	0.16	0.03
-0.84	18.43	-181.00	331.56	19.69	...	170.67	85.09	983.39	0.00	0.28	0.03	0.02
12.95	9.00	-91.36	9.21	1.31	12.60	6550.80	77.95	87.08	0.03	4.27	0.00	0.00
...	...	...	175.11	...	...	...	...	...	...	...	...	...
9.54	18.63	-920.00	1669.30	16.21	5.19	209.45	73.00	422.47	0.25	2.41	0.03	0.00
7.25	20.68	-622.70	959.44	15.24	10.51	179.16	71.93	567.93	0.19	3.05	0.17	0.03
12.78	21.92	5992.21	3687.96	1.88	10.16	513.30	64.94	195.98	2.54	0.01	1.71	0.01
20.13	12.78	4035.50	498.74	3.61	13.31	717.20	70.15	96.97	1.65	11.95	0.16	0.01
38.07	27.49	696.78	30.06	0.40	1.30	282.73	6.47	12.88	0.06	0.75	0.33	0.04
-12.18	44.34	-522.70	78.99	7.34	7.92	394.08	65.63	85.48	0.04	3.85	0.17	0.16
-4.96	11.23	-227.46	497.94	29.27	22.22	261.63	168.59	612.48	0.04	2.54	0.01	0.01
25.33	22.92	-290.70	-15.13	-0.29	6.54	1511.60	35.37	56.09	0.06	1.09	0.06	0.01
10.19	26.89	-722.59	1032.80	23.91	25.40	266.66	115.98	357.57	0.34	7.91	0.00	0.00
15.39	22.73	-461.80	146.10	3.42	0.42	321.06	15.14	40.44	0.14	3.26	0.46	0.11
18.83	17.17	3701.50	624.88	0.38	8.11	606.77	16.81	57.87	0.10	0.06	0.13	0.00
8.98	17.99	123.90	27.08	1.42	1.80	327.48	19.02	19.74	-0.07	-3.50	-0.10	-0.05
18.74	26.13	-340.22	560.14	12.92	14.60	617.61	148.20	502.37	0.17	3.97	-0.02	-0.01
2.10	11.41	-402.00	186.36	2.22	...	339.50	52.94	313.90	0.01	0.06	0.51	0.06
12.10	21.80	3691.46	2158.66	3.73	13.90	712.15	62.77	390.15	14.20	0.02	13.49	0.02

Environment dimension

Subregion/country	Land Use						Desertified Area	Renewable Water Resources		Water Withdrawal and Use			
	Arable Land	Forest Area	Moored Area	Permanent Crop	Perennial Pasture	Other Crops		Total Energy	Per Capita Energy	Total Energy	Agriculture	Domestic	Industry
	2002	2002	2002	2002	2002	2003		2000	2003-07	2003-07	1990-02	1990-02	1990-02
North Africa	4.41	7.45	0.89	0.54	24.88	3.96	-0.12	182.88	1205.89	133.40	84.37	7.30	8.33
Algeria	3.22	0.90	0.24	0.25	13.35	5.00	-1.24	14.32	442.81	6.07	64.91	21.91	13.18
Egypt	2.91	0.07	3.42	0.50	0.00	9.70	-2.78	58.30	794.39	68.65	78.44	7.62	13.94
Libya	1.03	0.20	0.27	0.19	7.56	0.10	-1.31	0.60	106.03	4.27	83.04	14.06	2.91
Mauritania	0.48	0.31	0.05	0.01	38.28	1.70	3.09	11.40	3825.50	1.70	88.24	8.82	2.94
Morocco	18.81	6.78	3.01	1.99	47.05	0.70	0.04	29.00	933.56	12.75	90.04	8.39	1.57
Sudan	6.83	25.94	0.82	0.18	49.32	5.20	1.56	64.50	1878.66	37.32	98.65	2.65	0.70
Tunisia	17.84	3.28	2.45	13.76	31.25	0.30	-0.22	4.56	458.89	2.64	82.01	13.83	4.17
West Africa	12.11	14.34	0.16	2.08	26.28	5.57	1.46	1302.75	12062.26	24.12	81.03	13.83	5.14
Benin	23.05	23.96	0.11	2.40	4.97	11.40	2.64	24.80	3584.85	0.13	45.38	31.54	23.08
Burkina Faso	15.89	25.91	0.09	0.19	21.93	11.50	0.21	12.50	933.32	0.76	88.46	11.54	0.00
Cape Verde	10.42	21.09	0.74	0.74	6.20	0.00	-6.88	0.30	634.25	0.02	80.65	16.13	3.23
Cote d'Ivoire	9.75	22.38	0.23	11.95	40.88	6.00	3.72	81.00	4793.75	0.93	64.52	23.66	11.83
Gambia The	25.00	48.10	0.20	0.50	45.90	2.30	-0.94	8.00	5471.96	0.03	85.36	22.88	11.76
Ghana	18.37	27.84	0.05	9.45	38.70	5.60	1.89	53.20	2488.66	0.98	68.40	23.93	9.67
Guinea	3.66	28.20	0.39	2.60	43.55	0.70	0.50	226.00	26218.10	1.51	90.07	7.95	1.99
Guinea-Bissau	10.67	77.77	0.60	8.82	38.41	0.00	0.99	31.00	20156.05	0.11	90.42	9.04	0.54
Liberia	3.95	36.14	0.03	2.28	20.76	1.70	2.18	232.00	66532.84	0.11	54.55	27.27	18.18
Mali	3.82	10.81	0.11	0.03	24.59	3.70	0.75	100.00	7457.68	6.55	90.13	9.01	0.86
Niger	3.54	1.05	0.05	0.01	9.47	7.70	4.65	33.65	2710.43	2.18	95.41	4.13	0.46
Nigeria	33.16	14.84	0.28	3.07	43.04	3.30	2.95	286.20	2251.47	8.01	68.79	21.10	10.11
Senegal	12.78	32.23	0.37	0.24	29.35	11.60	0.73	39.40	3810.81	2.23	92.81	4.49	2.70
Sierra Leone	7.47	14.73	0.42	0.91	30.72	2.10	3.42	160.00	30959.75	0.38	92.11	5.26	2.63
Togo	46.15	9.38	0.33	2.21	18.39	7.90	4.10	14.70	2930.04	0.17	44.97	52.66	2.37
Central Africa	4.08	41.88	0.03	0.57	21.81	8.51	0.35	1497.08	66155.59	1.52	84.25	27.78	7.97
Cameroon	12.81	51.26	0.07	2.58	4.30	4.50	0.93	285.50	17519.64	0.99	73.74	18.18	8.08
Central African Republic	3.10	38.77	0.00	0.15	5.02	8.70	0.13	144.40	38912.07	0.03	4.00	80.00	18.00
Chad	2.88	10.08	0.02	0.02	36.74	9.10	0.64	43.00	4856.56	0.23	82.61	17.39	0.00
Congo	0.56	64.60	0.00	0.15	29.28	6.50	0.08	832.00	217915.14	0.05	8.70	69.57	21.74
Equatorial Guinea	4.63	62.46	0.00	3.57	3.71	0.00	0.81	26.00	51282.05	0.11	0.93	83.33	15.74
Gabon	1.26	84.71	0.06	0.86	18.10	0.70	0.06	164.00	121391.58	0.12	41.67	50.00	8.33
Sao Tome and Principe	7.29	28.13	10.42	48.98	1.04	0.00	0.00	2.18	13212.12	...	...	...	...
East Africa	5.87	35.09	0.30	1.10	27.47	10.83	2.47	1948.00	4637.25	31.86	91.59	6.84	1.57
Burundi	38.40	3.66	2.88	14.21	38.55	5.70	15.64	3.60	509.34	0.23	82.61	17.39	0.00
Comoros	35.87	3.59	0.00	23.32	6.73	0.00	5.00	1.20	1518.99	...	...	...	...
Democratic Republic of Congo	2.96	59.64	0.00	0.49	6.62	5.00	0.39	1283.00	23577.19	0.36	30.56	52.78	16.67
Djibouti	0.04	0.28	0.04	0.00	56.08	4.31	0.00	0.30	421.35	0.01	87.50	12.50	0.00
Eritrea	4.95	15.69	0.21	0.03	68.98	4.30	0.34	6.30	1466.14	0.30	96.67	3.33	0.00
Ethiopia	9.94	4.59	0.19	0.74	20.00	16.90	0.88	110.00	1518.92	5.56	93.63	5.99	0.38
Kenya	8.08	30.04	0.16	0.99	37.42	8.00	0.54	30.20	931.52	1.58	83.92	29.75	6.33
Madagascar	5.07	20.17	1.87	1.03	41.27	4.30	1.00	337.00	18825.78	14.96	95.68	2.81	1.54
Rwanda	45.24	12.44	0.24	10.90	18.85	6.20	4.89	5.20	613.14	0.08	37.50	50.00	12.50
Seychelles	2.22	66.67	0.00	13.33	0.00	100.00	0.00	...	...	0.01	7.32	85.04	27.64
Somalia	1.67	11.98	0.32	0.04	68.54	0.80	1.02	14.20	1377.04	3.29	99.70	0.30	0.00
Tanzania	4.53	43.92	0.19	1.24	39.61	29.80	0.24	91.00	2415.65	5.18	89.35	10.17	0.48
Uganda	25.88	21.26	0.05	10.65	25.94	24.60	2.18	86.00	2472.00	0.30	40.00	43.33	16.67
Southern Africa	5.84	30.96	0.33	0.31	50.34	12.41	0.82	633.05	5621.26	22.69	89.75	24.08	6.17
Angola	2.41	55.95	0.06	0.24	43.31	6.60	0.18	184.00	13070.04	0.35	80.00	22.86	17.14
Botswana	0.65	21.93	0.00	0.01	45.17	18.50	0.95	12.24	6818.94	0.14	42.88	35.71	21.43
Lesotho	10.87	0.46	0.03	0.13	65.90	0.20	0.00	3.02	1678.89	0.05	20.00	40.00	40.00
Malawi	24.45	27.65	0.32	1.49	19.66	11.20	2.78	17.28	1400.68	1.01	80.20	14.85	4.95
Mauritius	49.26	7.88	10.84	2.96	3.45	77.83	0.83	2.75	2231.14	0.73	87.72	29.52	2.78
Mozambique	5.36	39.03	0.14	0.30	56.12	8.40	0.21	216.11	11266.29	0.63	87.30	11.11	1.59
Namibia	0.99	9.77	0.01	0.00	48.16	13.60	0.91	17.94	8920.93	0.30	71.00	24.33	4.67
South Africa	12.08	7.30	1.23	0.79	68.73	5.50	0.09	50.00	1105.85	12.50	82.71	31.24	6.05
Swaziland	10.35	30.35	4.07	0.70	69.77	34.94	-1.11	4.51	4184.36	1.04	96.55	2.30	1.15
Zambia	7.08	42.03	0.06	0.04	40.36	31.90	2.72	105.20	9630.17	1.74	75.88	16.67	7.47
Zimbabwe	8.32	49.22	0.30	0.34	44.46	12.10	1.68	20.00	1548.55	4.21	78.91	14.01	7.09

Pressure on Water Resources		Total Primary Energy			Total Primary Energy Consumption		Carbon Dioxide Emissions		
2003-07	2005	2003	2003	2003	2003	2003	2003	2003	2003
40.32	73.02	13.90	5.41	8.50	22.54	39.64	336.46	2.59	1.40
2.93	42.39	7.07	1.33	5.73	20.77	41.87	84.36	2.65	1.32
96.91	117.75	2.70	2.32	0.38	27.52	32.29	135.24	1.88	1.60
0.00	711.33	3.36	0.73	2.63	...	130.81	49.72	8.96	...
96.49	14.91	0.00	0.05	-0.05	44.49	17.36	3.22	1.11	2.85
0.00	43.97	0.01	0.50	-0.48	10.82	16.21	33.74	1.10	0.74
76.92	57.86	0.51	0.14	0.36	7.79	4.12	8.84	0.26	0.50
8.99	57.89	0.25	0.34	-0.09	12.86	34.85	21.33	2.17	0.80
29.24	1.85	5.82	1.43	4.39	14.25	3.78	118.37	0.25	1.18
56.47	0.52	0.00	0.03	-0.02	7.36	3.82	1.72	0.25	0.49
0.00	6.24	0.00	0.02	-0.02	4.27	1.37	1.12	0.09	0.27
0.00	8.27	0.00	0.00	0.00	2.96	5.14	0.15	0.33	0.19
5.31	1.15	0.14	0.10	0.03	17.87	6.09	5.36	0.32	0.94
62.50	0.38	0.00	0.00	0.00	11.11	2.85	0.29	0.20	0.80
43.05	1.85	0.06	0.13	-0.06	16.69	6.00	5.47	0.26	0.73
0.00	0.67	0.00	0.02	-0.02	6.18	2.64	1.32	0.16	0.36
48.39	0.36	0.00	0.01	-0.01	21.62	3.46	0.38	0.25	1.57
13.79	0.05	0.00	0.01	-0.01	16.11	2.11	0.51	0.15	1.14
40.00	6.55	0.01	0.02	-0.01	3.53	1.18	0.62	0.05	0.14
89.60	6.48	0.00	0.02	-0.01	5.82	1.33	1.22	0.10	0.45
22.78	2.80	5.60	0.98	4.62	17.09	7.94	93.46	0.75	1.62
33.00	5.65	0.00	0.07	-0.06	10.13	6.51	4.56	0.45	0.70
0.00	0.24	0.00	0.01	-0.01	16.82	2.80	0.96	0.19	1.16
21.77	1.15	0.00	0.02	-0.02	10.84	3.51	1.23	0.23	0.70
36.29	0.10	1.77	0.19	1.58	6.60	21.43	18.59	1.93	0.64
4.38	0.35	0.18	0.08	0.10	6.13	4.78	6.24	0.39	0.50
2.36	0.02	0.00	0.01	0.00	4.84	1.51	0.35	0.09	0.29
65.12	0.53	0.08	0.00	0.08	1.15	0.35	0.20	0.02	0.08
73.32	0.01	0.52	0.02	0.51	4.30	4.12	3.03	0.82	0.65
0.00	0.42	0.46	0.05	0.41	16.98	100.99	3.93	8.02	1.35
0.00	0.07	0.53	0.04	0.49	6.45	29.40	4.74	3.56	0.78
0.00	...	0.00	0.00	0.00	23.84	8.88	0.10	0.60	1.82
18.92	1.64	0.23	0.55	-0.32	8.99	19.99	27.20	1.43	0.45
0.00	6.39	0.00	0.01	-0.01	12.87	1.12	0.42	0.06	0.71
0.00	...	0.00	0.00	0.00	4.61	1.91	0.10	0.13	0.32
29.85	0.03	0.11	0.08	0.03	5.76	1.52	1.81	0.03	0.13
0.00	2.67	0.00	0.03	-0.03	...	37.59	1.96	2.80	...
55.56	4.76	0.00	0.01	-0.01	13.00	2.24	0.71	0.16	0.95
0.00	5.05	0.02	0.08	-0.06	11.68	1.10	4.06	0.06	0.61
33.11	5.23	0.04	0.15	-0.11	10.69	4.80	8.11	0.25	0.56
0.00	4.44	0.01	0.04	-0.03	6.75	2.12	2.24	0.13	0.41
0.00	1.54	0.00	0.01	-0.01	8.11	1.63	0.89	0.11	0.53
0.00	...	0.00	0.02	-0.02	22.88	201.05	1.16	14.55	1.66
57.75	23.17	0.00	0.01	-0.01	...	1.29	0.75	0.09	...
9.89	5.70	0.03	0.08	-0.05	7.54	2.10	3.53	0.10	0.34
40.91	0.45	0.02	0.04	-0.02	5.97	1.46	1.46	0.06	0.23
28.36	3.58	8.32	5.71	2.62	26.17	24.96	454.37	1.75	2.08
0.00	0.19	1.96	0.13	1.82	9.74	9.89	15.93	1.17	1.15
80.39	1.14	0.02	0.05	-0.03	6.93	29.14	3.82	2.13	0.51
0.00	1.65	0.00	0.01	0.00	6.13	3.55	0.21	0.11	0.19
6.60	5.84	0.01	0.02	-0.01	14.42	2.03	0.80	0.07	0.47
0.00	26.35	0.00	0.05	-0.05	9.97	42.69	3.70	3.03	0.71
54.19	0.29	0.16	0.17	-0.01	38.50	8.82	1.74	0.09	0.40
65.66	1.67	0.01	0.05	-0.04	11.83	25.38	2.30	1.15	0.54
10.40	24.99	5.92	4.90	1.01	29.63	108.85	411.25	9.13	2.49
41.46	23.10	0.01	0.02	-0.01	11.10	19.56	1.35	1.25	0.71
23.76	1.65	0.09	0.11	-0.02	24.97	10.01	2.24	0.21	0.52
29.50	21.03	0.14	0.19	-0.05	22.44	14.63	11.04	0.86	1.31
21.60	1.14	3.00	1.53	1.47	20.57	15.60	1.30	1.10	0.77

Notes:

- a. Land use as % of land area. Source of Data: Food and Agriculture Organization (FAO) Online Database www.fao.org. Percentages do not add up to 100 because of land use overlap. Refer to FAO for the definitions of land use categories used in this table.
- b. Source of Data. World Resources Institute Online Database. www.wri.org
- c. Deforestation rate as % of total forest area. Source of Data: World Bank Africa Database 2005 CD-Rom
- d. Water indicators calculated from data obtained from FAO, Land and Water Development Division 2005. AQUASTAT Information
- e. WDR= Water Dependency Ratio. WDR is the ratio of water flowing in from neighboring countries to internal renewable water resources in the country. Zero means a country is totally dependent on its internal renewable water resources
- f. Data for the calculation of energy indicators were obtained from the US Energy Information Administration <http://www.eia.doe.gov>
- g. Ratio of total energy consumption to GDP (Thousand Btu per US \$ of GDP at market prices in year 2003)
- h. The ratio of CO₂ Emissions to GDP at market prices (Metric Tons of Carbon Dioxide per Thousand US \$ of GDP at Market Prices)

Institutional indicators

	Population Growth Rates ^a				Total Fertility Rate ^b	Life Expectancy at Birth ^c			Infant Mortality ^d			Under-5 Mortality ^e		
	Total	Rural	Urban	% Urban		Both Sexes	Males	Females	Both Sexes	Males	Females	Both Sexes	Males	Females
Subregion/country	2000-05	2000-05	2000-05	2005	2000-05	2000-05	2000-05	2000-05	2000-05	2000-05	2000-05	2000-05	2000-05	2000-05
North Africa	1.84	0.25	2.93	59.64	3.41	66.49	64.70	68.44	46.07	49.63	42.33	64.43	68.57	60.71
Algeria	1.51	0.16	2.47	60.00	2.53	71.00	69.70	72.20	37.40	38.40	36.30	41	42	40
Egypt	1.91	1.86	1.97	42.30	3.29	69.60	67.50	71.80	36.70	40.30	32.90	43	47	39
Libya	1.97	-0.44	2.35	86.90	3.03	73.40	71.40	76.10	19.20	19.70	18.70	21	21	21
Mauritania	2.97	-0.40	5.13	64.30	5.79	52.50	50.90	54.10	96.70	103.90	89.30	156	163	150
Morocco	1.48	-0.06	2.64	58.80	2.76	69.50	67.40	71.70	38.10	43.30	32.50	46	54	39
Sudan	1.93	0.41	4.35	40.80	4.45	56.30	54.90	57.90	72.20	77.70	66.40	119	126	113
Tunisia	1.10	0.21	1.60	64.40	2.00	73.10	71.10	75.30	22.20	24.10	20.20	25	27	23
West Africa	2.64	1.60	4.29	39.55	5.86	50.41	49.33	51.43	108.18	114.15	101.99	177.20	182.80	171.60
Benin	3.18	1.81	4.92	46.10	5.87	53.80	53.00	54.50	105.10	108.80	101.20	161	164	159
Burkina Faso	3.17	2.72	5.25	18.60	6.67	47.40	46.70	48.10	121.40	127.00	115.60	196	202	191
Cape Verde	2.39	0.47	3.92	57.60	3.77	70.20	66.80	73.00	29.80	38.20	21.20	36	46	25
Cote d'Ivoire	1.63	0.84	2.60	45.80	5.06	46.00	45.20	46.80	118.30	125.70	110.70	189	199	180
Gambia The	2.84	2.87	2.76	26.10	4.75	55.50	54.00	56.90	77.00	83.00	70.90	129	136	122
Ghana	2.14	1.27	3.20	46.30	4.39	56.70	56.20	57.20	62.30	64.90	59.60	102	103	100
Guinea	2.17	1.00	4.41	36.50	5.92	53.60	53.20	54.00	105.50	107.30	103.70	166	164	167
Guinea-Bissau	2.99	1.78	5.38	35.60	7.10	44.60	43.10	46.20	119.70	129.30	109.80	211	223	199
Liberia	1.37	0.26	2.66	47.90	6.80	42.50	41.40	43.50	141.90	151.40	132.00	224	232	215
Mali	2.98	1.96	5.15	33.70	6.92	47.80	47.10	48.40	133.50	138.50	128.20	220	223	217
Niger	3.39	2.70	5.84	23.30	7.91	44.30	44.20	44.30	152.70	156.00	149.20	264	262	266
Nigeria	2.24	0.68	4.06	48.30	5.85	43.30	43.10	43.50	114.40	119.60	108.80	200	204	197
Senegal	2.39	0.97	3.86	51.00	5.05	55.60	54.40	56.80	83.50	88.00	78.80	133	135	130
Sierra Leone	4.07	2.92	5.91	40.20	6.50	40.60	39.30	42.00	165.10	175.80	154.00	290	303	277
Togo	2.72	1.81	4.41	36.30	5.37	54.20	52.30	56.20	92.50	98.70	86.20	137	146	129
Central Africa	2.26	0.79	3.41	50.00	5.22	48.81	47.89	48.73	89.01	96.04	81.80	148.29	156.86	139.57
Cameroon	1.88	0.26	3.44	52.90	4.65	45.80	45.10	46.50	94.30	100.90	87.60	163	170	155
Central African Republic	1.33	0.45	2.53	43.80	4.96	39.40	38.50	40.30	98.20	109.50	86.60	176	192	159
Chad	3.42	2.90	5.02	25.80	6.65	43.60	42.50	44.80	116.00	125.50	106.20	203	215	191
Congo	3.02	2.09	3.84	54.40	6.29	51.90	50.60	53.10	72.30	81.50	62.90	108	120	96
Equatorial Guinea	2.31	0.48	4.32	50.00	5.89	43.50	42.80	44.20	102.00	109.40	94.40	181	190	173
Gabon	1.67	-2.82	2.57	85.20	4.02	54.60	53.80	55.40	57.90	62.10	53.60	95	100	90
Sao Tome and Principe	2.16	2.18	2.14	37.90	4.06	62.90	61.90	63.80	82.40	83.40	81.30	112	111	113
East Africa	2.63	1.64	4.92	32.89	5.80	49.03	47.98	50.04	92.77	99.44	85.90	152.92	160.67	144.92
Burundi	3.03	2.67	6.42	10.60	6.80	43.50	42.50	44.40	105.90	114.80	96.80	187	198	176
Comoros	2.65	1.72	4.39	36.30	4.89	63.00	60.90	65.10	57.70	64.80	50.20	77	86	68
Democratic Republic Congo	2.79	2.07	4.35	32.70	6.70	43.10	42.10	44.10	118.50	127.50	109.20	212	222	201
Djibouti	2.07	-0.80	2.64	84.60	5.09	52.70	51.40	53.90	93.20	101.20	84.90	140	149	131
Eritrea	4.26	3.74	6.34	20.80	5.53	53.50	51.50	55.40	64.60	67.80	61.30	94	98	90
Ethiopia	2.44	2.14	4.07	16.20	5.87	47.60	46.50	48.60	99.50	106.60	92.30	172	180	164
Kenya	2.20	0.32	5.17	41.60	5.00	47.00	47.90	46.20	67.80	73.60	61.70	118	125	110
Madagascar	2.78	2.50	3.54	27.00	5.40	55.30	54.00	56.70	78.80	83.80	73.60	131	137	126
Rwanda	2.38	0.39	11.80	21.80	5.70	43.60	41.90	45.30	115.50	122.70	108.30	190	201	178
Seychelles	1.01	0.51	1.52	50.20	...	...	...	...	...	...	...	...	...	...
Somalia	3.20	2.39	4.71	35.90	6.43	46.20	45.00	47.30	126.10	133.40	118.70	211	216	206
Tanzania	1.95	0.34	4.97	37.50	5.04	46.00	45.60	46.40	104.40	110.50	98.20	164	171	156
Uganda	3.40	3.31	4.06	12.40	7.10	46.80	46.50	47.10	81.20	86.60	75.60	139	145	133
Southern Africa	1.18	0.44	2.57	35.87	4.28	42.97	42.02	43.91	72.73	78.41	66.90	131.18	137.91	124.27
Angola	2.83	1.64	5.00	37.20	6.75	40.70	39.20	42.20	138.80	150.30	126.90	245	259	231
Botswana	0.13	-0.84	1.04	52.50	3.20	36.60	36.00	37.10	51.00	55.80	46.10	106	112	100
Lesotho	0.09	-0.07	0.81	18.20	3.65	36.70	34.90	38.10	66.50	72.30	60.50	123	130	116
Malawi	2.25	1.76	4.83	17.20	6.10	39.60	39.70	39.60	110.80	115.90	105.50	184	190	179
Mauritius	0.97	0.58	1.48	43.80	1.97	72.10	68.70	75.60	15.00	17.50	12.50	18	20	15
Mozambique	2.00	0.20	5.34	38.00	5.51	41.90	41.00	42.80	100.90	108.20	93.40	182	190	173
Namibia	1.39	0.62	3.01	33.50	3.95	48.60	47.70	49.40	43.80	46.90	40.70	78	81	75
South Africa	0.78	-0.32	1.62	57.90	2.80	49.00	47.10	51.00	42.70	45.70	39.70	74	78	69
Swaziland	0.18	0.00	0.75	23.90	3.95	32.90	32.50	33.40	73.10	80.30	65.70	143	152	134
Zambia	1.73	1.30	2.50	36.50	5.65	37.40	37.90	36.90	95.10	101.90	88.10	173	181	165
Zimbabwe	0.65	-0.04	1.94	35.90	3.56	37.20	37.50	36.90	62.30	67.70	56.80	117	124	110
Total Africa/ECA States	2.18	0.32	3.55	43.50	4.97	46.30	47.80	48.60	84.20	100.10	80.10	159	166	153

Country	Disease Prevalence			Literacy rate (% 15 years and above)			Net Primary School Enrollment Ratio			Gross Secondary School Enrollment Ratio			Gross Tertiary Enrollment Ratio			Access to Water			Access to Sanitation			Water Poverty
	Tuberculosis Prevalence Rate (PAF 100,000)	HIV Prevalence Rate (%) age 15+	...	Boys	Girls	...	Boys	Girls	...	Boys	Girls	...	Boys	Girls	...	Total	Rural	Urban	Total	Rural	Urban	
	2000	2001	2002	2000	2001	2002	2000	2001	2002	2000	2001	2002	2000	2001	2002	2000	2001	2002	2000	2001	2002	
321.57	179.71	0.51	35.71	25.57	45.57	88.20	89.20	87.00	64.43	64.96	63.86	25.00	24.25	25.75	77.71	87.14	85.43	67.71	51.43	81.00	50.67	
140	53	0.10	28	19	37	95	96	94	80	77	83	21	...	...	87.00	80.00	92.00	92	82	99	50
84	36	0.10	41	31	51	91	93	90	85	88	82	29	...	...	98.00	97.00	100.00	68	56	84	58
97	21	0.30	16	7	25	...	...	...	105	102	108	58	56	61	72.00	68.00	72.00	97	96	97	...
1000	664	0.60	57	47	67	68	68	67	23	25	20	4	6	2	56.00	45.00	63.00	42	9	64	50	
220	105	0.10	47	34	58	90	92	87	45	49	41	11	12	10	80.00	56.00	99.00	61	31	83	46	
590	355	2.30	37	27	47	...	...	...	35	38	32	...	...	...	69.00	64.00	78.00	34	24	50	49
120	24	0.10	24	14	33	97	97	97	78	75	81	27	23	30	82.00	60.00	94.00	80	62	90	51	
882.00	436.13	3.33	51.46	40.59	61.75	63.73	68.55	58.91	28.80	33.20	24.60	3.80	4.20	3.00	63.13	52.60	81.93	35.33	22.53	58.40	43.66	
850	141	1.90	57	41	72	...	...	...	28	38	17	...	...	...	68.00	60.00	79.00	32	12	58	39
1000	303	4.20	72	61	82	36	42	31	11	14	9	1	2	1	51.00	44.00	82.00	12	5	45	42	
150	328	...	22	13	29	99	100	98	70	67	73	5	4	5	80.00	73.00	86.00	42	19	61	41	
690	618	7.00	46	36	57	61	67	54	...	...	...	...	...	...	81.00	72.00	92.00	40	23	61	46
540	337	1.20	58	50	65	79	79	78	34	41	28	...	...	...	82.00	77.00	95.00	53	46	72	48
540	369	3.10	23	16	30	63	64	62	39	43	36	3	5	2	79.00	68.00	93.00	58	46	74	45	
740	394	3.20	...	...	...	65	73	58	24	33	15	...	...	...	51.00	38.00	78.00	13	6	25	52
1100	300	...	55	40	70	...	...	...	...	...	...	...	...	...	59.00	49.00	79.00	34	23	57	48
760	484	5.90	41	25	57	...	...	...	...	...	...	...	...	...	62.00	52.00	72.00	26	7	49	...
1200	582	1.90	71	60	81	44	50	39	20	25	14	2	...	...	48.00	35.00	76.00	45	38	59	41
1600	272	1.20	81	73	89	38	45	31	7	8	6	...	...	...	46.00	36.00	80.00	12	4	43	35
800	518	5.40	29	22	36	67	74	60	36	40	32	8	10	7	60.00	49.00	72.00	38	30	48	44	
690	429	0.80	58	48	67	58	61	54	19	23	16	...	...	...	72.00	54.00	90.00	52	34	70	45
2000	794	...	70.4	60.2	79.5	...	...	...	...	...	...	...	...	...	57.00	46.00	75.00	39	30	53	42
570	673	4.10	37	23	50	91	99	83	...	...	...	...	...	...	51.00	38.00	80.00	34	15	71	46
790.00	355.06	6.37	29.00	21.40	36.40	58.50	65.00	52.00	23.00	28.00	17.50	4.50	7.50	2.50	61.14	44.71	74.00	29.29	20.43	40.43	54.00	
730	221	6.90	23	17	29	...	...	...	31	34	28	5	7	4	83.00	41.00	84.00	48	33	63	54
1100	493	13.50	46	34	57	...	...	...	...	...	...	...	...	...	75.00	61.00	93.00	27	12	47	44
1100	439	4.80	49	41	57	63	75	51	15	22	7	...	...	...	34.00	32.00	40.00	8	0	30	39
510	489	4.90	14	9	19	54	55	53	...	...	...	4	8	1	46.00	17.00	72.00	9	2	14	57
890	351	...	13	6	20	...	...	...	...	...	...	...	...	...	44.00	42.00	45.00	53	46	80	68
420	242	8.10	...	...	...	...	...	...	...	...	...	...	...	...	87.00	47.00	95.00	36	30	37	62
...	256	...	...	...	...	...	...	...	...	...	...	...	...	...	79.00	73.00	89.00	24	20	32	...
925.83	520.69	4.66	30.93	23.97	37.73	64.29	65.86	62.43	32.22	35.00	29.33	2.00	2.78	1.33	61.69	69.70	106.50	37.48	31.46	50.08	42.70	
1000	519	6.00	46	40	52	57	62	52	11	13	9	2	3	1	79.00	78.00	90.00	36	35	47	40	
480	103	...	43	36	50	...	...	...	31	34	28	2	3	2	94.00	96.00	90.00	23	15	38	44
990	537	4.20	32	22	42	...	...	...	...	...	...	...	...	...	45.00	26.00	83.00	29	23	43	46
730	988	2.90	30	20	39	...	...	...	20	24	15	1	1	1	80.00	67.00	82.00	50	27	56	38
630	431	2.70	40	28	50	45	49	42	28	34	22	2	3	...	57.00	54.00	72.00	9	3	34	37	
850	507	4.40	55	48	62	47	52	42	20	25	14	2	4	1	22.00	11.00	81.00	6	4	19	35	
1000	821	6.70	13	8	18	66	66	66	33	34	32	...	...	...	62.00	46.00	89.00	48	43	56	47
550	325	1.70	29	23	36	79	78	79	...	...	...	2	2	2	45.00	34.00	75.00	33	27	49	48
1400	629	5.10	27	22	32	87	85	88	16	18	15	3	4	2	73.00	69.00	92.00	41	38	56	...	
...	65	...	8.1	8.6	7.7	...	...	...	111	111	111	...	...	...	87.00	75.00	100.00	100	100	100	...
1100	748	...	...	...	...	...	...	...	...	...	...	...	...	...	29.00	27.00	32.00	25	14	47	...
1500	476	8.80	20	13	27	69	69	68	...	...	...	1	1	1	73.00	62.00	92.00	46	41	54	48
880	621	4.10	28	19	37	...	...	...	20	22	18	3	4	2	56.00	52.00	87.00	41	39	53	44
720.38	423.55	21.92	21.56	17.26	25.02	70.90	70.50	71.60	50.10	49.80	50.30	6.88	6.63	7.38	71.55	62.45	91.18	48.27	37.55	68.91	50.18	
1700	256	3.90	33.2	17.9	46.2	...	...	...	...	...	...	1	1	1	50	40	70	30	16	56	41
100	342	37.30	19	21	18	81	79	83	73	70	75	5	5	4	95	90	100	41	25	57	57	
550	390	28.90	14	24	5	86	83	89	35	30	39	3	2	4	76	74	88	37	32	61	43	
1800	469	14.20	36	23	48	...	...	...	33	37	29	...	...	...	67	62	96	46	42	66	38
24	136	...	14	11	16	97	96	98	81	81	81	15	13	18	100	100	100	99	99	100	60	
1000	557	12.20	50	34	64	55	58	53	16	19	13	...	...	...	42	24	76	27	14	51	45
300	477	21.30	15	14	15	78	76	81	62	59	66	7	8	7	80	72	96	30	14	66	60	
230	341	21.50	13	12	13	89	89	89	88	84	91	15	14	18	87	73	98	67	44	86	52	
370	683	38.80	17	16	18	75	75	75	45	45	46	5	4	5	52	42	87	52	44	78	53	
750	508	16.50	18	12	23	68	69	68	28	30	25	...	...	...	55	36	90	45	32	68	50
1100	500	24.60	8	5	11	80	80	80	40	43	38	4	5	4	83	74	100	57	51	69	53	

Notes:

a. United Nations Population Division. World Population Prospects 2004 Online Database, UN Population Division.

b. Percentage urban of the total population. Source: United Nations Population Division. 2004. World Urbanization Prospects The 2003 Revision

c. Maternal Mortality Ratio per 100,000 live births. Source of Data: WHO, UNICEF, UNFPA

d. United Nations Statistics Division. MDG Online Database

e. UNESCO Online Database

f. Data were collected under the WHO-UNICEF Joint Monitoring Program and published in 2005. Further information about the JMP and its methodology can be found at: <http://www.unicef.org/jmp/>

g. The Water Poverty Index (WPI) measures the impact of water scarcity and water provision on human populations. WPI is a number between 0 and 100, where a low score indicates water poverty and a high score indicates good water provision. WPI is comprised of five component indices: Resources, Access, Capacity, Use, and Environment. Each of these component indices is made up of sub-indices. Source: World Resources Institute. www.wri.org.

The following signs and simples are used in the tables:-

k	Thousands
m	Millions
B	Billions
Q	Quadrillion
mt	Metric tons
m ³	Cubic meters
inhab.	Inhabitants
...	Data not available
Btu	British Thermal Unit
yr	Year