ECONOMIC REPORT ON AFRICA 1988

A Report of the Staffs of the

African Development Bank and Economic Commission for Africa
Abidjan Addis Ababa
Cote d'Ivoire Ethiopia

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This is the fifth annual Economic Report on Africa, jointly prepared by the staffs of the African Development Bank (ADB) and the United Nations Economic Commission for Africa (ECA). The object of this series of reports has been to provide, on an annual basis, an account of the state of the African economy, an analysis of recent economic performance, summary forecasts of future developments and an in-depth examination of a topical development issue.

Part I of this Report assesses recent developments in the African economy. Contrary to earlier forecasts, 1987 turned out to be yet another bad year. The combined Gross Domestic Product of the region grew by a mere 0.8 per cent in 1987. Traditional domestic and external factors again stood in the way of African governments' efforts to steer their economies towards a higher and sustainable growth path. Inadequate or late rains and sometimes prolonged dry spells adversely affected agricultural production. Prices, especially for such important commodities as coffee and tea either declined or remained weak. Of the major non-oil export commodities, only copper, gold and diamonds showed evidence of recovery. However, structural domestic impediments and the lack of spare parts partly compromised the potential advantages which countries such as Zaire and Zambia could have reaped from the export of copper. Again, weak international demand for oil continued to impede the growth of the major oil exporting countries during the year.

The foreign exchange resource squeeze arising partly from low export earnings and partly from inadequate and stagnating inflows of external resources has been compounded by the continued debt crisis. Debt servicing is now cutting deeply into the resources available for new investment. To cope with their balance of payments problems, countries were forced to reduce imports, thus adversely affecting growth.
A return to more reasonable rates of growth will hinge on the early and effective removal of the external resource constraints, in particular as they relate to the debt problem. Only then will the efforts initiated by African countries to bring about recovery materialize. Assuming a relaxation of these constraints in 1988, an improved trade climate and a return of normal weather, a higher rate of economic growth is forecast for the African economy in 1988.

The second part of the Report examines the interdependence between the environment and the economy. The maintenance of a sound environment is absolutely essential for sustained growth. The consequences of mismanagement of natural resources are pointed out and the effects of environmental degradation are studied. Issues of desertification, deforestation, groundwater loss and contamination, and urban waste pollution are linked to economic performance. The Report then goes on to make a point about the economic desirability of investing in environmental improvements or maintenance as the case may be. Examples of the economic loss to African economies caused by the depletion of the natural resource stock are presented. To make the argument explicit, case studies from several countries where environmental degradation has taken place are also presented and the underlying causes and effects are analyzed. The Report also outlines policy measures aimed at addressing environmental issues and examines the longer term economic benefits that are likely to accrue from the pursuit of such policies.
Finally, the Report closes with a section on the implications for the ADB and ECA. These include, respectively, greater emphasis on the agricultural sector, addressing externalities, elevating environmental issues to national planning levels, addressing rural issues, the enhancement of information, resource management and altered methodologies for project appraisal. The ECA is seen to have a major role in drawing the attention of the international and African communities to the critical issues of environmental degradation by, for example, quantifying the costs of environmental damage.

Signed

Adebayo ADEDEJI
Executive Secretary
Economic Commission for Africa

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President
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PART I: RECENT ECONOMIC DEVELOPMENTS AND PROSPECTS

1. CURRENT TRENDS IN AFRICAN ECONOMIES

1.1 The Overall Situation

Economic performance has again been disappointing in 1987. Output growth for the countries of developing Africa is estimated at only 0.8 per cent compared to a revised 0.5 per cent in 1986. In 1986, it was the downturn in oil exporting countries which was mainly responsible for the poor overall result, as non-oil exporting countries recorded their best performance so far this decade, with their combined GDP growing by 3.7 per cent compared to a fall of 1.2 per cent in oil exporting countries. This good showing on the part of non-oil exporting countries was itself the result of an exceptionally good year for agriculture, due to weather patterns returning to normal after the 1983-1985 drought and agricultural support policies starting to bear fruit. By contrast, in 1987, growth has been low for both oil exporters and non-oil exporters. For oil exporters, the rate of growth was a mere 0.3 per cent, as oil revenues, despite the increases in oil prices, were lower than expected. In fact, only two countries - Egypt and Angola - substantially increased oil production, particularly Angola, with production in 1987 nearing 310,000 b/d compared to 280,000 b/d in 1986. Algeria which was able until now to maintain and increase its hydrocarbon sector output despite OPEC quotas through reliance on condensates and gas production, recorded a 1.5 per cent fall in GDP in 1987, though its gas exports did well, increasing in volume by around 17 per cent. In Nigeria, the economy did not grow at all in 1987, since exports were at levels lower than expected and the industrial sector, constrained by severe import compression and operating well below capacity, showed very little growth.
### Table 1
Growth Rate of GDP by Subregion and Economic Grouping, 1986-1988*
(Percentage)

<table>
<thead>
<tr>
<th>Subregion</th>
<th>1986</th>
<th>1987&lt;sup&gt;a/&lt;/sup&gt;</th>
<th>1988&lt;sup&gt;b/&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>North Africa</td>
<td>0.3</td>
<td>1.6</td>
<td>3.0</td>
</tr>
<tr>
<td>Sub-Saharan Africa&lt;sup&gt;c/&lt;/sup&gt;</td>
<td>0.9</td>
<td>0.4</td>
<td>2.5</td>
</tr>
<tr>
<td>Central Africa</td>
<td>1.4</td>
<td>0.1</td>
<td>1.6</td>
</tr>
<tr>
<td>East and Southern Africa</td>
<td>3.2</td>
<td>2.8</td>
<td>3.6</td>
</tr>
<tr>
<td>Southern Africa</td>
<td>3.0</td>
<td>-0.4</td>
<td>4.2</td>
</tr>
<tr>
<td>West Africa</td>
<td>-0.6</td>
<td>0.6</td>
<td>2.7</td>
</tr>
<tr>
<td>Sahel countries</td>
<td>5.1</td>
<td>1.7</td>
<td>3.7</td>
</tr>
<tr>
<td>Oil exporters</td>
<td>-1.2</td>
<td>0.3</td>
<td>2.2</td>
</tr>
<tr>
<td>OPEC members</td>
<td>-2.3</td>
<td>-0.7</td>
<td>2.0</td>
</tr>
<tr>
<td>Non-oil exporters</td>
<td>3.7</td>
<td>1.6</td>
<td>3.5</td>
</tr>
<tr>
<td>LDCs</td>
<td>3.8</td>
<td>3.4</td>
<td>3.5</td>
</tr>
<tr>
<td>Others</td>
<td>3.7</td>
<td>0.6</td>
<td>3.7</td>
</tr>
<tr>
<td>Regional total</td>
<td>0.5</td>
<td>0.8</td>
<td>2.7</td>
</tr>
</tbody>
</table>

Source: ECA secretariat.

* GDP measured at 1980 prices.
<sup>a/</sup> Preliminary estimates.
<sup>b/</sup> Forecast.
<sup>c/</sup> Including the Sudan, which forms part of the North Africa subregion.

In the non-oil exporting countries, economic growth in 1987 slowed to 1.6 per cent, and this was mainly due to the incidence of drought in many areas of the region. On a value added basis, the agricultural sector in developing Africa grew by 3.8 per cent in 1986, but in 1987 a growth of only 1.4 per cent was recorded. Poor weather conditions hit several areas of the region, including Morocco in Northern Africa, part of the Sahel, Ethiopia, and countries of Southern Africa, particularly Mozambique, Swaziland, Zambia and Zimbabwe. As a result, according to the FAO, cereal production for the whole region declined by nearly 12 per cent. In Ethiopia, the failure of the rains in the northern parts of the
country created famine conditions as serious as in 1984/85, with 5
million people affected and the food deficit estimated at more than
1.3 million tons for 1988.

In Mozambique, the food deficit for the 1987/88 season is
estimated at 284,000 tons or 30 per cent of total requirements.
Although there was no threat of famine in Zambia, the damage done to
agriculture was nevertheless important as marketed output of maize,
the staple crop, went down to 7.3 million bags in 1987 compared to
10.2 million in 1986. In Zimbabwe, agricultural output fell by 25
per cent and contributed to the 3 per cent decline in overall GDP.
At the regional level however, the net food supply situation is not
alarming and the situation is not as critical as in 1983/84. In
fact, in some countries, very good results have been recorded, as in
Tanzania where bumper cereal crops have been harvested, because of
both good weather and agricultural incentive measures taken by the
authorities in the framework of their economic adjustment programme.

Commodity prices were up on average during 1987. The IMF
index of non-fuel commodity prices for example shows a rise of 8.6
per cent relative to 1986. Similarly, the Economist dollar
commodity index shows prices up by 37.3 per cent between January 5,
1987 and January 5, 1988. However, these increases were not equally
distributed among the more important commodities. For instance,
beverage prices were down, particularly for coffee whose price
declined 30 per cent on average compared to 1986. Cocoa prices were
also weak, and the situation was similar for tea, the prices of
which lost by an average of 11.5 per cent at the London auction.
For many of these commodities, there is the continuing problem of
excess stocks in an oversupplied market. Metal prices rose, the
chief beneficiary being copper. By contrast, cobalt and phosphate
prices were down. For the region as a whole, non-fuel commodity
prices increased by only 2.9 per cent, after an increase of 1.8 per
cent in 1986, and were on average 18.6 per cent below their 1980
levels. There was a strong improvement in diamond and gold prices
in the wake of the stock market crash of October 1987, but these two
commodities still represent a relatively small share of African
exports. The adverse trends in coffee and cocoa prices have been particularly hard on Cote d'Ivoire where the situation has been compounded by a drop in production. In 1987 the drop in coffee and cocoa prices is estimated to have cost that country about 10 per cent of its GDP, which itself declined by a substantial 5.8 per cent. The index of world prices of products exported by the countries of the UMOA, calculated in CFA francs by the BCEAO, shows a fall of 16 per cent in the first half of 1987 compared to the corresponding 1986 period.

1.2 Review of Major Domestic Economic Sectors

1.2.1 Agriculture

The year 1987 was particularly bad for African agriculture. After an impressive recovery in 1985 and a growth of 3.8 per cent in 1986, agricultural output increased by only 0.5 per cent in 1987. Almost all the subregions experienced poor performance during the year. Particularly poor results were registered in North West Africa and East Africa where output fell by 6.2 per cent and 0.2 per cent, respectively. Harvests were generally affected by prolonged dry spells and unusually late rains.

The very poor performance of the food subsector has been the major contributor to the deterioration in overall agricultural production in 1987. According to the FAO, cereal production in the region fell by some 8 per cent. At the same time, production of pulses decreased by 5.3 per cent and that of tubers rose by a mere 1.6 per cent with cassava production stagnating at around 106 million tons. The situation regarding food production was not uniform throughout the region, however. In North Africa, for instance, food production was generally considered satisfactory, except in Morocco and Sudan which continued to be affected by

1/ "Union Monetaire Ouest Africaine", or West African Monetary Union, grouping zone franc members in West Africa.
drought. In Central Africa, although rains were below normal in 1987, prospects for coarse grains are also considered generally satisfactory. However, in East Africa, the situation was mixed. While the United Republic of Tanzania had a main-season record crop in 1987, the food situation in Ethiopia has deteriorated further following continued below-normal late-season rainfall. In West Africa, unusually prolonged and abundant late rains benefited late-planted crops and improved harvest prospects; however, food production in the Sahel was estimated to have been more than 10 per cent below that of the record production registered in 1986.

In contrast to food crops, the overall performance of industrial crops was generally satisfactory in 1987. Production of all major industrial crops increased during the year; coffee by 5.6 per cent to 1.324 million tons, cotton by 7 per cent to 3.83 million tons, cocoa by 3.6 per cent to 1.13 million tons, sugar by 0.4 per cent to 5.64 million tons, tea by 3.4 per cent to 271,000 tons and tobacco by about 9 per cent to 318,000 tons. Higher total coffee production reflected larger harvests particularly in Cameroon, Ethiopia, Kenya and Uganda. In Ethiopia however, although production picked up from its lowest level of 155,000 tons in 1984/85 to 170,000 tons and 186,000 tons in 1985/86 and 1987/88 respectively, it was still much lower than the 240,000 tons attained in 1983/84. All cotton producers, with the notable exception of Egypt, registered output increases. Egypt's cotton production fell by about 8 per cent to 1.1 million tons in 1987. The increase in tea production is explained mainly by the rise in Kenya's production following satisfactory rainfall in 1987. Good climatic conditions in Mauritius and Swaziland and the enhanced capacity utilization in Sudan's Kenana sugar complex were instrumental in raising regional sugar output.

Production of forestry and fishery products continued to stagnate. Indeed the supply of fish and fishing products per capita has declined over the years and although imports have also declined, the region remains a net importer. The situation of the forestry subsector continues to be one of serious concern. Despite efforts
by many governments to halt desertification, the destruction of wildlife and soil erosion, forest resources are continually being depleted and desertification is spreading. The social and economic costs of such environmental deterioration are known to have serious implications for development in the region.\(^2\)

The momentum of policy reforms has been sustained during the past 2-3 years in the majority of African countries. Increased emphasis has been placed on issues such as food security, marketing services, mechanisation, supply of modern inputs, research and extension services, the efficiency of land-use and farming systems, livestock development, conservation of forests and assistance programmes for smallholders. The main policy instruments have included incentives, institutional reforms and higher investment spending. The decontrol of food prices has gained increased acceptance and an increasing number of countries have abolished food marketing monopolies. As an indication of the high priority given to the agricultural sector, increased proportions of national development budgets have been earmarked for agricultural and rural development.

1.2.2 Manufacturing

Preliminary estimates for 1987 indicate that regional manufacturing value-added increased by 3.7 per cent. Although modest, this result represents an improvement on the 2.4 per cent growth achieved in the previous year. The overall regional performance continues to be strongly influenced by that of North and West Africa, which together account for over 70 per cent of the regional total. The poor growth in 1986 was mainly attributable to a decline of about 2.5 per cent in West Africa. Foreign exchange difficulties in Nigeria, and the sharp decline in the supply of agricultural raw materials in the Sahelian part of the subregion

\(^2\) For detailed analysis for this and related issues see Part II of this report.
were the major factors behind the sharp fall in value-added generated in the sector. In 1987 however, there was a small increase in value-added of 1.7 per cent in West Africa, while in North Africa, which accounted for 51.2 per cent of total regional industrial output, manufacturing output grew by 5.4 per cent.

In 1987, the value-added generated in the major oil exporting countries increased by 4.0 per cent, following a poor 1.6 per cent in 1986. Though African LDCs however continue to face wide-ranging production and input supply difficulties, they nonetheless contributed strongly to the overall 1987 growth rate with their combined industrial output rising by 3.8 per cent during the year.

The modest performance of the manufacturing sector in 1986–1987 can be traced to structural factors such as the limited size of the market, poor intersectoral linkages, lack of skilled manpower and sometimes inappropriate technology. Natural and man-made calamities (drought and desertification, predators, etc.) also contributed to the plight of industry. The inadequacy of foreign exchange resources, while affecting various economic sectors, has especially affected the manufacturing sector, both in terms of new investment and in terms of the utilization of existing capacity.

Many countries continued to introduce policy reforms directed essentially towards raising production efficiency and expanding the industrial base. The policy adjustments covered, inter alia, pricing, industrial organization and the reorientation of industrial strategies towards greater compatibility with the needs of domestic development.
1.2.3 Mining

As a price taker and a sometimes marginal producer, the African mining sector in 1986-1987 continued to be greatly influenced by the developments in the world market and by domestic structural limitations, particularly in the non-fuel subsector. Thus, the performance of the mining sector in the reference period has to be examined against depressed demand in the OECD countries and the prevailing market conditions of oversupply and excess stocks, save for a few exceptions, notably copper and the precious metals.

Overall regional petroleum production fell by about 5 per cent in 1987 to 230.2 million tons following a slight rise of 0.7 per cent in 1986. The fall in oil production would have been steeper had it not been for a rise of about 4.9 per cent in the share of production of the eight non-OPEC African producers to about 35 per cent of total regional production. OPEC members' production fell by 9.7 per cent in 1987 mainly on account of sharp production decline in Nigeria and to a lesser extent in Gabon and the Libyan Arab Jamahiriya.

The non-fuel minerals show divergent production trends in 1986, the latest year for which complete production data are available. Of the 17 major commodities produced in the region about 9 recorded output declines. Among the latter are copper, lead, chrome, nickel, tin and iron ore. However, the strong showing of diamonds and to a lesser extent aluminium, phosphate rock, manganese and cobalt, more than compensated for the fall in production of the former group. On balance, the index of mining production rose by 4.2 per cent in 1986.

Although output data for 1987 are incomplete, they seem to closely follow the 1986 pattern except for copper which had a particularly buoyant market in 1987. Price trends however show a marked recovery as compared to 1986. Oil prices rose from their low levels of about $8 a barrel in August 1986 to about $17.50 a barrel
in January 1987 and although they weakened in February 1987 they picked up thereafter and generally stabilized at around OPEC's target price of $18 a barrel for most of the year. Prices of almost all major non-fuel minerals posted noticeable gains, although, with the exception of manganese and iron ore, they have remained well below their 1980 levels. Commodities recording a strong price recovery in 1987 included aluminium, copper, lead, gold and diamonds whose prices rose by 38.5 per cent, 13.8 per cent, 30.4 per cent, 21.4 per cent and 15 per cent, respectively.

1.3 The External Sector

Exports are estimated to have recovered in 1987, increasing in value by 15.1 per cent to $57.3 billion, and in volume by 2.0 per cent. In 1986, exports had dropped considerably by nearly 25 per cent as oil prices collapsed. Similarly, in 1987, it is the recovery of oil prices in large measure which accounts for the rise in exports. Compared to an average of $14.6 per barrel in the third quarter, oil prices have been at an average of $18.4 per barrel for Brent crude (26 per cent higher than the OPEC benchmark decided upon in December 1986). Oil exporters, however, recorded an increase of only 17.5 per cent in exports, because of OPEC quotas and poor demand. As previously noted, only Angola posted a large increase in exports because of a substantial rise in production. For non-oil exporters, the export gain was more limited at 11.6 per cent. This is explained by the behaviour of commodity prices, which though favourable as far as metals are concerned, were quite unfavourable for major traditional exports such as coffee and cocoa.

In contrast to exports, imports are estimated to have risen only modestly, by 3.3 per cent in value, while declining in volume by nearly 3.2 per cent. Policy factors explain a large part of this evolution as countries strived to reduce imports in the face of export revenues still well below the levels of the early 1980s and as debt service payments became more burdensome. A particularly
striking example is Nigeria, where imports are estimated in 1987 at only $4.9 billion compared to a peak of $21 billion in 1981. The fall of the dollar relative to other major currencies has also played its role, through the reduction in import demand, since most of Africa's import trade is in hard currencies other than the dollar.

Table 2

Merchandise Trade of Developing Africa 1986-1988

(annual percentage change)

<table>
<thead>
<tr>
<th></th>
<th>1986</th>
<th>1987a/</th>
<th>1988b/</th>
</tr>
</thead>
<tbody>
<tr>
<td>Value^c/</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Exports</td>
<td>-23.9</td>
<td>15.1</td>
<td>10.0</td>
</tr>
<tr>
<td>Imports</td>
<td>-2.4</td>
<td>3.3</td>
<td>9.0</td>
</tr>
<tr>
<td>Volume^d/</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Exports</td>
<td>-2.8</td>
<td>2.0</td>
<td>4.5</td>
</tr>
<tr>
<td>Imports</td>
<td>-4.5</td>
<td>-3.2</td>
<td>2.2</td>
</tr>
<tr>
<td>Unit Value^c/</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Exports</td>
<td>-20.7</td>
<td>12.8</td>
<td>5.3</td>
</tr>
<tr>
<td>Imports</td>
<td>2.2</td>
<td>5.2</td>
<td>6.6</td>
</tr>
<tr>
<td>Terms of Trade</td>
<td>-23.4</td>
<td>7.2</td>
<td>-1.2</td>
</tr>
<tr>
<td>Purchasing power of exports</td>
<td>-30.1</td>
<td>9.5</td>
<td>2.8</td>
</tr>
</tbody>
</table>


a/ Preliminary estimates.
b/ Forecast.
c/ In dollar terms.
d/ At 1980 prices.
Export prices recovered after the large drop of 1986, by an estimated 12.8 per cent, and with import prices rising moderately by 5.2 per cent, the terms of trade rose by 7.2 per cent after the 23.4 per cent deterioration recorded in 1986. Of course, the rise in oil prices was the main contributor to the higher export prices. For prices quoted on the international commodity market, the index for the African region shows a rise of 20.8 per cent when oil is included, but only 2.9 per cent if oil is excluded. For mineral exporters such as Zaire and Zambia, the rise in export prices was impressive, as high as 23.7 per cent in the case of Zambia with record copper prices in the second half of 1987. The trade deficit disappeared since exports rose and imports remained practically at the same level. Compared to a deficit of $2.4 billion in 1986, there was a surplus of $3.4 billion in 1987, which, though a favourable development, was still well below the $12 billion recorded in 1985.

The commodity distribution of African trade shows little change. On the export side, mineral fuels i.e. oil and related products are dominant with 69.3 per cent of the total in 1985, compared to 71.2 per cent in 1984. The slight drop corresponds to the fall in oil prices and not to any real gain for other commodities. In 1986 and 1987, the share of hydrocarbons may have fallen further. For imports, manufactured goods represent 58.9 per cent in 1985, while primary commodities represent 32.5 per cent with food, beverages and tobacco at 17.6 per cent.

Data for 1986-1987 show the developed market economies supplying and buying a growing proportion of Africa's trade, taking 75 per cent of exports and supplying 72.7 per cent of imports in the first half of 1987, Europe being the main trading partner of the region. The U.S. share of exports and imports was 14 per cent and 6.6 per cent, respectively. Japan, on the contrary, was more a supplier than an importer (6.9 per cent of imports against 1.9 per cent of exports). A striking new development is the growing share of developing countries in Africa's trade, particularly the Newly Industrialized Countries of South East Asia such as South Korea, a trend likely to gather strength in the future.
Table 3

(billions of dollars)

<table>
<thead>
<tr>
<th></th>
<th>1986</th>
<th>1987a/</th>
<th>1988b/</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exports f.o.b.</td>
<td>49.8</td>
<td>57.3</td>
<td>66.8</td>
</tr>
<tr>
<td>Imports f.o.b.</td>
<td>52.2</td>
<td>53.9</td>
<td>62.7</td>
</tr>
<tr>
<td>Trade balance</td>
<td>-2.4</td>
<td>3.4</td>
<td>4.1</td>
</tr>
<tr>
<td>Services &amp; private transfers (net)</td>
<td>-11.3</td>
<td>-14.6</td>
<td>-17.2</td>
</tr>
<tr>
<td>Current account balance</td>
<td>-13.7</td>
<td>-11.2</td>
<td>-13.1</td>
</tr>
<tr>
<td>Official transfers</td>
<td>4.0</td>
<td>4.3</td>
<td>4.6</td>
</tr>
<tr>
<td>Capital inflows</td>
<td>6.6</td>
<td>5.9</td>
<td>6.5</td>
</tr>
<tr>
<td>Errors and omissions</td>
<td>2.0</td>
<td>0.5</td>
<td>1.0</td>
</tr>
<tr>
<td>Increase in reserves</td>
<td>1.1</td>
<td>0.5</td>
<td>1.0</td>
</tr>
</tbody>
</table>

Source: ECA estimate.

a/ Preliminary.

b/ Forecast.

With the improvement in the balance of trade, there has been a marked improvement in the external position of the region in 1987. The current account deficit (excluding official transfers) is estimated at $11.2 billion dollars down from $13.7 billion in 1986. This deficit would have been lower except for the larger net outflows on services and private transfers due mainly to debt service payments. On the other hand, official transfers hardly increased, while capital inflows dropped by around $0.6 billion. Although complete data are not available, in current terms, net resource flows to sub-Saharan Africa rose by 13.3 per cent to $18.7 billion in 1986, though in 1985 prices, there actually was a fall of 6.7 per cent. Taking into account the fact that for countries of North Africa and the Middle East the fall was even greater, at 57.5 per cent, it is evident that net resources flow to the region as a whole declined in 1986. In 1987, there has been commendable efforts by the major multilateral financial institutions, namely the ADB, IMF and the World Bank to mobilize more funds for the region. However, despite the successful replenishment of the IDA, the increased facilities from the World Bank and the launching of the enhanced Structural Adjustment Loan facility by the IMF, the level
of resource flows is still below expectations, and out of line with what is called for by the UN-PAAERD\textsuperscript{3}. A key factor in this development is the drying up of export credits and bank loans as the debt servicing problems of the region continue. In fact, on the one hand major Western Banks have begun to limit their exposure on loans to Africa, while the various debt rescheduling exercises on the other hand tend merely to postpone the problem and increase the debt burden over the longer term.

1.4 Policy reforms

In 1987, the pace of policy reforms gathered momentum across the region, as the worsening or stagnating economic situation put pressure on governments to make important adjustments to their economies. Some 28 countries of the region are reported as applying adjustment or recovery programmes, with 17 (not including Ghana which has an extended arrangement) having standby agreements with the IMF, and 17 countries with structural adjustment arrangements under the SAL facility of the IMF. In addition, the structural adjustment loan programme of the World Bank has to be taken into account. Since the adoption of the APPER\textsuperscript{4} by the African Heads of State and Government and of the UN-PAAERD by the Special Session of the UN General Assembly in 1986, a consensus has emerged on the necessity of making reforms in the way African economies are managed, even though there are still serious difficulties and obstacles regarding the modalities of such reforms. For instance, there is almost unanimous agreement on the necessity of giving priority to agriculture and on the need to provide the farming population with an adequate set of incentives, in terms of remunerative prices, the provision of inputs, technical support and financial resources. By contrast, there is still serious debate regarding the role of the public sector, while the social impact of adjustment measures has become a very contentious issue.


Concerning the public sector, measures taken by some governments in 1987 have been far reaching to the point of signaling a fundamental change in the economic structure itself. Thus in Algeria, the Ministry of Planning was restructured, and new laws were presented to Parliament which would give public corporations considerable freedom of operation, and would allow lands of state farms, which represent a large part of the arable land, to be offered for rent to private operators. In Mali, a law was introduced which provides for the privatization of a number of public corporations or the sharing of ownership with the private sector, while others are earmarked for closure on grounds of unprofitability. For those corporations which remain public, institutional changes designed to effect greater financial discipline have been introduced. Other countries took steps to reform the public sector, including the privatization of some enterprises, such as in Senegal, Ghana, Gambia and Madagascar. In this latter case, the World Bank is supporting a restructuring programme with the so called GASPI loan.

Zambia has been one of the most prominent examples of the problems and difficulties associated with adjustment. After serious rioting over the elimination of food subsidies and a rapid depreciation of the currency (the kwacha) under the auction system, the government introduced in May 1987 its own economic recovery programme, the Interim National Development Plan (INDP). Under the new plan, the auction system was abandoned, the currency being pegged at ZK 8 to the U.S. dollar. Debt servicing was set at 10 per cent of export earnings, after allowance for the import needs of the copper industry, oil imports, the foreign exchange needs of the airlines and fertilizers. The strategy of the plan is to invest savings domestically instead of transferring them abroad for debt service, and to reduce imports through austerity measures such as the elimination of 'non-essential' imports. This contrasts with the IMF/World Bank strategy of reducing imports through the market price mechanism, through the devaluation of the kwacha and the removal of
import controls. Similar social difficulties arose in Guinea where rioting broke out over price and subsidies measures. Also, in Ghana the government has had to contend with strong opposition from the trade unions over its reform policies which have led to substantial redundancies in the civil service and the public sector. In Egypt, while the government did introduce in May 1987 a free foreign exchange market, it did retain multiple exchange rates, and particularly a favourable official exchange rate for imports of basic necessities such as wheat and flour.

Mozambique has entered into an adjustment programme in agreement and with the support of the IMF and the World Bank. In January 1987, the government of Mozambique started a recovery programme entailing a substantial liberalization of the economy, accompanied by a structural adjustment agreement with the IMF. Under the programme, the currency (metrical) was devalued twice in 1987 and again at the beginning of 1988. The programme has allowed for the favourable rescheduling of Mozambique's foreign debt, which, given the country's economic conditions, appeared to be quite unserviceable. In Angola, the government has started to implement policy guidelines set earlier in 1985, and is seeking membership in the IMF. The crisis condition of the economy can be gauged from the gap between the official value of the currency set at AK29.918 to the dollar and an underground market rate reported at 1800-2000 kwanzas per dollar. In fact, the currency has lost much of its significance and barter transactions are now being resorted to.

Adjustment policies naturally involve a shift in resources and a degree of income redistribution. For that matter, it is perhaps unreasonable to criticize these policies on the grounds of the apparent social costs in the immediate term. Appropriately formulated adjustment should allow for the provision of services at reasonable levels. At the same time, it should avoid being urban-biased. It is quite difficult to have simultaneously, say a cheap food policy for the urban areas and remunerative prices for producers. Resources simply do not exist to finance such schemes and it is doubtful that donors would allocate resources for that
purpose. Moreover, the policy of food subsidies and more or less guaranteed employment for graduates which has been followed in the past in many countries has been instrumental in aggravating rural-urban migration, in diverting scarce resources from investment and, as seriously, in preventing the emergence of self-supporting activities in the urban sector.

One aspect of the adjustment debate which deserves urgent attention is the debt issue. At present, countries expend a high proportion of their foreign exchange earnings on debt service with a consequent limit on resources available to finance necessary imports. Moreover, the level of debt service in many instances places a virtual financial stranglehold on many of the region's debtor countries. The rescheduling solution, as currently applied, appears only to postpone the problem and worse still, leads to further debt accumulation. It would then seem that a more realistic solution lies in offering African countries a debt servicing package which would set debt service at some manageable level, taking into account the effective payment capacity of these countries as well as their development needs. This may mean that some portion of the debt may have to be cancelled and the interest rate structure revised. In this respect, the proposals made by the OAU Heads of State and Government at their recent Addis Ababa Special Summit on debt point in a useful direction. The proposal by the ADB also merits attention. Under this latter plan, a country's eligible outstanding debt would be converted into a long-term security with a fixed rate of interest below current market rates. A redemption fund would be established for such securities into which the country would undertake to make annual payments such that enough funds are accumulated by maturity date, to pay off the outstanding debt. As an integral part of the ADB proposal, multilateral finance institutions are expected to assist in matters of the country's development policy formulation and planning, as well as increasing their levels of financial assistance.
2. ISSUES IN AFRICA'S RECOVERY

2.1 Commodity prices

A major characteristic of developing Africa's trade in the 1980s has been the sustained fall in commodity prices and trade volumes. Prices, as measured by unit values, have fallen almost consistently since 1981 and reached their lowest level ever, 62.0 per cent of the 1980 index. In 1987, however, the index of unit values posted a 12.8 per cent gain, owing largely to the recovery in oil and mineral prices. However, the 1987 prices were at only 70 per cent of their levels of 1980. Import unit values have also declined, albeit at rates lower than those of exports. Thus developing Africa's barter terms of trade deteriorated from 105.7 per cent in 1981 to 68.5 per cent in 1986, rising however to 73.2 per cent in 1987. The purchasing power of exports likewise fell sharply, standing in 1987 at only 66.4 per cent of its 1980 level.

Comparable statistics for sub-Saharan Africa reflect a similar tendency except that export unit values continued to fall in 1987. Again as in the case of the region as a whole, import unit values, after falling between 1981 and 1985, increased sharply in 1986 and 1987. The terms of trade therefore continued to fall and in 1987 were 27 per cent below the 1980 level.

Price movements, reflecting on the export side, demand and supply considerations and on the import side, rising costs and profitability, have severely affected overall foreign trade flows. If developing Africa were to trade at 1980 export and import prices, the partial and first round effects would have been a cumulative surplus of about $45.3 billion between 1981-87. Table 4 suggests that developing Africa's estimated loss in export earnings amounts to $89.7 billion while its import gain, arising from the concurrent fall in import prices, amounts to $44.4 billion over the period. Similarly, sub-Saharan Africa's overall trade loss is estimated at about $18.4 billion, reflecting about $33.4 billion in terms of export earnings loss and about $15.0 billion in import price gain.
Table 4
Impact of the Fall in Prices on Developing Africa's Trade\(^a/\)
(in $ billion)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Developing Africa</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Exports</td>
<td>-11.7</td>
<td>-15.2</td>
<td>-32.7</td>
<td>-15.6</td>
<td>-89.7</td>
</tr>
<tr>
<td>Imports</td>
<td>11.2</td>
<td>7.0</td>
<td>5.2</td>
<td>2.3</td>
<td>44.4</td>
</tr>
<tr>
<td>Overall loss</td>
<td>-0.5</td>
<td>-8.2</td>
<td>-27.5</td>
<td>-13.3</td>
<td>-45.3</td>
</tr>
<tr>
<td>Sub-Saharan(^b/)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Exports</td>
<td>-4.0</td>
<td>-5.1</td>
<td>-6.8</td>
<td>-8.0</td>
<td>-33.4</td>
</tr>
<tr>
<td>Imports</td>
<td>3.4</td>
<td>2.2</td>
<td>2.2</td>
<td>0.9</td>
<td>15.0</td>
</tr>
<tr>
<td>Overall loss</td>
<td>-0.6</td>
<td>-2.9</td>
<td>-4.6</td>
<td>-7.1</td>
<td>-18.4</td>
</tr>
</tbody>
</table>

Source: ECA secretariat.

\(^{a/}\) (-) sign indicates loss and a (+) indicates a gain if 1980 prices are assumed to prevail.

\(^{b/}\) Excluding Nigeria.

The above results have been particularly influenced by the fall in oil prices, on both the import and the export sides as well as by the recent slide in the value of the dollar. This notwithstanding, it may be unreasonable to assume further falls in commodity prices as there seems to be a consensus that prices are now so low that further weakening is unlikely. For 1988, oil prices are forecast to remain around their 1987 level of about $18 a barrel, with import demand rising by perhaps only 1.0 per cent. On the supply side, this will depend more on OPEC members' adherence to their assigned quotas. Metal prices are also expected to be weak, with copper prices expected to fall sharply, by perhaps up to 20 per cent of their 1987 levels. Aluminium prices are also expected to stagnate or fall. Only precious metals — notably gold and diamonds — are likely to continue to have better fortunes in 1988. Prices of soft commodities like cotton, coffee and cocoa are however expected to remain weak.
2.2 The Debt issue

The external debt of developing Africa grew steeply in recent years to an estimated $218.1 billion in 1987, about 54.2 per cent of which is owed by sub-Saharan Africa (including Nigeria). It is not the sheer size of the African debt which gives rise to serious concern since, in absolute terms, Africa is the least indebted of the continents. Rather, it is the size of debt obligations in relation to available resources that renders African debt the most critical. Total external debt outstanding amounted to about 70 per cent of GDP and three-fold of export earnings in 1987. The debt service ratio for the region as a whole stood at

Table 5
Debt and Debt Service of Developing Africa
(values in billions of dollars)

<table>
<thead>
<tr>
<th></th>
<th>1984</th>
<th>1985</th>
<th>1986</th>
<th>1987a/</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total debt</td>
<td>152.1</td>
<td>174.4</td>
<td>207.7</td>
<td>218.1</td>
</tr>
<tr>
<td>Sub-Saharan</td>
<td>80.6</td>
<td>95.5</td>
<td>117.4</td>
<td>118.1</td>
</tr>
<tr>
<td>North Africa</td>
<td>71.5</td>
<td>78.9</td>
<td>90.3</td>
<td>100.0</td>
</tr>
<tr>
<td>Debt service</td>
<td>21.7</td>
<td>24.3</td>
<td>26.4</td>
<td>26.5</td>
</tr>
<tr>
<td>Sub-Saharan</td>
<td>9.9</td>
<td>12.0</td>
<td>13.7</td>
<td>13.8</td>
</tr>
<tr>
<td>North Africa</td>
<td>11.8</td>
<td>12.3</td>
<td>12.7</td>
<td>12.7</td>
</tr>
<tr>
<td>Ratios</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Debt/GDP</td>
<td>0.57</td>
<td>0.67</td>
<td>0.74</td>
<td>0.70</td>
</tr>
<tr>
<td>Debt/exports</td>
<td>1.94</td>
<td>2.14</td>
<td>2.98</td>
<td>2.95</td>
</tr>
<tr>
<td>Debt service ratio</td>
<td>27.6</td>
<td>29.3</td>
<td>42.7</td>
<td>35.8</td>
</tr>
<tr>
<td>Sub-Saharan</td>
<td>26.1</td>
<td>29.3</td>
<td>42.9</td>
<td>47.3</td>
</tr>
<tr>
<td>North Africa</td>
<td>29.1</td>
<td>30.4</td>
<td>38.5</td>
<td>28.9</td>
</tr>
</tbody>
</table>


a/ Preliminary.
42.7 per cent in 1986, falling slightly to 35.8 per cent in 1987. For sub-Saharan countries the corresponding ratios were 42.9 per cent and 47.3 per cent respectively. In North Africa these ratios were lower but still formidable.

Although the debt service ratios provide useful measures of the debt problem, the critical issue is that mounting debt repayment obligations are falling due at a time when the continent's export earnings are contracting and the inflow of external resources is stagnating in real terms. Further, as countries find it increasingly difficult to meet outstanding commitments, the deterioration in their creditworthiness limits new borrowing and even the disbursement of agreed loans. Faced with a foreign exchange squeeze, an increasing number of countries are accumulating arrears and severely limiting imports and thereby further frustrating the recovery process.

According to a recent United Nations report on financing African recovery, in 1986 alone, sub-Saharan Africa failed to pay between $5-6 billion in debt service obligations as indicated by accumulation of arrears or rescheduling. With no global framework for debt negotiations, the debtor countries were forced to seek debt relief within the framework of existing bilateral arrangements. It has been reported that at least 55 rescheduling agreements involving 22 sub-Saharan African countries were negotiated between 1980 and 1986. Unfortunately, rescheduling often results merely in the postponement of debt service payments and further capitalization of interest payments. A more lasting approach should have as its objective the long-term viability of the debtor countries and their participation in the world economy on a self-sustaining basis. To this effect several proposals have been advanced by various parties in Africa. The Abuja statement\(^5\) called for: (a) lower interest rates on existing debts and longer repayment and grace periods; (b) conversion into grants of bilateral debts for low income countries undertaking structural adjustment programmes; (c) repayment of debt

in local currency; and (d) conversion of debt and debt-servicing into investment portfolios and equity. The African Development Bank (ADB), on its part put forward a proposal for refinancing Africa's external debt. The Third Extra-Ordinary Session of the Assembly of Heads of State and Governments of the Organization of African Unity, held in Addis Ababa in November-December 1987 underscored the commitment of African countries to honour their commitments and called inter alia, for the adoption of a debt policy consistent with long-term growth. It also called for the convening of an international conference on Africa's external indebtedness in 1988.

3 OUTLOOK FOR 1988

The stock market crash of October 1987 has created considerable uncertainty as to the prospects for the world economy, and therefore for Africa, in 1988 and beyond. Even though events since the crash seem to have allayed fears of a recession, such a turn of events would have serious consequences for the region. Demand for African exports would fall, while there is a strong possibility that interest rates would rise on major financial markets, developments which would mean further cuts in import capacity and heightened debt service pressure. Not only would growth be compromised, but for many countries present levels of scheduled debt service would become unmanageable. Fortunately, there are strong indications that major industrial countries are taking the necessary policy measures to avert a recession. This is the thrust of the recent OECD Outlook containing projections for the short-term.

ECA projections for 1988 rule out a recession during the year and assume no major disruption to the world economy. The other


major assumptions are the following:

(a) After drought conditions in many areas in 1987, weather patterns will be normal during 1988, as appears to be borne out by early information on the weather in North and Southern Africa;

(b) Oil prices will not decline as much as in 1986 and even if they do decline, they are unlikely to fall very much below $16 a barrel;

(c) The dollar exchange rate will remain around the levels reached in October/November, 1987.

(d) Reform policies now in place in many African countries will not be disturbed.

Under this general set of assumptions, it is forecast that Africa will record a rate of real output growth of 2.7 per cent in 1988, after only 0.5 and 0.8 per cent in 1986 and 1987, respectively.

This outlook is predicated mainly on a recovery of exports of goods and services which are forecast to grow by 4.2 per cent and a 2.7 per cent increase in real investment spending. Agricultural output which rose by only 1.2 per cent in 1987 is forecast to rise by a strong 4.1 per cent, as in 1986. Manufacturing will grow by 4.3 per cent, again a significant improvement on past performance, since the 1980-1987 average of only 3.1 per cent is considerably below the Lima and the Lagos Plan targets. As for mining, only a 1 per cent gain is forecast, as demand for oil is expected to remain weak in industrial countries and as the effects of technical change on the demand for other minerals will continue to be felt. This is particularly true for the main non-fuel minerals exported by the region such as copper, cobalt, phosphate, iron ore, uranium and bauxite. In fact an index of mining output for the region shows an average growth of only 0.4 per cent during 1980-1986 for non-fuel minerals.
In the subregions, the strongest performance is expected in Eastern and Southern Africa where output is forecast to grow by 3.6 per cent. For Central, North and West Africa, growth is forecast at 1.6, 3.0 and 2.2 per cent respectively. Sub-Saharan Africa's growth is forecast at 2.5 per cent. Oil exporters will improve on 1987 growing by 2.2 per cent compared to 0.3 per cent, but many of these countries are expected to continue to experience serious difficulties. In Central Africa, countries such as Congo, Gabon and Cameroon will have to contend with sharply reduced government revenues, while in Nigeria only a modest 2.0 per cent growth is expected. Only Algeria is forecast to grow substantially, this on account of the strength of its increasing gas production and exports. Non-oil exporters are expected to fare much better with the rate of growth forecast at 3.5 per cent, higher than the estimated 3 per cent increase in population.

The overall outlook is optimistic and, realistically, growth rates would have to be revised downwards considerably in the event of a recession in the industrial countries or adverse weather conditions in the region. Moreover, the debt issue appears more and more critical for development prospects of the region, as the level of debt service puts severe limits on the amount of resources available for investment, while at the same time resource transfers are shrinking. It is then of crucial importance that the debt question receives a practical solution in the near future and that ways are found to reverse the declining trend in net resources flows to the African region.

Over the medium term, it is clear that one critical determinant of overall growth in the African economy is the performance of agriculture. That performance is, in that time-frame, closely linked to the soundness of the natural resource base. The maintenance and conservation of the natural resource base with a concern for environmental quality should therefore be a leading priority. Part II of the Report addresses the symbiotic relationship between the environment and economic performance.
PART II: ENVIRONMENT AND ECONOMIC DEVELOPMENT IN AFRICA*

1. Introduction

1.1 The Issues

Economic development in Africa depends on capital investment, the quality of the work force, land, and natural resources. The environment is a natural resource, serving many functions. Suitably managed, it yields clean air and water, pasture and browse for livestock, wood for timber and fuel, and a self-cleansing capability for assimilating waste products. Improperly managed, the environment deteriorates and harms economic progress.

Balanced economic development involves the proper use of natural resources. This statement is particularly true of Africa where the resource base is threatened by climatic and man-made factors. The results of resource mismanagement are desertification, deforestation, and pollution of air and water. The sources of mismanagement lie deep in international attitudes to aid, in macroeconomic policies which give the wrong 'signals' to resource users, and in the level of poverty in Africa which policy is aimed at reducing. But there are encouraging signs that policy is being rethought and realigned with environment more to the fore.

The issues to be addressed in this part of the Report are:

- How important is resource degradation? This is construed to mean, what are the economic dimensions of resource misuse?

* This part of the Report was prepared with the assistance of Professor D. Pearce of the University College, London, who served as a consultant, with the assistance of Mr. S. Barrett, researcher at the London School of Economics, and prepared a paper on this subject. Their assistance is gratefully acknowledged.
The answer to the first question involves an understanding of how environmental quality and economic change are interrelated. In particular, can natural resources be used up "optimally" in order to build up man-made capital?

Why does resource degradation occur?

What are the policy measures at the local, national, regional and international levels that need to be put into effect?

What, in particular, should the African Development Bank (ADB) and the Economic Commission for Africa (ECA) do?

1.2 The Environment-Development Relationship

Despite the many successes of past development effort, there is a growing body of opinion which questions the focus of development aid, national economic policy and the methodologies for evaluating investments and policies aimed at sustainable economic growth. While there are many critiques of the existing approaches, those associated with "sustainable economic development" have occasioned major interest.8/

"Sustainable Development" is not a precise concept, but it has several important characteristics:

It stresses the importance of the role of natural resources in the process of economic development. "Natural resources" are construed to mean not just exhaustible resources such as fossil fuels and minerals,

but also the potentially renewable resources of water, forests and other biomass, soil quality and the capacity of the natural environment to receive, degrade and neutralise waste. Sustainable development calls for more emphasis on these resources.

Like traditional growth economics, a resource-based development policy stresses the requirement of sustainability, i.e. the need to ensure that the benefits of development are not short-lived, and that the range of choices for further development is not reduced significantly.

To ensure sustainability, emphasis is put on maintaining the stock of natural resources so that each generation of people has access to broadly the same resource base. Since exhaustible resources must eventually decline in quantity, this "equal access" requirement means that it is the flow of services provided by resources (i.e., the value of the functions they perform) that needs to be broadly in balance over time.\(^9\)

Maintaining the resource base as a policy objective implies that there is only a limited trade-off between environment and development. Instead of sacrificing environment for development, the argument is that environmental improvement is a major means of achieving development.\(^10\) The particular focus is on:

\(^9\) In economic terms this might be accomplished by managing exhaustible natural resources so that their real prices are roughly constant over time. For renewable resources, the issue is simpler since they can be managed so that only the sustainable yield is harvested, the stock being constant over time. See T. Page, Conservation and Economic Efficiency, (Baltimore: Johns Hopkins University Press, 1977).

\(^10\) It must be stressed that the theory of sustainable development is not yet well-defined. Further, the idea of wholesale environment-development complementarity is not acceptable in this report.
The role of the agricultural sector in overall economic development, and the links, some of them not obvious, between the environment and agriculture.

- The role of rural environmental quality in human health, animal welfare and crop productivity, and the role of urban environmental quality in human health.

These features of sustainable development thinking are highlighted here because they help to explain some of the new policy directions that may be warranted in many African economies - a greater focus on rural areas and the small farmer, incentives for sustainable agricultural output, improvements in the urban environment, and community involvement. They also help to indicate potential changes in direction for aid and development agencies - more integration of environmental factors into project identification and assessment, and more focus on environmentally sensitive macroeconomic policies.

2. Economy and Environment: The Background

African development has suffered in the 1980s. Economic performance has deteriorated and environmental degradation has increased. This section begins by documenting the important economic and environmental trends. It is then argued that these trends are not independent but mutually interacting.

2.1 The Economy

In northern Africa, real gross domestic product (GDP) and per capita GDP increased in the 1980s in all countries except Libya, a net oil exporter. The situation in the sub-Saharan countries has been more bleak. Sub-Saharan GDP as a whole fell in the 1980s. Even in those countries where GDP has increased, advances in per capita GDP have been undermined by annual population growth rates exceeding three per cent - the highest in the world. The low income of many countries is a potentially secular, today on a per...

Total agricultural output has risen by over two per cent per year in the last two decades, but population has risen faster. South of the Sahara, per capita output does seem to follow a long-term trend.\footnote{12/ See, for example, \textit{World Bank, Toward Sustained Development in Sub-Saharan Africa: A Joint Programme of Action}, (Washington, DC: World Bank, 1984), p. 2, and H.E. Jahnke et al., \textit{The Impact of Agricultural Research in Tropical Africa}, CGIAR Study Paper NO. 21, (Washington, DC: World Bank, 1987), pp. 7-11.} To make up for these shortfalls, food imports, of which a large proportion are concessional, have increased.

Africa's current debt problems have been caused by a worsening in the terms of trade, rising interest rates and the growth in borrowing over the last decade, particularly from commercial banks at floating rates. The problem is particularly acute in sub-Saharan Africa. Debt servicing problems will undoubtedly frustrate attempts to revive the African economies. Even if a large proportion of debt is rescheduled, many countries will find it extremely difficult to raise export earnings in order to finance their debt obligations and attract the investment required to support growth. \footnote{13/ For a discussion of sub-Saharan Africa's debt problems, see \textit{World Bank, World Development Report} (New York: Oxford University Press, 1986), pp. 52-53.}
In response to Africa's persistent economic problems, and the drought and famine of 1984-85, OAU adopted in 1985 Africa's Priority Programme for Economic Recovery (APP) 1986-1990, and the United Nations launched in 1986 a Programme of Action for African Economic Recovery and Development (UN-PAAERD) 1986-1990. These programmes recognised that Africa's problems cannot be solved without commitments from both the African countries and the international community. In the short run, policies must be designed to deal with food shortages that might lead to outbreaks of famine and to detect at an early stage when and where such outbreaks may occur. In the medium term, there must be greater agricultural investment, both arable and grazing lands must be made more productive, and prices and subsidies must send signals that are congruent with the goals of increasing agricultural yields and productivity. Crisis management must not lead to neglect of Africa's medium- and long-term constraints on development, among which are its limited environmental resources. To permit growth in the longer run, these constraints will have to be eased.

2.2 The Environment

The term "environment" is open to many definitions. A broad definition encompasses the natural and the controlled environments and extends to the social conditions facing current and future generations and living organisms in general. In this Report a narrower focus is taken, by concentrating on the natural resources of soil, water and biomass, and on urban air and water quality. Social conditions are partly the outcome of how these resources are used.

Africa's main environmental problems arise from:

1) desertification, a process of biomass productivity decline with consequent loss of crop, livestock and fuelwood productivity;

2) deforestation, a process of reduced forest and woodland cover, with consequent loss of fuelwood supplies and soil protection;
iii) groundwater loss and contamination, arising from demands for water in excess of natural recharge rates and salinisation; and

iv) urban and and water pollution, caused by inadequate treatment of sewerage and industrial discharges.

Desertification occurs in arid and semi-arid environments, and is caused by a combination of irregular rainfall and overuse (see section 4 below). Desertification is manifested in soil erosion, soil compaction, a reduction in the soil's organic matter and nutrient content, and salinisation and waterlogging. Soil erosion refers to the transportation of topsoil by winds and rains. When soil is compacted, the ability of the soil to retain moisture is impaired. Reductions in organic matter and nutrient content lessen soil fertility. Salinisation and waterlogging are caused by the use of low quality water and poor drainage. All of these forms of desertification result in reduced crop and/or livestock yields.

Estimates of the extent of desertification by type of land use and region are given in Table 6. In irrigated lands, desertification is manifested primarily by salinisation and waterlogging (although compaction is also a problem where heavy machinery is used). These problems are most severe in the Nile Valley and North Africa, but occur in most irrigated areas. In rangelands, desertification is evidenced by a reduction in the vegetative cover, and sometimes also by erosion, crusting and loss in fertility. In areas of rainfed cropland, the major factor is soil erosion, although loss in fertility, crusting and compaction are also important. In terms of the areas affected, desertification is more extensive in the rangelands than in areas of rainfed cropland or irrigated land. On the basis of land area, the problem in irrigated areas seems to be relatively minor. However, the per hectare economic impacts of desertification are more severe for irrigated lands simply because both physical output and the unit-value of crops are higher on irrigated land. The economic cost
per hectare of salinised irrigated land is estimated to be three times as great as the cost of desertified rainfed cropland and 100 times as great as the cost of desertified rangeland.\[14/\]

Table 6

Desertification in Africa

<table>
<thead>
<tr>
<th>Type of Land</th>
<th>Northern Africa</th>
<th>Sudano-Saharan Africa 1/</th>
<th>Southern Africa 2/</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>4,050</td>
<td>2,126</td>
<td>720</td>
</tr>
<tr>
<td>Affected by Deserti-</td>
<td>987</td>
<td>284</td>
<td>49</td>
</tr>
<tr>
<td>fication</td>
<td>24.4</td>
<td>13.4</td>
<td>6.8</td>
</tr>
<tr>
<td>Rangeland Total</td>
<td>166,300</td>
<td>814,412</td>
<td>156,500</td>
</tr>
<tr>
<td>Affected by Deserti-</td>
<td>156,000</td>
<td>783,458</td>
<td>49,300</td>
</tr>
<tr>
<td>fication</td>
<td>93.8</td>
<td>96.2</td>
<td>31.5</td>
</tr>
<tr>
<td>Rainfed Cropland</td>
<td>17,005</td>
<td>27,103</td>
<td>2,940</td>
</tr>
<tr>
<td>Total</td>
<td>13,701</td>
<td>23,057</td>
<td>2,225</td>
</tr>
<tr>
<td>Affected by Deserti-</td>
<td>80.6</td>
<td>85.1</td>
<td>75.7</td>
</tr>
<tr>
<td>fication</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


Notes: 1. Includes: Cape Verde, Chad, Djibouti, Ethiopia, Gambia, Kenya, Mali, Mauritania, Niger, Nigeria, Senegal, Somalia, Sudan, Uganda, Cameroon, Burkina Faso.

2. Excludes South Africa.

Desertification is most acute in Sudano-Sahelian Africa (See Table 6). Within this region, some areas are more seriously affected. If we concentrate on the difference between actual human populations and carrying capacity - the number of people an area of given size can support on a sustainable basis - areas of particular sensitivity can be identified. A recent World Bank study has found that using this measure, desertification poses its greatest threat in a horizontal zone running through Senegal, southern Mauritania, southwestern Mali, northern Burkina Faso, southern Niger, northern Nigeria, northern Cameroon and Chad. This zone, identified as the Sahelo-Sudanian zone in Table 7 (see also map, Annex 1), lies south of the Saharan and Sahelo-Saharan zones, and so the problem of desertification is seen as being more than merely stopping an "advancing desert," which is an oversimplified and misleading view of desertification.

Table 7

<table>
<thead>
<tr>
<th>Zone</th>
<th>Crop/Livestock Sustainable Population</th>
<th>Actual Rural Population</th>
<th>Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Saharan-Sahelo-Saharan</td>
<td>1.0</td>
<td>1.8</td>
<td>-0.8</td>
</tr>
<tr>
<td>Sahelian</td>
<td>3.9</td>
<td>3.9</td>
<td>0.0</td>
</tr>
<tr>
<td>Sahelo-Sudanian</td>
<td>8.7</td>
<td>11.1</td>
<td>-2.4</td>
</tr>
<tr>
<td>Sudanian</td>
<td>8.9</td>
<td>6.6</td>
<td>2.3</td>
</tr>
<tr>
<td>Sudano-Guinean</td>
<td>13.8</td>
<td>3.6</td>
<td>10.2</td>
</tr>
<tr>
<td>Total</td>
<td>36.3</td>
<td>27.0</td>
<td>9.3</td>
</tr>
</tbody>
</table>

Source: J.E. Gorse and D.R. Steeds, Desertification in the Sahelian and Sudanian Zones of West Africa, World Bank Technical Paper No. 61, 1987, Table 4, p.28.

15/ Most measures are based on nutritional and fuelwood subsistence needs, and estimates of available sustainable yields. Thus, if there are \( x \) tonnes of sustainable fuelwood supply per annum, and the subsistence need is \( y \) tonnes per person, the fuelwood carrying capacity is \( x/y \). Care must be exercised in interpreting estimates of carrying capacity. See D.J. Mahar (ed.), Rapid Population Growth and Human Carrying Capacity: Two Perspectives, World Bank Staff Working Paper No. 690, 1985.

16/ J.E. Gorse and D.R. Steeds, Desertification in the Sahelian and Sudanian Zones of West Africa, World Bank Technical
The Sahelo-Sudanian zone is bordered to the south by an area where the actual rural population is less than the population which the environment is capable of sustaining. This relative imbalance has led populations in the worst affected areas to migrate south. At current population levels, the south seems capable of absorbing these migrants. But if productivity gains do not keep pace with population growth, the little margin that exists now will be quickly taken up.

Desertification is often accompanied by a reduction in tree cover. In arid and semi-arid areas, this is especially due to demands for fuelwood. Indeed, the World Bank study referred to above found that the fuelwood carrying capacity of Sahelian and Sudanian Africa is exceeded by the actual (rural plus urban) population in every zone except the southernmost Sudano-Guinean zone. The study in fact suggests that fuelwood shortages limit the carrying capacity of arid and semi-arid West Africa by more than do low crop and livestock yields.

Based on estimates of fuel requirements and availability, a study by the FAO has identified the population at risk throughout sub-Saharan Africa, where fuelwood is in especially short supply. Populations experiencing "acute scarcity" are defined in the study as those living in areas where energy requirements could not be met even by taking wood on a nonsustainable basis or by making use of animal waste. Populations experiencing a fuelwood "deficit" are those living in areas where fuel needs were met by taking wood on a nonsustainable basis. Using these criteria, the study found that the most vulnerable areas include not only the arid and semi-arid zones south of the Sahara, but also the eastern and southeastern parts of the continent, and the islands and mountainous regions of Africa. Deficits are also experienced in the savannas of West, Central and East Africa. The number of people affected by fuelwood shortages, already large, is expected to increase steadily under the pressure of population growth (see Table 8).

17/ See J.E. Gorse and D.R. Steeds, op cit., specially Table 3 and 4 on pages 13 and 28.

Table 8
Populations Experiencing Either an "Acute Scarcity" or a "Deficit" in Fuelwood Supply in Sub-Saharan Africa

<table>
<thead>
<tr>
<th>1980</th>
<th>2000 1/</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Millions)-----</td>
<td>--------</td>
</tr>
<tr>
<td>Rural Affected Population</td>
<td>180</td>
</tr>
<tr>
<td>Total Rural Population</td>
<td>288</td>
</tr>
<tr>
<td>Affected Population as Percent of Total</td>
<td>62%</td>
</tr>
<tr>
<td>Total Affected Population</td>
<td>201</td>
</tr>
<tr>
<td>Total Population</td>
<td>320</td>
</tr>
<tr>
<td>Affected Population as Percent of Total</td>
<td>63%</td>
</tr>
</tbody>
</table>


Note:
1. The projections are based on expected rates of population growth.

Soil erosion rates are notoriously difficult to calculate and all sources caution against relying too heavily on numerical estimates. Table 9 reproduces illustrative data for parts of Africa. Soil erosion has both on-farm impacts in terms of reduced crop productivity and off-farm impacts in terms of sedimentation, but detailed research into the quantification of these impacts is surprisingly limited.
Table 9
Examples of Erosion Rates in Africa

<table>
<thead>
<tr>
<th>Location</th>
<th>Details</th>
<th>Mean Annual Rainfall (mm)</th>
<th>Erosion Rate (ton ha/year)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ethiopia, Central Plateau</td>
<td>Suspended sediment yields</td>
<td>500-800</td>
<td>165</td>
</tr>
<tr>
<td>Tanzania, Mpwapwa</td>
<td>Bare plot</td>
<td>620</td>
<td>146</td>
</tr>
<tr>
<td>Cote d'Ivoire, Adiopodoume</td>
<td>Bare soil, 7% slope</td>
<td>2,100</td>
<td>138</td>
</tr>
<tr>
<td>Zimbabwe, Henderson</td>
<td>Bare plot, 4.5% slope</td>
<td>750</td>
<td>127</td>
</tr>
<tr>
<td>Burkina Faso, Gampela</td>
<td>Bare soil, 7% slope</td>
<td>800</td>
<td>126</td>
</tr>
<tr>
<td>Zimbabwe</td>
<td>Bare plot, 4% slope</td>
<td>400</td>
<td>10.8</td>
</tr>
<tr>
<td>Zimbabwe, Henderson</td>
<td>Complete grass cover, 4.5% slope</td>
<td>750</td>
<td>0.7</td>
</tr>
<tr>
<td>Cote d'Ivoire, Adiopodoume</td>
<td>Natural bush fallow</td>
<td>2,100</td>
<td>0.6</td>
</tr>
<tr>
<td>Zimbabwe, Umsweswe</td>
<td>Sediment yield for catchment</td>
<td>750</td>
<td>0.25</td>
</tr>
<tr>
<td></td>
<td>Severely eroded sub-catchment</td>
<td>750</td>
<td>9.8</td>
</tr>
</tbody>
</table>


In tropical Africa, forests are cleared for agriculture and felled for fuelwood and commercial timber - sawn logs, veneer logs and wood for pulp. Data on tropical forest resources and rates of production and clearing are imperfect, as are data on most of Africa's environmental resources, but a study by the FAO and UNEP hints at the scale of the problem.\(19\) Of tropical Africa's

undisturbed and productive closed broadleaved forests, 225 thousand hectares each year are cleared, mainly for agriculture, and 635 thousand hectares each year are selectively logged for hardwoods and veneers (see Table 10). If these rates for 1981-85 persist, the undisturbed forests of tropical Africa will all have been altered in some way in about 130 years' time.

Table 10

Undisturbed Productive Closed forests in Tropical Africa

<table>
<thead>
<tr>
<th>Broadleaved</th>
<th>Coniferous</th>
</tr>
</thead>
<tbody>
<tr>
<td>Resource</td>
<td>113,889</td>
</tr>
<tr>
<td>Rate of Clearing</td>
<td>225</td>
</tr>
<tr>
<td>Rate of Logging</td>
<td>635</td>
</tr>
</tbody>
</table>


Notes:
1. As of the end of 1985.
2. 1981-85 annual average.

If we consider disturbed (logged) forests, managed forests and open tree formations as well, then clearing alone (mainly for agriculture) has proceeded at a rate of 3.7 million hectares per year (see Table 11). If this rate continues unabated, all of tropical Africa's closed and open productive forests will be cleared in under nine decades. This calculation assumes that forest areas are not replanted. However, it is estimated that only one out of every 29 hectares cleared is replanted. 21/  

20/ As defined by the FAO and UNEP, these are forests more than 60 to 80 years of age which have been undisturbed by logging and are accessible to exploitation.

21/ J-P. Lanly, op cit.
Table 11
Areas of Tree Formation and Rate of Clearing in Tropical Africa

<table>
<thead>
<tr>
<th>Resource</th>
<th>Closed (Thousands of Hectares)</th>
<th>Open (Thousands of Hectares)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>156,734</td>
<td>159,555</td>
</tr>
<tr>
<td>Rate of Clearing</td>
<td>1,331</td>
<td>2,345</td>
</tr>
</tbody>
</table>


Notes:
1. As of the end of 1985.
2. 1981-85 annual average.

These aggregate figures mask important differences among regions and countries. Of West Africa's 2,126 thousand hectares of undisturbed, productive closed forests, 164 thousand hectares, or almost eight per cent, are logged annually. In East Africa, only 1.6 per cent of the forests are logged annually; in Central Africa the figure is only 0.4 per cent. The undisturbed closed forests of East Africa are cleared at a rate of 1.7 per cent per year, while in West Africa the rate is about one per cent and in Central Africa it is 0.1 per cent.

In tropical areas, forests have for centuries been cleared for shifting cultivation and secondary forest has been established on fallow land. But as populations have grown, pressures on the land have increased and fallow periods have become shorter so that secondary forest succession often does not occur. When fallow periods shrink, there is a loss in soil fertility and in the soil's ability to resist erosion. Yields can be maintained or increased, but only with the help of chemical fertilisers. This problem has particularly profound implications for agricultural yields in West Africa, where shifting agriculture is widely practised (see Table 12).

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22/ FAO and UNEP, *Forest Resources of Tropical Africa. Part I: Regional Synthesis*, (Rome: FAO, 1981), Table 3, p.57, Table 7a, p. 95 and Table 6a, p.86.
Fertiliser use is, however, extremely low in Africa, and as a result yields have fallen. One alternative to the application of chemical fertilisers is agroforestry. Trees planted can enrich the soil and at the same time produce yields of fuelwood in as little as three years. This is just one example of the ecological interlinkages that exist in Africa. Trees not only serve as a supply of logs, fuelwood, poles and fodder but they also control soil erosion by nutrient recycling, water retention and providing wind shelter. The cutting of trees can hasten the spread of desertification.

### Table 12

Fallow areas in Tropical Africa

<table>
<thead>
<tr>
<th>Area</th>
<th>Total Area</th>
<th>Total Fallows</th>
<th>Percent of Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(Thousands of Hectares)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Northern Savanna</td>
<td>4,236,322</td>
<td>12,750</td>
<td>3.0</td>
</tr>
<tr>
<td>West Africa</td>
<td>2,015,817</td>
<td>55,642</td>
<td>27.6</td>
</tr>
<tr>
<td>Central Africa</td>
<td>5,325,681</td>
<td>44,615</td>
<td>8.4</td>
</tr>
<tr>
<td>East Africa</td>
<td>8,496,392</td>
<td>52,644</td>
<td>6.2</td>
</tr>
<tr>
<td>Tropical Southern</td>
<td>1,399,285</td>
<td>330</td>
<td>-</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>21,473,497</strong></td>
<td><strong>165,981</strong></td>
<td><strong>7.7</strong></td>
</tr>
</tbody>
</table>


The greater part of deforestation in Africa is due to agricultural clearance. Perhaps two-thirds of the clearance is for shifting agriculture with less and less prospect for re-establishment of secondary forest as the pressure for expanded agricultural land grows. Explaining agricultural clearance is far more complex than putting the blame at the door of many millions of small farmers. Underlying the demand for extension land is rapid
population growth, price and policy incentives to marginalise subsistence crops in favour of allocating more productive land to cash crops, subsidies, climatic change and the breakdown of common property management regimes. In short, explaining agricultural colonisation is a complex procedure combining many elements of social and economic pressures on agriculturalists. In turn, this means that policy to correct or at least contain deforestation has to focus on discouraging small farmers from clearing the land indiscriminately and on removing the factors which facilitate major invasions of forest such as large-scale mechanised agriculture.

Highly variable rainfall in many parts of Africa makes water conservation vital. Irrigation costs are high - $5,000 to $25,000 per hectare - and many large irrigation schemes face problems of contaminated water through overapplication of fertiliser and pesticides and the concentration of waterborne diseases such as schistosomiasis. This suggests a refocussing of efforts to develop other water resources based on shallow groundwater and, of critical importance, on local control and involvement. Even here there are problems: new boreholes frequently act as a "magnet," drawing in nomadic and semi-sedentary livestock owners who subsequently deplete the wells or degrade the vegetation around them. Integrated water-livestock-forestry management is required in place of investment and policy efforts which frequently stress one objective at the cost of overall efficiency.


25/ E.G., mechanised agriculture is responsible for major vegetation clearance in Sudan, and mechanised agriculture is heavily subsidised. See D.W. Pearce, Natural Resource Management in West Sudan, Government of Sudan, Khartoum, and World Bank (Washington, DC, July 1987).
While the focus here is on natural resources, especially renewable resources, in rural areas, the quality of the urban environment affects the lives of some 32 per cent of Africa's population on average. In some countries (such as Rwanda and Lesotho) urban population is as low as five per cent of the total population, while in others (such as Algeria) it is as high as 66 per cent. Systematic and reliable data on the quality of urban environments are scarce. Thus the proportion of the urban population with access to sanitation services is not known in many cases. However, where these data are available, access rates range from 13 per cent (Lesotho) to 100 per cent (Zambia and Libya). Air quality is poorly measured so that reasonable comparisons are very difficult to make. The most casual observation indicates the scale of traffic congestion and inadequate waste disposal facilities.

2.3 The Environment-Economy Interaction

For some time now, it has been recognised that a relationship exists between environmental quality and economic performance. Traditionally, the relationship has been seen as a trade-off. Environmental quality could be maintained or improved, but only at the expense of economic growth; a country could grow economically, but only by degrading its environment. Faced with this trade-off, the policy problem became how much growth to sacrifice in order to protect the environment. Since the environment appeared to be dispensable, and economic growth urgent, in poor countries, an illusion was created that natural environments could be exploited at limited cost.

Recently it has been recognised that environment-economy interactions are more complex than was originally thought, and that developing countries are unique even apart from their low incomes per capita. In developing countries, growth depends to a large extent on the maintenance of environmental quality, and environmental quality depends on incomes in these countries; environment-economy interactions are more complementary than in developed nations. The question is not how much environmental
quality to sacrifice in order to raise GNP per capita, but how much to invest in environmental protection so that a healthy rate of economic growth can be sustained in the future. This idea of the complementary relationship between environment and economy, at least at low levels of income, is one of the fundamental features of the theory of sustainable development discussed in the Introduction. The sustainable development philosophy stresses the importance of natural environments to economic development and the need, in broad terms, to maintain the stock of natural assets so that emerging and future generations can have equal or improved access to the quality and quantity of environmental services - soil fertility, clean and abundant water, fuelwood and rangeland.

The traditional theory of growth in economies based on natural resources suggests that depletion, or equivalently a deterioration in the productive capacity of the resource base, is not necessarily a bad thing. Economic growth can still occur provided there is a sufficiently large stock of alternative capital (such as machinery) and an ability to substitute alternative inputs (labour as well as capital) for natural resources in production. The limiting effects of resource depletion can also be offset if there is a sufficiently large rate of technical progress such that more output can be produced using less of the resource input. If the economy's performance indicator is income per capita, an additional requirement is that population growth should not be too high.

In the context of Africa, environmental degradation is a macroeconomic problem precisely because these conditions are not met. Alternatives to natural resources simply do not exist on the scale that is needed. The share of agriculture in GDP exceeds 50 per cent in some countries, even by official statistics. In rural areas, agriculture (including forestry and livestock) is virtually the only source of income, and very often provides a subsistence living. Other inputs can substitute for environmental services - chemical fertilisers, for example, can offset natural reductions in soil fertility. But such substitutes are often not economic given
the prices received for the output and the prices paid for alternative inputs. Furthermore, such substitutes are often not technically appropriate. The use of large tractors on thin topsoils, for example, can cause more harm than good. Because of problems such as these, substitution of alternative inputs has not led to the rates of technical progress needed to offset the deterioration in environmental services. In some cases, high technology inputs have made matters worse.

Despite these problems, agricultural and food production have increased. Whether these increases (small by world standards) can be sustained is perhaps an open question (although some of these gains are due to extensive development, and there is reason to believe that because of environmental degradation current gains may lead to future losses). But there can be no doubt about the drag on economic performance caused by ever larger numbers of people. If population growth were accompanied by high rates of technical progress which more than compensated for the increases in resource demand, the natural resource problem would be less important. But high population growth combined with low technical progress is devastating to both the economy and environment.

3. **THE ECONOMIC IMPORTANCE OF ENVIRONMENTAL DEGRADATION**

3.1 **Environmental Linkages**

The importance of natural environments arises from their pervasive influence on the workings of the national economy. Figure 3.1 illustrates some of the environmental linkages that have economic impacts. As land is cleared for sedentary or unsustainable fallow agriculture, for example, so aeolian and sheet soil erosion occurs. Man-made erosion adds to natural erosion rates to cause sedimentation of irrigation channels, waterways and reservoirs, and pollution of estuaries and coastal regions. Flood plains are raised and water supply is affected. The removal of trees adds to fuelwood problems and increased burning of animal waste may occur to compensate. Use of natural fertilisers as fuels deprives the soil of nutrients from the application of dung and crop residues to
soils, exacerbating the erosion by reducing nutrient content, giving rise to "degradation cycles." As sedimentation of waterways increases so the costs of maintaining clear irrigation channels rises. The sediment is contaminated by fertiliser and pesticide run-off. Water supplies become contaminated, especially where human and animal waste discharge to water is uncontrolled. Through the many interconnections in the natural resource system, and between that system and the economy, the standard of living ("SOL" in Figure 3.1) is affected, both in terms of real incomes and human health. Understanding these economic and environmental linkages is of major importance for environmental control and for a better appreciation of the economic importance of environmental quality.

Figure 3.1: Schematic Illustration of Economy-Ecosystem Interaction

- Fuelwood demand
- Agricultural clearance
- Industrial demand

Other functional losses:
- Wildlife
- Air pollution
- Microclimate
- Global effects
- Option/Existence
- Genetic stocks

Overgrazing/overcropping
Dung/crop residues used as fuel

Deforestation

SOIL FERTILITY LOSS/erosion

Losses to navigation: hydroelectric power
Loss of agricultural output

Irregular flow of irrigation water

Drought/flood cycles

Disaster magnification

Ground/surface water losses

Water supply and potability

Morbidity/mortality

Sedimentation

River/reservoir, navigation

Drought/flood cycles

Microclimate

Global effects

Option/Existence

Genetic stocks

Ground/surface water losses

Irregular flow of irrigation water

Dung/crop residues used as fuel

Overgrazing/overcropping

Fuelwood demand

Agricultural clearance

Industrial demand

Navigation growth

Industrialization

Access to institutional services

Irregular flow of irrigation water
3.2 Direct Dependence Costs

In advanced economies the dependence of economic activity on the services of natural environments is not obvious. The "roundaboutness" of technology tends to displace economic activity from renewable natural resources. Nutrient balance in soil is readily maintained with artificial fertilisers. Clean water is ensured through treatment plants, and fuel demand is met almost entirely from oil, gas, coal and nuclear power. Advanced technology results in a significant "distance" between natural resources and their final use. Natural resources may be no less important in developed economies, but the economy-environment linkages are supplemented by a technological capability and a diversity of alternative resources to ensure that the effects of declining resource quality and quantity are ameliorated. Higher incomes also reduce the pressure to allow natural resources to deteriorate. In Africa the relationship between economy and environment is more direct. In consequence, maintenance of water quality at source is a critical issue for human health and welfare. Table 13 shows that nearly two out of every three people in Africa still rely on unpiped water for their supplies, the proportion having fallen in urban areas from 66 per cent to 57 per cent because of population growth. While half of the population in urban areas has some form of sanitation, only 18 per cent have access to sanitation in the rural areas. While more people are being supplied with piped water and sanitation, helped by national policies and by the United Nations International Drinking Water Supply and Sanitation Decade launched in 1980, the demand is ever growing as populations expand.

Table 13
Population of Africa Served by Water Supply and Sanitation

<table>
<thead>
<tr>
<th></th>
<th>Water Supply</th>
<th>Sanitation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1980 (Millions)</td>
<td>1983 (Millions)</td>
</tr>
<tr>
<td>Urban Areas</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1980</td>
<td>89 (66%)</td>
<td>91 (57%)</td>
</tr>
<tr>
<td>Rural Areas</td>
<td>76 (22%)</td>
<td>103 (29%)</td>
</tr>
<tr>
<td>Total</td>
<td>162 (34%)</td>
<td>194 (38%)</td>
</tr>
</tbody>
</table>

Table 14 shows how dependent people in Africa are on fuelwood supplies and how many countries face unsustainable use rates.

Table 14
Woodfuel Dependency and Excess Wood Harvests

<table>
<thead>
<tr>
<th>Share of Traditional Fuels in Primary Energy</th>
<th>Excess Harvest Rate (1)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Per cent)</td>
<td>(Per cent)</td>
</tr>
<tr>
<td>Uganda</td>
<td>71</td>
</tr>
<tr>
<td>Malawi</td>
<td>93</td>
</tr>
<tr>
<td>Sudan</td>
<td>83</td>
</tr>
<tr>
<td>Ethiopia</td>
<td>89</td>
</tr>
<tr>
<td>Tanzania</td>
<td>91</td>
</tr>
<tr>
<td>Niger</td>
<td>80</td>
</tr>
<tr>
<td>Mauritania</td>
<td>n.a</td>
</tr>
<tr>
<td>Sahel</td>
<td>n.a</td>
</tr>
</tbody>
</table>


Note:
1. Rate of consumption in excess of mean annual increment in wood stock. Thus a figure of 100% means that consumption is at twice the rate of regeneration.

The prospects for securing a transition from traditional fuels to petroleum products, natural gas, electricity and coal are remote for many of the African people. Necessary continued reliance on traditional fuels is clearly threatened, however, by unsustainable use rates, indicating the vital importance of management of natural forests, afforestation schemes, agroforestry and tree crops.

3.3 The Economic Benefits of Investing in the Environment

The direct dependence effects noted above reveal their importance in other ways. If so many people are so dependent on natural resources, investing in those resources should yield high economic rates of return. A careful and detailed study of afforestation economics for an area of Northern Nigeria demonstrates
The extensive economic benefits to be obtained. The benefits of afforestation include:

- prevention of soil fertility damage, measured by changes in agricultural output with and without trees as shelterbelts and in agroforestry farming;
- enhancement of soil fertility, and hence additions to agricultural productivity, from agroforestry and shelterbelts (this enhancement to be added to the prevention of deterioration above);
- increased dry season fodder due to fodder trees and shrubs and increased crop residues from increased agricultural productivity; and
- tree crop products - firewood, poles and fruit.

These were measured and evaluated, and provide a minimum figure for benefits given that other functions were not evaluated - e.g., effects on water supply. Internal rates of return to shelterbelts ranged from 13-17 per cent, and for agroforestry from 14-22 per cent, demonstrating that, properly evaluated, afforestation investment is very profitable in economic terms. More extensive analysis of the feedback effect would also show that environmental investments are an effective way of breaking the vicious circle of poverty and environmental degradation associated with direct dependence. Thus, it is poverty that partly accounts for environmental degradation as hitherto sustainable farming practices are abandoned to cope with land scarcity, drought and the "marginalisation" of many farmers. As land degradation occurs so poverty is worsened as ever more short- and immediate-term concerns take over.

A second example of the economic benefits of investing in environmental resources is Sudan's Southern Stock Route (SSR). Sudan's livestock sector accounts for 40 per cent of gross domestic product and for the livelihood of 80 per cent of the population. Livestock, especially sheep sold to Saudi Arabia, is a major export. The major livestock areas of the west of Sudan produce animals which are trekked often great distances to Omdurman. The trekking is dictated by fodder and water availability, and the great pressure on water supplies - especially on wateryards with inadequate machinery and methods of controlling use. To relieve this pressure on environmental resources, a "Southern Stock route" was proposed, shifting some of the movement to a line south of the traditional route. To achieve this, the SSR involves provision of groundwater resources (wateryards) for sale to livestock traders and some sedentary and transhumant pastoralists, and the provision of veterinary services. The economic benefits would result from: reducing livestock holding costs; reducing weight losses from trekking; reducing trekking mortality; increasing the seasonal stability of supplies to urban areas and hence prices; reducing consumer prices as marketing costs fall; increasing employment in the wateryards; and reducing range and water point degradation on existing trekking routes, thus reducing desertification risks. Allowing for the costs of providing facilities but ignoring the anti-desertification benefits, the economic rate of return of the project was estimated to be 27 per cent, well above the widely-used "test" rate of return of 10 per cent.

3.4 The Macroeconomics of Environmental Quality

The importance of strengthening policy measures on, and increasing investments in, natural environments is underlined by seeing what macroeconomic cost is incurred by environmental degradation. Such exercises in damage cost estimation also reveal

that environmental costs show up in forms readily appreciated by national planning agencies. Several examples can be given.

Environmental quality is also important for export products. A number of African countries rely upon forest products for export revenue. Yet those same countries are experiencing deforestation unaccompanied by significant afforestation activity. Illustrative data are shown in Table 15.

Table 15
Deforestation and Forest Product Exports

<table>
<thead>
<tr>
<th>Forest Product Exports as a Percent of Merchandise Exports (Percent)</th>
<th>Annual Rate of Deforestation (Percent)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cameroon</td>
<td>10.1</td>
</tr>
<tr>
<td>Congo</td>
<td>5.6</td>
</tr>
<tr>
<td>Central African Rep.</td>
<td>24.5</td>
</tr>
<tr>
<td>Cote d'Ivoire</td>
<td>16.0</td>
</tr>
<tr>
<td>Liberia</td>
<td>5.4</td>
</tr>
</tbody>
</table>

Source: Authors' computations based on FAO data; World Bank, World Development Report (Annual Reports); World Resources Institute/IIED, World Resources Report (Annual Reports)

Table 15 shows that the impact on Liberia and Cote d'Ivoire is particularly serious. The net result is a depreciation of the natural capital stock. As this natural capital is lost, much of it irrevocably because of the subsequent erosion of forest soils which makes reafforestation increasingly difficult, so an option for sustaining export revenues into the future is lost. Such capital depreciation would be of less significance if the revenues from forest product exports were reinvested in man-made capital, but this appears to occur only to a limited extent, partly because of a failure, at times, by national governments to "capture" the economic rent from forests, and partly because of the pressures to use "Economic rent" in this context is the difference between the export price of forest products and the costs of logging, handling and delivery to the point of export. Economic theory shows that the major part of this rent can be taxed by national governments without altering the investment behaviour of forest concessionaires. See J.W. Gray, Forest Revenue systems in Developing Countries, FAO Forestry Papers 43 (FAO, Rome, 1983).
revenues for consumption purposes. These losses in future forest revenues are only part of the problem. Forests serve many functions, including soil protection, humidity conservation, conservation of carbon dioxide, shelter for plants, wildlife and indigenous human populations, provision of minor forest products (fruits, vines, fodder, honey, etc.). As deforestation occurs, these functions are also lost. It is only an accident of national accounting systems that leads us to think these lost functions are unimportant to the macroeconomy, illustrating the need to revise national accounting conventions to reflect the importance of so many unpriced environmental services. Because environmental services are not bought and sold in markets they appear to be free. In calculating GNP and other measures of economic activity, the result is that the depreciation of natural assets is ignored. Equally, pollution results in a reduction in human welfare. Yet the national accounts either ignore pollution, which should appear as reduced GNP, or, perversely, record expenditures associated with activities increasing pollution as a gain in GNP.

30/ See R. Repetto, Economic Policy Reform for Natural Resource Conservation, World Resources Institute, September 1986, Draft Manuscript; and H.M. Peskin, "National Income Accounts and the
Acacia senegal and, to a lesser extent, Acacia seyal, play a vital role in Sudan's economy. From these trees comes "gum arabic" ("hashab" from A. senegal, and "talha" from A. seyal) which is Sudan's third biggest export item (after cotton and livestock), earning $US 80 million in 1985. The productive potential is even larger. Yet the belt of land in mid-Sudan which supports the gum arabic industry is facing severe degradation as drought in the northern areas forces cultivators to move south, using the trees as fuelwood, and as the relative attractiveness of growing crops instead of Acacia has increased. The tragedy has been not just the loss of foreign exchange and reduced farm incomes (since intercropping of trees and crops is feasible), but the loss of the many environmental services performed by Acacia trees. As a leguminous tree, Acacias maintain soil stability and fertility through nitrogen fixation and root formations. The trees provide browse and fodder, fuelwood and effective fencing material (because of the thorns) and even roots with which to line wells. The gum arabic belt in Sudan is a "buffer zone" against the desertification pressures coming from the drought-affected north. The single most important measure to encourage gum arabic plantings, and the reduction of smuggling of existing gum to neighbouring countries, is to raise the price paid for the gum by the Gum Arabic company. This was effected by the Sudan Government in 1986. The results have yet to be evaluated but all the signs are encouraging.*

The sustainable development philosophy stresses that some natural environments should be preserved for their intrinsic value. Protected forests and wetlands and other areas of outstanding scientific interest fall into this category. Even with protected areas, however, the opportunity to "exploit" them for legitimate national gain should not be ignored. One way in which land areas can be protected whilst simultaneously yielding revenues is through "debt-for-nature" swaps. The basic idea is to use the second-hand market in debt by purchasing debts at a discount and then "swapping" the debt for an agreement to conserve a natural environment. Such swaps have already taken place on a small monetary scale with Costa Rica, Ecuador and Bolivia. 31/ They produce much needed reductions in international indebtedness at a cost of forgoing the development benefits that might be associated with more conventional exploitation of land through, e.g., clearance. Many African countries are well-placed to consider such swaps, or more direct payments from developed economies for the external benefits yielded by unique habitats and wildlife, making the costs of setting aside land for preservation purposes less onerous.

Section 1 of this part of the Report (Pages 25 - 28) showed that a particular feature of sustainable development concepts is the idea that, while some environments must be preserved and protected, many environments can be used in an efficient and sustainable fashion. By analysing the many functions that natural environments can serve it is frequently possible to secure a sustainable yield of products from the environment, serving both the aims of securing profit from the environment and of maintaining the stock of natural assets. The potential for such exploitation is often surprising. For instance, the substitution of softwood charcoal for hardwood charcoal can create employment, yield government revenues and save ecologically valuable hardwood forests.

4. THE CAUSES OF ENVIRONMENTAL DEGRADATION

At the most general level, the causes of environmental degradation seem apparent: too much is taken from the environment and not enough is put back. In the first part of this section, we identify the main proximate causes of environmental degradation. In the second part we identify the more important root or underlying causes.

The process of causation is complex. A "proximate" cause identifies an activity which gives rise to a physical change in the ecology of natural resources and which has deleterious effects on human welfare. Thus deforestation is a proximate cause of soil erosion, but soil erosion is a proximate cause of sedimentation. An "underlying" cause is defined in terms of given or "exogenous" factors, such as administered prices to which producers and consumers have to respond by adapting behaviour. What is "exogenous" is not always easy to define - population growth is both exogenous in that it reflects given preferences for having children, and "endogenous" in that it is also a response to poverty (by increasing labour supply and the means of care in old age).

4.1 Proximate Causes

The principal causes of soil erosion are overcultivation, overgrazing and deforestation. Overcultivation is in turn caused by shortened fallow periods, some mechanised farming, the expansion of farming into drier grazing lands and the planting of ecologically inappropriate crops. Shortened fallow periods are a problem where the shortened fallow is not accompanied by an increase in the use of inputs and technologies that maintain soil fertility. Erosion is worse on steep slopes and where topsoil is exposed to the winds and rains. Erosion may also lead to downstream effects. Silt carried by rivers may reduce both yields on irrigated lands and the capacity of hydroelectric facilities.
Deforestation may also set into motion further erosion. Not only does the loss of trees lead to erosion directly, but as fuelwood becomes scarce people substitute crop residues and manure which were formerly used for soil maintenance.

Africa is particularly vulnerable to soil erosion because of intense soil drying in the dry seasons, variability of climate and levels of poverty which often preclude adequate soil conservation measures. The basic response to the need to expand food production has been to extend the margins of cultivation. Since 1920 over 90 million hectares of land have been opened to cultivation, and existing lands have been pressurised beyond the capacity of soils to regenerate using prevailing technology. Yet even within these technological limits there are practices such as terracing, minimum tillage and tree planting which are easily introduced and which have already yielded promising results.

Desertification in rangelands is caused primarily by overgrazing. One problem has been the increase in the number of livestock. Between 1963 and 1983, the number of cattle in all of Africa increased 45 per cent. In the Sudano-Sahelian zone the increase was as high as 74 per cent, and in southern and western Africa the increase was 60 per cent. At the same time as livestock populations were increasing, the size and quality of pastures were reduced as cultivators moved into the best grazing lands.

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32/ L. Brown and E. Wolf, op. cit.
33/ ibid, pp.41-43.
Desertification in Northern Kenya*

The arid lands of northern Kenya support a mainly nomadic pastoral economy. Degradation of these lands threatens the indigenous people, and serves as a drag on the economy of the country as a whole.

What has caused the degradation? One reason is that the home ranges of the indigenous people have been reduced. This has been caused mainly by the drawing of political and administrative boundaries, the setting aside of tracts of land as national parks and forest reserves, and the establishment of commercial ranches. Large areas have also been the scene of intertribal livestock raiding and banditry. In the study area for the Integrated Project in Arid Lands (IPAL), one-quarter of the land was not used because of security problems.

Another problem has been an increase in the human population. In the IPAL study area, population has grown at a rate of over three per cent per year.

Traditional nomadic practices have also changed. Human and animal populations have come to concentrate around sources of fresh water (especially boreholes), and sites for shops, schools and famine relief centres. One reason for this is that these areas offer security from intertribal livestock raiding. Another is that recent periods of drought have made pastoralists more dependent on perennial water supplies, and in the case of families which lost their herds during the droughts, more dependent also on famine relief. Famine relief food supplies have become a permanent feature of some local economies.

It is here in these concentrated areas that desertification is most severe. Degradation centres in these areas and spreads in ever widening circles as the people have no alternative but to travel farther to find productive grazing and the wood they need both for fuel and for constructing livestock enclosures. This is a common phenomenon in arid and semi-arid Africa. In Niger, desertification advances not from the Sahara but from central points, scattered throughout the landscape, where human and animal populations have concentrated.+


Box 3

**Floodplain Development in Northern Cameroon**

Hydro-agricultural projects in the floodplain of the Logone river in northern Cameroon dominate development in this region, and supply 70 per cent of the nation's rice consumption. Yet these projects have also altered the local ecology.

The projects have reduced the extent of flooding in the area, with consequences for both cattle herding and wildlife. Two irrigated rice fields and an artificial lake have taken up room formerly used for grazing, and the diversion of flood waters to the irrigated fields has reduced the productivity of neighbouring grazing lands. Although grazing improved in the vicinity of the new lake, the effect of the projects on cattle herding has on balance been negative.

Flooding in nearby Waza National Park has also been reduced. During the dry season, water has to be trucked in to fill normally permanent lagoons that have since become dry. The diversion of flood waters also reduced the carrying capacity of the savanna floodplain. With wildlife threatened, the Direction Generale au Tourisme and the Societe d'Expansion et de Modernisation de la Riziculture de Yagoua have explored the feasibility of constructing canals that can restore part of the Waza floodplain pastures. The cost of two options under consideration is between $2 and $4 million.

The area's forest resources have also come under pressure. The 90-100,000 people involved in the projects rely on these resources for their fuelwood supplies, and demand is outstripping natural regeneration. Significant investment will be needed to ensure a sustainable supply of firewood. Proposals being considered include management of the natural forests, afforestation projects, improvements in the efficiency of consumption and an increase in the availability of substitute fuels.

The overall net benefit of the hydro-agricultural scheme may well be positive, but in the absence of a comprehensive cost-benefit analysis, which would also have to assess alternative ways of achieving the desirable irrigation, the sign of the total economic effects of the scheme is indeterminent.

*Factual information is from C.A. Drijver and M. Marchand, *Taming the Floods: Environmental Aspects of Floodplain Development in Africa*, Leiden: Centre for Environmental Studies, State University of Leiden, December 1985, Annex C.*
The problem, however, is not simply one of there being too many animals relative to the grazing area. Evidence suggests that herds are too large in some areas, but perhaps too small in others. The drilling of wells has provided perennial water supplies, around which pastoralists and their herds have congregated during the dry seasons. Range and livestock management have not been practised in these concentrated areas, and forage conditions in the vicinity of wells have as a consequence deteriorated. It is from these areas of concentration that desertification often spreads (see Box 2).

Water is a scarce resource in much of Africa. Droughts have accelerated degradation in arid and semi-arid Africa (see below). Water development projects have also led to problems. In attempting to ease the constraint of water supply in the Sahelian zone, deep wells have been constructed. But recharge of ground water supplies can be slow, and many wells have been overexploited. Improper management of well water has also caused localised desertification. Water projects involving irrigation and hydroelectric power have also had unintended adverse consequences for the environment - the flora and fauna of the floodplain, the carrying capacity of the floodplain grasslands and the yields of recession agriculture (see Box 3). One reason for this is that the environmental impacts of many projects are not assessed in the planning stages. As noted above, the performance of many projects has also been affected by soil erosion.

The proximate causes of deforestation were documented in section 2. They are the clearance of forests and woodlands for cultivation, and the felling of trees for fuelwood and logging. Deforestation is a problem primarily where the rate of deforestation exceeds the rate of regeneration, and where substitutes for forests, woodlands and fuelwood are often either not economic or not available. An exception is where the forest serves as a habitat for wildlife. In this case disturbance of the forest itself may lead to irreversible losses, and the best policy may be to simply set aside some areas from exploitation (see Box 4).
Sierra Leone has taken steps to establish the Outamba-Kilimi National Park, the country's first national park, in the arid north. But the diversity of wildlife in the savanna of northern Sierra Leone is lower than in the rainforests, and the types of species that inhabit the rainforests are different from those found in the Outamba-Kilimi Park. Concern has been expressed because the country's tropical forests have been heavily exploited. Unless action is taken soon to manage the use of the forests, and to protect some areas (particularly primary forests) from exploitation, the opportunity to do so later may be lost. In the process, important sources of regional income may disappear and species such as the forest elephant, the pygmy hippopotamus and the chimpanzee may become extinct in Sierra Leone.

Protection of the rainforests should be seen in the context of rural development as well as wildlife and ecosystem conservation. In recommending areas to be set aside as strict nature reserves, highest priority should be given to areas that are richest in diversity, harbouring the rarest species and subject to the least pressure for development. In the Gola forest of Sierra Leone, these criteria suggest that protection of the area known as Gola North be given first priority.

Protecting wildlife may seem to be a low priority for expenditure. Such a view is mistaken. There are three ways in which the value of wildlife is revealed. First, it is often a source of food: many traditional sources of meat protein in Africa have been lost by the failure to value wild meat sources properly. Second, the potential for tourism revenues in the face of the substantial demand for real "wildlife experience" is considerable. Third, "debt-for nature" swaps indicate the value which many people place on conserving natural habitats (see Section 3.4). All of these sources of value are translatable into cash flows.

4.2 **Underlying Causes**

Some of the root causes of environmental degradation discussed here are endogenous, in the sense that they are within the control of African governments. Others are exogenous in that they are outside the influence of national governments. Yet others can be regarded as being endo-exogenous in the sense that they are partially controllable by national governments.

To meet sub-Saharan Africa's external debt obligations, imports will have to be cut back. Yet imports are critical to the sub-continent's economic development. Sub-Saharan Africa depends on imports for virtually all of its fertiliser, for example, and supplies have already been reduced because of a lack of foreign exchange\(^{36/}\). Up to now, debt has not been the main reason for slow development. But it is likely to become an ever more biting constraint in the future if more debt is neither converted to grants nor rescheduled into longer repayment periods.

The effect of the debt problem on imports has been estimated by the World Bank\(^{37/}\). The estimates are based on a comparison of projected debt service payments and export capabilities, and assume that rescheduling take place where projected debt service ratios significantly exceed those experienced in the recent past. Focusing on the countries eligible to join the International Development Association (IDA), countries such as Benin, Zambia and Somalia are particularly vulnerable. For the other IDA-eligible countries, such as Kenya, Senegal, Lesotho and Ghana, the debt problem is less severe. Nonetheless, resource flows to these countries will have to increase substantially if per capita imports are to be held constant in real terms.

\(^{36/}\) FAO, *African Agriculture*, Annex 1, op.cit., p.23. North Africa is well endowed with domestic fertiliser production capacity, but most of the rest of Africa does not have domestic sources of production.

This leaves sub-Saharan Africa more dependent on aid. Even before the recent debt problem, most countries depended on aid for development. In the early 1980s, 17 countries were entirely dependent on aid for their fertiliser supplies. Of all the Central African and Sahelian countries, only Niger and Zaire purchased any fertiliser on a commercial basis.38/ But aid is limited and hence total fertiliser imports are extremely low in most countries. Without inputs such as chemical fertilisers, agricultural yields will decline, and pressures to deplete the soil's natural fertility and to cultivate in more marginal areas will increase.

World commodity prices have also worked against Africa's interest, as Table 16 shows. Only coffee, cocoa and plywood prices have increased overall since 1972.

### Table 16

**International Commodity Prices**

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Cocoa</td>
<td>100</td>
<td>263</td>
<td>157</td>
<td>135</td>
</tr>
<tr>
<td>Coffee</td>
<td>100</td>
<td>141</td>
<td>123</td>
<td>217</td>
</tr>
<tr>
<td>Tea</td>
<td>100</td>
<td>103</td>
<td>139</td>
<td>75</td>
</tr>
<tr>
<td>Rice</td>
<td>100</td>
<td>124</td>
<td>72</td>
<td>61</td>
</tr>
<tr>
<td>Sorghum</td>
<td>100</td>
<td>83</td>
<td>89</td>
<td>69</td>
</tr>
<tr>
<td>Maize</td>
<td>100</td>
<td>89</td>
<td>102</td>
<td>75</td>
</tr>
<tr>
<td>Bananas</td>
<td>100</td>
<td>87</td>
<td>94</td>
<td>99</td>
</tr>
<tr>
<td>Groundnut Oil</td>
<td>100</td>
<td>126</td>
<td>80</td>
<td>46</td>
</tr>
<tr>
<td>Soybeans</td>
<td>100</td>
<td>95</td>
<td>85</td>
<td>64</td>
</tr>
<tr>
<td>Cotton</td>
<td>100</td>
<td>98</td>
<td>96</td>
<td>58</td>
</tr>
<tr>
<td>Plywood</td>
<td>100</td>
<td>98</td>
<td>100</td>
<td>115</td>
</tr>
<tr>
<td>Tobacco</td>
<td>100</td>
<td>87</td>
<td>100</td>
<td>n.a.</td>
</tr>
</tbody>
</table>

Source: Authors' calculations from World Bank data.

Note: 1. 1985.

In sub-Saharan Africa, a large proportion of the population derives its income from agriculture - often on a subsistence level. An important indicator of environmental degradation, and of the health and prosperity of the rural population, is the difference between actual population levels and carrying capacity, or the number of people the environment is capable of supporting at a minimum subsistence level on a sustainable basis.

We have already noted that fuelwood demands exceed carrying capacity in many parts of sub-Saharan Africa. We have also presented estimates which suggest that the nutritional requirements of people living in much of Sahelian and Sudanian West Africa exceed the capacity of the local environment to produce food on a sustainable basis. Other estimates by the FAO\(^{39/}\) show that in terms of food, actual populations exceed carrying capacity in 14 sub-Saharan countries. In another seven countries, carrying capacity will be exceeded by the turn of the century. Yet in 19 sub-Saharan countries, carrying capacity exceeds the current population by a fairly wide margin; and overall sub-Saharan Africa is estimated to be capable of feeding, on a sustainable basis, more than twice its actual 1975 population.

These figures assume that the level of technology remains low - i.e., that very limited improvements, such as application of chemical fertilisers, are made. If an intermediate level of technology were employed, carrying capacity could be higher by a factor of four. At a high level of technology, such as is used in Western Europe, carrying capacity could be increased by a factor of almost twelve.

These figures help put the problem of population in perspective. In a subsistence economy, population is certainly excessive if the actual level exceeds carrying capacity⁴⁰/. But carrying capacity must be defined in terms of the technology employed. What is excessive at a low technology may not be at a higher technology. The countries in Table 17 whose carrying capacity is already exceeded have intensified their use of the land. Some have employed a more advanced technology; to different degrees, all have depleted soil productivity⁴¹/. Population is a cause of environmental degradation when people do not have the means of acquiring food other than by growing it themselves, and when the level of technology is such that the land is incapable of supporting them on a sustainable basis.

⁴⁰/ This is a limited criterion for defining an excessive population. We do not address here the question of the optimum population, on which a large literature has been written.

### Table 17
Sub-Saharan African Countries Grouped According to the Relation Between their Population and Carrying Capacity

<table>
<thead>
<tr>
<th>Carrying Capacity Already Exceeded</th>
<th>Carrying Capacity Exceeded by 2000</th>
<th>Carrying Capacity Exceeded After 2000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lesotho</td>
<td>Mauritania</td>
<td>Tanzania</td>
</tr>
<tr>
<td>Rwanda</td>
<td>Namibia</td>
<td>Sierra Leone</td>
</tr>
<tr>
<td>Burundi</td>
<td>Nigeria</td>
<td>Gambia</td>
</tr>
<tr>
<td>Niger</td>
<td>Uganda</td>
<td>Mozambique</td>
</tr>
<tr>
<td>Kenya</td>
<td>Botswana</td>
<td>Cote d'Ivoire</td>
</tr>
<tr>
<td>Somalia</td>
<td>Senegal</td>
<td>Liberia</td>
</tr>
<tr>
<td>Ethiopia</td>
<td>Burkina Faso</td>
<td>Guinea</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Guinea Bissau</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Chad</td>
</tr>
</tbody>
</table>


The influence of population growth on the depletion of soil productivity is particularly apparent in areas of shifting agriculture. Upon planting crops in cleared-out areas, soil productivity quickly declines. Within a few years it becomes economic to let these lands lie fallow and to clear other areas. As population increases, pressure on the land increases as well, and eventually fallow periods grow shorter. Soil productivity is given less time to recover, and as a consequence yields decline. Farmers may wish to substitute other inputs to compensate for the reduction in soil productivity. But at some point the marginal product of labour will decline, and technical inputs such as chemical fertilisers and ploughs may not be available or economic at current prices. Agricultural output per capita could increase if the rate of technical change were sufficiently large to offset both the decline in soil productivity and the increase in population. But the rate of population growth in sub-Saharan Africa is so large that there does not seem to be enough time to bring about the compensating changes that are needed.

42/
Drought is a recurrent phenomenon in semi-arid Africa, and has contributed greatly to the continent's agricultural and development problems – particularly in the Sahel and Ethiopia. This much is well known. However, the effects of drought on environment-economy interactions are more complex than may appear.

First, most African countries command the resources needed to last the occasional bad year; the effects of drought are greatest when there are two or more successive bad years. Failures lasting one or two seasons have characterised the African climate for centuries. However, the West African Sahelian drought that began in 1968 lasted 17 years, and recent droughts have occurred in places (such as northern Ethiopia) that lie on the margins of Africa's wetter lands. This and other evidence is seen by some climatologists as suggesting a shift toward a drier African climate. It therefore seems prudent for countries to plan on the expectation that recent climatic trends will continue.

Second, at the same time as the severity and duration of droughts have increased, the continent seems to have become more vulnerable to drought. The effects of recent droughts were made worse because during the preceding years of perhaps above normal rainfall, cultivation had advanced into former rangelands. This left both cultivators and pastoralists more vulnerable to drought. Cultivators had an increasing proportion of their crops planted in marginal areas. Pastoral pastures were reduced in size and the mobility of nomadic pastoralists was restricted, making it more difficult for nomads to exploit areas of localised rainfall. It is widely recognised that drought is not solely to blame for

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desertification; its main effect has been to exacerbate land use problems that preceded the droughts.

Third, drought has also had indirect effects on environment and development in Africa; policy responses to drought have caused problems that cannot be attributed to drought alone. The availability of famine relief food at times when rainfall would permit a return to farming has encouraged drought victims to depend on relief. The construction of deep wells has led pastoralists to concentrate in the vicinity of the wells, whereas in the past water shortages forced herds to move before pastures were overgrazed.

Finally, it has been suggested, but not proved, that agricultural development and environmental degradation have themselves contributed to climate modification. Possible agents of change include overgrazing, deforestation, large irrigation projects and even tree belts intended to reduce wind erosion.

Many domestic policies have effectively lowered agricultural product prices. The main motive for keeping food prices below their equilibrium market values is to protect the real incomes of individuals living in urban areas who have little or no opportunity to grow subsistence food crops. But low farmgate prices have several incentive effects which generally harm the rural environment. First, they reduce the rate of return to long-term soil and water conservation measures, limiting the extent of investment in environmental protection on the farm. Second, they discourage supply response by farmers since lower prices may prevent farmers from using fertilisers and other technologies.

The effects are not unequivocal, however. It is possible that low prices can encourage higher output in order to secure a given income. Much also depends on what kinds of crops are encouraged or discouraged. The World Bank has found that export crops are heavily taxed. Many export crops such as coffee, tea and cocoa are benevolent in environmental terms.

Notwithstanding structural adjustment currently being undertaken, the currencies of many African countries are still overvalued in real terms. The effects of overvaluation are to encourage imports and discourage exports, or to worsen the balance of payments. This can have implications for the environment. For instance, the planting of coffee trees, which are ecologically less harmful to the soil, is made to look less attractive than the planting of, say maize, which does not bind the soil as well. Overvaluation also shifts the internal terms of trade in favour of those who consume imports (often the urban population) and away from those who produce exports (mainly the rural population). Devaluation is thus a hard political decision. Nonetheless, in 1986, five African countries (Ghana, Nigeria, Gambia, Guinea and Sierra Leone) introduced exchange arrangements which essentially leave the valuation of currency to the market.

Subsidies also influence the decisions of farmers to employ commercially available inputs such as chemical fertilisers and farm machinery. Subsidies on chemical fertilisers are often as high as 50 to 70 per cent. The effects of subsidies on the environment seem to cut in both directions. On the one hand, they compensate somewhat for the lower prices received by farmers, and hence favour conservation. On the other hand, in lowering the price of subsidised inputs relative to nonsubsidised inputs, the use of

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economically and environmentally inappropriate technologies may be encouraged. Chemical fertilisers are not always better than organic fertilisers; in many cases, such as in the semi-arid tropics, chemical fertilisers can do more harm than good. An analysis of fertiliser subsidies by the World Bank suggests that temporary or small subsidies may be beneficial — for example, by encouraging learning by doing — but that the case for longer-term or large subsidies is more difficult to justify. There is typically no economic justification for subsidising farm mechanisation.

It is a proposition in economics that the incentives to conserve resources to which all individuals have unrestricted access are weaker than the incentives to conserve privately owned resources — where by ownership we mean possession of well-defined rights or tenure to the resource property. Among the bundle of rights belonging to the owner but attached to the resource are: the right to exclude others from using the resource; the right to transfer ownership of all or part of the resource; and an understanding regarding the period during which the rights are valid, and the manner of their termination or renewal. Environmental degradation may be encouraged where these rights are not well-defined or where ownership of rights is not conferred to individuals.

Tenure is in fact limited in much of Africa. In many countries (such as Ethiopia, Mauritania, Nigeria, Tanzania, Zaire and Zambia), land is owned, and use rights are conferred, by

\[50/\text{ibid, pp.95-97.}\]

\[51/\text{ibid, p.98.}\]


\[54/\text{ibid, p.150.}\]
the state. A farmer who lets his land lie fallow in order to enhance the soil's productivity risks losing his rights altogether. This creates an incentive for farmers to intensify production beyond desirable levels. Insecure tenure may also have the opposite effect. Where use rights are acquired simply by cultivating land, a further incentive is created for farmers to move into frontier areas. This shifts the extensive margin of cultivation into marginal lands, and imposes costs on the previous users of the land - often nomadic pastoralists.

When tenure is limited, farmers cannot offer the land they are cultivating as collateral against loans, and access to credit is restricted. The effects of limited tenure are thus two-fold: it encourages inefficient use of soils and underinvestment in non-land inputs. Both effects lead to lower yields.

Land need not be privately owned to be properly managed. In many cases communally owned rangelands are tightly regulated by nomadic tribes (although laws may permit - and even encourage - cultivation of rangeland). Management may break down, however, by the introduction of wells with unlimited access. In Niger, the number of animals congregating at pumping stations exceeds the number government planners had counted on by a factor of two or three. The problem is caused by allowing free access to the water. The government did not want to restrict particular ethnic groups from using individual pumping stations, and for similar reasons found it impractical to limit the number of users at each station. Further, the government did not want to charge users for access to the water because the pastoralists' animals were already heavily taxed. The only remaining option was to close boreholes for a period until the surrounding rangeland could be restored. But of

55/ For a theoretical treatment, see D. Southgate and D. Pearce, "Natural Resource Degradation in Developing Countries: A Causal Analysis of Agricultural Colonisation," Discussion Paper No.87-26, Department of Economics, University College London, July 1987.

56/ Unesco/UNEP/UNDP, "Desertification in the Eghazer and Azawak Region," in J.A. Mabbut and C. Floret (eds.), Case Studies on
course this increases the pressure around the stations that remain open. With free access to the water, self regulation of the rangelands by the nomads broke down, and the benefit of water during the dry season was offset by the degradation of pasture in the vicinity of the pumping stations.

Poverty is invariably associated with forces which bring about environmental degradation. The poorer the community, the more the future is discounted in decision making, and hence the less attractive are investments in resource conservation. As the needs of today and tomorrow become urgent, the concerns of next year and the next decade recede. The poorer resource users are, the less likely they are to be able to afford technological solutions to non-sustainable practices. While such associations between poverty and environmental degradation make it difficult to divorce environment from wider socioeconomic issues, poverty alone is rarely sufficient to explain resource losses. A great many communities have existed for long periods at subsistence level and in broad equilibrium with their environments. An important objective of many development policies has to be the restitution of the environment in order to break the vicious circle of poverty.
5. **POLICY MEASURES FOR ENVIRONMENTAL AND ECONOMIC RECOVERY**

5.1 **Introduction**

The severe Sahelian and Sudanian droughts of 1984/5, and the Ethiopian drought of 1987/8, have focussed the world's attention on both the immediate needs for aid and crisis resources in Africa, and the need for longer-term reconstruction of the economic base of the majority of national economies. The consequences of failing to achieve the reconstruction of the food, energy, water and shelter sectors of these economies are dire. The UN Food and Agriculture Organisation has already shown that, by the year 2000, 29 African economies will be unable to feed their populations if traditional methods of farming continue.\(^{57}\) Of these countries, 17 would become self-sufficient if they could raise the level of agricultural inputs to an "intermediate" level - i.e., use some fertilisers, pesticides and improved seeds, and adopt soil conservation measures and improved cropping patterns on one-half their cultivable land. Even if "high" inputs are used (equivalent to Western methods of farming), some African economies would remain dependent on food imports (Cape Verde, Rwanda, Mauritius).

These projections indicate that the process of "long-term" reconstruction has to be urgent and pervasive. Central to that process is improved environmental quality in terms of the renewable natural resources. Because environmental resources are so fundamental, virtually all areas of economic and social policy have an environmental dimension. To separately speak of an "environmental policy" for Africa is thus to misunderstand the role of environment in development policy. At the same time, recognition of the extensive role of environmental resources makes the kinds of policy measures that are needed almost boundless. This section addresses only the salient measures that the new focus on environment suggests are needed at the national, regional and international level. Ultimately, the measures that will be required will be specific to individual countries, and even to regions and areas within countries.

5.2 The Role of Incentives

Basic to reconstruction policy is the design of positive incentives to conserve valuable resources in such a way as to permit their sustainable use, and the design of negative incentives to reduce the inefficient use of those resources. The two broad types of incentives involved are:

- market-based incentives, and
- government directed incentives.

Market-based incentives reflect the power of market forces. Extensive research and practical experience teach that the actors in the environment-economy interlinkage - farmers, households, merchants, credit agencies - respond to price signals set by the market. In Niger, for example, the 1970s witnessed a much more rapid increase in the price of sorghum and cowpeas than in groundnuts. The sensitivity of farmers' supply responses to price changes was seen in the switch from groundnut production to cowpea and sorghum production, illustrating the powerful influence that prices can exert.\(^{58}\) Cowpeas also overtook groundnuts as Niger's main agricultural export. As it happens, and a less recognised fact, cowpeas are environmentally benign, being leguminous crops, whereas groundnut production is often destructive of marginal soils. The general evidence on supply response in Africa for export crops is that elasticities are in the range 0.1 to 1.0 for wheat, sorghum, cotton, tobacco, rubber and palm oil. The upper end of the range is higher for maize, groundnuts, cocoa and coffee.

There thus appears to be a significant role for markets to correct for past government interventions which, typically, have turned the internal terms of trade against agriculture by depressing agricultural prices.\(^{59}\) Policies which keep agricultural prices


low are understandable. There is a legitimate concern to protect the poor from rising food prices, although the poor who are protected in this way are invariably in urban areas. The rural poor are likely to suffer even more from low prices because of the depressing effects on farmers' incomes. The mechanisms which have biased the internal terms of trade against agriculture include:

- price controls which result in cash crop prices below export prices;
- exchange rate controls which cause exchange rate appreciation and depress real agricultural producer prices;
- producer taxation and high marketing margins;
- taxing imported agricultural inputs; and
- agricultural export taxation.

Low producer pricing is not confined to those food crops sold domestically. A wide-ranging survey found that farmgate prices for groundnuts were systematically below border prices in Côte d'Ivoire, Sudan, Zambia, Malawi, Senegal and Mali in the 1970s and early 1980s. A similar result held for maize in Zambia and Tanzania; for rice in Tanzania, Egypt, Ghana, Senegal and Cameroon; cocoa in Côte d'Ivoire, Ghana, Togo and Cameroon; coffee in Tanzania, Côte d'Ivoire, Cameroon and Togo; tobacco in Malawi and Tanzania; and cotton in Cameroon, Burkina Faso, Togo, Malawi, Senegal, Sudan, Egypt and Mali. A number of African countries have made efforts to improve production incentives by raising prices of food crops and export crops.

There are several major cautions to be exercised in such a price policy reform, or "pricism" as it has become known. The first is to ensure that the negative impact on the urban poor of what will essentially be increased food prices is minimised. To this end a major focus of concern needs to be exportable cash crops where, as noted above, supply elasticities appear to be significant.

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60/ H. Binswanger and P. Scandizzo, Patterns of Agricultural Protection, Agriculture and Rural Development Department, (World Bank, Washington DC, 1983).
and impacts on urban populations are likely to be low. The second caution is that price incentives only work if the producer of the crop actually receives the increased price: there has been widespread criticism of parastatal agencies' purchasing policies in a number of African countries, on the basis that the agency takes too high a proportion of the market price. The third caution is to ensure that the supply responses are "real" in the sense that what is measured is not simply due to a diversion of supply from local rural markets, with consequent reduced rural food availability. The fourth caution is to ensure that the supply response is not environmentally costly, and hence non-sustainable. Interestingly, a greater emphasis on export crops could serve this end: tree and bush crops such as coffee, cocoa, rubber, bananas, and tea are generally better for soil conservation than many subsistence crops. Some root crops are not environmentally benign, but increased emphasis on leguminous root crops such as soybean and cowpeas is often environmentally advantageous. But hard and fast rules are difficult to establish. As one commentary has remarked:

"...there appears to be no general rule that either cash crops - even those that are predominantly exported - or food crops are more ecologically sustainable."  

Crop policy is thus likely to be fairly finely balanced once environmental issues are taken into account. More emphasis on some export crops could conserve soils, but might "marginalise" subsistence crops further by displacing them from the more fertile soils.  

Higher food prices will encourage a positive supply response, and hence increase farm incomes, but may harm the urban poor. Higher prices might also harm the rural poor by depleting local market supplies, and could even encourage more extensive agriculture which is damaging to sustainable agriculture as virgin land is cleared. Cash crops may also "squeeze" food crops from the most fertile land, as appears to have happened in some parts of the Sahel with groundnuts' expansion.  

While much more research is

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63/ World Commission on environment and Development, op.cit., pp.80-1.  
64/ L. Timberlake, Africa in Crisis, (Earthscan/IIED, 1985), pp.72-3.
needed on the links between agricultural prices and renewable resources, it seems evident that the policy implications are not clear-cut, but need to be evaluated on a case-by-case basis. The "cash versus food crop" argument is a long-standing one and its resolution is likely to be regionally specific.

The most widespread subsidies are those given to agricultural inputs such as pesticides, fertiliser, credit, irrigation water and farm machinery. To some extent, such input subsidies compensate farmers for low product prices. But the general effect of such subsidies is to encourage over-use of the inputs, as Section 3 demonstrated.

Policies regarding input subsidies thus need careful review. Subsidies have the effect of wasting resources because the true cost of the resource is not signalled to the user of the resource. There is ample evidence to indicate that more rational pricing would lead to more careful use with consequent reductions in the costs of misuse - e.g. mortality and morbidity from pesticide hazards,65/ and fertiliser runoff and pollution from excessive use of irrigation water and/or excessive application of fertilisers.66/ Moreover, subsidy policies divert valuable government income from alternative uses. In 1981 it is estimated that Nigeria's fertiliser subsidies were costing some $250 million a year. Detailed reappraisal of input subsidy policies is called for. Much the same applies to taxation which forces producer prices down.

One response to suggestions that domestic prices, particularly of export crops, be raised to encourage a supply response is that the resulting agriculture is then at the mercy of notoriously unstable international markets. The majority of

65/ World Resources Institute, Paying the Price: Pesticide Subsidies in Developing Countries. (World Resources Institute, Washington DC, 1985).

commodities has experienced real price falls, making a policy of switching to export crops on environmental and income generating grounds open to some question.

Policies to influence world commodity prices are notoriously difficult to implement. International commodity agreements have attempted to stabilise world prices but with singular lack of success. The proposals of the Brundtland Commission to expand the funds for compensatory finance, as under the IMF's Compensatory Financing Facility, and to increase donor assistance for diversification investments to prevent over-reliance on single crops, are worthy of international attention. Both would reduce the temptation to compensate for declining world prices by expanding production in environmentally damaging ways.

Because this report focuses on a justification for elevating the status of environmental concern in policy planning, it has tended to concentrate on examples of the economic costs of allowing natural environments to deteriorate. But this must not be allowed to obscure Africa's success stories, which are often overlooked. Sustainable cereal crop yields have more than doubled between 1964 and 1984 in Swaziland, Tanzania and Libya. Tanzania has more than doubled the productivity of its root crops and countries recording increases in root crop productivity of over 50 percent include Côte d'Ivoire, Libya, Mauritius, Rwanda, Tunisia and Uganda. Irrigated land more than doubled between 1974 and 1984 in Congo, Liberia, Madagascar, Mali, Mozambique, Niger, Nigeria, Tanzania, Zaire and Zimbabwe. For the continent as a whole, irrigated land increased by 25 per cent over this same period. Zimbabwe has achieved major farm productivity gains by small farmer "packages" of fertiliser and seed, a credit system using the crop as collateral, an impressive extension service, and attractive producer price incentives. Kenya has produced an outstanding soil conservation programme based on indigenous farmer knowledge of terracing techniques, good but unintrusive extension advice backed up by specialists if needed, active involvement of women's groups and the training of technical assistants.

The recipe for success is generally the same -- combine a package of technical advice with economic incentives and local involvement, and it will be possible to alter the economic fortunes of the rural sector of African economies.

### 5.3 Population Policy

Limiting population growth is an integral part of sustainable development policy. Despite some attempts to argue that population growth is itself a spur to technological change and economic development, the African situation is one where population growth is impeding long-term development, constraining government attempts to raise living standards and improve health and nutrition, and impairing self-determination, especially of women. Substantial population growth in Africa is inevitable, however, regardless of measures that have already been taken to lower birth rates. By the year 2000, the population of sub-Saharan Africa will be at least 45 per cent higher than in 1986, and by 2045 it will have increased to at least two-and-a-half times its present size.

The reasons for thinking that Africa will not react to population change in the way that currently industrialised countries did in their past include: (i) the sheer speed of population change, at around 3 per cent per annum compared to 1 per cent per annum in Europe in the 19th Century; (ii) the absence of complementary investments in communications and other infrastructure; (iii) slow technological progress.

As a result, rapid population growth has given rise to serious environmental damage in many parts of Africa, and especially in semi-desert and dry bushland areas. Savanna and forest lands have also suffered. Despite the vastness of land areas in Africa, the effect of population growth on renewable resources is contributing to irreversible losses of those resources. This "mining" of the renewable resource base thus adds a further impediment to the development process. Population policy which centres on family planning programmes is essential as a long term measure to protect the resource base. Effective family planning costs around $20 per active user in Africa, or about $0.75 per

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capita. Current international population assistance is some $0.12 per capita. Even allowing for individual government contributions, there is thus a significant shortfall in terms of expenditures, together with a problem of finding trained personnel to carry out such programmes.

The need for a positive government stance on population policy has already been acknowledged by African countries at both the Second African Population Conference in Tanzania (1984), and the UN International Population Conference in Mexico (1984). But progress is slow. The average contraceptive prevalence rate (percentage of married women of childbearing age using contraceptives) is only 3–4 per cent in sub-Saharan African, compared to rates of over 50 per cent in much of Asia. But rates of 51 per cent are being achieved in Mauritius, and 22 per cent in Zimbabwe. Rates of around 25 per cent must be achieved if population growth overall is to be brought down to 2 per cent, indicating the need for greater awareness of the consequences of population growth, and measures to stimulate the demand for smaller families through contraception.

5.4 Land Tenure and Natural Resources

Sub-section 4.2 considered the argument that much environmental degradation comes about because resources are not privately owned. Instead they are either held "in common" by a community or tribe, or are not owned by anyone at all — "open access" resources. It is suggested that such common property and open access resources are prone to the "tragedy of the commons" whereby no one user of the resource has any incentive to control his consumption of it because he cannot be assured that other users will similarly curtail their consumption. This is an "assurance problem" which can only be solved either by establishing firm rules which limit individual use of the resource for the common good, or by "privatising" the resource so that individuals secure private ownership. Population pressure alone makes the establishment of common ownership regulation difficult, especially if the number of potential users of the resource becomes so great that each
individual's share falls below some minimum acceptable level. A great deal of land in Africa is under common ownership or is subject to ill-defined rights. The "tragedy of the commons" argument would therefore suggest that land be removed from common ownership and be placed in private hands. Moreover, it is suggested that such changes in land tenure will often occur "naturally" as the true value of the natural resources rises with scarcity.

There is some truth in the "tragedy of the commons" but the reality is far more complex. While open access resources, where there are no owners at all, are certainly at greater risk of overexploitation, common property resources may often be better managed than privately owned ones. The rules for mutually beneficial use are often strong and binding, particularly where they are based on tribal or local law. While population growth has undoubtedly contributed to the breakdown of social controls over resource use, those same controls often extended to population growth itself. Other causes of the decline of effective common property management have been external to the community: changes in tribal administrations brought about by government, price signals which have altered cropping patterns, and so on.

Would more land titling improve natural management in Africa? The evidence is unclear. More secure tenure appears certainly to improve access to rural credit, since the land can be used as collateral. In so far as credit can be used for investments in soil conservation, tree planting etc., titling may be important. Tenure may also increase the chances of growing perennial crops: insecurity encourages short-cycle crops. But much of the evidence for such statements comes from research outside Africa. The most detailed assessment to date concludes that:

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"The lesson from other parts of the world is that efficiency requires individual land rights to be recognized in a way that provides sufficient security (either in the form of long-term leases or land titles). That stage may not have been reached in Sub-Saharan Africa. But in other parts... the justification for a change in land arrangements already exists. In such cases, what is needed is a careful analysis of the benefits and costs of different systems (for example, title registration, and long-term leases), including equity considerations. The gain in efficiency may or may not outweigh the costs of introducing a new system."71/

5.5 National Planning

A priority concern in Africa must be to establish environmental quality and improvements to renewable resource stocks as a major objective of national planning. This means placing environmental issues to the fore of National Plans, as several countries such as Sudan and Zambia have already done. Others have pursued National Conservation Strategies in association with the International Union for Conservation of Nature and Natural Resources (IUCN). It also means establishing environmental expertise in each of the planning agencies, and especially in Ministries of Finance, Planning, Agriculture and Forestry. Because environment is intersectoral - it obeys no sectoral boundaries - it is important to establish institutions which can take an overall view. In some cases this may mean a separate Ministry of Environment or Natural Resources. In other cases, special advisory units can be established. Planning also needs to follow natural environmental boundaries such as agro-ecological zones and watersheds. Political districts only rarely coincide with such ecological boundaries, but the range of interlinkages in the environmental system means that planning on the basis of established political boundaries will risk ignoring important environmental overspills ("externalities") between districts.

Regional Planning

The focus on more natural ecological zones also serves to underline an important regional feature of Africa's environmental problem. Many important natural resources are shared between nations: the Nile waters offer a conspicuous example, but the Niger, Zambezi and Volta rivers are also shared, as is Lake Chad and even underground aquifers of major significance for future water supplies. The shared nature of resources is underlined by the ease with which refugees can and do move between countries. Intergovernmental planning is therefore needed if Africa's natural resources are to be used in the most efficient way.

This regional dimension is already important in terms of research and technological change, as exemplified by such bodies as the International Livestock Centre for Africa (ILCA), International Laboratory for Research on Animal Diseases (ILRAD), and the International Institute of Tropical Agriculture (IITA), all established by the Consultative Group on International Agricultural Research (CGIAR). There is a need for increased research into drought-resistant crops, water harvesting methods to maximise rainfall retention, disease-resistant seeds, fuelwood conserving stoves and fires, suitable technology that can be afforded by small farmers, and so on. While much of this research can and does take place at the national and sub-national levels to capture the location-specific features of many of the solutions, considerable economies can be secured by researching at the regional level issues that are common to many countries.

Another major area where regional research can yield economies is in the creation of Geographical Information Systems (GISs). A major constraint on effective planning for efficient natural resource management is the lack of reliable data in many African economies. Such data deficiencies result in whole mythologies about natural resource problems and a consequent risk that policy measures will be misdirected. Urgent needs include assessments of forest cover, soil erosion and soil capability, desertification risks and the distribution of human and livestock
populations. GISs make use of "ground truth" - actual ground inspections and data collection - and aerial and remote sensing photographing to provide the basis for land use planning and even emergency planning through "early warning systems". Each country will need its own GIS but there are good economic reasons for placing some GISs on a regional basis.

5.7 Micro Planning

Considerable advances in the more efficient use of natural resources can be obtained by "elevating" environmental issues to national and regional planning status. But such centralised and supra-national approaches must be accompanied by "micro-planning" which focuses on the household and individual farm as the planning unit.

The first aim is to utilise the extensive indigenous knowledge that farmers and householders have of their own natural environments. The tendency to suppose that problems have technological solutions that are best imposed from outside without collaborating with those whose lives are to be affected by them has an extensive history. Indeed, it has often been cited as a criticism of donor behaviour, regional research agencies and of traditional models of extension.\(^72\) The extension worker should become the natural agent to interact with local people in solving problems.

The second feature of micro-planning is to understand better how micro units react to the kinds of incentives that advocates of sustainable development feel are needed. The efficiency of policy measures would be vastly improved if policy could be implemented with local participation. The participation will often need to be cognisant of the gender relationships within the household: women are frequently more aware of natural resource problems since they usually carry the water, gather the fuelwood,

cook the meals, raise the children and tend the fields. There are numerous examples of investments failing because of a lack of appreciation of the sexual division of labour.\(^73\)\(^/\)

The third aspect of micro-planning is the use of non-governmental organisations (NGOs). NGOs specialise in small-scale, local participatory and flexible projects. How far their role can be expanded is open to debate, but they provide a valuable vehicle for introducing micro-planning in Africa.

5.8 Investment Policy

Environmental considerations must be integrated into investment planning, both by national governments and donor agencies. The salient features of such an integrative approach are as follows: \(^74\)\(^/\)

(i) When considering projects and programmes greater attention should be paid to the various ecological interlinkages which bear on the investment. A major dam, for example, will affect downstream sedimentation, displace local populations, and perhaps attract migrant populations. If there is deforestation in the watershed area, the impacts of this on the live storage capacity of the reservoir must be evaluated, and so on. Tracing these interlinkages forces attention to be focussed on a wider "spatial unit of account" in terms of the area of land under consideration.


(ii) Project design still tends to follow sectoral definitions. Investments are in, say, rural electrification rather than rural energy, afforestation rather than integrated rural development, and so on. In many cases the sectoral bias will not matter. But where intersectoral overspill is significant, it is important to establish a problem-oriented approach and aim at the least (social) cost solution to that problem. If rural electrification is partly aimed at stimulating small-scale local industry, for example, it is likely to be unsuccessful unless it is also associated with investment in road infrastructure and some marketing institutions. Afforestation policies may be justified in terms of timber supply and fuelwood yields, but it is important not to accept fuelwood demand as being outside the influence of policy. An integrated approach would also look at the nature of the demand to see if, for example, improved charcoal burning stoves could conserve fuel. The idea of investment packages is familiar, but environmental considerations suggest that there is a greater need for more package approaches.

(iii) Critical to the process of integrating environmental issues into project design and appraisal is the proper valuation of environmental services. Section 3 illustrated the idea of the economic valuation of the natural environment. It was argued there that proper design of policy and investments will often find that environment and economic development are complementary, but, where there is a trade-off, what matters is that the true cost of depleting environmental services is understood. Techniques of economic valuation are advanced in the developed world: much greater research effort is needed in the developing world.
(iv) The idea of sustainable development has yet to be introduced successfully into investment appraisal. Given the basic idea that the flow of services from the stock of natural resources should not be depleted, both on economic efficiency criteria and because of the requirement that future generations have broadly equal access to the stock, investment appraisal should assess the impact of policy on the resource stock, seeking ways of compensating for losses, perhaps by separately investing in specific projects designed to augment the stock. A further feature of sustainability is the requirement that once a donor investment has ceased, the resulting scheme should be capable of continuation by the recipient country without further assistance: this suggests greater focus on the conditions that are likely to prevail when donor assistance ends, on manpower training, education and management skills, and sustained profitability.

(v) The balance between rural and urban investments similarly requires re-evaluation. Because of the historical bias towards urban investment, rural-urban migration has unnecessarily accelerated, creating further problems of providing expensive urban infrastructure, adding to unemployment and frequently lowering average rates of return across investment as a whole. Redressing the balance would increase employment because of labour-intensity in agriculture and rural industry. Greater investment in rural areas could help conserve valuable rural resources by giving rural populations more of a stake in their future as security increases. It can also assist in reducing urban pollution, housing problems and unemployment.

75/ For an outline approach, see A. Markandya and D.W. Pearce "Natural Environments and the Social Rate of Discount", Project Appraisal, March 1988.
5.9 Conservation Policy

Environmental considerations are easily confused with the idea of preserving wilderness areas. There are strong arguments for preservation. Africa contains rich sources of biological diversity in its forests and savannah lands, and in some of the desert and semi-desert areas. Demonstrating the economic value of biodiversity is difficult: the values appear less "real" than those of development. Nonetheless, there are major direct economic gains to be obtained from managing biodiversity, as Kenya has demonstrated. Other African countries are also successfully exploiting the substantial demand for tourism and scientific interest in wildlife and ecosystems. A fine balance needs to be struck between the high demand and its effects on the very resources that are being valued. In this respect, experience in designing national conservation strategies is invaluable. The economic importance of conservation clearly needs more emphasis and demonstration. Where preservation appears to dictate leaving areas alone with very limited human disturbance, Africa should pursue the idea of encouraging developed nations to contribute to the cost of so-called "non-development".

Conservation, as opposed to preservation, tends to permit more human management of the resources in question. Wildlife reserves tend to be a mix of preservation and conservation, but conservation can extend to the idea of managing wildlife as a food resource, and for skins and hides. Conservation can even be profitable. Studies of forest management regimes are tending to show that clear-felling of tropical hardwoods and replacement with sawtimber plantations is becoming less and less economically attractive as hardwood prices rise and non-timber products are valued properly. Natural forest management regimes have the capability of yielding a continuous flow of resources and conserving species diversity at the same time.\textsuperscript{76/} Schemes for taxing forest rents could also be improved to secure a greater share of revenue for the host countries.

The high fertility of the Nile Delta and Valley is mostly due to the silt which for thousands of years had been carried by the flooding river waters and deposited annually onto the agricultural lands. Egypt's River management for irrigation has mostly been concerned with water quantity. Thus, since the early 1800's when the first barrage was built, up until the Aswan High Dam was finally commissioned in 1964, successively larger quantities of that silt have been prevented from reaching agricultural lands, until the silt has almost disappeared after 1964. The building 'staple' of Egyptian houses has always been mud bricks (either raw or fired) which are manufactured by successively shaving the film of annually deposited silt. But, after the high dam, the practice continued while the shaved layers of topsoil where not being replaced. The number of brick kilns sprouted and became a dominant feature of the rural landscape, as the growing population's demand for building materials continued. For a typical peasant, an illegal sale of a layer of topsoil 1 meter thick from an acre of land could bring him as much as $100,000 when tilling the same area would at most provide him with annual net earnings of $200 - 300. By the mid seventies, the problem had reached such a magnitude that a public outcry had caused the government to more effectively implement the already existing laws and codes for countering the practice. A special police force was deployed (among other measures such as legal action) and today about 85% of the brick making enterprises have either been closed down or (as is the case for the majority) have been given soft loans to shift to cement brick manufacture, with some technical help from governmental institutions. Thus, a process of resource degradation has been successfully checked through conservation measures.
commitment to include environmental considerations in both project-specific work and in its strategic approaches to development at the country and sector levels. Seminars and Symposia have been held with the aim of focusing attention within and outside the Bank, on environmental issues.

More needs to be done however, by the African Development Bank and by other donor agencies. What are the implications of fully accepting the importance of environmental factors in economic development? The first is that the relative emphasis of the lending programme should remain on the agricultural sector. The second is that the sectoral focus of lending needs to be reconsidered to address inter-sectoral externalities. In many cases, such externalities may not alter the kind of lending decision made or policy advice given. In others it will affect decisions by:

- promoting far more cautious approaches to lending, scrutinising investments that indicate potential for environmental damage;
- encouraging investment in environmental rehabilitation (restoration of water points, afforestation, agro-forestry, soil conservation, etc.);
- ensuring that environmental damage is properly evaluated; and
- paying more attention to the sustainability of investment packages.

The third element of a new focus involves encouraging African governments to "elevate" the status of environment in national plans, conservation strategies, etc. Indeed, ADB has already indicated its willingness to support initiatives on "national action plans" which integrate macroeconomic planning and environmental management. This will require, inter-alia that country programming and project preparation fully and systematically incorporate environmental considerations. The fourth element involves intensification of efforts to reach the rural poor. The challenge here is to diffuse investments across many small projects, making use of existing local institutions, tribal administrations
and NGOs. Above all, extension should be introduced where none currently exists, and new ideas relating to resource conservation should be integrated into existing extension practice. In this regard, the role of women demands special attention since women constitute an important group for management and use of natural resources. The fifth element is information. Not only should data be collected on soil conditions, climate, vegetation cover, and biomass energy availability, but there should be more research into the behavioural features of rural and urban households. Without the latter, one cannot say confidently how resource conservation can best be served by redesigning incentives. In addition, these data should be publicly available for use.

The sixth element, which builds on the fifth, is a better understanding of how resource management can be stimulated and improved by macroeconomic and international policy. ADB can influence national governments and the international community in this respect. Regional cooperation on environmental issues and programmes should be encouraged by the Bank, given its regional character and mandate.

Finally, the methodologies for project appraisal need to be developed further in respect of environmental factors. Some revisions to cost-benefit analysis have already been suggested in recent publications,\(^7^9\) but much greater effort is needed.

The Bank is giving priority to environmental issues in its 1987-1991 Five-year Operational Programme. In addition to

encompassing the previous points in broad terms, the Bank proposes to increase programmes relating to reducing population pressure, and to enhance institutional strength with respect to environmental matters.

6.2 **The Economic Commission for Africa**

Whereas ADB continuous to draw attention to environmental issues and to re-orient its lending programme, the ECA has a similar role of bringing the attention of the international community and African governments through its annual Conference of Ministers, to the special environmental problems of Africa. ECA successfully cooperated with the Organization of African Unity (OAU) in preparing the position paper presented to the UN General Assembly Special Session in 1986, in which environment was one of the priority issues.

The ECA should continue to secure a more detailed understanding of environmental issues, the economic damage arising from environmental neglect, and the broad restructuring of economic policy that might be required to achieve environmental and economic sustainability. To this end, ECA might usefully consider regular publication of environmental monitoring reports for Africa, or separately for regions within Africa, and of more general work on issues in measuring the costs of environmental damage. This would, to some extent, be similar to efforts by the other regional UN agencies.

7. **CONCLUDING REMARKS**

The scale of the environmental problem in Africa is immense and daunting. Our understanding of the role of environment and natural resources in the development process has changed radically in the last decade, but we still have a great deal to learn. This suggests two basic reasons for elevating the status of environment in national and international planning:

recognition of the economic costs of environmental degradation that have already been incurred.

(ii) avoiding what are almost certain to be very much greater costs in the future, not just in economic terms, but also in terms of famine and chronic loss of livelihood.

It seems fair to say that we have established only part of the first reason, and some commentators dispute even that. Demonstrating the importance of preventive policy is inevitably more difficult. But there is a persuasive argument for treating the uncertainty about the future costs of environmental degradation very seriously indeed. Past aid and development efforts in Africa have not been efficient. The cost of redirecting policy in an environmentally sensitive fashion is not likely to be very high. The benefits of that change of policy are uncertain, but could be very large indeed. On the basis of a rational risk-averse strategy towards uncertainty, then, policies that aim at environmentally sustainable development are likely to pay off in a significant fashion. The reasoning in this part of the Report has been that, even if the argument about future costs is not accepted, there is ample evidence to show that past and current environmental degradation in Africa is unaffordable in terms of economic development.

The levels at which policy action is needed are four.

1. National governments can seek to integrate environmental considerations more fully into national planning, incentive structures and prices.

2. Local communities can be utilised for their detailed knowledge, involved in decision-making about natural resources, and encouraged to conserve and augment natural resources. Non-Government Organisations have a major role to play here.
3. International communities and foreign governments can be urged to lend more financial resources and to lend them in an environmentally sensitive manner. This requires more donor coordination than has hitherto taken place in Africa, a greater exchange of opinion and less "externally imposed" solutions that are insensitive to local needs and knowledge.

4. Regional organisations can establish information bases to assist in national and local planning, and engage in more regionally applicable research.

At all these levels, the first requirement is awareness of environmental functions and their economic importance. The second requirement is that the potential for sustainably exploiting those resources be investigated with a view to conserving resources whilst maximising the current benefits from the flow of resource services. The third requirement is that the environmental impacts of non-environmental policy be understood in order to avoid inconsistency in policies between sectors.

The policy measures that then emerge are likely to range in their time dimension from the immediate to the genuinely long-term. But, as section 4 noted, the truly long-term in Africa is too late for many of the problems. The spectrum of measures appears as follow:
The Spectrum of Policy Measures

<table>
<thead>
<tr>
<th>Levels</th>
<th>Short-Term (1-5 Years)</th>
<th>Medium-Term (6-20 Years)</th>
<th>Long-Term (Over 20 Years)</th>
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<tbody>
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<td>1. National</td>
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<td>Incentives</td>
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<td>(Prices)</td>
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<td>Rent Capture</td>
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<td>Diffusion of technology</td>
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<td>2. Regional</td>
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<td>Joint exploitation</td>
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<td>of shared resources</td>
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<td>3. International</td>
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It will be observed that the incentive issue is pervasive to policy. This observation alone is sufficient to establish the assessment of existing incentive structures and their possible reform as a top priority for action. Ideally, most of that action should take place at the national government level to avoid the controversy of "conditionality" imposed by lending agencies. The list also implies that incentives can act quickly. An example would be improved agricultural output from raising producer prices. Other incentives require "demonstration," and are therefore likely to be effective only over longer periods.

Other measures are better described as "enabling". Land and resource tenure may be a precondition for farmers to respond to price signals, for example. Such changes in the allocation of rights cannot be implemented overnight, but in terms of sustained development, they may be extremely important.

Education is the most effective medium-to-long-term measure. The influence of graduates trained, for example, in forestry is conspicuous in many African countries, blending the technical expertise that can be obtained by formal training with essential local knowledge. Moreover, it takes only a few well-trained individuals to modify policy and change opinion provided they have adequate resources to aid them.

At the regional level there is a need to share the costs of major technical investments - for example, in agricultural research. The caution here has to be that it is necessary to ensure the specific applicability of regional research, and this can only come from integrating research with local knowledge.

International actions involve a re-examination of all policies which "disable" countries from even commencing environmental improvement. Debt service payments and commodity prices in particular need to be addressed.
It is clear that action is needed at all levels of the community. The resource of local knowledge and expertise must, above all, be freed from the restrictions placed on it by conflicting economic signals from national, regional and international institutions.
ANNEX 1

Map Showing Definitions of Regions Used in this Report
ANNEX 2

Persons Interviewed for Part II

1. Dr. U. Ahmad, UNEP, Nairobi
2. Mr. Michel Baumer, ICRAF, Nairobi
3. Mr. R. Bensted-Smith, IUCN, Nairobi
4. Mr. L.B. Dangana, Unesco, Nairobi
5. Mr. G. Giannini, FAO, Rome
6. Mr. J.D. Keita, FAO, Rome
7. Mr. H. Lamprey, World Wildlife Fund, Nairobi
8. Mr. W. Lusigi, Unesco, Nairobi
9. Dr. R. Malpas, IUCN, Nairobi
10. Dr. F. Mouttapa, FAO, Rome
11. Mr. R. N'Daw, UNEP, Nairobi
12. Dr. P. Portas, IUCN, Gland
13. Mr. A. Potterton, World Wildlife Fund, Nairobi
14. Mr. D. Sanders, FAO, Rome
18. Mr. M.G. Zaroug, FAO, Rome