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UNIDO

African Industrial Workshop

Africa-Regional Industrial review

African Preparatory Conference for the World Summit on Sustainable development

Nairobi, 15-18 October 2001

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Preface

There have been many responses to Agenda 21 and the widespread dissemination of the concept of sustainable development, some of which may not have been expected. The word "sustainability" has been introduced into everyday conversation, but is often used without thought as to its recent history, context and meaning.

The passing of a decade since the United Nations Conference on Environment and Development (UNCED), held in Rio de Janeiro, Brazil, in 1992, provides an opportunity to reflect on the irreversible changes that have occurred within industry and in the regulatory climate within which it operates. This report, prepared for UNEP/UNIDO by Professor C.A. Buckley of the Pollution Research Group of the School of Chemical Engineering at the University of Natal in Durban, South Africa, serves to record some of the major events and changes that have occurred in Africa since UNCED. It also serves to record visions for the future in order to provide a platform for debate and discussion on the way ahead. In 1992, there was a vision and a desire to strive for sustainable development. There were goals and there were challenges, but each region had to define its own way forward. During the next 10 years, the lessons of the past must be learned, and diligence and thoughtfulness must characterize our endeavours.

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Explanatory notes

The following abbreviations and acronyms have been used:

AGOA	African Growth and Opportunities Act
BOD	biochemical oxygen demand
CIDA	Canadian International Development Agency
CDG	Carl Duisberg Gesellschaft e.V.
DANCED	Danish Cooperation for Environment and Development
DANIDA	Danish International Development
ECA	United Nations Economic Commission for Africa
EMPR	environmental management programme report
FAO	Food and Agriculture Organization of the United Nations
FINNIDA	Finnish International Development Agency
GCA	Global Coalition for Africa
GEF	Global Environment Facility
GNP	gross national product
GTZ	Deutsch Gesellschaft für Technisch Zusammerarbeit (GTZ) GmbH
GDP	gross domestic product
ILO	International Labour Organization
ISO	International Organization for Standardization
IUCN	World Conservation Union
LCA	life-cycle assessment
MVA	manufacturing value added
NEDLAC	National Economic Development and Labour Council (South Africa)
OAU	Organization of African Unity
OSH	Occupational safety and health
OPEC	Organization of Petroleum Exporting Countries
PGM	platinum Platinum-group metals
SADC	Southern African Development Community
SANSA	South African Network of Skills Abroad
SME	small and medium enterprise
SARDC	Southern African Research and Documentation Centre
UNAIDS	Joint United Nations Programme on HIV/AIDS
UNCTAD	United Nations Conference on Trade and Development
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNIDO	United Nations Industrial Development Organization
WHO	World Health Organization
WTO	World Trade Organization
WRI	World Resources Institute

Executive Summary

Industrial activity is a major contributor to many of the environmental and social problems facing society today. Industrial activity has, however, the potential to make an important contribution to achieving a sustainable society. It has been recognized that a key determinant of success for sustainable development is the linking of trade and environment. Rapid globalization, initiated in part by advances in communications technology, has facilitated the integration of national systems of production and finance, resulting in the growth of cross-border flows of goods, services and capital. Concepts and systems of manufacture have rapidly changed. This has had both negative and positive consequences for sustainability and has led to disagreements between developed and developing countries and within countries themselves. There are increased tensions between trade and environmental policies and issues. Environmental issues are becoming globalized, and it is now well recognized that many actions and impacts in one region have global impacts. As a result, environmental issues are increasingly becoming part of trade issues.

The New African Initiative is a pledge by African leaders based on a common vision and a firm and shared conviction that they have a pressing duty to eradicate poverty and place their countries individually and collectively on a path of sustainable growth and development, and at the same time a duty to participate actively in the world economy and world politics (OAU, 2001). The programme is based on the determination of Africans to extricate the continent from the malaise of underdevelopment and exclusion. Sustainable industrial development is one of the objectives of this initiative.

Poverty and the lack of capacity in many African countries is a major cause of environmental degradation. Increased investment in industrial development and the resulting increase in employment and wealth could be the route to environmental improvement and sustainability. Africa has undergone major social, economic and political transformations. At the turn of the twentieth century, the total population was estimated to be 118 million, 7.4 per cent of the world population. During the following 50 years, the population grew slowly as high fertility rates were offset by high death rates attributable to poor health conditions, infectious diseases and civil wars. When mortality rates began to decline sharply from the 1950s onwards as a result of the improved health conditions associated with economic development, there was a dramatic population increase. By 1997, the population was estimated to be 778.5 million, more than 13 per cent of the total world population (United Nations Population Division, 1996). It is projected that by 2025 the population in Africa will almost double, to 1,453 million, about 18 per cent of the projected total world population (ibid).

Only a small proportion of Africa's population is employed in the formal manufacturing sector. The most common industries are agro-industrial activities (food, textiles, leather and beverage production). However, Africa is richly endowed with minerals. Mining operations and oil and gas exploitation provide significant employment and are major sources of foreign exchange. In addition, they attract substantial foreign investment. Within the African context, tourism and commercial agriculture should be considered as important industrial activities that hold a great potential for employment and poverty alleviation.

Exploitation of minerals and hydrocarbons creates environmental impacts with pollutants such as sulphur dioxide and other acid gas emissions, acid mine drainage water and heavy-metal contamination. One type of water pollution, eutrophication, is a major problem for river systems, lakes and dams reservoirs is caused by industrial activity and wastes from human settlements and agriculture. Many environmental initiatives have been undertaken by industry in Africa, some funded and driven by international donor organizations, while others have been the result of local initiatives.

Action should be taken to reverse the current trend whereby Africa is increasingly marginalized. The achievement of peace, security and partnership between all interested parties are major priorities. The threats and opportunities posed and offered by globalization are amongst the greatest challenges to Africa.

It is recommended that the following issues should be incorporated into the agenda of the World Summit on Sustainable Development:

(a) More sustainable and beneficial use of African resources;

(b) Extension of basic services to all;

(c) Increased debt relief linked to sustainable development, good governance and poverty reduction;

(d) Creation of enabling environments for increased investment;

(e) Formation of partnerships between all stakeholders;

(f) Technology transfer.

The promotion of industrial development on a sustainable basis would make a significant contribution to poverty reduction and improved natural resource management. Sound corporate governance in the public and private sectors and the achievement of political and social stability are prerequisites for the successful implementation of any Summit decision. Industry affirms its support for the summit, which it trusts will deliver a new deal that will include all stakeholders working in partnership for our common future.

I. IMPLEMENTATION OF THE THREE DIMENSIONS OF SUSTAINABLE DEVELOPMENT

1. Industrial activity is a major contributor to many of the environmental and social problems facing society today. Industrial activity, however, has the potential to make an important contribution to achieving a sustainable society. It has been recognized that a key determinant of success in achieving sustainable development is the strong linking of trade and environment. Rapid globalization, initiated in part by advances in communication technology, has facilitated the integration of national systems of production and finance, resulting in the growth of cross-border flows of goods, services and capital. Manufacturing concepts and systems have changed rapidly. This has negative and positive consequences for sustainability and has led to disagreements between and within developed and developing countries. There are heightened tensions between trade and environmental policies and issues. Environmental issues are becoming globalized: certain actions and impacts in one region are now well recognized as having global impacts. This results in environmental issues increasingly becoming part of trade issues.

2. Poverty and lack of capacity in many African countries are major causes of environmental degradation. Increased investment in industrial development and the resulting increases in employment and wealth could be the route to environmental improvement and sustainability.

3. In seeking to ascertain the status of industry in respect to sustainability, a more specific definition of sustainable development has been suggested than that provided by the Brundtland Report, which states that "sustainable development is development that meets the needs of the present generation without compromising the ability of future generations to meet their needs". A suggested point of departure is the concept of sustainable investment, whereby investors obtain an acceptable and long-term return on financial capital without systematically degrading natural capital resources while at the same time building the social capital associated with the investments.

4. The following Tables provide examples of indicators of sustainable industrial development.

Economic elements of sustainable industrial development – developing financial capital

• Employment creation	• Developing a skilled workforce
• Ensuring competitiveness in the global market	• Maximizing natural resource productivity
• Increasing foreign exchange reserves	

Environmental elements of sustainable industrial development – protecting natural capital

• Promoting energy and water efficiency	• Minimizing waste and pollution
• Maintaining biodiversity	• Preventing or remedying land contamination
• Addressing climate change	• Promoting use of renewable resources
• Maintaining air and water quality	

Social elements of sustainable industrial development – promoting social capital

• Poverty alleviation	• Addressing historical inequalities
• Provision of education and training	• Protecting consumer rights and interests
• Reducing crime	• Empowering local communities
• Access to housing and basic infrastructure	• Ensuring health and safety in the workplace
• Promoting culture, sports and heritage	• Promoting community health
• Providing equal opportunities	

5. Natural capital is integral to the development of the economy of a region. Africa's place in the global community is defined by the fact that the continent is an indispensable resource base that has served all humanity for many centuries. Africa's rich complex of mineral, oil and gas deposits, its fauna and flora and

its wide, unspoiled natural habitat provide the basis for mining, agriculture, tourism and industrial development. The continent's rainforests are an ecological lung, and the minimal presence of environmentally harmful emissions and effluents represent a global public good that benefits all humankind. Africa's palaeontological and archaeological sites contain evidence of the evolution of the earth, life and the human species and its natural habitats contain a wide variety of unique fauna and flora. Also, open, uninhabited spaces are a feature of the continent. The richness of Africa's culture and its contribution to the varied cultures of the global community are well recognized (OAU, 2001).

6. Social capital development is about trust and social relations. In Fukuyama's terms, social capital is "a capability that arises from the prevalence of trust in society or in certain parts of it" (Fukuyama, 1995). It is a measure of "the ability of people to work together for common purposes in groups and organizations". It consists of both human capital (public health, nutrition, skills, education) and health and wealth creation potential (which includes intellectual capital). The implication is that a higher degree of trust (or common purpose) will enable a society to innovate organizationally.

A. The social dimension

7. Africa has undergone major social, economic and political transformations. At the turn of the twentieth century, the total population was estimated to be 118 million, 7.4 per cent of the world population. In the next 50 years, Africa's population grew slowly as high fertility rates were offset by high death rates attributable to poor health conditions, infectious disease and civil wars. When mortality rates began to decline sharply from the 1950s onwards as a result of the improved health conditions associated with economic development, there was a dramatic population increase. By 1997, the population was estimated to be 778.5 million, over 13 per cent of total world population (United Nations Population Division, 1996). It is estimated that by the year 2025, the population of Africa will almost double to 1,453 million, about 18 per cent of the projected world population (ibid).

8. Poverty and environmental degradation are linked in a vicious circle in which people cannot afford to take proper care of the environment (SARDC, IUCN and SADC, 1994). Poverty has been and remains a major cause and consequence of environmental degradation and resource depletion. Currently, almost 40 per cent of people in sub-Saharan Africa live below the poverty line, and both income poverty and human poverty are increasing (UNDP, 1997). According to current projections, Africa is the only continent where poverty is expected to rise during the next century (UNDP, 1998). The human condition in Africa remains a problem: of 45 countries low on the UNDP list of human development indicators, 35 are in Africa (UNDP, 1997). Reducing poverty and improving human development are major challenges for the continent.

9. Although the 1980s were considered a "lost" decade for both economic and environmental improvement in Africa (UNEP, 1991), with either negative or sluggish economic growth, there have been signs of economic recovery since the mid-1990s. In 1996, GDP grew by 4 to 5 per cent for the second year in a row, exceeding population growth, and in nearly three-quarters of sub-Saharan countries annual growth was over 3 per cent (GCA, 1997). Rates, however, varied from –15.4 per cent in Burundi to +37.3 per cent in Equatorial Guinea +16.1 per cent in Malawi (ECA, 1997). This overall good performance in every subregion except West and Central Africa was the result of better weather, a more favourable international environment and improved macroeconomic policies. Increased agriculture production was a notable contributing factor to higher growth (GCA, 1997).

10. During the 1980s and 1990s, many countries embarked on economic reform through structural adjustment programmes. While economic liberalization may have helped fuel economic recovery, there are indications that economic growth will harm rather than improve environmental conditions. For this reason, there is no substitute for explicit environmental policy actions (WRI, UNEP, UNDP and World Bank, 1996).

11. The debt burden has been a major constraint for many nations, which have had to spend more on servicing their debt than on providing basic social services. In 1997, Africa's total debt stood at $349 billion, or 67.5 per cent of annual GDP, with a debt service ratio of 21.3 per cent of exports plus remittances (ECA 1998). External debt varies widely; indeed, Angola, Côte d'Ivoire, the Democratic Republic of the Congo, Nigeria and the Sudan account for nearly half the debt of sub-Saharan Africa (United Nations, 1996).

Although the debt issue is being addressed by the international community, relief will be selective and will take a number of years to have effect (UNDP, 1997).

12. Africa's share in world trade is small and is shrinking because of fierce competition from other regions, which are enjoying faster and more sustained economic growth. In 1995, the continent's terms of trade had fallen to 89 per cent of the 1987 baseline index (GCA, 1997). Nevertheless, exports and imports significantly influence the regional economy, with exports alone accounting for 25 per cent of regional GDP and imports providing 20 per cent of domestic supply. Imports increased from $91 billion in 1990 to $125 billion in 1996, making Africa one of the world's most open regions (ECA 1997).

13. Growing fiscal constraints and competition for ever-dwindling public resources have seen the environment sacrificed, in terms of budgetary allocations, to the more pressing demands of health and education. As a result, donor funding is sustaining most environmental management programmes.

1. Emigration

14. Human capital plays a decisive role in the process of economic development (Mebratu, 2001), and investment in this field is a prerequisite for sustained economic growth. Most African countries suffer from low levels of investment in human capital. This has been further aggravated by a massive outflow of what little skilled manpower they have trained using scarce domestic resources. This form of resource loss has not received much attention from policy-makers, researchers or the international community. ECA estimates that between 1960 and 1975 about 27,000 high-level African professionals left for developed Western countries. In a 1995 World Bank study it was noted that some 23,000 qualified academic professionals emigrate from Africa each year in search of better working conditions. As a result, African countries have lost as much as one-third of their highly skilled personnel in recent decades. The region lost an estimated 60,000 middle- and high-level managers between 1985 and 1990 (Aredo and Zelalem, 1998). This situation has been made worse where the emigration of African professionals has necessitated their replacement by more expensive, expatriate experts (Mebratu, 2001), 30,000 of them in 1993. The World Bank estimates that, overall, 100,000 expatriates from the industrialized countries are employed in Africa at a cost of $4 billion per year, amounting to nearly 35 per cent of official development assistance directed to the continent (Aredo and Zelalem, 1998). Given the increasing brain drain from developing countries, it is difficult to conceive of sustained economic development taking place there on the basis of assistance by highly paid expatriate and foreign-based national experts.

2. Science and technology

15. There is a correlation between the rate at which a country's scientific establishment publishes articles on the natural and earth sciences and its capacity to respond to environmental problems. Data on publishing are available for only four countries (Egypt, Kenya, Nigeria and South Africa). The 1995 output ranges from 27 to 2 articles per million population, whereas the global median value is 110 articles per million population. These data are an indication of the national resources devoted to research and development. Data from 15 African countries indicate that expenditure ranges from 0.70 per cent of GNP (South Africa and Benin) to 0.01 per cent (Gabon), with a median of 0.25 per cent of GNP. This can be contrasted with a global median of 0.64 per cent of GNP. The technical capacity of countries can also be assessed by the number of research and development scientists and engineers. The global median is 663 per million inhabitants, while the African median is 75 per million inhabitants. All African countries except South Africa fall below the global median; nevertheless, Egypt, Gabon, Libya and Mauritius all have over 200 research and development scientists and engineers per million population (2001 Sustainability Index).

16. Africa's industries continue to be dominated by low levels of technology, skills and capacity utilization with a seemingly limited scope for the adoption of computer-assisted manufacturing and knowledge-intensive production systems. This, coupled with a heavy dependence on primary commodity exports (accounting for around 80 per cent of total export earnings), reflects the low levels of human resource development and limited technological capability that are major constraints to industrial expansion (United Nations, 2001).

17. Increased productivity is a prerequisite for higher incomes and rural industrial development. Thus, Africa's struggle to achieve rapid economic transformation will be lost or won depending on how effectively industrial development is linked with agricultural development, be it through increased manufacturing added value or through increased productivity and competitiveness to improve general employment levels (United Nations, 2001).

18. Globalization places a high premium on scientific and technological capacity to innovate and adapt and to increase productivity and competitiveness. Growth in the knowledge-driven economy is predicated on a labour force that is healthy and well endowed with knowledge and skills. Despite the progress in education and health in Africa over the past half century, both the volume and quality of human capital are widely acknowledged as being grossly insufficient to meet the challenges of the twenty-first century (United Nations, 2001).

19. The general objective of human resources development for industrialization is to reduce over-dependence on imported technical and scientific personnel while at the same time providing entrepreneurial capabilities and high-level managerial, engineering, technical and operational skills. Ideally, this should result in significant improvements in competitiveness, as measured by higher levels of productivity, better product quality, increased production and sales (both locally and internationally), and improved market share. The ultimate goal is to create a shift away from commodity dependence towards manufacturing at more advanced technology levels. This suggests that the required human capital should be able to transform available natural resources with maximum added value. The development of human resources for industrialization aims to match the supply of human resources to demand at the various levels and in the various sectors of the economy (United Nations, 2001).

20. A specific objective of human resources development is to produce an entrepreneurial cadre as pace-setters for industrialization who will provide the critical capabilities required for research and development and for the managerial, scientific, technological, technical and planning functions on which the industrial sector depends. For policy-making, the challenge is to identify the strategic sectors for which investment in human capital is required over the long term. Improving the human capital base also requires additional public investment, to reduce the cost of advanced education at the household level, promote higher enrolment in basic education programmes and the like. Similarly, particular efforts will have to be made to improve access to education for girls (United Nations, 2001).

3. Share of the manufacturing sector in total employment

21. The country-specific employment data presented in Annex I show that a very small proportion of Africa's population is employed in the formal manufacturing sector (UNIDO, 2001). For countries where data are available, the proportion of the population employed in the manufacturing sector ranges from high manufacturing employment countries such as South Africa (3.5 per cent), Tunisia (3.3 per cent), Mauritius (1.8 per cent), Zimbabwe (1.5 per cent), Botswana (1.5 per cent) and Algeria (1.0 per cent) through intermediate manufacturing employment countries such as Kenya (0.7 per cent), Zambia (0.6 per cent) and Ghana (0.4 per cent) to countries where manufacturing employment is negligible.

22. The most widespread manufacturing employment sectors are food, textiles, clothing and beverage production. Mining and natural-resource extraction are not included in these figures (UNIDO, 2001). In 1999, the manufacturing sector in Tunisia employed 450,000 people (33 per cent of the working population). Manufacturing enterprises employing 10 or more people provide 85 per cent of the jobs in that sector and export-only enterprises provide 55 per cent of all employment in the sector.

4. Share of the mining sector in total employment

23. Mining (formal large and medium-scale, and small-scale) is a major contributor to employment, especially in the SADC countries, where there are about 2,500,000 people employed in formal mining activities and 1,500,000 in the small-scale sector. The United Republic of Tanzania and Zimbabwe account for 550,000 and 350,000 miners respectively, mainly involved in small-scale mining. The number of small-scale miners is expected to triple over the next 10 years in Zimbabwe. The situation in other parts of the

region should largely follow a similar pattern (Drechsler, 2001). It is estimated that there are about 3,500,000 small-scale and traditional miners in Africa. The sector could be providing livelihoods for up to 2,000,000 people and has the capacity to contribute more than $3 billion to GDP (ILO, 1999).

5. Share of the tourism sector in total employment

24. The World Travel and Tourism Council estimates that for 2001 the travel and tourism sector directly employed 4,500,000 people and indirectly employed 11,000,000 people in sub-Saharan Africa, while in North Africa the numbers are 1,500,000 and 3,000,000 respectively. This activity directly contributes $23 billion (4 per cent of GDP) and indirectly $48 billion (8.3 per cent of GDP) to the economies of African countries (World Travel and Tourism Council, 2001).

6. Female–male ratio in manufacturing

25. Empirical evidence from some studies reveals not only that Africa has the largest number of poor people in the world but also that poverty is also increasingly taking on a female face (World Bank, 1998; UNDP, 1995). Although the data disaggregated by gender for formal sector employment are rather marginal, available statistics show that fewer women than men are represented in this sector. Women's participation in the industrial sector remains low, varying from 2 per cent in Guinea-Bissau and Madagascar to 17 per cent in Ghana and South Africa (World Bank, 1998). The proportion of economically active women working in the industrial sector ranges from 43 per cent in Mauritius, 40 per cent in Tunisia and 10 per cent in Zimbabwe to 1 per cent in Ethiopia. The male–female ratio in the industrial sector varies from 6:1 (Egypt) to 2:1 (Ethiopia, Mauritius and Tunisia) (UNDP, 2001).

26. Small-scale or informal mining has a high proportion of women (Zimbabwe, over 50 per cent; Zambia, over 30 per cent; Mozambique, 30 per cent and the United Republic of Tanzania, 25 per cent) and children (20 to 25 per cent) (Drechsler, 2001).

7. Health

27. Infectious diseases are responsible for almost half of mortality in developing countries. These deaths occur primarily among the poorest people because the poorest do not have access to the drugs and commodities necessary for prevention or cure. Approximately half of the infectious-disease mortality can be attributed to just three diseases, HIV, tuberculosis and malaria. None of these diseases has an effective vaccine to prevent infection in children and adults (WHO, 2000).

28. It has been reported that at the end of 1999 there were 23 million people in sub-Saharan Africa living with HIV or AIDS (UNAIDS, 2000). This is approximately 8 per cent of the total adult population. Countries with more than 20 per cent of their population living with HIV or AIDS are Botswana, Lesotho, Swaziland and Zimbabwe, while it is estimated that Ethiopia, Kenya, Nigeria and South Africa each have over 2 million cases. Within the African region, WHO reports that in 1998 there were an estimated 961,000 deaths from about 240 million cases of malaria and about 1.5 million deaths attributable to tuberculosis (WHO, 2001).

B. The economic dimension

29. Poverty alleviation is a key duty set out in the New African Initiative. Also poverty alleviation as a key to sustainable development is a core issue for the SADC region where, the fossil fuel sector has attracted foreign investment. A partial solution would be improved access to markets and financial mechanisms.

30. In the 1990s, almost all African countries embraced privatization and the attraction of foreign capital as central to their economic development policies. The majority of these countries are, however, more attentive to the apprehensions and evaluations of international organizations and transnational companies than to their domestic providers of capital. Despite these efforts, Africa's participation in flows of foreign direct investment (FDI) is minute and has actually been shrinking in recent years. According to UNCTAD, Africa's share of developing countries' FDI had fallen from 11 per cent in the 1986–1990 period to

5 per cent in 1991–1996 and decreased even more to a mere 3.8 per cent in 1996. On the other hand, funds held by Africans abroad amount to hundreds of billions of dollars. Africa has a larger portion of wealth held overseas by residents than any other continent: 39 per cent, compared with 6 per cent for East Asia before the economic crisis of the late 1990s (ECA, 1999).

31. Between 1982 and 1991, capital flight from the severely indebted, low-income countries in sub-Saharan Africa was about $22 billion, equivalent to about half the external resources required for development. It should be noted that as Africa struggles to cope with debt, the average ratio of capital flight to debt was over 40 per cent for 18 sub-Saharan African countries. For some countries, it is even higher (94.5 per cent for Nigeria, 94.3 per cent for Rwanda and 74.4 per cent for Kenya) (ECA, 1999). Relative to other regions, sub-Saharan Africa invests less of its own capital at home than other developing areas. Despite a lower level of wealth per worker than in any other region, Africa's wealth owners have relocated 37 per cent of their wealth outside the continent. This compares to a ratio of 17 per cent in Latin America and only 3 per cent in East Asia (Mebratu, 2001).

32. In Africa, per capita income dropped from $749 in 1980 to $688 in 1998, and poverty is expected to increase over the next 10 years. This is clear from the trends in economic growth throughout the region. In order to halve poverty by 2015, GNP needs to grow at an annual rate of 5 per cent whereas the average growth rate in the 1990s was only 2.1 per cent (United Nations, 2001).

33. Sufficiently high growth rates can be sustained only if efforts are made to diversify the production base of African economies, particularly expansion of the manufacturing sector and other industrial activities. Empirical studies have shown that a 1 per cent growth in GDP requires more than a 1 per cent growth in manufacturing value added. In order for African economies to grow quickly, the industrial sector will need to grow faster to create spillover effects in other sectors of the economy. The corresponding increase in manufacturing value added, however, requires an economically conducive environment, together with the necessary support infrastructure to minimize transaction costs, a major stumbling block for higher growth of the industrial sector in Africa (United Nations, 2001).

34. Mining activities (both the formal large- and medium-scale and the informal small-scale) provide a significant contribution to GDP, ranging from 12 per cent (Zambia), 8 per cent (South Africa and Zimbabwe) to between 1 and 2 per cent (Malawi, Mozambique and the United Republic of Tanzania) (Drechsler, 2001).

1. Economy-wide net investment

35. Official development assistance to sub-Saharan Africa averaged $18 per person in 1999. In 1999, net foreign direct investment (as a per centage of GDP) was 29 per cent in Angola, 18 per cent in Lesotho, 17 per cent in Equatorial Guinea, 9 per cent in Mozambique and 5 per cent in Zambia. Elsewhere, net foreign direct investment was less than 5 per cent of GDP (UNDP, 2001).

36. A study of public enterprises in Nigeria showed that most if not all of the large-scale industries established by Government were technological failures, whether they were agriculture-related industries such as sugar processing and the production of fertilizers, or iron and steel, cement or newsprint manufacturing (Imevbore, 2001). In all cases, the conceptualization of the process of technology and capability acquisition was totally deficient. In no case did the contractual agreements for establishing industries did not include a commitment to long-term support of the enterprise beyond facilitating acquisition of hardware. The point seemed to be lost in all cases that technological learning is not a by-product of hardware purchases but a strategic objective to be pursued in industrialization efforts. Furthermore, the continuing harassment of companies by some State and local Governments through unauthorized multiple levies and charges in defiance of the law creates a significant disincentive for business. Consequently, frequent disruptions of production occur. There is clearly an urgent need to enhance the ability of local manufacturers to operate through policy measures that seek to address the problems causing poor utilization of capacity.

2. Ratio of trade to GDP

37. UNIDO studied country statistics highlighting country population, manufacturing value added (monetary value, proportion of GDP, per capita value), manufactured exports (monetary value, proportion of total exports), number of employees in the manufacturing sector and the three top-ranked manufacturing sectors. The values of goods and services exported as a proportion of GDP range from highs of 78 per cent (Congo) and 64 per cent (Mauritius) to a low of 6 per cent (Rwanda), with an average of about 30 per cent. Twice as many countries increased the value of their exports of goods and services as decreased them over the study period. For sub-Saharan Africa, the average ratio of primary exports to manufactured exports was 2:1. Only in Madagascar, Mauritius, Senegal, the South Africa Customs Union and Tunisia did the value of manufactured exports exceed the value of primary exports. Over the past 10 years, the ratio of the value of manufactured goods to primary exports from these five entities has increased. Only South Africa has a significant proportion of high-technology manufactured exports (7 per cent by value) (UNDP, 2001).

38. In Tunisia, the average annual growth rate for industry and manufacturing between 1992 and 2000 was 5.9 per cent. In 1998 they contributed 33 per cent of GDP. Continued reliance on exporting primary resources has a negative effect on the economies of countries as commodity prices and demand have declined for most of the decade. On one hand, the decline in the export of primary resources should be welcomed because it could indicate a move by society in general to a less-resource-intensive lifestyle. On the other, it increases the economic hardships for exporting countries. In 1995, Tunisia signed free-trade agreements with the European Union that will result in a phased opening of the market and the abandonment of trade tariffs by 2007. In 1996, a national plan for industrial upgrading was initiated. Approximately 4,000 key industrial enterprises have been targeted for assistance over a 10-year period.

39. In Nigeria, the oil sector accounts for over 80 per cent of revenue and over 95 per cent of exports. Agriculture accounts for about one third of GDP, while the industrial sector contributes only 6 per cent to GDP.

40. At 30 per cent, capacity utilization in all sectors of the Nigerian economy between 1998 and 2000 was very low. The Manufacturers' Association of Nigeria attributed this (Imevbore, 2001) to:

(a) Raw material supply problems: dysfunctional infrastructure: inadequate technical facilities for processing raw materials of the correct technical specifications and quality; uncertainty of supply; exorbitant prices of certain local raw materials compared to their imported counterparts; and

(b) An inability to compete with imports resulting from uncoordinated trade liberalization, dumping and inconsistent Government policies.

41. The challenge is to move up the value chain and add more value to primary commodities before they are exported. Also, the export of agricultural products produced in a sustainable manner should be developed.

3. Per capita manufacturing value added in GDP

42. Data on manufacturing value added are available for a number of African countries. The 1990 average for Africa was $80 per person per year. This can be contrasted with the 1990 figure of $290 for all developing countries and $4,880 for developed countries. Thus, it can be inferred that, in general, the manufacturing sector is insignificant and environmental degradation from manufacturing is not potentially as serious a problem as in the rest of the world. The challenge, however, is to ensure that cleaner production techniques are transferred whenever manufacturing investments are considered. Further capacity must be developed to regulate and operate such technology.

43. Countries with a significant manufacturing sectors (i.e., exceeding $200 per capita per year) include Egypt, Libya, Mauritius, Morocco, South Africa and Tunisia. When ranked according to value added, South

Africa is far ahead of the rest, producing about one third – $5.1 billion – of the manufactured output, followed by Egypt, Morocco, Libya, Algeria and Tunisia.

4. Minerals

44. Mineral exploration and production are significant parts of the economies of African countries and remain key factors for future economic growth. The region is richly endowed with mineral reserves and ranks first or second in terms of concentration (20 to 89 per cent) of world mineral reserves of bauxite, chromite, cobalt, diamonds, gold, manganese, phosphate rock, PGM, titanium minerals (rutile and ilmenite), vanadium, vermiculite and zirconium (Coakley and Mobbs, 2000).

45. In 1999, although the continent attracted significant investment in mineral developments, particularly in the oil and gas sector, widespread civil wars, internal ethnic or political conflicts and refugee displacements continued to destabilize a number of African countries and constrained new investment in mineral exploration and development in many areas. Countries directly affected in 1999 included Algeria, Angola, Cameroon, the Republic of the Congo, the Democratic Republic of the Congo, Eritrea, Ethiopia, Guinea, Guinea-Bissau, Liberia, Nigeria, Rwanda, Sierra Leone, Somalia, the Sudan and Uganda. Negative economic effects from the burden of military assistance to opposing sides in the civil war in the Congo were also felt by Angola, Namibia, Rwanda, Uganda and Zimbabwe (Coakley and Mobbs, 2000).

46. In general, international mineral exploration companies were cutting exploration expenditures. Exploration budgets for non-fuel minerals in Africa declined by 49 per cent to $323 million in 1998 from their peak of $662 million in 1997, in line with the worldwide trend. The benefits of the more than $2.4 billion for mineral exploration expended in Africa between 1994 and 1999 were, however, evident in the commitment of capital investment for new mines, particularly for gold, during 1998 and 1999 (Coakley and Mobbs, 2000).

47. Investments in the mining and mineral processing industry during 1998 and 1999 resulted (Coakley and Mobbs, 2000) in:

(a) $1.1 billion per year in export revenues for West African countries;

(b) Privatization of the remaining assets of the Zambian Copper Company;

(c) $1.6 billion in development work at gold mines in South Africa;

(d) Investments of $1.15 billion in base-metal production in Southern Africa.

5. Petroleum and natural gas

48. The upstream oil industry in Africa has proven reserves of 75.4 billion barrels (7 per cent of the world's total) and in 1998 it produced 7.8 million barrels per day (381 million tons per year) of over 40 types of crude oil. Five countries dominate Africa's upstream oil production; together, they account for 85 per cent of the continent's oil production and are, in decreasing order of output, Nigeria, Libya, Algeria, Egypt and Angola. Other oil-producing countries are Cameroon, the Congo, Côte d'Ivoire, the Democratic Republic of the Congo, Equatorial Guinea, Gabon and Tunisia. Exploration is taking place in a number of countries including Chad, Madagascar, Namibia, South Africa, and the Sudan, seeking to increase their output or become first-time producers, while Mozambique and the United Republic of Tanzania are potential gas producers (Mbendi, 2001).

49. The downstream oil industry comprises 44 refineries in 25 countries with a total distillation capacity of 3 million barrels per day, 4 per cent of the world total. The major refining centres, in decreasing order of refining capacity as a per centage of total African capacity, are in Egypt (19.2 per cent), Algeria (16.7 per cent), South Africa (15.6 per cent), Nigeria (14.6 per cent), Libya (11.6 per cent), Morocco (5.2 per cent) and Kenya (3.0 per cent). South Africa also produces synthetic fuels. All countries have

marketing and distribution facilities. In addition to fuels, Africa has an active lubricants industry, which encompasses base oil refining and lubricant blending, distribution and marketing (Mbendi, 2001).

50. The oil industry is the major component of Nigeria's economy. Nigeria is the largest producer of oil in Africa, ranked twelfth in the world in production of crude petroleum and condensate by volume and accounting for 3 per cent of world production and 8 per cent of the OPEC total (Mobbs, 2000).

51. The opening for exploration of deepwater offshore blocks by African Governments resulted in 32 major oil companies investing a total of $1.27 billion in 1999, bringing the total exploration expenditure to $5.33 billion between 1994 and 1999. In Angola alone, a capital expenditure of over $18 billion is expected to be made between 2000 and 2003 to develop petroleum resources. A feasibility study was undertaken in Chad to develop an inland oil deposit for export at a cost of $3.5 billion. The long-term energy needs of Benin, Ghana and Togo should be met by constructing a $400 million pipeline to transport Nigerian natural gas which is currently being flared off. In Namibia, there are plans to invest $1 billion in developing the Kudu gas field with part of the production being used for a gas-fired power station (Coakley and Mobbs, 2000). An investment of over $3 billion is being considered for developing gas fields in Algeria. An oilfield is being developed in Equatorial Guinea, and the Sudan has commissioned a $1 billion oil refinery and pipeline to export oil. The United Republic of Tanzania is planning to develop a gas field.

6. Agriculture

52. In 1999, for the third consecutive year, overall agricultural production failed to keep up with the population growth rate (currently 2.5 per cent per year) and rose by only 2.1 per cent after increasing by 2.3 per cent in 1998. Crop production is estimated to have increased by 2.2 per cent despite of a 0.4 per cent drop in cereal production, while livestock production expanded by a more modest 1.7 per cent. The estimated 2.4 per cent increase in food production contrasts with a 1.8 per cent drop for non-food items. Preliminary estimates for 2000 indicate that agricultural production will rise by only 0.5 per cent and that only modest increases in crop, food and livestock production will be realized. Non-food production is estimated to have contracted for the second year in a row. On the other hand, cereal output is predicted to increase by 2.8 per cent to 88.1 million tonnes, about 3.6 per cent above the previous five-year average but 2.1 million tonnes short of the record crop achieved in 1996. In per capita terms, however, agricultural production continues to stagnate, with levels for agriculture, cereals and food items in 2000 virtually identical to those of 1990 (FAO, 2001).

7. Trends

53. After average annual GDP growth of only 0.4 per cent between 1992 and 1994, economic performance in sub-Saharan Africa began to improve after 1995. This positive trend continued in 1999, although at a reduced rate, with real GDP growing by 2.1 per cent. The economic slowdown was largely caused by difficult global economic conditions during the second half of 1997 and most of 1998 rather than by domestic factors. For 2000, a growth rate of 3.3 per cent is expected, rising to 4.3 per cent in 2001. Strengthening economic activity in South Africa and the oil-exporting countries, in particular Nigeria, is driving the rebound. The rate of inflation increased from 11 to 15 per cent between 1998 and 1999 and is expected to be about 16 per cent in 2000. Malawi and Zimbabwe experienced large increases in inflation. Economic performance across the region was diverse: Cameroon, Ghana, Mozambique, Uganda and the United Republic of Tanzania are expected to continue to grow strongly as a result of macroeconomic and structural reforms, while in many other countries, economic growth, especially agricultural activity, continue to be hampered by past, ongoing or new conflicts (FAO, 2001).

54. The overall picture is strongly influenced by the performance of the economies of Nigeria and South Africa, which together account for about half of sub-Saharan Africa's GDP. Following the high growth rates of 1996, these two economies slowed to 1.1 and 1.2 per cent rates of real GDP growth in 1999. Over the 1996-1999 period, sub-Saharan Africa grew at a rate of 4 per cent per year, if Nigeria and South Africa are excluded, and 3.3 per cent when those two countries are included. The South African economy is expected to grow by 3 to 4 per cent in 2000 and 2001. The steep increase in petroleum prices is helping to lift

Nigeria's fortunes, although long-term robust growth will depend on the Government's ability both to restore macroeconomic stability and improve governance (FAO, 2001).

C. The environmental dimension

55. The Environmental Sustainability Index seeks to provide a measure of the sustainability of a country in a systematic, reproducible and transparent fashion using existing data. For 2001, data were available for 30 African countries out of a global total of 122 countries. Botswana, Zimbabwe, South Africa, Mauritius and Gabon headed the list (ranking from 40th to 49th in the world). The Central African Republic, Ghana and Egypt are middle-ranking (56th to 67th), while Madagascar, Rwanda, Nigeria, Libya, Ethiopia and Burundi are amongst the 10 lowest-ranked countries (113th to 122nd).

56. Biochemical oxygen demand normalized by the amount of available fresh water is an indicator of organic pollution caused by industry or human settlements. Data, in kg BOD/cubic kilometre, are available for only 10 African countries, and of these Mauritius (17,000), Tunisia (11,500), Morocco (7,700) and South Africa (3,700) are well above the global median value of about 900 kg BOD/cubic kilometre of fresh water (2001 Sustainability Index).

1. Share of natural-resource-intensive and pollution-intensive activities in manufacturing value added

57. The mining and metallurgical sector is one of the most natural-resource-intensive sectors in Africa. The Mining, Minerals and Sustainable Development Project, Southern Africa, set out to quantify the impact of mining on three river catchments in southern Africa. It concluded that acid mine drainage, releases of potentially toxic metals, releases of other potentially toxic substances, salinity, suspended solids, changes in water supply and demand and small-scale mining were the major agents causing environmental damage.

(a) Acid mine drainage

58. Acid mine drainage represents the most widespread and pervasive mining-related agent of impact. This is particularly true if the mineralized targets for mining consist of sulphide ore bodies or are contaminated with sulphides, especially iron sulphide (pyrites). Whenever these ores are exposed to air and moisture, the sulphide minerals begin to oxidize, producing high concentrations of total dissolved salts (particularly sulphates), low pH values and high concentrations of dissolved metal ions (especially iron). The resulting solutions are toxic to most forms of aquatic life and can lead to dramatic changes in the functioning of ecosystems and to changes in the structure and chemical composition of soils. The process of sulphide oxidation is very difficult to stop once it has started and the resulting acid mine drainage can persist for centuries, as proven in some British lead and tin mines. Many South African, Zambian and Zimbabwean mineral deposits are susceptible to acid mine drainage. Gold or base-metal mines that exploit these commodities in the various Greenfield formations (South Africa and Zimbabwe) experience an added problem from arsenic (which is highly toxic) that is liberated by and transported in the acid mine water. Acid mine water can affect the environment 50 to 100 kilometres from the source. It is a particular problem in regions with surplus water where the ground has been extensively broken. No permanent solutions have been found and prevention relies on restricting contact or movement of water through broken ground.

(b) Toxic metals

59. Residual metals from mining processes can enter the external environment, where they have the potential to cause various types of damage to the biophysical environment. The more important problematic metals are cadmium, chromium, copper, mercury, vanadium, zinc and, to a lesser extent, iron and manganese, because these metals have toxic effects at relatively low concentrations if they are present in specific oxidation states or forms.

60. Specific areas of concern are:

(a) Releases of hexavalent chromium from chromium mining operations and from ferroalloy smelters and refineries in South Africa and Zimbabwe. If discharged to the aquatic environment, hexavalent chromium can be extremely toxic to aquatic life;

(b) The continuing use of mercury by artisan gold miners to concentrate gold poses toxicity risks to the aquatic environment and to the health of the miners. It appears that almost every artisan gold-mining operation in Malawi, Mozambique, South Africa, the United Republic of Tanzania, Zambia and Zimbabwe uses mercury extraction methods;

(c) Vanadium and chromium contamination of ground and surface waters by vanadium and chromium mines located on the Bushveld Igneous Complex in South Africa, particularly the Steelpoort Valley and the region around Rustenburg in the Crocodile sub-catchment;

(d) Antimony, cadmium and tin contamination of surface waters in the Greenstone formations mined for these metals or as contaminants in gold-mining operations in Greenstone rock formations in South Africa and Zimbabwe. Specific examples are the Murchison and Giyani Greenstone formations in South Africa;

(e) Copper contamination at various levels from copper mines and smelters in the Zambian Copper Belt, the areas close to the Great Dyke in Zimbabwe, the Selibe-Phikwe copper-nickel mine in eastern Botswana and the Phalaborwa area in South Africa;

(f) Iron and manganese contamination of surface streams, either in solution or as unsightly oxy-hydroxide precipitates caused by aeration of iron-rich acidic solutions associated with pyrite oxidation and acid mine drainage. Specific examples occur in several iron-ore mines and in gold and coal mines in South Africa and Zimbabwe;

(g) Zinc and lead contamination associated with acid mine drainage from low-grade ore stockpiles at Kabwe in Zambia and the Letaba Mine in South Africa;

(h) Antimony contamination associated with mines located on the Murchison Greenstone Formation in South Africa.

(c) Potentially toxic substances

61. The most important issues here relate to the potential for contamination posed by the organics and solvents used to separate metals from their ores during the processing phases. Most attention has been paid to the cyanide used in gold mining because of the very large volumes of cyanide that are used and its toxicity to most forms of life.

(d) Salinity

62. The most important issues associated with salinity (total dissolved salts) relate to the potential for degradation of water quality for other water users and of the aquatic environment. In particular, acid mine drainage is often closely associated with increased salinity levels and decreased fitness for use of the water which can lead to reduced crop yields and flocculation of clay particles in the soil.

(e) Suspended solids

63. Increased levels of suspended solids from poorly managed excavations and sites result in coating of aquatic plants, blockage of sunlight and clogging of fish gills. Suspended sediments can concentrate and carry adsorbed metal ions which could present a toxicity problem downstream.

2. Energy and water consumption

64. Data on this aspect were scarce.

(a) Energy

65. South Africa generates 178,192 GWh of electricity per year, which is more than half the electricity generated in Africa. Eskom, the South African electricity utility, provides data on the amount of coal burnt, water consumed and the mass of major emissions. Overall thermal efficiency is given as 34.4 per cent and line losses as 7.4 per cent. Specific water use is 1.21 L/kWh sent out (Eskom, 2000). Sasol, the synthetic fuel producer, accounts for roughly 30 per cent of liquid fuel production in South Africa, and another 10 per cent is produced by Mosgas (Rukato, 2001). Africa has about 7.7 per cent of the world's gas and petroleum reserves outside the United States of America (Klett et al., 1997).

(b) Water

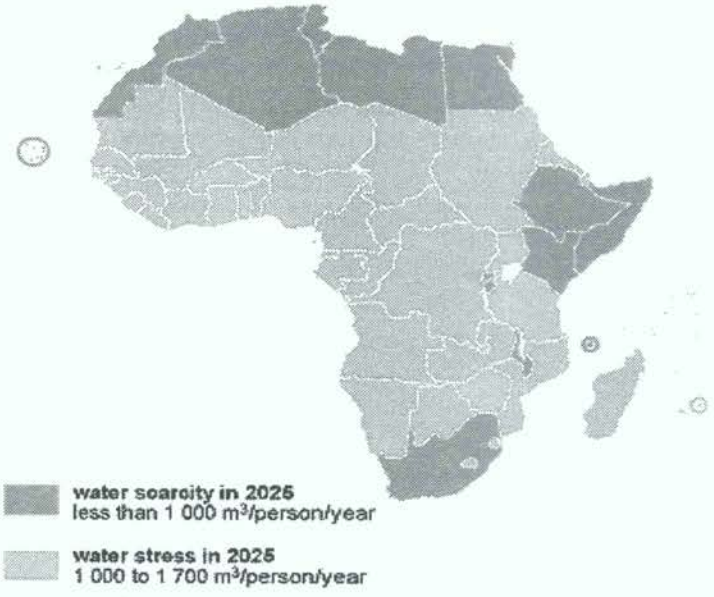
66. While Africa uses only about 4 per cent of its renewable freshwater resources, water is becoming one of the most critical natural resource issues (WRI, UNEP, UNDP and the World Bank, 1998). The continent is one of the two regions in the world facing serious water shortages (Johns Hopkins, 1998). Africa has abundant freshwater resources in large river basins such as those of the Congo, the Nile and the Zambezi and in lakes such as Lake Victoria, the second-largest freshwater lake in the world. There are, however, great disparities in water availability and use within and between African countries because water resources are so unevenly distributed. For example, the Congo basin contains 10 per cent of Africa's population but accounts for about 30 per cent of the continent's annual run-off (Johns Hopkins, 1998). Other contributing factors are the inadequate assessment and the underdevelopment of water resources, the lack of technical and institutional infrastructure and the lack of investment in water-resource development.

67. Most fresh water comes from seasonal rains, which vary with climatic zone. The greatest rainfall occurs along the equator, especially in the area from the Niger delta to the Congo basin. The Sahara desert has virtually no rain. Northern and Southern Africa receive 9 and 12 per cent of the region's rainfall (FAO, 1995). In West and Central Africa, rainfall is exceptionally variable and unpredictable. While the Sahelian countries have limited supplies of freshwater, most countries in the humid tropical zone have abundant water. The availability of water varies considerably even within countries and the situation is further complicated by frequent droughts and inappropriate water management programmes.

68. Groundwater resources are crucial for many countries and people in Africa, particularly during the dry season and in large arid zones. Groundwater is the main source of water in many rural areas, including for nearly 80 per cent of the human and animal populations in Botswana (Government of Botswana, 1993) and at least 40 per cent in Namibia (Heyns, 1993). In Libya, groundwater accounts for 95 per cent of the country's freshwater withdrawals, while in areas such as the Pangani Basin of the United Republic of Tanzania groundwater is a significant source for irrigated agriculture (FAO, 1997b; World Bank and DANIDA, 1995). In many parts of the continent, groundwater resources have not yet been fully explored or tapped.

69. Demand for water is increasing rapidly in most countries as a result of population growth and economic development. Although some African countries have high annual averages of available water per capita, many others already or will soon face water stress (1,700 cubic metres or less per person per year) or scarcity conditions (1,000 cubic metres or less). Currently, 14 countries in Africa are subject to water stress or water scarcity, with those in North Africa facing the worst prospects (Johns Hopkins, 1998). A further 11 countries (see map) will join them in the next 25 years (Johns Hopkins, 1998; UNEP GEO-2000).

Water stress and water scarcity in 2025



70. In the SADC region, water demand is projected to rise by at least 3 per cent annually until 2020, a rate almost equal to the region's population growth rate (SARDC, IUCN and SADC, 1994). It has been estimated that by 2025, up to 16 per cent of Africa's population (230 million people) will be living in countries facing water scarcity, and 32 per cent (another 460 million) in water-stressed countries (Johns Hopkins, 1998). Africa's share of water on a per capita basis is estimated to have declined by as much as 50 per cent since 1950 (Bryant, 1994; UNEP GEO-2000, 1999).

71. It has been projected that in 2030, mining, industry and power generation will require about 10 per cent of total South African water demand (including the environmental reserve) (Basson et al., 1997). Tunisian industry consumes about 10 per cent of all potable water.

3. Emissions of greenhouse gases

72. Africa's emissions of greenhouse gases are still low, estimated at only 7 per cent of all global emissions (World Bank, 1998). Africa as a whole presently emits only 3.5 per cent of the world's total carbon dioxide emissions. South Africa alone contributes 44 per cent of the region's $C0_2$ emissions. Total carbon dioxide emissions in the region are expected to increase to 3.8 per cent of the world total by the year 2010 as a result of increased industrialization and urbanization (Energy Information Administration, 1997). As they serve as a sink for carbon dioxide and therefore mitigate the accumulation of greenhouse gases, Africa's vast forest reserves play a key role in alleviating and balancing the emissions of the industrialized world. This crucial function is, however, threatened by accelerating deforestation (UNEP GEO-2000, 1999).

73. Emissions of greenhouse gases vary also with the volume of subsidies which encourage wasteful consumption of energy and materials. The Sustainability Index 2001 had subsidy data for only four African countries which indicated that South Africa and Mauritius were globally average, while Egypt had slightly higher subsidies than average and Zimbabwe was towards the top of the table. Zambia has the greatest proportion of renewable energy (83 per cent). Uganda, Cameroon and Ghana produce between a third and a half of their energy supplies from renewable sources while 14 countries produce less than 10 per cent from renewable sources. The economies of South Africa, Egypt, Zambia, Nigeria, Libya and Zimbabwe are, in decreasing order, above the global average for energy use per unit GDP. All the rest of the countries are at or below average. South Africa has the highest cumulative carbon dioxide production at 10 times the global median, while Nigeria, Egypt, Libya and Morocco are, in decreasing order, above the global median.

4. Existence of official environmental policies and incentives

74. The current international environmental governance regime is considered to be inefficient and SADC has proposed changes. The SADC region adopted Agenda 21 and the principles of sustainable development as the basis for the region's sustainable development strategy, and its countries have ratified the three Rio Conventions: the United Nations Framework Convention on Climate Change, the Convention on Biological Diversity and the United Nations Convention to Combat Desertification. According to data from the Sustainability Index 2001, African countries in general have developed more environmental strategies and action plans than the global average, but four have produced no strategies or plans.

75. Tunisia established its National Commission for Sustainable Development in 1993, its National Observatory for Environmental and Sustainable Development in 1994 and its local Agenda 21 in 1995. The objective of the National Sustainable Development Commission is to devise and implement a strategy and a national action plan for sustainable development, working to integrate environmental issues in sector-based development policy, strategies and plans. It also aims to protect the right of future generations to a healthy, viable environment, halting environmentally irrational modes of production and consumption and achieving self-sufficiency and food security while guaranteeing a judicious use of natural resources, particularly water resources, and suggesting appropriate regulations to check pollution. The responsibility of the National Observatory is to collect, process and disseminate national information on the environment, produce statistics and indicators on the environment and development, especially sustainable development indicators, develop and set up networks for monitoring and follow-up of the state of the environment, and a national accountancy system for the environment and natural resources. It will participate in devising the Government's overall policy on sustainable development and put this into effect, particularly through prospective studies on the environment and development. It will also contribute, with information, to integrating the idea of sustainable development into decision-making processes and will publish regular reports and documents on the state of the environment.

D. Conclusions

76. The key areas of progress during the past decade have been:

(a) In encouraging and strengthening the linkage between agriculture and industry. Many agricultural products could be produced in a manner that would make them particularly attractive to buyers in developed countries;

(b) In using large investments in the mineral and oil and gas industries to leverage down-stream integration;

(c) In promoting the growth in small- and medium-sized businesses, particularly in small-scale mining and agro-industrial manufacturing;

(d) In trade initiatives such as the American Growth and Opportunity Act to increase local production through exports;

(e) In the exploitation of sustainable sources of energy together with the expansion of electricity grids throughout the region;

(f) In energy substitution from indigenous biomass fuels, with the prospect of a gas network in view, although energy efficiency should be designed into the delivery system.

77. A number of aspects must be addressed in order to ensure that further progress can be made. The major issues relate to people, skills and capacity, and range from HIV/AIDS, the migration of skilled people, insufficient education and training and an insufficient number of trained people in the manufacturing sector resulting in an inability to formulate and enforce environmental policy. The low skills and educational base in the region results in an impoverished population with low spending power and a poor savings ratio. Large amounts of direct foreign investment in industry will not occur until local citizens are prepared to invest in their own countries. This requires political will to reduce the levels of conflict and corruption. Weak prices for primary commodities will continue to have a negative affect on all economies.

II. MEANS OF IMPLEMENTATION

78. The aim of this section is to highlight how and with which tools the industrial sector has responded to the challenges of sustainable development. Information on the strategies, approaches and measures used to achieve progress will be outlined. The positive actions of the sector will be acknowledged, but the sector will also recognize the limits faced, such as geographical constraints, membership structure and defective

implementation. Information will be provided on the regulatory framework in which the sector must operate and the extent to which it has affected decisions and actions.

79. While industry must ultimately implement cleaner production, the role of Government is to lead by providing a favourable environment that will accelerate the process and encourage industry to initiate its own cleaner-production programmes. Governments are increasingly realizing that the command-and-control approach towards environmental management has severe limitations. It is also widely acknowledged that market-based incentives and voluntary compliance by business enterprises should go hand-in-hand with legislative measures and consumer awareness. Hence, the need for continuous relationships and dialogue among the various stakeholders, government, business and civil society is inevitable for sustainable development (UNEP, 2000).

A. Cleaner-production programmes and initiatives in Africa

80. Over the years, several countries in Africa have initiated or implemented projects and programmes related to cleaner production. Most of these programmes are donor-funded, either bilaterally or multilaterally, and they are short-lived. Their sustainability needs to be demonstrated and local ownership needs to be clearly shown by the implementing countries. It must be borne in mind that any successful cleaner-production initiative must be led by local people with local knowledge, which calls for building a basic capacity level in the region.

1. National cleaner production centres

81. UNIDO and UNEP, together with donors such as DANCED and the Government of the Netherlands, established the National Cleaner Production Centres Programme in 1994. Since then, with UNEP assistance, UNIDO has established seven centres in Africa, in the United Republic of Tanzania (1995), Zimbabwe (1995), Tunisia (1996), Morocco (1999), Ethiopia (2000), Kenya (2000) and Mozambique (2000). As stated in the original project document, the aim of the programme is "...to move away from the current piecemeal approach of UNIDO and UNEP (as well as other bilateral and multilateral organizations) to the promotion of cleaner production" (UNIDO/UNEP, 1994, p.14). Instead, the programme would "...support country initiatives that formulate and implement a coordinated and integrated programme for cleaner production" (ibid). The main vehicles identified for supporting these country initiatives were the national cleaner production centres. The emphasis in the project document, however, was mainly on the activities to be conducted and less on the institutional structure.

2. The Environmental Capacity Enhancement Project

82. The Environmental Capacity Enhancement Project is a three-year CIDA-funded pilot project with the University of Guelph as the executing agency. The head office of the project is situated at the University of Guelph and the field office is based at the University of Cape Town. The project is intended to increase institutional capacity among organizations committed to environmentally sustainable development in Southern Africa. The project seeks to enhance, through training, research and internships, the ability of organizations and professionals to assess, evaluate and address the sustainability implications of policy options and technology choices within a changing social/cultural, economic and political context.

83. The Environmental Capacity Enhancement Project organized its fifth training initiative, Workshop and Round Table on Targeting Sustainable Development through Cleaner Production and Consumption, in Harare from 18 to 30 August 1997 and 1 and 2 September 1997. The Workshop introduced the principles and practice of cleaner production. Emphasis was placed on the industrial sector but some attention was also given to the municipal sector. The Round Table, on the other hand, brought together waste management experts from the southern African region to share experiences and knowledge and explore opportunities for networking. Participants were drawn from Botswana, Kenya, Lesotho, Malawi, Mozambique, South Africa, Uganda, the United Republic of Tanzania, Zambia and Zimbabwe.

3. Southern African Network for Training on the Environment

84. The Institute of Environmental Studies at the University of Zimbabwe is the focal point for a regional training project, funded primarily by Carl Duisberg Gesellschaft of Germany, known as the Southern African Network for Training on the Environment (SANTREN). SANTREN was established by professionals with geological or mining backgrounds in response to environmental concerns about mining operations. The initial collaborating countries were Botswana, Malawi, Mauritius, Namibia, South Africa, the United Republic of Tanzania, Zambia and Zimbabwe. SANTREN is now a network of about 150 environmental professionals from southern African institutions which seeks to promote the sustainable use of the environment through education, research and information exchange.

85. At the centre of the SANTREN initiative is the development of short courses on topical environmental issues. The short courses are designed to address negative environmental practices and provide possible solutions or offer mitigation measures. The courses are aimed at a wide range of audiences, depending on their needs, including Government personnel, the private sector, the mining sector, non-governmental organizations, tertiary education and research institutions and resource managers.

4. Regional workshop on ecologically sustainable industrial development for African countries

86. The ecologically sustainable industrial development workshop held in Dar es Salaam from 22 to 24 October 1997 was a joint effort between the Cleaner Production Centre of the United Republic of Tanzania, the host, and UNIDO, the sponsor. The three-day workshop targeted senior-level decision-makers from Government Ministries responsible for environment, finance and industry. The private sector also participated. The main objective of the workshop was to explore possibilities for regional cooperation on ecologically sustainable industrial development and on issues related to the financing of potential development activities. The participants agreed to proceed with the promotion of a regional cooperation initiative for capacity-building among the participating countries in order to improve the status of the environment there. On the basis of the workshop's recommendations, a request was submitted to UNIDO to formulate a project document to facilitate regional cooperation on institutional frameworks, industrial activities, participation of the business community and non-governmental organizations, and the establishment of a regional newsletter. The participants came from Ethiopia, Kenya, Uganda, the United Republic of Tanzania and Zambia.

5. Regional and subregional centres for training and technology transfer under the Basel Convention

87. The regional and subregional centres for training and technology transfer on environmentally sound management of hazardous wastes and the minimization of their generation established under the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal represent a major step forward for the efficient and effective implementation of the Convention. The centres are aimed primarily at strengthening the capacity of Governments in the region to comply with the technical requirements of the environmentally sound management of hazardous wastes and also with the legal and institutional aspects of the implementation of the Convention. Building on existing institutions, the regional and subregional centres for training and technology transfer provide an institutional framework for the coordination and implementation of practical and technical programmes, in particular on waste minimization, treatment, recovery, recycling and final disposal. The activities of the centres are tailored to the needs of the countries in terms of technical and non-technical training, access to and dissemination of information, and the development of knowledge and awareness. The centres will provide a forum for addressing various facets of hazardous waste management. Industry and environmental enforcement personnel will be able to exchange experiences and develop their knowledge and technical expertise.

88. The activities of these centres include the provision of training services, technical assistance and advisory services, information exchange, research, technology transfer, promotion of awareness, needs analysis, developing fund-raising strategies, promotion of cleaner production and waste minimization and establishing networks within the region. Regional or subregional centres will be established for Africa, one each for English-, French- and Arabic-speaking countries. Through GTZ, the Government of Germany carried out a feasibility study for the establishment of a subregional centre for English-speaking countries.

At the same time, UNEP, through its Swedish Technical Cooperation Trust Fund, undertook feasibility studies for the establishment of subregional centres for Arabic- and French-speaking African countries. South Africa, Senegal and Egypt are hosting these subregional centres, for English-, French- and Arabic-speaking countries respectively.

6. UNIDO/UNEP: industrial and municipal waste management for Africa

89. UNIDO and UNEP have joined forces to develop a continental programme on industrial and municipal waste management for Africa. Six subregional training workshops of one week each were planned for 1998 and 1999. The United Republic of Tanzania hosted one for the Eastern African countries (Eritrea, Ethiopia, Kenya, Sudan, Uganda and the United Republic of Tanzania) from 23 to 27 November 1998. The training workshop for Southern Africa was hosted by Mozambique from 1 to 5 December 1998.

7. Southern African Regional Conference on Cleaner Production

90. DANCED was the principal sponsor of the Southern African Regional Conference on Cleaner Production held in Midrand, South Africa, from 11 to 13 May 1998. Within its overall objective of promoting cleaner production in southern Africa, the Conference sought specifically to address the need to improve the level of awareness, understanding and implementation of the concept throughout the subregion by providing a platform to stimulate dialogue and cooperation between all interested parties with a view to developing a shared vision and action plan for promoting cleaner production throughout the region. In achieving this objective, the Conference sought to create greater awareness of the implications of cleaner production amongst all sectors and to mobilize managers, decision-makers and technical operators to promote the adoption of cleaner production practices. Furthermore, a forum for exchanging experiences in implementing successful, locally-relevant, cleaner-production case studies was provided, aimed at regional Governments, to assist them in reviewing policy options for promoting cleaner production. Current barriers to and opportunities for cleaner production implementation were identified and funding mechanisms for pilot projects were discussed. In addition, regional input into the UNEP fifth high-level seminar on cleaner production was prepared and contributions to the formulation of the international protocol were made. Finally, building on the experience of cleaner production Round Tables in the United States of America, Europe and Asia, the Conference examined the merits of establishing a Southern African Round Table on cleaner production.

8. UNEP project: strategies and mechanisms for promoting investment in cleaner production

91. UNEP has initiated a three-year project aimed at increasing investment in cleaner production in developing countries. The project will demonstrate how such investments can be stimulated by helping financial institutions understand the importance of cleaner production and helping cleaner production experts develop creditworthy investment proposals. The project, focusing on five demonstration countries (Guatemala, Nicaragua, the United Republic of Tanzania, Vietnam and Zimbabwe) is being carried out under a trust fund created by the Norwegian Government.

9. Carl Duisberg Gesellschaft training programme

92. CDG is about to launch a training programme in the United Republic of Tanzania and Zambia on cleaner production, environmental management and aspects of productivity. A fact-finding mission visited those countries in July 2000.

B. Environmental management systems

93. Environmental management systems are being more widely implemented. Companies with major shareholders in developed countries often lead the way in corporate reporting. The ISO 14000 series of standards is experiencing exponential growth like the ISO 9000 series did five years ago.

94. Up to the end of December 2000, a total of 228 ISO 14000 certifications had been issued in African countries out of a global total of 22,897. A country-by-country breakdown is given in Table 1 (ISO, 2001). It should be noted that not only industrial organizations may receive certification.

Table 1. ISO 14000 certifications issued in Africa

Country	1995	1996	1997	1998	1999	2000
Egypt		1	7	13	35	78
Kenya						2
Mauritius		1	1	2	3	4
Morocco					1	4
Namibia					1	4
Nigeria						1
South Africa			21	30	82	126
Tunisia				1	1	3
Zambia				2	2	2
Zimbabwe					4	4
Total		**2**	**29**	**48**	**129**	**228**

95. Global financial and sustainability reporting initiatives are having an effect on large companies with international ties, an effect which is beginning to trickle down through industry. National competitions rewarding sustainability, and environmental and social reporting serve to raise standards and create awareness.

C. Technical assistance and technology transfer

96. International technology transfer programmes have a multi-pronged effect through awareness raising, capacity-building and breaking down barriers between regulators and industry.

1. Cleaner production

97. A two-year cleaner industrial production project for Ethiopia was carried out by the Chemical Society of Ethiopia in collaboration with the Ethiopian Private Industries Association and financed by the Heinrich Böll Foundation. The project involved some 38 manufacturing establishments between 1990 and 1991. Besides putting forward the concept of cleaner production, the project enabled participating firms to use a hands-on approach in which trained staff conducted comprehensive environmental audits to determine sources of pollution and wastage and drew up staggered plans of action showing costs and benefits. The experience was fruitful in demonstrating that pollution and waste are losses of valuable resources. Environmental gains are easy to promote, along with such returns as a better public image and improved relations with regulatory authorities. Integrated programmes have been identified by UNIDO and some are under way through the newly established National Cleaner Production Centre.

2. Occupational safety and health

98. An ILO/FINNIDA technical cooperation programme involving 21 countries in English-speaking Africa focused on occupational safety and health. Through this capacity-building programme, the OSH Inspectorate of the Ethiopian Ministry of Labour and Social Affairs obtained training for factory inspectors and also books, measuring kits, computers and computer accessories. A regular quarterly publication, the African Newsletter on Occupational Health and Safety, has enabled occupational inspectors and interested professionals to write and exchange research findings, views and opinions on OSH in Africa. An OSH clearing house and an ILO International Occupational Safety and Health Information Centre (CIS) was established under the Inspectorate, which is providing services to workers, employers and researchers (Malifu, 2001).

3. Sustainable industrial development

99. Ethiopia has received assistance from the Government of the Netherlands and UNIDO to develop capacity in sustainable industrial development, including funding for the development of an industrial environmental database (Malifu, 2001).

4. Industrial sector support

100. Since 1998, UNIDO has been using the concept of integrated programmes as a means of strengthening its response to industrial development needs and focusing its assistance at the country level. This exercise has confirmed that the priority sectors for industrial development are agro-based, such as leather and leather products and the textile, garment and food industries. These subsectors are characterized by an abundance of raw materials coupled with adequate skill levels, and have the potential for rapidly improving productivity (United Nations, 2001).

101. In 1999 and 2000, Governments confirmed that their comparative advantages lay in diversifying their economies by processing agricultural products, primarily textiles/garments, leather/leather products and food. This is the core of the UNIDO strategy in each country, emphasizing the need to improve quality standards, identify new market channels and increase product range (United Nations, 2001).

102. A total of 13 programmes were ongoing in sub-Saharan Africa in 2000 (in Burkina Faso, Côte d'Ivoire, Eritrea, Ethiopia, Ghana, Guinea, Mali, Mozambique, Nigeria, Rwanda, Senegal, Uganda and the United Republic of Tanzania) and 5 in northern Africa (Algeria, Egypt, Morocco, the Sudan and Tunisia). Their common goal is to improve the competitiveness of selected industries and, wherever possible, identify new market opportunities, thus opening the door to the global economy. Four new programmes, for Eritrea, Madagascar, Mali and Nigeria, were approved in 2000 (United Nations, 2001).

103. As part of the integrated services for the African leather industry which it has developed over the years (for Ethiopia, Kenya, Malawi, Namibia, the Sudan, Uganda, the United Republic of Tanzania, Zambia and Zimbabwe), UNIDO has been tackling critical environmental problems by assisting companies in installing or upgrading effluent treatment plants and providing operator training at the Nairobi Leather Development Centre (United Nations, 2001).

104. In the context of its decentralization policy and in order to strengthen its field representation, UNIDO opened the Regional Industrial Development Centre in Lagos. Apart from its crucial role in implementing the UNIDO country framework for Nigeria, the Centre will provide technical support to countries in West and Central Africa. It will serve as a technical support facility for programme formulation, as a resource centre for short-term advisory services for the public and private sectors and as a regional centre of excellence for industrial development issues, including sustainable development. It will serve also as a technical support facility for the active involvement of UNIDO in Montreal Protocol and GEF projects (United Nations, 2001).

5. Rural industry

105. Rural industry has been supported by focusing on improving technologies through the introduction of modern shop-floor management systems, with an emphasis on minimizing waste and improving hygienic conditions in plants. In addition, to ensure sustainability appropriate technical staff have been trained. This approach was coupled with quality control systems which in the case of fisheries in Guinea successfully enabled European Union fish export standards to be met. This meant improving the technical capabilities of the standardization and certification structures through training and the introduction of international standards. In some countries, such as Burkina Faso and Mali, hybrid-drying techniques for preserving fruit and vegetables were introduced with a view to reducing post-harvest losses. All integrated programmes utilize a version of this approach, adapting it to the needs and conditions of each country as appropriate (United Nations, 2001).

6. Small- and medium-scale enterprise support

106. UNIDO activities in the development of small- and medium-scale enterprises are carried out for the three main economic levels, which are policy formulation and implementation; institutional capacity-building; and improving entrepreneurial skills at the enterprise level. Activities in Burkina Faso, Côte d'Ivoire, Ethiopia, Ghana, Guinea, Senegal, Uganda and the United Republic of Tanzania address the gender imbalance by including assistance to women entrepreneurs involved in food processing whereby both their technical and their business skills are enhanced. Similar activities for the textile and garment sector have been carried out in Kenya and the United Republic of Tanzania. Support for improving the quality of traditional textiles has been provided to artisans in Burkina Faso, Guinea and Senegal under approved integrated programmes (United Nations, 2001).

107. At the enterprise level, the objective is to ensure that adequate business advisory services are made available in accordance with entrepreneurs' needs. In addition, women entrepreneurs are encouraged to participate in integrated programmes concentrating on improving their small businesses by developing new products and improving product quality and range (United Nations, 2001). To achieve this, particular attention is paid to the quality of the services provided by support institutions, both public and private and, where necessary, the required tools and methods are provided through training programmes. In some cases, new institutions are required. Although it is still too early to comment on the impact, there have been marked improvements in the quality and range of traditional textiles, women's food-processing activities, fish exports to the European Union and, in general, awareness with regard to quality (United Nations, 2001). As in the context of industry, all integrated programmes in the area of rural development and food security, utilize a version of this approach, adapting it to the needs and conditions of each country as appropriate (United Nations, 2001).

7. Environment and industrial development

108. UNIDO activities in the area of environmental protection build on the fact that industry is the affirmed major polluter and that a targeted multidisciplinary approach is necessary to ensure the required mitigation. Although African industries do not generate significant atmospheric pollution compared to their counterparts in the North, efforts are needed to introduce environmental best practices at these early stages of industrialization (United Nations, 2001).

109. Integrated programmes in Africa have concentrated on the key areas where environmental impacts are most visible, specifically, urban waste disposal and cleaner production. Significant progress has been made in creating awareness at the policy level of the need to tailor environmental legislation to the country's level of industrialization and the size and structure of the existing industrial processing units (United Nations, 2001).

8. Environmental policies for sustainable industrial development

110. The first UNIDO-executed and GEF-financed programme on water pollution control and biodiversity conservation of the Gulf of Guinea Large Marine Ecosystem was successfully completed in 1999. The follow-up project, covering the 15 countries bordering the Gulf of Guinea, is being prepared and is due for implementation in 2002, once the GEF approval process is complete (United Nations, 2001).

111. Through the Chamber of Mines, the South African minerals industry has developed guideline documents to assist mining operations in fulfilling their environmental protection and management obligations. The Environmental Management Programme Report concept was developed through cooperation between the Chamber and the Department of Mineral and Energy Affairs in an attempt to consolidate the environmental management requirements of mining operations into a single comprehensive document. A range of other initiatives has been undertaken (Rukato, 2001).

9. The United Nations Framework Convention on Climate Change and its Kyoto Protocol: clean development mechanism

112. In 2000, UNIDO completed the first phase of a regional programme for African industry and financed the participation of African countries in a meeting in Lyons, France in September 2000. On the basis of the presentations given, the Chair of the African Group at that meeting requested that the programme should be expanded to cover more African countries. The second phase of the programme is currently under preparation and will cover sub-Saharan Africa. Each participating country is expected to identify two priority sectors for the development of investment projects to be presented at the seventh meeting of the Conference of the Parties to the Climate Change Convention, to be held in Morocco in 2001 (United Nations, 2001).

10. Pollution control and waste management: recycling for job creation

113. On the assumption that awareness-raising is crucial for reaching environmental solutions, UNIDO seeks to build capacity in order to promote the establishment of pollution control services. Thus, in many African countries, efforts are being made to support non-governmental organizations to enable them to improve their services for recycling and for waste disposal generally in urban centres such as Matoto Commune in Conakry, Matola Municipality and Machava Industrial Estate in Maputo,; Antananarivo; Nairobi; and Casablanca. Additional projects have been short-listed for Ghana, Ethiopia and Nigeria (United Nations, 2001).

D. Multilateral agreements

1. The Basel Convention

114. As of 7 August 2001, 34 African countries were parties to the Basel Convention on the Control of Tranboundary Movements of Hazardous Wastes and Their Disposal (Basel Convention, Ratifications).

2. Ozone treaties

115. As at 6 August 2001, only five African countries had not ratified the ozone treaties (UNEP, 2001).

E. National industrial development policies – a case study

116. Ethiopia began to formulate its conservation strategy in 1989 with assistance from IUCN and completed it in 2001. The end of military rule brought about liberalization of prices and markets, the removal of subsidies, reductions in trade tariffs and current account stability. Public policy promoted symbiosis between agriculture and industry (agricultural-development-led industrialization) and strengthened the growth of the domestic market and the utilization of domestically-available raw materials (with labour-intensive technologies). The 1998 programme of privatization of Government enterprises aimed to generate revenue for financing Government development activities; to reduce Government's role in the economy, freeing it to concentrate on other activities; and to promote economic development through expansion of the private sector. An export strategy was developed with a view to creating markets for the agricultural sector, generating foreign exchange and promoting international competitiveness. A science and technology policy was instituted to build up the country's science and technology capability and enhance its contribution to the national economy. There are special programmes to support industry and energy production.

117. An environmental policy was adopted in 1997 which provides policy elements that ensure industrial sustainability in Ethiopian whereby technology must be appropriate and affordable, the full environmental and social costs must be calculated, hazardous wastes and pollution from industry are controlled on the "polluter pays" principle, and environmental impact assessments are recommended.

118. Although policy promotes environmental impact assessments, there is no legislation mandating them and little capacity to undertake them. Similar observations can be made regarding the lack of legislative and

other back-up for other policies: the policy of phasing out dependency on traditional biomass fuels by promoting electricity has failed because subsidies to the power generation industry were eliminated (Malifu, 2001).

F. Removal of trade barriers

119. The United States Government trade initiative, the African Growth and Opportunity Act, which was passed in May 2000, allows preferential access to the United States of America for exports from the 35 sub-Saharan countries approved under the Act (United States Department of State, 2000).

G. Constraints

120. As previously noted, there are many more constraints on implementing cleaner production and sustainable industrial development than there are factors promoting success. This section highlights some of the more significant or frequently encountered constraints.

1. Governance

121. Many African Governments failed to empower their peoples so that they could embark on development initiatives and realize their creative potential. Today, the weakness of Government remains a major constraint on sustainable development in a number of countries. One of Africa's major challenges is to strengthen the capacity to govern and develop long-term policies. At the same time, there is also an urgent need to implement far-reaching reforms and programmes in many African countries (OAU, 2001).

2. Globalization

122. While no corner of the world has escaped the effects of globalization, the contributions of the various regions and countries have differed markedly. The locomotive for globalization's major advances is the highly industrialized nations: only a few countries in the developing world play any substantial role in the global economy. Many developing countries, especially in Africa, contribute passively and mainly on the basis of their environmental and resource endowments (OAU, 2001).

3. Financial

123. Financial constraints were recognized by Ethiopian companies as preventing investment in cleaner production technologies. This was in part caused by low demand and because the competition, which did not have to implement environmental controls, got a free ride (Malifu, 2001).

4. Regulatory

124. Inconsistent, lax or inappropriate regulatory controls have been recognized in a number of countries as barriers to the implementation of cleaner production techniques and occupational health and safety measures (Malifu, 2001).

5. Lack of awareness

125. There is an overwhelming lack of awareness of the advantages of pollution prevention and cleaner production. This lack is not just amongst industrialists and their employees, it extends throughout the financial, service, educational and regulatory sectors. It is especially prevalent among small- and medium-sized enterprises (Malifu, 2001).

6. Lack of knowledge

126. Without people trained in environmental management techniques and other tools of cleaner production, progress in implementing national policies will be impossible (Malifu, 2001).

7. Lack of accredited environmental laboratories

127. Risk assessment and monitoring is impossible in the absence of accredited environmental laboratories (Malifu, 2001).

8. Lack of accredited solid-waste incinerators and disposal sites

128. The establishment of well controlled and regulated waste-disposal sites is a prerequisite for responsible waste disposal (Malifu, 2001).

III. FUTURE CHALLENGES AND GOALS (THE NEXT 10 TO 30 YEARS)

129. The negative aspects of globalization must be overcome: access to markets for African products in industrialized countries must be improved; levels of foreign private capital investment must rise and the issue of the elimination of subsidies to certain sectors in the developed world must be addressed. Also, the determination of Africans themselves to extricate themselves and their continent from the malaise of underdevelopment and exclusion from a globalizing world must be recognized.

130. Research and development in clean coal technologies and in energy supply and usage efficiency together with the switch to renewable resources must be both affordable and adapted to the specific conditions of Africa (SADC, 2001). The technology gap, which has widened significantly over the last 10 years, must be addressed through technology transfer, partnerships and information exchange. OAU has led the way with the New African Initiative, which was approved on 11 July 2001; the initiative proposes an African strategy for achieving sustainable development in the twenty-first century.

A. Cleaner production and sustainable development: barriers and driving forces

131. The following barriers and driving forces were identified at the Southern African Regional Conference on Cleaner Production:

(a) Barriers:

(i) Insufficient business leadership or political will to address the need for sustainable industrial development;

(ii) A general lack of appreciation within the business community of the benefits and techniques associated with cleaner production;

(iii) A lack of effective regulatory pressure and appropriate market incentives;

(iv) A lack of capacity within the public sector to administer environmental regulations effectively;

(v) A widespread perception that the introduction of cleaner production practices has significant cost implications;

(vi) A general resistance to changes in current management practices and production processes;

(vii) An absence of strong public pressure for the adoption of cleaner production;

(b) Driving forces:

(i) The entry into African markets of international businesses that are subject to increasing pressure for improved environmental performance and have developed the capacity to implement cleaner production practices;

(ii) The introduction of effective directive-based (command-and-control) regulations in combination with "co-regulatory" (involving both industry and regulators) and market-based instruments;

(iii) The increasing availability of appropriate technologies;

(iv) The adoption of new (improved, cleaner-production) technology is an existing management tool.

B. Organic or eco-labelled goods

132. Changes in consumption patterns in the developed world present an opportunity for exports of environmentally and socially preferred goods (Mebratu, 2001). Products from developing countries that currently have environmentally based advantages in industrialized countries' markets include organically grown food, reusable and recyclable materials, biomass fuels, natural fibres and sustainably harvested forest products. Product environmental statements and eco-labels based on life-cycle considerations will become far more prevalent in the developed world.

133. In Zimbabwe, most cash-crop cotton is grown under near-organic conditions and is hand picked, resulting in lower environmental impact and higher quality relative to a machine-harvested crop. In South Africa, trials on growing organic cotton and integrated pest management are being undertaken and a DANCED-funded cleaner-production demonstration project is investigating the market for organic cotton products in Europe: developing auditable supply-chain certification from the cotton producer to the end product is a major challenge, and the close proximity of grower, ginner, spinner, weaver, finisher, designer and garment manufacturer is a major advantage for the local manufacturing industry in that regard.

134. Internationally, South Africa had one of the highest proportions of forests certified by the Forest Stewardship Council. This presents a potential competitive advantage for downstream industrial processors.

135. The use of environmental life-cycle assessment (LCA) is becoming more prevalent in developed countries. African countries must become involved in LCA of their primary and manufactured products. Because of the lack of local capacity, LCAs of primary resources from Africa are being made without the input or knowledge of local people. Ignorance of the results could result in their products being replaced by substitutes and in missed opportunities to improve their manufacturing processes.

C. Environmental performance

136. The New African Initiative recognizes that a healthy and productive environment is a necessary condition for the initiative to succeed (OAU, 2001). It recognizes, however, that many environmental initiatives can be accomplished within relatively short time frames and offer exceptionally good returns on investment. Two themes of direct relevance for industry are:

(a) Global warming, where the initial focus of the Initiative is on monitoring and regulating the impact of climate change; and

(b) Environmental governance, which relates to the institutional, legal, planning, training and capacity-building requirements of the Initiative.

1. Ethiopia – a case study

137. Ethiopia has identified the following major challenges:

(a) Creating awareness of the impact of pollution caused by the manufacturing sector and the consequent economic losses both to enterprises and to the national economy;

(b) Developing the required institutional and technical capacity at various levels to reduce the total amount of waste generated and the resultant pollution impact on the environment;

(c) Promoting a comprehensive industrial waste management programme based on an integrated pollution prevention and control approach that emphasizes prevention;

(d) Establishing the necessary physical and institutional infrastructure to provide continuous support in the selection of technology and in operational management in order to ensure that new manufacturing industries have a more sustainable basis;

(e) Instituting a mechanism of incentives to encourage manufacturing industries to engage in a process of continuous improvement yielding both economic and environmental dividends (Malifu, 2001).

D. Health

138. Health issues are of great significance for the industrial sector: where employees are susceptible to disease, productivity can be lowered and skills can even be lost. Also, serious health problems in society mean smaller markets for industrial products.

1. HIV/AIDS

139. While comprehensive data on the scale of the HIV/AIDS epidemic are difficult to compile, material from the Industrial Environmental Forum of Southern Africa indicates that the epidemic has already reached serious proportions. Some estimates put the number of deaths of children under the age of 15 at 3.6 million. Some 40 million people in the world are HIV-positive, and of these 70 per cent are in sub-Saharan Africa. The South African epidemic developed later than those afflicting other sub-Saharan African countries. The total number of HIV-infected people in South Africa is expected to increase well into the next decade.

140. Current studies show that unless major behavioural changes significantly alter the course of the epidemic, in South Africa there could be between 5.3 and 6.1 million infected individuals by 2005 and between 5 and 7.5 million by 2010. Approximately 15 to 18 per cent of all South African adults aged between 20 and 64 are currently infected and this could rise to between 20 and 23 per cent by 2005 and 22 to 27 per cent by 2010. Gender differences are pronounced, with women between the ages of 15 and 20 at the highest risk. While the incidence in men peaks some years later. In South Africa, where 53 per cent of the population is under 25, teenage infection rates are still increasing at an alarming rate. It is estimated that around 200,000 South Africans are currently living with AIDS. AIDS-related deaths are projected to increase dramatically to a peak of 900,000 per year in 2009. By 2005, it is expected that there will be around 1 million orphans under the age of 15, rising to about 2.5 million in 2010. Many orphans will grow up in child-headed households or as street children. Orphans will themselves be vulnerable to abuse, sexual exploitation and emotional instability, leading to high-risk relationships and HIV infection. AIDS mainly strikes adults aged between 25 and 45 so that many of those affected are income providers, carers and nurturers. A dramatic impact on the working population and overall levels of productivity in the South African economy will be felt. Manufacturing is the largest contributor to GDP in South Africa, followed by community social and personal services. The greatest proportion of workers is employed in these sectors. Although many companies have HIV awareness and voluntary testing programmes in place, as leading South African business strategist Clem Sunter has said, business leaders must consider the cost of the epidemic in terms of the human and employment costs and in terms of shrinking markets.

141. A code of practice on HIV/AIDS in the workplace has been agreed by the South African National Economic Development and Labour Council (Nedlac). The code envisages that employers and labour should develop proactive strategies to eradicate HIV/AIDS discrimination. Companies that have responded positively to this code include ABB (Asea Brown Boveri), Anglo American, Billiton, Ford, Nissan and SAB (South African Breweries Plc.).

142. In the mining industry, the incidence of HIV/AIDS is generally thought to be high, with estimates of infection ranging from about 15 per cent to 30 per cent of the workforce. Single-gender hostels and the migrant labour system, with the resulting polygamous sexual practices, and the poor socio-economic conditions in areas from which many of the miners originate are thought to be contributory factors. Given that HIV/AIDS is not an immediately apparent disease and that many of the workers return to other countries at the end of their contracts or when they retire, follow-up on cause of death is extremely complicated.

143. Gold Fields of South Africa Ltd., which uses its own model for estimating the effect of HIV/AIDS on its gold-mining operations, have estimated that AIDS-related costs could reach $4 for every troy ounce of gold and that doing nothing about it could push the price up by $10 an ounce. The assumptions built into the model make it specific to Gold Fields. The impact is likely to result in a decline in gold output (Mail & Guardian, 2001).

144. The mining majors, including Gold Fields, Anglo American and Billiton, all have significant policies in place to encourage the voluntary testing of all head office and underground staff and have established wellness programmes. The continuing stigma attached to HIV/AIDS in South Africa means that few employees come forward for voluntary testing. A number of South African corporations have conducted voluntary and anonymous prevalence studies to gauge the likely impact of HIV/AIDS on their future operations. The aim is to raise awareness of the importance of staying HIV-negative, to encourage employees who think they may be HIV-positive to seek counselling and treatme, and to assist management in identifying the likely impacts as a benchmark for future studies. To paraphrase Clem Sunter again, Government, business and workers must work in partnership to combat the disease and to explore avenues such as tax rebates for companies making antiretroviral treatment available to workers as the costs cannot be borne by any one party alone. Anglo American is using a number of mechanisms to build family awareness of HIV/AIDS and extend support to rural communities, and is spreading the message through industrial theatre performances, videos, in-house electronic mail and other communication tools.

145. The most important message is that of helping employees who are not infected with HIV to stay that way. At the Anglo American operation at Namakwa Sands on the South African west coast, for example, the prevalence of HIV was found to be only 0.6 per cent in the workforce, 90 per cent of whom participated in a voluntary survey. This inspired the West Coast Community HIV/AIDS Initiative, which aims to ensure that the epidemic does not take root in this region.

146. Another important initiative being undertaken within the mining industry concerns benefit restructuring to accommodate early treatment and early ill-health retirement benefits. In Zimbabwe, Anglo American has modified its employee benefits system so that the discrepancy between death-in-service and ill-health-retirement benefits has been narrowed. This helps employees gain access to early treatment and gives infected individuals time to spend with their families prior before they die.

147. The chemical industry, along with other sectors in South Africa, has joined forces with the Government and organized labour in a concerted effort to stem the spread of the disease. A number of South African chemical companies have individually extended their corporate social investment programmes to support institutions working with AIDS orphans and other people whose lives have been adversely affected by the epidemic. In this regard, education of employees receives particular attention.

148. Metropolitan areas report that at the level of individual businesse, HIV/AIDS among managers, employees and their families will impose significant direct and indirect costs. One study, by the Harvard Centre for International Health, of two South African companies indicates that HIV infections may cost companies between 2 and 6 per cent of total salary costs per year. The most significant costs are likely to be indirect, such as absenteeism from illness or funeral attendance; lost skills; training and recruitment costs;

reduced work performance and lower productivity. The vulnerability of businesses to HIV/AIDS will vary depending on factors such as the type of business and production processes. For highly skilled, labour-intensive industries and capital-intensive industries that require specialists to operate particular machinery the costs will be particularly high. HIV/AIDS will also affect the growth of many markets for goods and services and will shift demand to certain sectors, most notably the health-care sector. Non-essential goods with high demand elasticities are likely to be more susceptible to these shifts than staple products. However, with the expectation that there will be large numbers of child-headed families and that many middle-income households will be pushed into poverty, the market for goods and services could be adversely affected.

149. In February 2000, the South African Business Council on HIV/AIDS was launched, whose main aim is to establish an integrated business effort against HIV/AIDS. Eskom, the electricity utility, currently chairs the Southern African Power Pool Forum on HIV/AIDS, which aims to share experiences throughout the region.

150. Predicting the economic outcome of a new phenomenon like AIDS is complex. However, it has been reported that the epidemic has the potential to restrict economic growth by:

(a) Reducing the number of workers available to the economy;

(b) Decreasing public sector, corporate and personal savings through health care and related HIV/AIDS expenses;

(c) Reducing Government investment in infrastructure as expenditure on HIV/AIDS increases;

(d) Reducing Government's capacity to deliver its programmes as a result of significant HIV/AIDS-related absenteeism.

151. Some estimates suggest that GDP growth rates could be reduced by between 0.3 and 0.4 per cent per annum over the next 15 years. The impact on human health and social development is expected to be profound. Affected people, particularly orphans, will have greatly reduced chances of fulfilling their human potential (Industrial Environmental Forum of Southern Africa, 2001).

2. Malaria

152. The Minister of Health of South Africa was recently quoted as saying that malaria costs Africa about $12 billion every year and slows economic growth by 1.3 per cent annually. An estimated 14 million people in the region are diagnosed with malaria every year, with as much as 40 per cent of the population in hard-hit areas infected with the disease. Those who suffer the most aere some of the continent's most impoverished people and malaria keeps them poor.

153. The war against malaria was given a considerable boost last year when the United Nations Intergovernmental Negotiating Committee on persistent organic pollutants (POPs) at their meeting in Johannesburg in December 2000 approved the use of DDT for malaria spraying under restricted and properly controlled conditions. Extensive, multifaceted programmes to combat malaria have reduced the incidence of the disease by 38 per cent in some areas in the Zambian Copper Belt, to the lowest levels recorded in 11 years. Malaria is the number one killer in the Copper Belt. These spraying programmes are aligned with the Zambian Government's malaria control programme and also with the World Health Organization's Roll Back Malaria Campaign, which aims to halve mortality rates from malaria by 2010. The spraying programmes also provide important employment opportunities, and spraying teams can be multi-skilled and provide primary health care and hygiene education too. Companies operating in other parts of southern Africa have also undertaken extensive malaria programmes to reduce incidence amongst their employees.

3. Tuberculosis

154. In Africa, the tuberculosis rate is 216 cases per 100,000 people. The 11 countries of the Southern African subregion account for approximately 275,000 cases every year of the total caseload in Africa. Of those 275,000 almost half are in South Africa. An analysis of tuberculosis trends and the impact of HIV infection on the situation in the subregion estimates that by 2001 the smear-positive case rate will have increased from 198 per 100,000 inhabitants for the subregion as a whole to 681 per 100,000 if tuberculosis control efforts are not optimized. Aggravating the situation is the fact that 69 per cent of these cases are directly attributable to HIV infection (Fourie, 2001).

E. Employment

155. An environment must be created in which entrepreneurship and investment can occur, leading to industrial growth and employment opportunities. In this context, agricultural products and minerals are areas of great potential. An increase in downstream linkages from resource production to product fabrication is a major challenge. The spread of transport links, electricity and communications into rural areas will enhance opportunities for these areas to enter the mainstream manufacturing and industrial economy. The major sectors that offer potential for increasing employment are agriculture, tourism and value-added manufacturing.

F. Physical and institutional infrastructure

156. Certain critical institutions are required to support the development of the private sector, so there is a need to create and enhance institutional capacity in areas such as financial infrastructure extension services, support institutions in research and development and umbrella national organizations such as small industry development organizations and organizations those that provide one-stop services for entrepreneurs. There is also a need to create institutional capacity for linkages with Governments to foster policy coordination through such mechanisms as small-enterprise development councils, national associations of small- and medium-scale enterprises and forums for dialogue between business associations, non-governmental organizations and Governments (United Nations, 2001).

157. Also, physical infrastructure is essential in the modern world economy for the efficiency of both domestic and external trade flows, improved productivity in production, processing and marketing, and for the integration of the national, subregional and regional economic space. If they are well planned, carefully targeted, efficiently priced and operated, and well maintained, infrastructure systems can play an important role in facilitating economic activities, increasing opportunities for production, increasing the equitable distribution of economic opportunities, reducing rural-to-urban migration pressures, minimizing pressures on the environment and reducing poverty. Many studies have demonstrated that efficient infrastructure boosts national competitiveness within the world economy. Basic services must be extended to all people.

G. Technical education and training

158. While there is a need for increased resources for technical education, course content must be examined from a sustainability/cleaner production perspective. The analytical tools of cleaner production, such as energy efficiency, waste minimization and life-cycle thinking, must be included at all levels of technical education and must not be regarded as a specialization or as an optional add-on. Cleaner-production education must be considered as part of a life-long skills development programme and should not be confined to formal education.

159. Training for illiterate persons is a particular challenge for the region, and in this connection more widespread use of industrial theatre is a strategy worth developing and expanding. Also, waste minimization clubs are a technique for action-based industrial training that promotes financial and environmental improvements (Barclay and Buckley, 2001).

H. Emigration

160. The policy responses that have been promoted to contain or reverse the "brain drain" can be divided into two groups on the basis of the approaches they employ (Mebratu, 2001). The first approach considers brain drain as a loss and devises the following policy measures to counteract (Brown 2000):

(a) Restrictive policies to make emigration more difficult through various mandatory requirements, including compulsory national service;

(b) Policies to make emigration less attractive by offering highly skilled workers incentives to remain in the home country;

(c) Policies whereby either the receiving country or the individual migrant is taxed in order to compensate the country of origin for its loss of human capital.

161. The limited effectiveness of these policy measures has led to a new form of thinking around the brain drain, issue that recognizes the potential advantage that a country's highly skilled expatriates can represent for its development process. This approach led to the development of the following two options (Brown 2000):

(a) The return option, which was first implemented in the 1970s. Few countries encouraged their highly skilled expatriates to return home, and only a few of them, such as India, the Republic of Korea and Taiwan, have been able to implement this strategy effectively;

(b) The diaspora option, which promotes the creation of networks of highly skilled expatriates that are referred as "expatriate knowledge networks". The idea is to set up connections between highly skilled expatriates and between the expatriates and their country of origin.

162. While the long-term effectiveness of the restrictive policy option may be questionable, all the other options may help to enable African countries to utilize the skills of their citizens for national development. Hence, African countries should give high priority to developing a coherent policy and strategy based on a combination of the above options. More importantly, African countries need to review their human resource management strategies, which in most African countries are based on a tactical approach that emphasizes administrative rules, procedures, authorities, power dynamics, a heavy reliance on past experience and short-term decisions. Since such an approach rejects new developments and seeks to perpetuate the status quo, it deserves limited tolerance and is not attractive to highly skilled persons. In this context, African countries must embrace a strategic management approach that focuses on communication, participation, teamwork, appraisal, training and organizational development strategies (Mebratu, 2000). The shift from the tactical to the strategic human resource management approach and reversal of the brain drain should be taken as one of the major challenges in promoting sustainable development in the region.

163. The following have been identified as the major strategies that would require global and regional cooperation to contain or reduce the impact of brain drain on the development of African countries (Mebratu, 2000):

(a) A conducive environment: most push and pull factors that drive the brain drain process are related to the economic and institutional conditions of the working environment. In this context, African countries must strive to create a conducive working environment with merit-based incentive systems as part of a strategic approach to human resource management;

(b) Expatriate knowledge networking: the development of a network that facilitates exchanges of information and cooperation between highly trained and skilled expatriates throughout the world should be promoted by African countries. In this context, countries can learn from African knowledge networks such as SANSA and the Knowledge and Technology Transfer Society of Ethiopia;

(c) Reorienting technical cooperation: technical cooperation aimed at capacity-building for development has constituted the major part of development cooperation over the past few decades. If technical cooperation is to be more effective, it must be reoriented to promote endogenous capacity utilization and serve as a vehicle for the reversal of brain drain.

I. Environmental reporting

164. Companies in Africa that do produce environmental reports have compared very favourably with their international counterparts. Over half of the top South African companies included disclosure on sustainability issues in their annual financial reports for 2000 (KPMG, 2001). An increasing trend has developed towards transparent reporting on the "triple bottom line" of environmental, social and financial performance. The Global Reporting Initiative (2001) listed five South African companies (out of 94) as using their June 2000 Sustainability Reporting Guidelines in writing their most recent sustainability or environmental reports.

J. Networking of national cleaner production centres

165. The major manufacturing activities in the region are in the textile, clothing, food and beverage sectors. Internationally, these sectors have been well investigated and there are numerous guides on waste minimization, pollution prevention and cleaner production. The priority is to transfer this knowledge to enterprises. One strategy has been to develop national cleaner production centres. The successes of these centres must now be assessed, their weaknesses rectified and their successes built upon. Local success stories and the subsequent publicity which they are given are great motivators for replication.

166. Lack of knowledge and weak environmental regulations are frequently cited as barriers to the implementation of cleaner production. National cleaner production centres have been shown to be effective in promoting sustainable patterns of consumption and production. The continued activity of these centres would further develop capacity and assist in improving the economic and environmental performance of the industrial sector (Tazi, 2001).

K. Conflict

167. The New African Initiative acknowledges that peace, security, democracy and good political governance are prerequisites for sustainable development and undertakes to promote these principles (OAU, 2001).

L. Democratic institutions and good governance

168. Negative practices such as bribery, nepotism, embezzlement and excessive bureaucracy must be fought with heightened vigilance (Malifu, 2001). The New African Initiative has undertaken to embark on a targeted capacity-building initiative to implement effective measures to combat corruption and embezzlement (OAU, 2001).

169. Good governance implies a credible democratic system based on the separation of the executive, legislative and judicial branches, an incorruptible judicial system, guaranteed safety and security for all citizens and the sound management of public affairs. In the management of public affairs, good governance must be measured against the yardstick of transparency in the use of public resources, equity in the distribution of the national wealth, financial responsibility at all levels, the proper use of human resources and an effective strategy to combat corruption (United Nations, 2001).

170. To make the management of public resources more transparent, managers and executives in public administration must be capable of developing, foreseeing, monitoring, regulating and accounting for their management of Government. To achieve this, the current trend is towards decentralization, liberalization, privatization and participation (United Nations, 2001). Secure and stable property rights have been key elements for economic growth in modern times: entrepreneurs have little incentive to accumulate and innovate unless they control the return on the assets which they produce or improve. In addition, markets

fail when participants engage in fraudulent or anticompetitive practices (United Nations, 2001). The biggest challenge for regulatory design is achieving political independence and autonomy while introducing rules to ensure accountability. Regulators should be appointed on the basis of professional rather than political criteria and they must have formal protection from arbitrary removal from office. Accountability requires transparency in the regulatory agency's decision-making and a single set of clear and consistent procedural rules (United Nations, 2001).

M. Diversification of production and exports

171. African economies are vulnerable as a result of their dependence on primary production, resource-based sectors and narrow ranges of exports. There is an urgent need to diversify production, and the logical starting point is to harness the existing basis of African production, which is its natural resource base. Value added in agro-processing must be increased and a broader capital goods sector must be developed through a strategy of economic diversification based on intersectoral linkages. Private enterprise must be supported, specifically the microenterprises in the informal sector and small- and medium-sized enterprises in the manufacturing sector which are the principal engines of growth and employment. Governments should remove constraints on business activity and encourage the creative talents of African entrepreneurs (OAU, 2001).

172. To promote diversification of exports, the New African Initiative seeks to achieve the following objectives:

(a) Improved procedures for customs and duty drawback/rebate schemes;

(b) Lower trade barriers through negotiations in multilateral organizations and through improved standards;

(c) Increased intraregional trade through promoting cross-border contacts between African firms;

(d) Improving Africa's negative image through conflict resolution and through marketing;

(e) Management of short-term skill shortages through appropriate firm-level incentives.

173. To achieve this the following actions should be undertaken:

(a) On the African level:

(i) Promotion of intra-African trade and promotion of African sources of imports;

(ii) Creation of marketing mechanisms and institutions to develop marketing strategies for African products;

(iii) Publicity for African exporting and importing companies and their products through trade fairs;

(iv) Reductions in the cost of financial transactions and operations;

(v) Promotion and improvement of regional trade agreements;

(vi) Promotion of intraregional trade liberalization and harmonization of rules of origin, tariffs and product standards;

(vii) Reductions in export taxes.

(b) On the international level:

(i) Negotiation and facilitation of measures and agreements for increased access for African products to the world market;

(ii) Encouragement of foreign direct investment;

(iii) Assistance for capacity-building in the private sector, and for strengthening country and subregional capacity to participate in trade negotiations, implement WTO rules and regulations and identify and exploit new trading opportunities emerging from the evolving multilateral trading system.

N. Mining

174. The New African Initiative (OAU, 2001) has the following objectives with respect to mining:

(a) Improved quality of mineral resource information;

(b) Creation of a regulatory framework conducive to the development of the mining sector;

(c) Identification of best practices that will ensure the efficient extraction of natural resources and minerals of high quality.

175. The following actions are suggested:

(a) Harmonization of policies and regulations to ensure basic agreed minimum levels of operational practices and information;

(b) Harmonization of commitments to the continuous reduction of the perceived investment risk in Africa;

(c) Harmonization of business investment incentives and resource information;

(d) Increased collaboration on knowledge of and value-addition to natural resources;

(e) Application of conditional principles to value-added investment (beneficiation) for African mining investments;

(f) Establishment of an African system of schools of mines to develop education, skills and training at all levels. The system could take the form of collaboration between existing schools.

176. The presence of ore deposits in Southern Africa that are too small to be exploited by large mining operations presents an opportunity for small-scale mining. This should be undertaken in an orderly fashion so as to transform the illegal, informal traditional mining sector into a formal small-scale mining sector.

177. In southern Africa, financial provision for mine closures was introduced in 1994: companies commit themselves to putting aside the requisite funds during the operation of the mine to make provision for closure and post-closure rehabilitation.

O. Privatization

178. Privatization has represented a significant change in policy for most African countries and was embarked upon when other fundamental political and economic reforms were also under way. Many privatization programmes suffered from poor design, inadequate preparation and insufficient resources. Also, and despite efforts to expand indigenous ownership of enterprises, there has been a notable absence of any type of mass privatization or capitalization programme in sub-Saharan Africa. To alleviate these

shortcomings, ECA undertook a series of studies and organized an ad hoc experts' meeting which recommended measures to promote privatization in strategic sectors of African economies such as telecommunications, transportation and tourism. The meeting recognized that ownership, employment and transparency constitute the critical issues in privatization processes. Other elements that critically affect the success of privatization programmes were identified, such as the strategies and policies required to enhance the implementation of privatization in Africa; an independent and effective regulatory capability, adequate judicial enforcement of contractual rights; and mobilization of high-quality investors.

P. Capital markets

179. ECA paid special attention to the promotion of capital markets in Africa. ECA, UNCTAD and the African Capital Market Forum jointly addressed issues related to this matter. Capital market needs-assessment missions were undertaken in 15 selected African countries (Algeria, Botswana, Cameroon, Côte d'Ivoire, Egypt, Ghana, Kenya, Malawi, Morocco, Nigeria, South Africa, Tunisia, Uganda, the United Republic of Tanzania and Zambia) to ascertain the degree of capital market development in each country and the type of technical support and measures needed to improve access to existing support strategies and services. A high-level policy workshop made specific recommendations regarding the regulatory environment, the bond market, the stock exchange, brokerage services, institutional investors, public awareness, technological infrastructures and regional integration. These preparatory efforts have created a network of players in the capital markets within and outside Africa for effective collaboration and partnership.

Q. Manufacturing

180. The New African Initiative (OAU, 2001) has the following objectives with respect to manufacturing:

(a) Greater production, competitiveness and diversification in the domestic private sector, especially in the agro-industrial, mining and manufacturing subsectors with potential for exports and employment creation;

(b) Establishment of national standards associations in African countries;

(c) Harmonization of the technical regulatory frameworks of African countries.

181. These will be achieved by the following actions:

(a) On the African level:

(i) Development of new industries or upgrading existing industries where African countries have comparative advantages, including agriculture-, energy- and mineral- – resource-based industries;

(ii) Participation in the relevant international standards organizations. Active membership would give Africa a stronger voice in these bodies and enable African industry to participate meaningfully in the development of international standards. Participation would transfer copyright of international standards to African national associations;

(b) On the international level:

(i) Facilitation of partnerships through the development of mechanisms such as joint business councils for information-sharing between non-African and African firms and for working towards the establishment of joint ventures and subcontracting arrangements;

(ii) Assistance in strengthening African training institutions for industrial development, particularly through the promotion of networking with international partners;

(iii) Promotion of the transfer of technologies to African countries;

(iv) Development and acceptance of a best-practice framework for technical regulations that meets both the requirements of the WTO Agreement on Technical Barriers to Trade and the needs of Africa. The technical regulation frameworks of the developed countries are not only steeped in history, they are also unnecessarily complex for many countries in Africa;

(v) Establishment of standards information centres to provide industry and government with information on international, regional and national standards, thereby facilitating market access.

R. Small and medium-scale enterprises

182. To enhance the competitiveness of African economies through policy initiatives and actions contributing to the diversification of the region's economy and targeting industrial development, ECA carried out a review of existing support services and designed a strategic framework for providing new support services to enhance the regional and global competitiveness of small- and medium-scale enterprises in Africa (United Nations, 2001).

183. ECA presented these at an ad hoc expert group meeting in Mauritius in December 2000. The meeting made valuable recommendations for improving the regulatory and policy environment in which African small- and medium-scale enterprises operate; facilitating their access to credit; and improving transportation and communications infrastructure to enhance economic performance and competitiveness. The meeting recommended the development of human resources, support service institutions and appropriate technologies for quality control and marketing for those enterprises (United Nations, 2001).

184. The ECA Secretariat has devoted much effort to the promotion of programmes that allow access by formal- and informal-sector operators to financial schemes that enable them to acquire resources for their operations. For example, credit for microprojects was analysed in a study carried out to improve access to loans by operators of small- and medium-scale enterprises through the effective use of formal and informal finance systems. The study reviewed current practices and made recommendations to Governments, financial institutions, non-governmental organizations and informal-sector operators (United Nations, 2001).

S. Energy

185. The New African Initiative (OAU, 2001) has the following objectives with respect to energy:

(a) Increased access to reliable and affordable commercial energy supply from 10 per cent to 35 per cent of Africa's population within 20 years;

(b) Improved reliability and lower cost of energy supply to productive activities in order to make economic growth of 6 per cent per year possible;

(c) Reversal of environmental degradation associated with the use of traditional fuels in rural areas;

(d) Exploitation and development of the hydropower potential of African river basins;

(e) Integration of electricity transmission grids and gas pipelines to facilitate cross-border energy flows;

(f) Reform and harmonization of petroleum regulations and legislation in Africa.

186. These objectives will be achieved by the following actions:

(a) Establishment of an African forum for utility regulation and of regional regulatory associations;

(b) Establishment of a task force to recommend priorities and implementation strategies for regional projects including hydropower generation, electricity transmission grids and gas pipelines;

(c) Establishment of a task force to accelerate the development of energy supply to low-income housing;

(d) Extension of the scope of the biomass energy conservation programme from SADC to the rest of the continent.

187. The primary environmental impact of energy consumption is in the excessive use of vegetation for fuel. This results in land degradation and respiratory disease. Eskom, the South African electricity utility, produces 50 per cent of all the electricity generated in Africa. It has electrified almost 2.4 million homes since 1991 and an expansion programme is continuing. This has resulted in an improved local environment.

188. Environmental considerations are included in Eskom's strategic electricity planning processes: strategic plans have been developed to harness hydropower from Central Africa and distribute it to other parts of the continent. A range of research and demonstration projects is being undertaken on demand-side management, supply-side management and environmental externalities. Matching finance was received from GEF for a pre-feasibility study for solar thermal electricity studies. Studies have indicated that for the next 50 years hydropower resources will equal coal as an energy source within southern Africa.

Bibliography

African Development Bank, African Development Report - 2001: A Summary, http://www.afdb.org.

Aredo, D. and Zelalem, Y, (1998), Skilled Labor Migration from Developing Countries: An Assessment of Brain Drain from Ethiopia, in Proceedings of the Seventh Annual Conference of the Ethiopian Economy. Addis Ababa: The Ethiopian Economic Association.

Ashton, P, Love, D, Mahachi, H and Dirks, P. (2001), An Overview of the Impact of Mining and Mineral Processing Operations on Water Resources and Water Quality in the Zambezi, Limpopo and Olifants Catchments in Southern Africa. Mining, Minerals and Sustainable Development Project, Southern Africa.

Fourie, B. (2001), The burden of tuberculosis in South Africa, MRC National Tuberculosis Research Programme, South Africa (www.sahealthinfo.org/publications/body_tb).

Barclay, S.J. and Buckley, C.A. (2001), An Update on Waste Minimisation Clubs in South Africa–R18m saved, SA Water Bulletin, p 9 (www.wrc.org.za/wrcpublications/wrcbulletin/v27_4/WATER per cent20UITLEG per cent20.1.pdf).

Bason, M.S., van Niekerk, P.H. and van Rooyen, J.A. (1997), Overview of water resources availability and utilisation in South Africa, Department of Water Affairs and Forestry Report P RSA/00/0197.

Brown, M. (2000), Using the Intellectual Diaspora to Reverse the Brain Drain: some useful examples, presented at the Regional Conference on Brain Drain, Addis Ababa.

Brundtland (1987), Report of the World Commission on Environment and Development,

Coakley, G,J, and Mobbs, P,M, The Mineral Industries of Africa, United States Geological Survey (www.minerals.usgs.gov/minerals/pubs/country/africa99.pdf).

DANCED (1998), South African–Danish Country Programme for Environmental Assistance, 1998–2002, Ministry of Environment and Energy, Copenhagen, ISBN 87-601-7276-2.

Drechsler, B. (2001), Small-scale Mining and Sustainable Development in Southern Africa, Mining, Minerals and Sustainable Development Project, Southern Africa.

Eskom (2000), Towards sustainability–Eskom environmental report 2000 (www.eskom/co.za).

FAO (2001), The state of food and agriculture 2001 (www.fao.org/docrep/003/x9800e/x9800e00.htm).

Fukuyama, Francis (1995), Trust: The Social Virtues and the Creation of Prosperity, Hamish Hamilton.

Gelb, S. (1999), Sustaining the nation: Economic growth, people and the environment, in G. Maharaj (ed, Between Unity and Diversity: South Africa and the National Question, Idasa, Cape Town.

Global Leaders of Tomorrow Environment Task Force (2001), Environmental Sustainability Index, World Economic Forum, Annual Meeting 2001, Davos, Switzerland (www.ciesin.columbia.edu/indicators/ESI).

Global Reporting Initiative (2001), Companies using the GRI Sustainability Reporting Guidelines (www.globalreporting.org/GRIGuidelines/Reporters.htm).

Hanks, J. (2001), Agenda 21 Review, Common Ground Consulting, Cape Town.

Human Development Indicators–2001 (www.undp.org/hdr2001).

ILO (1999), Sectoral Activities Programme, Social and Labour Issues in Mines, Geneva.

Imevbore, A.M.A. (2001), National Industrial Overview of the Contribution of UNIDO to Sustainable Development in Nigeria, a report prepared for UNIDO for the Rio+10 assessment.

Industrial Environment Forum of Southern Africa (2001).

International Organization for Standardization (2001), The ISO Survey of ISO 9000 and ISO 14000 Certificates, Tenth cycle: up to and including 31 December 2000 (www.iso.ch/iso/en/prods-services/otherpubs/pdf/survey10thcycle.pdf).

Klett, T.R., Ahlbrandt, T.S., Schmoker, J.W., and Dolton, G.L. (1997). Ranking of the world's oil and gas provinces by known petroleum volumes: U.S. Geological Survey Open-File Report 97-463 (www.greenwood.cr.usgs.gov/energy/WorldEnergy/OF97-470A/index.htm).

KPMG (2001), KPMG Survey of Sustainability Reporting in South Africa–2001, accessed on 6 November 2001 (www.kpmg.co.za/download/KPMG_Sus_Rep_Survey_2001.pdf).

Mail & Guardian, 27 July–2 August 2001.

Malifu, A. (2001), Report on Industrial Contribution to Sustainable Development in Ethiopia, UNIDO, Ethiopia.

Mbendi (2001), Africa: Oil and Gas Industry–Overview (www.mbendi.co.za/indy/oilg/af/p0005.htm).

Mebratu, D. (2000), Strategy Framework for Sustainable Industrial Development in sub-Saharan Africa, PhD thesis, Lund University, Lund.

Mebratu, D. (2001), The Challenges of Sustainable Industrial Development in Africa, Input to the Preparatory Process for the World Summit on Sustainable Development, UNIDO, Nairobi.

Mobbs, P.M. (2000), The Mineral Industry of Nigeria, United Stated Geological Survey, accessed 6 October 2001 (www.minerals.usgs.gov/minerals/pubs/country/9229099.pdf).

OAU (2001), A New African Initiative: Merger of the Millennium Partnership for the African Recovery Programme (MAP) and Omega Plan, July 2001, (www.dfa.gov.za/events/afrinit.htm).

Rukato, H. (2001), Draft Input for the Review of Agenda 21–Energy and Mining, Chamber of Mines of South Africa.

SADC, SADC Subregional Consultations in Preparation for the World Summit on Sustainable Development, 17–19 September 2001, Mauritius.

South African Department of Trade and Industry (2001), Driving competitiveness: An integrated industrial strategy for sustainable employment and growth (www.dti.gov.za/downloads/docs/ indstrat2.pdf).

Tazi (2001), The Moroccan Cleaner Production Centre–tool for industry and sustainable development.

United Nations (2001), Implementation of the Programme for the Second Industrial Development Decade for Africa 1993–2002, Report of the Secretary-General, A/56/139.

UNAIDS (2001), Report on the global HIV/AIDS epidemic, June 2000, ISBN: 92-9173-000-9 (www.unaids.org).

ECA (1999), The Challenge of Financing Development in Africa, Report to the fourth session of African Ministers of Finance, Addis, Ababa.

UNEP (2000), First African Round Table on Cleaner Production and Sustainable Consumption, Nairobi, Kenya, 9-11 August (www.unepie.org/pc/cp/events/Round Tables.htm).

UNEP GEO-2000 (1999), Global Environmental Outlook (www.grida.no/geo2000/english/0051.htm).

UNEP/UNIDO (2001), African Preparatory Conference for the World Summit on Sustainable Development African Industry Workshop Report, Nairobi, 15 October 2001.

UNESCO (2000), The World Heritage List (www.unesco.org/whc/nwhc/pages/doc/main.htm).

UNIDO (2001), Selected industrial country statistics (www.unido.org/doc/50215.htm).

UNIDO/UNEP (1994), Generic Project Document for the Establishment of National Cleaner Production Centres, UNIDO.

United States Department of State (2000), Fact Sheet: The Trade and Development Act of 2000 - Advances U.S. ties with sub-Saharan Africa and the Caribbean (www.usinfo.state.gov/regional/af/trade/t0051801.htm).

WHO (2000), WHO Information Factsheets, HIV, TB and Malaria–Three major infectious disease threats (www.who.int/inf-fs/en/back001.htm).

WHO (2001), World Health Report–1999 (www.who.int/whr/1999/en/pdf/mortality.pdf).

World Travel and Tourism Council Year (2001), 2001 Tourism Satellite Accounting Research Tables (www.wttc.org).

Annex 1. Country Manufacturing and Economic Data

Country	Population (millions)	Manufacturing Value Added			Manufactured exports		Manufacturing employees	Rank by sector		
		US$ (billion)	% GDP	US$ per capita	US$ (millions)	% of exports		1	2	3
Average for Africa			12.3	80						
Algeria	30.8	3.2	9.7	153	2641	19.0	292,078	iron and steel	food	textiles
Botswana	1.6	0.2	4.8	150	na	na	23,066	textiles	food	other manufactures
Cameroon	14.7	2.0	10.4	65	612	34.8	53,092	rubber	food	wood
Congo, Rep of	2.9	0.2	7.5	53	68	6.2	7,628	food	beverage	wood
Egypt	672.0	17.2	24	303	2821	80.6	1,125,910	textiles	food	non-metallic minerals
Ethiopia	61.1	0.4	6.1	7	75	17.8	82,379	textile	food	beverages
Gambia	1.3	0	5.0	17	na	na	2,482	food	printing and publish	beverages
Ghana	19.7	0.7	2.3	9	230	32.5	83,157	wood	textiles	food
Kenya	29.5	1.0	9.3	37	1173	71.0	216,889	food	textiles	transport equipment
Liberia	2.9	0.1	na	na	na	na	2,045	beverage	food	other chemical
Libyan	5.5	3.4	10.4	618	1932	89.8	na	na	na	na
Mauritius	1.1	0.8	21.5	751	1488	96.3	99,421	clothing	food	textiles
Morocco	27.9	5.9	17.3	218	2994	64.0	498,962	clothing	food	textiles
Mozambique	19.3	na	na	na	78	34.0	62,490	food	textiles	clothing
Niger	10.4	0.2	6.2	13	na	na	na	na	na	na
Nigeria	124.1	2.1	5.3	17	182	2.6	300,621	furniture	textiles	printing
Senegal	9.2	0.9	15.8	82	412	84.5	35,348	food	textiles	industrial chemicals
Sierra Leone	4.9	0	5.9	9	na	na	12,963	food	beverages	printing

Country	Population (millions)	Manufacturing Value Added			Manufactured exports		Manufacturing employees	Rank by sector		
		US$ (billion)	% GDP	US$ per capita	US$ (millions)	% of exports		1	2	3
Somalia	9.7	0	5.2	7	na	na	16,214	food	textiles	paper
South Africa	39.9	25.1	17.2	563	11,572	59.1	1,417,000	food	clothing	fabricated metal
Sudan	28.9	2.7	8.1	37	104	45.0	na	na	na	na
Tanzania	32.8	0.4	6.6	16	210	35.3	126,425	food	textiles	industrial chemicals
Tunisia	9.5	3.1	18.2	335	5190	90	292,078	clothing	food	textiles
Uganda	21.1	0.5	8.1	25	na	na	na	na	na	na
Zambia	9.0	0.5	11.4	44	997	94.5	50,988	food	textiles	fabricated metal
Zimbabwe	11.5	1.6	14.3	80	1197	56.5	166,696	food	textiles	clothing

Annex 2. Country Data-Production of Selected Mineral Commodities, 1999 (source Coakley and Mobbs, 2001)

(Thousands of metric tons gross weight unless otherwise specified)

Country	Aluminium	Bauxite	Cement	Chromite	Coal	Cobalt mine Co content (metric tons)	Copper mine Cu content	Diamonds (thousand carats)	Gold (kilograms)	Graphite	Iron ore	Lead mine Pb content (metric tons)	Manganese ore	Petroleum (crude) (thousands barrels)	Phosphate rock	Steel (crude)	Uranium concentrate (U_3O_8) (metric tons)
Algeria			7,500								1,336	1,215		438,840	196	400	
Angola			350					4,096						270,000			
Benin			450						500								
Botswana					900	329	22	21,348	1								
Burkina Faso			50						886								
Burundi									5								
Cameroon	85		450						1,000					37,000			
C. Africa Republic								550	100								
Congo Brazza			10						10					93,951			
Congo-Kinshasa			158			1,000	36	20,116	207					8,650			
Côte d'Ivoire			650					310	2,628					10,000			
Egypt	193		22,000		400						3,000		30	311,000	1,018	2,619	
Equator Guinea														37,000			
Eritrea			45						500								
Ethiopia			700						2,000								
Gabon			175					500	70				2,092	124,500			347

Ghana	104	353	1,870					648	81,594				541	2,190		75		
Guinea		15 000	0					400	13,300									
Kenya	2		1,200						990							25		
Liberia			15					500	1,000									
Libya			3,000											481,000		945		
Madagascar			120	100					50	13								
Malawi			175		54													
Mali			10						23,688									
Mauritania			50								11,500							
Morocco			7,200		129	950	5		380		4	79,798	29	35	22,767	5		
Mozambique		6	390		100				17	2								
Namibia								1,557	2,008			9,361					3,171	
Niger			30		135				1,000								3,441	
Nigeria	16		2,500		30				10					777,000				
Rwanda			66						10									
Senegal			1,000											1	1,820			
Sierra Leone			100					500	30									
Somalia																		
South Africa	689		8,900	6,817	223,471	450	144	10,022	451,300		29,512	80,191	3,122	5,493	2,900	7,300	193	
Sudan			350	10					6,000					17,000				
Swaziland					400													
Tanzania			1,200		35			120	7,000									

Togo			560												1,700		
Tunisia			4,864								222	6,589		30,960	8,006	229	
Uganda			210						2,500		300					15	
Zambia			300		100	4,236	260		700								
Zimbabwe			1,000	641	4 977	129	5	45	27,666	12	599				90	228	
World share	**5 %**	**12 %**	**4 %**	**54 %**	**5 %**	**24 %**	**4 %**	**54 %**	**25 %**	**4 %**	**5 %**	**6 %**	**29 %**	**9 %**	**28 %**	**2 %**	**22 %**

Annex 3. Country Data (Industrial Environmental Issues)

Country	Environmental Issue	Ref
Algeria	dumping of petroleum-refining wastes and other industrial effluents is leading to the pollution of rivers and coastal waters	1
Botswana	limited fresh water resources	1
Congo, DR	water pollution	1
Côte d'Ivoire	water pollution from sewage, industrial and agricultural effluents	1
Ethiopia	industrial wastewater (tannery, textiles)	2
Ghana	water pollution	1
Kenya	water pollution from urban and industrial wastes	1
Liberia	pollution of coastal waters from oil residue	1
Madagascar	surface water contamination from raw sewage and other organic wastes	1
Malawi	water pollution from agricultural runoff, sewage, industrial wastes	1
Morocco	oil pollution of coastal waters	1
South Africa	lack of inland fresh water, salinization, mine drainage, industrial effluents	1
Tunisia	toxic and hazardous waste disposal risks	1
Zambia	acid rain, mine drainage	1
Zimbabwe	air and water pollution	1

1. Adapted from African Development Bank, Simona Kufakwandi (2001). Consortium Funding for Sustainable Forestry Management: Africa, perspective and priorities.

2. Malifu, A. (2001). Report on Industrial Contribution to Sustainable Development in Ethiopia, UNIDO, Ethiopia.

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