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(Continued on the inside back cover.)

280



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Kevin M. Cleaver
W. Graeme Donovan

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Kevin M. Cleaver is director of the World Bank's Africa Technical Department. W. Graeme Donovan is principal agricultural economist in the Environmentally Sustainable Development Division of the Africa Technical Department.

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Contents

<i>Foreword</i>	vii
<i>Acknowledgements</i>	viii
<i>Abstract</i>	ix
1. The Extent of Rural Poverty in Sub-Saharan Africa	1
2. Lack of Agricultural Development as a Major Cause of Rural Poverty	4
3. A Program to Accelerate Agricultural Growth	8
4. Has the Strategy Been Implemented?	10
<i>Policy Reform</i>	10
<i>Technology Development</i>	11
<i>Rural Infrastructure</i>	14
<i>Land Conservation and Forestry</i>	14
<i>Rural Associations</i>	14
<i>Land Tenure</i>	15
<i>Regional Integration</i>	15
<i>Food Security</i>	16
5. Measures of the Impact of Policy and Investment on Agriculture	17
6. Does Agricultural Growth Benefit the Rural Poor?	21
7. Agricultural Progress in the “Big Ten” Countries	23
<i>Nigeria</i>	23
<i>Ghana</i>	24
<i>Cameroon</i>	24
<i>Ethiopia</i>	24
<i>Côte d’Ivoire</i>	25
<i>Sudan</i>	26
<i>Kenya</i>	26
<i>Uganda</i>	27
<i>Tanzania</i>	27

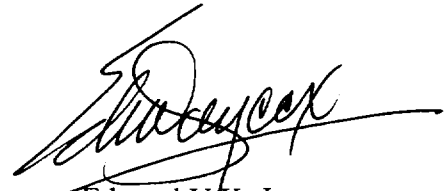
8. Summary of Agriculture Growth Experience in the “Big Ten”	29
9. Conclusion	31
Statistical Tables	32
A1. Agricultural Growth (Value Added)	32
A2. Sub-Saharan Africa: Food Security	33
A3. Sub-Saharan Africa: Population and Food Security, 1990-2020	34
A4. Forest Area and Deforestation	35
A5. Extent of Soil Degradation in Major Regions of the World, early 1980s	36
A6. Evaluation of African Agricultural Research Institutions	37
[(Financing average per year (1990))]	
A7. Fertilizer Use	39
A8. Sub-Saharan Africa Irrigated Areas (thousand hectares)	40
A9. Elasticities of Agricultural Output with Respect to Factors of Production	41
A10. Rating Countries by Performance	42
A11. Sub-Saharan Africa: Agricultural Value-Added and Agricultural Land	43
Annex: World Bank and African Government Poverty Assessments	44
Notes	46

Foreword

This study examines the agricultural scenario in Sub-Saharan Africa over the past five years. Its aim is to assess the progress of agriculture, and in particular the implementation of various elements of a strategy for its development. In 1989, the World Bank set targets for agricultural growth against which to measure the impact of programs it was supporting. Which countries have succeeded in attaining the targets? What have been the factors contributing to that success? And in the countries where agriculture has been growing too slowly, is it because important strategic elements have not been addressed, or does the strategy itself need to be changed? How has agricultural growth contributed to poverty reduction? These are some of the questions which this study addresses.

The critical role of agriculture in Africa's development is acknowledged universally. Unfortunately, urban bias is also still very active. It is vital that the gap between assent to the strategic elements, and actions to implement them, should be bridged. Agricultural development is complicated and challenging - perhaps one of the most challenging parts of economic development. The main elements of a strategy for progress in agriculture complement one another - if one or more is missing, agricultural growth suffers visibly. This study illustrates the validity of these assertions. In doing so, it provides an overview of recent developments in agriculture in Sub-Saharan Africa which will be valuable to all those concerned with its progress.

The payoffs to achieving healthy agriculture are so vital to general economic growth and poverty alleviation, that it is worthwhile to bring substantial resources to bear on achieving this growth.



Edward V.K. Jaycox
Vice President
Africa Region

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Abstract

There is a strong relationship between agricultural stagnation and poverty in Sub-Saharan Africa.* Much, though not all, of the solution for poverty alleviation depends on stimulating agricultural growth in Africa. Data collected by the World Bank, the Food and Agricultural Organization of the United Nations (FAO), and the African Governments, shows that most of Africa's poor live in rural areas and depend on agriculture for survival. The dependence is both direct in growing food and cash crops, and indirect by working on farms or by trading in agricultural inputs and products. Growth of agriculture, of agricultural production, and of agricultural incomes helps the rural poor, and hence alleviates poverty. It also helps the non-poor, in some cases more than the poor. In the few African countries which have implemented policy reforms consistently and reduced implicit and explicit taxation on agriculture and investment in agriculture, there has been some modest revival of agriculture growth, averaging between 3.5 to 5 percent for several years. Nigeria, Uganda, Tanzania, Benin, Guinea, and Mauritius represent these good agricultural performers.

Unfortunately, in most countries of Sub-Saharan Africa, agriculture has grown much more slowly than population, agricultural incomes have stagnated in real terms, or fallen. The major problems continue to be poor economic and agricultural policy, and inadequate public investment in infrastructure, rural education, agricultural services such as extension and research, and rural health. Poor policy and poor public investment have led to a lack of private investment in farming, farm input supply, and processing. Domestic markets have been lost to foreign imports, and export markets lost to countries in Asia, the Middle East and Latin America. The countries that have stopped discrimination against agriculture through improved policies and better investment show the way for Sub-Saharan Africa as a whole, because it is in these countries in these years that rural poverty has been reduced. There is a nevertheless a set of additional constraints facing the poorest rural inhabitants, that agricultural growth will help resolve only in the long run. Targeted measures are needed to address the problems of the poorest rural inhabitants, even in growing agricultural economies.

This paper was prepared for presentation at the Africa Studies Association Meeting in Toronto, Canada, November 1994 parts of which are presented in two panels entitled "Poverty in Sub-Saharan Africa: Issues and Actions", and "Agriculture and Environment in Sub-Saharan Africa." An earlier draft was presented at the American Agricultural Economics Association meeting in San Diego in August 1994. Comments received have been incorporated.

* Sub-Saharan Africa refers to all of Africa except South Africa, Morocco, Algeria, Tunisia, Libya and Egypt. To maintain consistency and because of quite different agricultural constraints, this distinction is maintained.

1. The Extent of Rural Poverty in Sub-Saharan Africa

There are many facets of poverty in Sub-Saharan Africa (SSA). World Bank poverty assessments undertaken over the past four years for a number of countries (listed at the end of the study) indicate that poor people, both in rural and urban areas, lack purchasing power due to low income, low access to assets and lack of opportunities for income generation. They also often lack access to social and economic services,¹ which includes education, health, and sanitation. Living conditions such as the state of children's health, adult illiteracy, primary school enrollment, access to health services, life expectancy, are often poor in rural areas.

Table 1 shows the proportion of people below the poverty line for both rural and urban areas. The poverty line used for this estimate is consumption of less than \$1 per person per day. Comparisons between countries can be made because consumption is expressed in US dollars by converting national consumption estimates using purchasing power parities.² Unfortunately, data limitations in earlier years do not permit an assessment of the evolution of rural poverty in most countries.

<i>Country</i>	<i>Rural (%)</i>	<i>Urban (%)</i>
<i>Cameroon</i>	71	25
<i>Côte d'Ivoire</i>	77	23
<i>Gambia, The</i>	66	33
<i>Ghana</i>	94	19
<i>Guinea-Bissau</i>	58	24
<i>Kenya</i>	41	20
<i>Lesotho</i>	54	55
<i>Madagascar</i>	37	44
<i>Malawi</i>	63	10
<i>Mali</i>	<i>n.a.</i>	50
<i>Nigeria</i>	78	34
<i>Tanzania</i>	59	61
<i>Uganda</i>	57	38
<i>Zaire</i>	76	32
<i>Zambia</i>	88	46

Sources: World Bank. 1994. *Report on the Status of Poverty in Africa, the Many Faces of Poverty in Africa*, Technical Department, Africa Region, Washington, D.C. Draft for Gambia, Guinea-Bissau, Kenya, Nigeria, Côte d'Ivoire, Cameroon, Uganda, Zambia. Data based on primary survey undertaken in each country; David Sahn, Paul Dorosch, Stephen Younger. 1994. "Economic Reform in Africa," "A Foundation for Poverty Alleviation." Cornell Food and Nutrition Policy Program, Cornell University, New York. P.8; World Bank. 1993. "Mali, Assessment of Living Conditions." Report No. 11842-Mali. Washington, D.C.

In nearly every country for which data is available, the majority of the poor are rural. Data from alternative sources confirm the same phenomenon in other African countries. Using UNICEF data, a Poverty Assessment undertaken by the World Bank for Namibia found that 75 percent of the poor are dependent on agriculture.³ A survey conducted in Senegal in 1992 shows that mean per capita income and mean per capita food expenditure are higher in urban than in rural areas.⁴

Quality of life indicators reinforce the finding that rural communities fare worse than urban communities. These indicators include access to safe water, secondary enrollment rates of female in schools, primary school enrollment rates, and the incidence of childhood stunting. The following table shows that in three countries having high quality primary survey data, The Gambia, Zambia, and Kenya, rural populations do worse according to every single indicator.⁵

<i>Table 2: Stunting in 3-59 Month Old Children</i>		
<i>Country</i>	<i>Children (%)</i>	
	<i>Rural</i>	<i>Urban</i>
<i>Gambia, The</i>	15	3
<i>Kenya</i>	22	11
<i>Zambia</i>	47	34

Source: World Bank. 1994. *Poverty Indicators for Selected Countries*. Technical Department, Africa Region, Washington, D.C.

<i>Table 3: Access to Safe Water</i>		
<i>Country</i>	<i>Rural</i>	<i>Urban</i>
	<i>Population (%)</i>	<i>Population (%)</i>
<i>Ethiopia</i>	9	69
<i>Gambia</i>	40	78
<i>Guinea, The</i>	38	84
<i>Guinea-Bissau</i>	88	94
<i>Kenya</i>	38	96
<i>Mali</i>	10	45
<i>Uganda</i>	56	83
<i>Zambia</i>	19	90

Source: World Bank. 1994. *Poverty Indicators for Selected Countries*. Technical Department, Africa Region, Washington, D.C. World Bank. 1993. *Mali, Assessment of Living Conditions*: Report No. 11842 - Mali. Washington, D.C; World Bank. 1993. *Ethiopia: Toward Poverty Alleviation and a Social Action Program*: Report No. 11306-ET. Eastern Africa Department, Washington, D.C. P. 125

Table 4: Primary School Enrollment and Literacy Rates								
Primary School Enrollment					Literacy Rates			
School Age Children (%)								
	Rural (%)		Urban (%)		Rural (%)		Urban (%)	
Country	Male	Female	Male	Female	Male	Female	Male	Female
<i>Gambia</i>	32	20	55	49	60	22	58	40
<i>Guinea</i>	22	10	83	53	--	--	--	--
<i>Guinea-Bissau</i>	30	14	65	52	12	13	40	36
<i>Kenya</i>	73	74	69	74	--	--	--	--
<i>Uganda</i>	--	--	--	--	70	47	89	80
<i>Zambia</i>	58	--	78	--	--	--	--	--

Source: World Bank. 1994. *Poverty Indicators for Selected Countries*. Technical Department, Africa Region, Washington, D.C.

2. Lack of Agricultural Development as a Major Cause of Rural Poverty

The household budget surveys available suggest that the major cause for low incomes in rural areas has been stagnating agricultural production. Agricultural production in Sub-Saharan Africa increased at about 1.6 percent per annum between 1965 and 1980 and at about 1.3 percent annually during the 1980s (Table A1 shows agricultural growth for each country). This compares to population growth averaging 2.8 percent per annum during the same period. Average per capita food production has declined in many countries, per capita calorie consumption has stagnated at very low levels, and roughly 100 million people in Sub-Saharan Africa are food insecure (Table A2). Food imports increased by about 185 percent between 1974 and 1990, food aid by 295 percent. But the food gap (requirements minus production) filled by food imports, or by many people going with less than what they need, is widening. The average African consumes only about 87 percent of the calories needed for a healthy and productive life (Table A2). Projections of food requirements and likely food availability (Table A3) show a growing gap at historical growth rates of production and consumption. But a few African countries are doing much better than the average, with agricultural growth rates in the 3.0 to 4.5 percent per annum range in recent years (Nigeria, Tanzania, Uganda, and Benin - see Table A1). The policies of these countries help show the way forward, and are returned to below. Table A3 shows that similar performances throughout Africa would close this food gap.

Analysis of the causes of this slow average growth was undertaken in 1989 as the basis for World Bank agricultural assistance to Sub-Saharan Africa.⁶ A further analysis when carried out by the World Bank in 1993.⁷ This former analysis is only summarized here. Of greatest significance has been the fact that technology-based agriculture had not come to Africa on a significant scale. Most of the agricultural growth that has occurred has been due to expansion of cultivated area, not yield increases. There are many reasons for this. For one, there has been little investment in irrigation, which was a major input into Asia's Green Revolution. In addition, unlike Asia, there has been little demand by farmers for yield - increasing agriculture technologies.

The reasons for these investment shortfalls are complex. In a few countries there has been, until recently, widespread land abundance combined with labor and capital scarcity. Many of the new technologies offered to African farmers increased output per unit of land by requiring additional labor and capital input (in the form of purchased inputs and equipment). This was the reverse of what was needed from the perspective of the African farmer who had generally little capital and labor, but could open new land. This situation was exacerbated in many African countries by government controls of agricultural prices, overvalued domestic currencies, and heavy taxation of agricultural exports, combined with neglect of rural infrastructure, which reduced the profitability of producing for the market. These deficiencies were compounded by ill-fated government intervention assisted by the donors, in marketing, agriculture processing and input supply. When marketing and input supply systems do not work, and producer prices are artificially low relative to input costs, the risks to farmers who are dependent on these systems increase. Risk-averting farmers will not use these market-dependent methods in this situation. The extensive African farming and livestock systems which use much land, little capital and labor, and which are less dependent on markets, are rational farmer responses to these various natural and government-made constraints.

These fundamental problems suggest the first of several elements of reform. The private sector must be brought into agricultural marketing, processing and input supply, as well as into other commercially-oriented agriculture services. Governments, assisted by donors, have been failures at this activity, and experience elsewhere suggests that the private sector can be more successful.

There are additional reasons for an expanded private sector focus. World agricultural prices have been at historically low levels since the early 1980s. Although there are signs of improvement, it remains likely that increases will not be large. Low world prices have translated into relatively low prices for African farmers, and for agricultural marketing and processing enterprises, even when governments do not further reduce them through price controls. This reflects increasing competition for limited world markets. Since private enterprise is found to be demonstrably more effective at carrying on this competition, the future must include greater emphasis on the private sector.

The second element of a new strategy which follows from the above analysis is a more effective approach to technology creation and transfer. Government agricultural services (research, extension, credit, and livestock services), most often donor-supported, have historically not helped bring relevant agricultural and livestock technology to Africa on a significant enough scale. Analysis has shown an extraordinary deterioration of agricultural research (Table A6) and of government agricultural services generally. Donors have been found to be too competitive with one another, and not sufficiently concerned about coordination of their efforts to be effective in reversing this situation. The technological revolution in agriculture occurring in industrial countries, and in Asia and Latin America, has not been captured by Africa to a significant enough extent.

Neglect of roads connecting town to country, and the prevailing focus of government infrastructure investment in the mega-cities has been found, in many countries, to cut the agricultural sector off from urban and export markets. It also cuts farmers off from the source of improved inputs and equipment, which is in the towns and cities. It is from secondary towns that most services are provided to farming communities, and where the immediate collection markets for agricultural produce are usually found. Many African countries have focused so much of their resources on the large mega-cities that these secondary towns so important to agriculture have been neglected. Similarly, the focus of government health, education, and water investment in the larger cities, neglecting rural areas, resulted in the frequently appalling health and education status of rural populations. Rapidly growing numbers of unhealthy, uneducated rural people are unlikely to be agricultural innovators.

In many African countries, the lack of democratic institutions was reflected in rural areas by government-imposed restrictions on farmers organizations, and lack of farmer empowerment. Cooperatives were either banned, or their management taken over by government. Farmer input into the design and management of agricultural services was nearly universally absent, including in donor projects.

Analysis showed that the natural resource base in many African countries was deteriorating by the early 1980s. The incidence of soil erosion and degradation is higher than in other areas of the world, and there is evidence of water pollution, siltation of irrigated areas, pasture degradation, and disappearance of wildlands. Forests are being cut faster than they are being re-implanted. (Tables A4 and A5).

The cause of soil degradation in Africa appears to be the combination of maintenance of traditional farming practices, with rapidly increasing farming populations. Shifting cultivation and transhumant pastoralism have been appropriate under conditions of slow population growth, abundant land, limited capital and limited technical know-how. The ecological and economic systems were in equilibrium. The key to maintaining this equilibrium was mobility. People shifted to a different location when soil fertility declined or forage was depleted. This allowed the fertility of the land to be reconstituted through natural vegetative growth and decay. For field cropping, this typically

involved farming a piece of land for two to four years, then leaving it fallow for as long as fifteen to twenty-five years. Herders' mobility generally involved a far greater geographic range, but a far shorter temporal cycle, dictated by the seasonal availability of water and forage.

As long as land was abundant, more land could be gradually brought into the farming cycle to accommodate the slowly growing populations. Where population density increased slowly, the traditional extensive agricultural production systems gradually evolved into more intensive, and eventually permanent, systems which included soil conservation, fertility management, various forms of agro-forestry and the integration of livestock into farming systems. This has happened, for instance, in the Eastern African highlands, in Rwanda, and in the more densely settled areas of northern Nigeria. But in most of Sub-Saharan Africa, the scope for further expansion of crop land has drastically narrowed in recent years. Large areas of forests, wetlands, river valley bottoms and grassland savanna have already been converted to farmland. This can be seen particularly in most of West Africa and in the traditional grazing areas of Eastern and Southern Africa. On average, per capita arable land actually cultivated declined from 0.5 ha per person in 1965 to slightly less than 0.3 ha/person in 1990 (it was 0.3 ha/person in India in 1965). In many areas, rural people are increasingly compelled to remain on the same parcel of land, yet they continue to use their traditional production techniques. Soil fertility and structure deteriorate rapidly where fallow periods are too short and traditional cultivation methods continue to be used. As a result, crop yields decline and soils erode. In most areas, population growth has been so rapid that the reduction of arable land per farmer and the associated soil degradation have greatly outpaced the countervailing innovation and adjustment by farmers. When farming is no longer viable, people migrate to establish new farms on land previously not used for farming in semi-arid areas and in tropical forests where soil and climatic conditions are poorly suited to annual cropping.

In some countries, land continues to be more abundant in relation to current population. But in some of these land-abundant countries, much of this land is under tropical forests which need to be preserved. In most of Africa, rapid population growth is pushing settlers to extend farming and grazing into areas that are agro-ecologically unsuited to these forms of land use.⁸

One of the conditions which stimulated Asian farmers to adopt "Green Revolution" technology -- the abundance of labor relative to cultivable land -- is increasingly emerging in parts of SSA.⁹ But institutions and individuals have not been able to adapt quickly enough in the face of very rapid population growth. The reasons are rooted in the constraints discussed here. Slow technological innovation because of ineffective agricultural research and extension systems is part of the reason. The poor transport infrastructure throughout most of SSA severely blunts farmers' incentives to switch from subsistence to market production and from extensive to intensive farming. Inappropriate agricultural marketing and pricing as well as fiscal and exchange rate policies have reduced the profitability of market-oriented agriculture, prevented significant gains in agricultural productivity and contributed to the persistence of rural poverty. Poorly conceived and implemented agricultural projects have not helped. The lack of agricultural intensification in most of Africa has meant that expanding rural populations must depend on increasing cropped area, to the detriment, in many cases, of natural resource sustainability.

The widespread prevalence of gender-specific roles and responsibilities in rural production systems may be a major factor contributing to agricultural stagnation and environmental

degradation.¹⁰ In many areas, women have primary or sole responsibility for food crop production, and they usually manage separate fields for this purpose. Given women's triple roles -- child bearing/rearing, family and household maintenance, and production/income-earning activities-- the pressures on their time continue to intensify. With increasing deforestation, combined with growing populations requiring more fuelwood, fuelwood has become scarcer. Women must walk further to fetch it. Increasing populations put greater pressure on available water resources, while environmental degradation reduces the availability and accessibility of water. Women must walk further to fetch water. Time constraints, and inhibited access by women to agricultural credit, land, and extension, give women little choice but to continue practicing traditional low-input, low-productivity farming which, with sharply shortened fallow periods, is neither environmentally sustainable nor viable in terms of longer-term agricultural productivity.

Customary land tenure systems were found historically to provide considerable security of tenure on land brought into the farming through customary rules of community land ownership and allocation of use rights to members of the community.¹¹ However, with the breakdown of traditional institutions and the strengthening of the modern state, these traditional arrangements are increasingly unsatisfactory. Much common property land -- forests, wetlands and range lands -- has become de facto open-access land due to the weakness of customary land allocation mechanisms in the face of new challenges. Much has been converted to farming, often with significant negative environmental consequences. In many areas where traditional land rights systems provided for overlapping and complementary uses by sedentary farmers and transhumant herders, the development of valley bottoms into permanent crop land has created major constraints on the mobility of herders, with negative implications for environmental integrity. Increasing population pressure and agro-environmental problems are inducing considerable rural-rural migration. Since migrants often come with conflicting traditions of land allocation and land use, strangers' tenurial rights and their implications for land resource conservation are of increasing concern.

Many governments have responded by nationalizing the ownership of land-- and then allowing customary rules to guide the use of some land, while allocating other land to private investors and public projects. Often, the well connected have used their influence to wrest land from its customary owner-occupants. The result has been reduced, rather than improved, tenurial security. In most cases, this has accelerated the breakdown in customary land management and the creation of open access conditions, especially in forest and range areas. In open access conditions, settlement and exploitation by anyone are permitted and environmental degradation is invariably rapid. Where governments allocated individual land titles--as in Kenya, Zimbabwe, and Cote d'Ivoire -- this generally ignored the prior existence of customary tenure arrangements, and more often than not, the actual results have differed considerably from the stated intent. Local community and individual land resource management have been discouraged, while political and economic elites have succeeded in alienating the land from its traditional owners and users.

3. A Program to Accelerate Agricultural Growth

World Bank analysis in 1989 suggested that a minimum agricultural growth rate in the average African country, needed to address poverty, is 4 percent per annum.¹² At projected population growth rates, this amounts to a per capita growth of about 1 percent per annum. The reason for this focus on agriculture was that in most African countries, agriculture and agro-industry had greater comparative advantage than any other sector. A large proportion of Gross Domestic Products (GDP) comes from the agricultural sector (35 percent on average), and an even larger percentage of employment (70 percent on average). No other sector of most African economies was large enough to serve as an engine of economic growth in the next decade. There are exceptions, for example, in the oil-producing economies of Nigeria, Congo, and Gabon. Those African countries having significant manufacturing such as Kenya and Zimbabwe, can make gains from industry, though most manufacturing is agro-industry, dependent on agriculture. The complementary goals of poverty alleviation, environmental protection, and reducing constraints on women all required rapid agricultural growth. This is because most of the poor live in rural areas and are dependent on agriculture. Farmers are the primary managers of soils, water and pastures and therefore will need to manage problems arising from the deterioration of natural resources. Most working women are in agriculture. The strategy proposed by the World Bank to achieve those goals included the following elements:¹³

- A policy environment which makes intensive agriculture profitable to farmers and increases the role of the private sector and of rural associations in agriculture services;
- New technologies and higher valued crops;
- More intensive use of chemical and organic inputs;
- Integration of livestock to use animal power and manure;
- Better techniques of irrigation, hand tools, and crop storage;
- Better rural infrastructure, especially roads, to improve markets and strengthen rural-urban links;
- Greater security of land tenure to encourage investment and better land management;
- Improved financial services to help farmers save, borrow and invest;
- Better education and health for farmers;
- Better natural resource management and environmental protection;
- Greater participation of farmers in services, especially of women farmers.

Only part of these strategic directions was seen to be achievable through economic policy reform. But policy reform was seen to be a prerequisite including the removal of subsidies on agricultural inputs and on consumer food prices, the elimination of over-valuation of currencies, elimination of agricultural trade and processing monopolies, deregulation of agricultural prices (or at least increases to world levels), and reduced agricultural taxation. Replacement of subsidized agricultural credit with measures to establish sustainable financial institutions was also foreseen. These regulatory systems were to be replaced by government provision of market and price information, promotion of private and cooperative activity, building market infrastructure, ensuring the proper use of weights and measures, control of the quality of exports, establishment of a legal framework for deepening competitive marketing, and reduction of barriers to trade within Africa.

The other measures listed here are pursued outside of adjustment programs, through investment projects. Most important has been the reform of agricultural research institutes; coordination of public research and extension systems with agricultural faculties in universities; setting up networks for exchanging technical information within Africa; tightening management of agricultural extension and strengthening its linkages with agricultural research; improving training of

extension agents, and getting better feedback from farmers. The World Bank and other donors financed national public agricultural extension systems, and agricultural training. New crop varieties have been tested on farms, and appropriate policies recommended to ensure a supply of spare parts for agricultural machinery.

For rural roads, the strategy proposed that governments should set up distinct institutional and funding arrangements, decentralize institutions, use local contractors and technicians, and employ labor-intensive techniques for construction and maintenance. In setting priorities for infrastructure investment, biases against rural and secondary town development were to be corrected.

To deal with land and soil management, the Bank has emphasized that soil conservation should be made financially attractive to farmers, and that more tree species producing fruit, nuts, and fodder should be planted to both diversify food production and institute soil conservation. For fuelwood, there should be systematic management of forest cover, investment in communal woodlots, and plantations of fuelwood species. There is a need to preserve and manage wildlife commercially, involving local communities. Action has been advocated to codify traditional land tenure systems, provide collective land ownership titles to groups, set up judicial processes for dealing with disputes, and improve administrative capacity in land titling matters. Actions have been recommended to prevent erosion of women's rights in land and trees, and to increasingly formalize them. In addition to promoting women's groups, the Bank has advocated increased farmer participation in designing and implementing investment initiatives in rural areas, and a greater role for rural people and their associations in the rural development process.

4. Has the Strategy Been Implemented ?

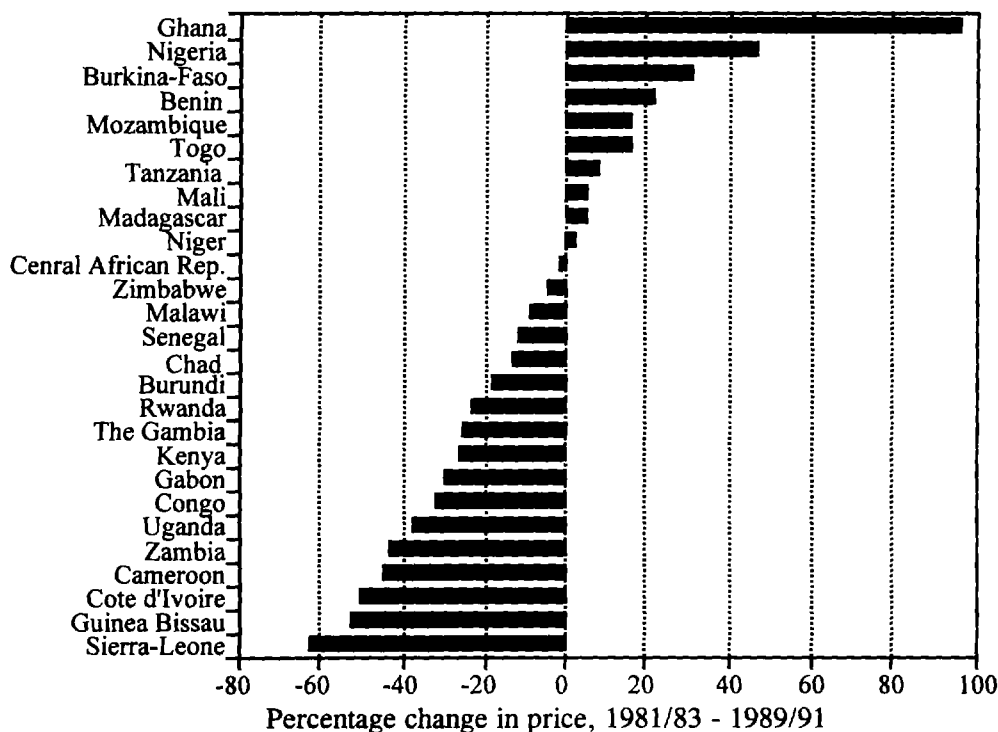
Policy Reform

Analysis of the achievements and deficiencies of agricultural policy reform was recently published in a review of structural adjustment in twenty-nine countries of Sub-Saharan Africa. Most policy reforms took place in the period from 1986/87 onwards, when the volume of adjustment operations reached its peak.¹⁴

In the face of declining international prices for exports, ten countries improved policies by increasing or allowing increases in real producer prices for exports enough to more than offset the international decline.* Policy improvements in a further nine countries raised real producer prices for exports, but not enough to overcome the international decline.** In eight countries, deterioration in policies reinforced the price declines experienced in world markets.*** These results are illustrated in Figure 1. The ten countries which managed to increase real export prices for farmers achieved this by a combination of lowering export taxes, raising administered producer prices, reducing marketing costs (usually by deregulation and demonopolization of export marketing), and depreciating the exchange rate of the domestic currency.

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- * Benin, Burkina Faso, Ghana, Madagascar, Mali, Mozambique, Niger, Nigeria, Tanzania, and Togo.
 - ** Burundi, Central African Republic, Congo, Gabon, Kenya, Malawi, Sierra Leone, Uganda and Zimbabwe.
 - *** Cameroon, Chad, Côte d'Ivoire, The Gambia, Guinea Bissau, Rwanda, Senegal, and Zambia.
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Figure 1: Changes in RPP between 1981-83 and 1989-91



Note: RPP = Real producer price of agriculture exports.

Source: World Bank estimates. World Bank. 1993. *Adjustment in Africa: Reform, Results, and the Road Ahead*. Policy Research Department. Washington, D.C.

In eighteen of the twenty-nine countries reviewed, the marketing of at least one major export crop was "loosened" in some way. This was done by eliminating a monopoly marketing board -- (Cameroon, Madagascar, Niger, Nigeria, and Tanzania); or linking producer prices to world prices (Malawi tobacco, and most of the cotton companies of West Africa are good examples); or allowing private traders to compete, either in exporting or in domestic purchase of the commodities.¹⁵ Unfortunately, the number of countries in which reforms were not undertaken, or where they have not been implemented fully is large, and on balance, there is still far to go in export market reform.

In seventeen of the twenty-nine countries reviewed, the marketing of a major food crop was "loosened" in some way. Food crop liberalization appears to have proceeded more quickly than that for export crops, perhaps because of the tremendous fiscal burden of failed food marketing boards. The typical steps taken in liberalizing food crop marketing include (not necessarily in sequence) raising (fixed) prices towards export or import parity, making price announcements more timely in relation to the crop planting season, speeding payments to farmers after marketing, freeing prices from official controls, relaxing restrictions on private traders such as those embodied in movement controls, restructuring parastatal marketing agencies to improve their management and/or finances (this has typically involved writing off massive accumulated debts, in some cases as high as 5 percent of the country's GDP), allowing private traders to compete with an official marketing agency, and elimination of an official agency (very few countries have taken liberalization as far as this last step).

An example of food crop market liberalization is Tanzania, which began in 1984 to lift movement restriction on grain. Beginning in 1987, private traders were permitted to purchase grain from cooperatives in competition with the National Milling Corporation, although marketing outlets for farmers were still confined to the primary cooperative societies. In the following year, the grain trade was fully liberalized. In 1990, the remaining restrictions on private grain purchase at the farm level were removed. The National Milling Corporation effectively ceased to function by the 1990/91 season, when its access to crop finance effectively ended. However, the continued use of the Strategic Grain Reserve as a mechanism for price support raised fears that it might evolve into another maize board. Private traders still face many informal administrative barriers and regulations. In many areas, local charges and levies are unevenly applied, and regional authorities continue to impose restrictions on private traders that raise the effective cost of marketing. In addition, the extremely poor condition of roads results in high transport costs. Private traders do not even visit in areas where costs of primary marketing are from nine to forty times those of secondary marketing. Besides being hampered by legal restrictions, private traders have been unable to obtain credit, which is still confined to cooperative societies for grain purchases. In spite of these obstacles, private traders have succeeded in providing a market for farmers in accessible localities, improving food supplies, and stabilizing food prices in urban areas. The increase in competition that has occurred to date, even though still restricted, has already reduced profit margins in private trading.¹⁶

Technology Development

Technology development is undertaken through agricultural research and extension by both the public and private sectors. The 1989 World Bank study *From Crisis to Sustainable Development in Sub-Saharan Africa*, called for substantial reform of public sector agricultural research and extension systems, and efforts by governments to develop partnership with the private sector in technology development.

A recent review of the status of agricultural research systems in Africa undertaken by the staff of the Special Programme for African Agricultural Research (SPAAR) shows the continued poor state of African agricultural research (Table A6). SPAAR has completed frameworks for action to reform agricultural research for the Southern Africa Development Community (SADC) and Sahel Regions. Two remaining frameworks for action in Eastern Africa, and in the humid and sub-humid zones of Western and Central Africa -- are expected to be finished by the end of 1994. The frameworks are being used to improve the management of research in Tanzania and Mali. Progress has begun in Burkina Faso, Côte d'Ivoire, Ethiopia, Ghana, Kenya, Malawi, Niger, Senegal, Uganda, Zambia, and Zimbabwe.

Progress in reforming agricultural extension is more advanced. Several countries have moved to consolidate the numerous agricultural extension projects created by donors into a more efficient and lower-cost national agricultural extension system. Recent evaluations of the Kenya and Burkina Faso extension systems show extremely high economic rates of return.¹⁷ Similar progress has been made in Benin, Côte d'Ivoire, Ghana, Guinea, Malawi, Mali, Niger, Nigeria, Tanzania, Togo, Uganda, and Zambia. These systems are quickly spreading improved agricultural technology which has been available for some time but not adopted by farmers due in part to poor extension, but also to the lack of incentives for farmers to use the technologies in a poor policy environment, and due to input supply constraints. With policy reform increasing the profitability of farming, extension works much better. In addition, some of these extension systems have made special efforts to recruit women extension agents, and to develop messages designed to assist women. Kenya and Nigeria have been particularly good in assisting women farmers.

Table A7 shows fertilizer consumption per hectare of arable land in each African country in 1970/71, 1986, and 1991. These data on uptake of one of the most important modern inputs into farming give some indication of the impact of extension and the adoption of improved technology. For Sub-Saharan Africa as a whole, average application rates increased at only 0.9 percent per annum. In a number of countries, fertilizer use fell during the 1986-1991 period, while in others it grew modestly. Between 1986 and 1991, for comparison, India's fertilizer application rates increased by 5.4 percent per annum, and China's 9.8 per annum. The countries which applied fertilizer at rates at least half of the Sub-Saharan Africa average, and for which fertilizer application rates rose at more than 3 percent per annum are shown in Table 5.

Togo	17
Tanzania	13
Mauritania	13
Ghana	12
Malawi	9
Chad	7
Nigeria	6
Senegal	5
Ethiopia	4

Note: Excludes those experiencing a large decline from 1970 to 1986.

Source: Table A7.

In some of the countries mentioned in the table, most of the growth in fertilizer use took place in the last two years of the period, and choosing different end points for the series may have given different growth rates in some cases. While there were encouraging signs of growth in consumption in some countries over the period, Sub-Saharan Africa accounted for only about 0.8 percent of total world consumption in 1986, and about 1 percent in 1991. It thus remains a very insubstantial player in the fertilizer market, which in part accounts for the high costs of fertilizer procurement for many African countries. Leaving aside South Africa, Sub-Saharan Africa is also a negligible *producer* of fertilizer, accounting for less than 0.4 percent of world output. Nigeria and Zimbabwe, between them, accounted for more than 80 percent of that production in 1991.

A controversial aspect of technology policy involves fertilizer subsidies. In sixteen of the twenty-nine countries reviewed in the adjustment study referred to previously, fertilizer subsidies had been reduced or eliminated, and virtually total decontrol of fertilizer marketing achieved. The removal of subsidies has not been associated with reduced fertilizer use. In fact, some of the countries removing subsidies had the most rapid increase in fertilizer use in the 1985-1991 period (including Ghana, Guinea, Malawi, and Tanzania). Several countries removing subsidies experienced slow growth or reduction in the use of fertilizer; among them Cameroon, Mali, Mozambique, and Sierra Leone. But fertilizer subsidy appears to have little to do with these trends, which are associated more importantly with declining profitability of agriculture (especially of export crops) due to price declines, exchange rate overvaluation, or supply disruption. The desirability of reducing fertilizer subsidies is related to the fact that these are captured mainly by the largest farmers who need them least, and have a negative impact on overstretched government budgets. Allowing private competition in distribution addresses the problem of poorly managed government distribution of fertilizer. Costs of fertilizer might best be reduced in the medium term by allowing private distribution, and focusing public resources on infrastructure (to reduce the cost of supply). Better agricultural extension would increase demand and improve the efficiency of application.

Another aspect of technology development involves investment in efficient irrigation systems. The 1989 study recommended small-scale, cheap, farmer-managed systems. There has been some investment of this sort, especially in Nigeria, Mauritania, and Niger. It has proven very productive. The Sudan has more than twice as much agricultural area under irrigation as any other country in Sub-Saharan Africa, and more than two-thirds of irrigated areas across the continent is in three countries: Sudan, Madagascar and Nigeria (Table A8). The rather unreliable data on irrigated area suggest that between 1986 and 1991, irrigated areas may have increased at about 0.6 percent per annum in Nigeria, 1.5 percent per annum in Madagascar, and 0.5 percent per annum in Sudan.¹⁸ This says nothing however, about a more important variable: the *quality* of irrigation, and gains made in production per unit area. In the medium term, especially in Madagascar, a focus on productivity of existing schemes is likely to have the greatest payoff.

Nigeria is an interesting case. Its irrigation potential is between 1.6 and 1.9 million hectares, compared to 174,000 hectares presently under intensive irrigation.¹⁹ Not all of this technical potential can be developed economically. It has been estimated that irrigated cropping can produce four to five times per hectare the value of rainfed cropping. A major need in tapping this potential is to keep investment costs low: they cannot exceed about \$4000/ha if irrigation is to be financially viable. Of enormous interest in this regard is small-scale lift irrigation from rivers and shallow wells, undertaken by individual farmers themselves. About 84,000 hectares are already irrigated this way in Nigeria, using pumps. In addition, about 17,000 hectares have been irrigated by farmers using small motorized pumpsets to exploit shallow aquifers in the flood plains (*fadamas*). In such systems, investment costs are about \$1,200/ha, and annual operating costs \$260/ha. The economic rate of

return on such investments is estimated to be about 30 percent. In contrast, public irrigation schemes have capital costs as high as \$15,000/ha. It is estimated that no public sector irrigation investment in Nigeria has been economic. In particular, investments in large storage dams and downstream systems have been uneconomic.²⁰

Rural Infrastructure

Public expenditure reviews by the World Bank have shown very little shift in emphasis by governments from urban infrastructure to rural infrastructure, and the latter continues to be neglected in government budgets. Rural infrastructure, including roads, water supply, electricity, telecommunications and the marketing infrastructure of secondary towns, is very important for the development of agriculture, for fostering reliable markets and agro-processing, and especially for realizing the full potential of the growth linkages of agriculture to the entire rural sector. The World Bank has begun a major Sub-Saharan Africa rural infrastructure initiative which would allocate responsibility for management of construction and maintenance to local government bodies, and use private contractors to undertake most works. There has not yet been much investment as a result, and linking rural infrastructure investments with agricultural growth remains one of the weaker pillars of the agricultural development strategy. Nevertheless, there are several countries which devote more resources to rural infrastructure: Botswana, Côte d'Ivoire, Kenya, Nigeria, Zimbabwe, and more recently, Tanzania.²¹

Land Conservation and Forestry

The 1989 study focused on the identification of agricultural technologies which conserve natural resources, such as contour farming, use of bunds to stop water and soil run-off, agro-forestry, multi-cropping, and no-tillage farming -- technologies which were to be introduced by extension services. The better extension services have begun to introduce these technologies, with some success (Kenya and Burkina Faso are ahead in this work). However, there continue to be claims of serious soil erosion in Sub-Saharan Africa.

Several large investment programs have begun to promote better management of forests in the public domain, notably in the Central African Republic, Congo, Côte d'Ivoire, Gabon, Ghana, Guinea, Kenya, Tanzania, and Zimbabwe. But the rate of forest felling has generally continued unabated, with the Food and Agricultural Organization of the United Nations (FAO) estimating an increase in the rate from 3.7 million hectares per annum in the 1980s (Table A4). Removal of forests has been accompanied, in some cases, by disappearance of wildlife species for which the forest provided habitat, and reduction of subsistence options for forest dwellers.

Rural Associations

The aim of improving rural associations was to provide better support to farmers, and as a vehicle for harnessing their energies to define and implement their own rural development. Rural associations have existed for a long time to market farm inputs and crops, provide credit to members (savings societies), jointly produce food crops (women's groups), manage pastures, or process agricultural commodities. Mobilizing greater farmer participation in rural development would inevitably be facilitated by more assistance to these associations.

Donors have become more inclined to support farmers' groups. Farmer-managed savings and loan cooperatives in Benin, Burundi, Cameroon, Côte d'Ivoire, and Rwanda, have been supported by donors and government, and have shown considerable success.²² Cooperative marketing enterprises in Kenya (coffee) have shown success in the past, but the rest of Africa ignored this model. Now there is a resurgence of interest in cooperatives in Cameroon, Tanzania, and Uganda, but not elsewhere. Informal farmer organizations such as women's groups are no longer restricted anywhere. Pastoral associations and irrigation water associations are becoming stronger in the Sahel.

Despite the open and more liberal environment for farmers' associations, and the willingness of donors to support such groups, the volume of credit, farm inputs, and crops handled by formal and informal farmers' groups remains extremely small. It is likely to expand only slowly, as farmers become better educated and communications improve. The private sector is likely to develop these services more rapidly than are farmers' groups.

Land Tenure

There has been some additional study of this issue since 1989,²³ particularly in the Côte d'Ivoire, Ethiopia, Kenya, Malawi, Nigeria, Rwanda, South Africa, and Tanzania. The findings vary, but in most cases support the view described in previous paragraphs that traditional land tenure relationships are breaking down under the force of government legislation or action (expropriation of land for parastatal farms or for plantations including forestry plantations). This breakdown is accelerated by land titling, the disappearance of customary mechanisms of dispute resolution, immigration of peoples from other ethnic groups, pastoral-farmer conflicts, and civil war. In other cases, traditional land tenure systems have proven to be more robust, evolving toward individual "ownership" and rights of inheritance. The latter is most likely to occur where governments protect customary tenure through legislation.

Very few actions have been taken on the ground in Africa since 1989 to improve land tenure security. A project in Côte d'Ivoire would strengthen the legal protection of customary tenure, and the government is experimenting with farmer participation in land allocation decisions in forests. A large-scale land management project in Burkina Faso is experimenting with village - based tenure systems. Similar programs are being designed in Mali and Niger. Zimbabwe and Kenya have strong titling mechanisms, but with mixed results as the elite have benefited most. Land issues will be important in South Africa, with a legacy of forced removals from land in the past to be redressed. Land tenure and titling issues are likely to become more vexing in the future, as shifting cultivation gives way to settled agriculture, and population pressures on land increase.

Regional Integration

Very little progress has been made in reducing formal constraints to agricultural trade between African countries, or in regional cooperation in agricultural research. Trade barriers and investment barriers continue to be the norm. However, there has been a change in recognition of the problem. The West African Ministers of Agriculture, representing seventeen countries in West Africa, have established an informal organization whose objective is to reduce agricultural trade and investment barriers, and to improve sharing of technological development in agriculture. The SADC area has a similar agricultural committee. If these groupings can move to action, based on their own analysis, considerable gains could be made. The Global Coalition for Africa is also developing an agricultural advisory committee for Africa, intended to facilitate greater cooperation and exchange in policy, research and trade questions.

Food Security

Table A3 projects food supply and demand in Sub-Saharan Africa to the year 2020. The projections foresee a large food gap (though much smaller than that projected in 1989) with a simple extrapolation of present trends of population, production, and consumption per capita. The gaps foreseen by the year 2010 are larger than could conceivably be filled by food aid. The solution continues to be to increase food supply (the target is doubling the growth rate of food production to 4 percent per annum) and reduce population growth. The option of reducing consumption per capita is not acceptable, given the already low average food consumption. In fact, the most recent estimate of the proportion of Africa's population with inadequate access to food has increased to 33 percent from the 20 percent suggested in the 1989 study. Most of this increase results from a particularly bad agricultural year for Eastern and Southern Africa in 1992. The food situation in Liberia, Somalia, and Sudan has also worsened. The overall estimates will vary greatly from year to year.

There have been some successful food security interventions of a short-term nature. The drought relief efforts in 1992 of Kenya, Malawi, Zambia, and Zimbabwe, worked well. Food aid has been re-established in Somalia. Food security projects were begun between 1991 and 1994 in six countries: Benin, Burkina Faso, Cameroon, Madagascar, Mozambique, and Rwanda. In addition, food security strategies have been established and are being partially implemented in Kenya and Sudan. Many donors provide food to the needy, food for work, and some dietary supplements. Increased food supply and better marketing in countries successfully undertaking marketing and policy reform are likely to increase access to food in the medium term, as well as help reduce its costs in real terms. Between 1986 and 1990, food production grew at 3 percent per annum or faster in Benin, Botswana, Côte d'Ivoire, Kenya, Mali, Niger, Nigeria, Togo, and Uganda (FAO data). Most of these countries also achieved positive growth rates of food production per capita. On balance therefore, there are some countries where food security is improving, largely due to economic reforms and the greater availability of food; some which remain in crisis (largely where there is civil strife and/or drought); and many others where the situation is not in crisis, but is bad and unchanged.

5. Measures of the Impact of Policy and Investment on Agriculture

There are numerous problems involved in measuring the impact of the reforms discussed here. First, data are available only through 1991 for most variables. Second, there is a question of causality. Agricultural production moves from year to year as a function of factors including weather, international prices, and government investment in activities not related to the strategic interventions. Civil strife is an important factor disrupting agricultural production. Third, some of the actions proposed have most impact only in the long run. These include agricultural research, water and land management, drought contingency planning and forest policy reform.

The measures which could have immediate impact include agricultural price and marketing reform, exchange rate change, trade policy reform, transport policy and infrastructure development, better farm input supply and agricultural extension. The major impact of these changes will be to increase the real price to the farmer, by increasing real output prices, reducing input costs, or increasing the productivity of labor or land use. Economic literature suggests that this incentive effect should serve to increase agricultural value added.

There is some empirical evidence in Africa regarding short- and medium-run agricultural supply response to improved policy. A study by William Jaeger of agricultural supply over time for a sample of African countries found elasticities of supply ranging from -0.10 to -0.25 for real effective exchange rate changes (showing a negative response to appreciation of the real exchange rate, positive to depreciation), and from 0.1 to 0.5 for aggregate agricultural prices.²⁴ This latter finding suggests that a 10 percent real increase of aggregate agricultural prices stimulates a 1 to 5 percent increase in agricultural value added.²⁵ There have been several recent studies of agricultural supply response which obtain similar results.

All of the ten countries listed earlier which succeeded in increasing real producer prices for agricultural exports, also increased agricultural output during the period 1980-1992; six of the ten at more than 2.5 percent per annum. For other Sub-Saharan African countries which were unable to permit a real agricultural price increase, there was no boost to agricultural production from this source. There was a subset of eight countries, however, which undertook reforms to partially offset the negative effects of declines in international prices. The agricultural sectors of these countries are likely to have grown faster with the reforms than they would have without, since real producer prices would have declined even further without reform.

Once prices are set right and agricultural taxation reduced to reasonable levels, significant increases in agricultural output can be obtained only from changes in the level of "supply shifters." The analysis undertaken here suggests that the most important of these in the case of Africa are technology, increased use of land, labor and equipment, infrastructure, and knowledge transfer to farmers. The impacts of rainfall changes are large, and complicate attribution of growth to other factors. Evidence of the impact of these other factors is scant. The elasticity estimates for individual factors vary within a relatively wide range: 0.30 to 0.75 for labor, 0.0 to 0.8 for land, 0.1 to 0.2 for equipment, 0.2 for rainfall, and 0.1 to 0.3 for fertilizer (Table A9).

When the historical growth rates of land use (2.5 percent per annum), labor (2.5 percent per annum), capital stock (4 percent per annum), fertilizer (0.9 percent per annum), and rainfall (-1 percent per annum) are applied to mid-points of the above elasticity estimates, the projected historical growth rate of agriculture is about 2 percent per annum in real terms. This is very close to the actual historical growth rate of agricultural output in Africa. To achieve a long-run growth rate of

agricultural output at 4 percent per annum requires more efficient use of labor, land and capital, and fertilizer (resulting in increased elasticities), as well as greatly expanded increases in the growth of capital stock in agriculture and of fertilizer use.

It is likely that land and labor expansion will slow down in the future, and become less of a source of agricultural growth than in the past. A plausible scenario of success is shown below.²⁶

<i>Input</i>	<i>Input Growth Rate (% per Annum)</i>	<i>Elasticity</i>	<i>Projected Output Growth Due to Input Growth (% per Annum)</i>
<i>Land and Labor</i>	<i>1.8</i>	<i>1.0</i>	<i>1.8</i>
<i>Fertilizer</i>	<i>10.0</i>	<i>0.1</i>	<i>1.0</i>
<i>Capital stock</i>	<i>6.0</i>	<i>0.2</i>	<i>1.2</i>
<i>Rainfall</i>	<i>0.0</i>	<i>0.1</i>	<i>0.0</i>
<i>Sum of Factors</i>			<i>4.0</i>

Source: Kevin M. Cleaver. 1993. *A Strategy to Develop Agriculture in Sub-Saharan Africa and a Focus for the World Bank*, Technical Paper no. 203, World Bank, Washington D.C.

In this scenario, technological change is embodied in the elasticities of output with respect to labor, capital and fertilizer use. There is some indication that agricultural extension in particular is increasing the efficiency of factor use in the several countries cited above. Empirical evidence is available from the studies of the impact of extension in Burkina Faso and in Kenya, demonstrating very substantial productivity and hence production gains in those two countries.²⁷ But there is no empirical evidence of recent expansion of investment and input use of the magnitude required. As shown in Table A7, some fifteen countries had growth rates above 3 percent per annum in fertilizer consumption per hectare, while at least eleven had negative growth rates for fertilizer use.

Another way of looking at recent changes in agricultural performance is to divide African countries into groups according to performance on the various strategic objectives, and then comparing agricultural growth rates of the groups. Major indicators used include the following: quality of agricultural policy, technology development as measured by fertilizer use, quality of extension, and quality of rural infrastructure.²⁸ The assessment of each of these factors by country is given in Table A10.

Table 7: Countries Doing Well in Agricultural Policy, and One or More of Fertilizer Distribution, Extension, or Rural Infrastructure²⁹		
Country	Agricultural Growth Rates	
	1981-87 (% per annum)	1988-92 (% per annum)
Benin	6.1	4.9
Botswana	-4.6	2.2
Burkina Faso	2.6	0.8
Ghana	0.8	1.6
Guinea	N/A.	3.3
Kenya	2.5	1.6
Malawi	3.0	-1.8
Mali	0.0	2.6
Mauritius	3.4	9.0
Niger	2.2	N/A.
Nigeria	3.8	4.2
Rwanda	-0.6	1.8
Tanzania	4.3	5.0
Togo	6.8	2.0
Uganda	0.2	3.3
Weighted Average	2.61	3.20

Source: Tables A1 and A10.

Table 8: Countries Doing Well on Either Policy Alone, or Two Indicators		
Country	Agricultural Growth Rates	
	1981-87 (% per annum)	1988-92 (% per annum)
Barundi	3.1	2.5
CAR	3.4	-0.6
Congo	2.3	-0.4
Côte d'Ivoire	-5.7	2.3
Gabon	1.7	-1.2
Madagascar	2.6	2.0
Mozambique	-0.4	0.6
Zimbabwe	1.9	-2.1
Weighted Average	-1.74	0.91

Source: Tables A1 and A10.

Table 9: Countries Doing Well on at most One Indicator other than Policy		
Country	Agricultural Growth Rates	
	1981-87 (% per annum)	1988-92 (% per annum)
Cameroon	0.5	-5.8
Chad	2.2	5.6
Ethiopia	-2.2	1.0
Guinea-Bissau	4.2	-2.1
Mauritania	0.9	0.1
Senegal	2.8	-0.2
Sierra Leone	2.7	-2.9
Sudan	1.3	-0.5
Zambia	8.0	-10.4
Weighted Average	0.91	-1.89

Source: Tables A1 and A10.

The results indicate that countries which are undertaking agricultural and macroeconomic policy reform, facilitating expanded farm input supply (especially fertilizer), instituting effective extension services, and investing relatively more in rural infrastructure have had better agricultural growth on average, though still below the target of 4 percent. The fewer the number of these four critical recommendations adopted, the poorer, on average has been agricultural growth in the 1980 - 1992 period.

Noticeable however is the great variation in agricultural growth rates between countries. Chad has not introduced any of the recommended policies and investments yet has had a rapidly growing agricultural sector in the 1988-1992 period. This appears to have resulted from improved rainfall and recovery from its long war. Civil strife has a very negative impact on agriculture as indicated in the cases of Sierra Leone and Sudan. Countries such as Liberia, Somalia, Zaire and Angola are probably doing poorly as well, but data are not available.

6. Does Agricultural Growth Benefit the Rural Poor?³⁰

Analysis of rural poverty often stops with the obvious association between agricultural growth and rural poverty alleviation. However, household budget surveys now permit a more detailed look at the poorest part of the rural population in the African countries surveyed. Not all rural people, nor all farmers, are poor. In most of Africa, the most common situation of extreme rural poverty is found on a small agricultural holding. Among the poorest smallholdings are those headed by a woman responsible for farming the family plot. The husband has migrated to the city, died, or left. The family grows subsistence crops (millet, sorghum, cassava, beans and pulses), and may have some small stock (chickens and goats). The children work, often walking hours daily to obtain water and fuelwood. Without male labor, and with a large number of dependents, these farms suffer from labor shortages at peak periods. Women also have more difficulty obtaining access to credit and extension services. They also tend to be more poorly educated.

<i>Benin</i>	20
<i>Guinea</i>	40
<i>Guinea-Bissau</i>	7
<i>Kenya</i>	30
<i>Namibia</i>	40
<i>Uganda</i>	26
<i>Zambia</i>	23

Source: World Bank. 1994. *Report on the Status of Poverty in Africa, the Many Faces of Poverty in Africa*. Technical Department, Africa Region, Washington, D.C.

A second category of rural poor consists of older and more infirm farmers. The cause of their poverty is their less efficient labor both for farming and for marketing. Older farmers are also often less well educated, or uneducated. Educational levels among farmers has been found to be associated with the level of crop yields.

Thirdly, in a few countries, there are large populations of refugees in rural areas, sometimes from neighboring countries engulfed in civil war. A fourth category of the rural poor consist of both male-and female- headed households found in remote areas who live far from roads and markets. As a result, inputs are more expensive to obtain and transport costs to market are greater, reducing income from cash cropping. Extension and other services are likely to be less available. In both liberalized crop marketing systems, and those monopolized by government marketing agencies, remote farmers are less likely be served. But in liberalized marketing systems, purchase prices are likely to be lower.

A fifth category of the rural poor is found in areas with poor soils or poor rainfall. When rainfall is chronically low, or is highly variable, farmers are susceptible to drought, and other forms of seasonal stress. The Poverty Assessment undertaken by the World Bank in Zambia analyzed this situation.³¹ It confirmed the vulnerability of Zambia's rural poor to drought, which was made very

apparent in 1992. Zambia's rural poor were least likely to benefit from safety nets established to help the poor in the 1992 drought. Instead, the rural poor coped with drought by selling assets (such as livestock), consuming "famine" food foraged from the bush, making increased use of common property (fishing, charcoal), begging (often from relatives), and changing to more drought-resistant crops. Some did obtain food aid. A related finding is that the worsening environmental situation in some rural areas described here exacerbates rural poverty.

By stimulating the agricultural economy, the reforms and investments proposed should provide income opportunities to the rural poor over the medium and long term. Better natural resource management, better adapted agricultural research and extension, more extensive rural infrastructure, development of schools and health facilities in rural areas, and empowerment of farmers will benefit the rural poor. But none of these services or investments will be adequate for some time. Drought and environmental degradation, social dislocation, aging, and destruction of the family structure will continue. People suffering as a result of these constraints will need targeted assistance. It is not the purpose of this study to describe targeted programs. But several interventions are available. The best make use of traditional lineage transfer systems, community sharing and group activity. These include social funds (providing matching funds to poor communities to undertake community commercial and infrastructure investments); hiring the poor in rural infrastructure projects managed by local contractors (including food for work schemes), direct food or nutritional supplements in food deficient areas, and subsidized farm inputs (such as fertilizer) targeted to destitute farmers. Maintenance of public sector agricultural crop marketing assistance in the most remote areas may be necessary in the short and medium term as the private sector is strengthened in higher potential areas. Non-governmental organizations (NGOS) presently provide some such assistance. Greater collaboration between such institutions, rather than competition and antagonism, would be useful.

7. Agricultural Progress in the "Big Ten" Countries

Another way to assess agricultural progress across Sub-Saharan Africa is to review the situation in the "big ten" agricultural countries: those which together account for more than 70 percent of the agricultural value added of the entire region. Table A11 summarizes data on value-added for agriculture in 1991, for thirty-five countries in Sub-Saharan Africa. The largest agricultural sectors for which data are not available for 1991 are Zaire, Angola and Somalia, but where they fit in the table can readily be seen by comparing data for them for 1987-1989, which are available. In making a total for Sub-Saharan Africa for comparative purposes, South Africa is omitted, because, until recently, it has not been included in comparative statistics. It does, however, have the second largest agricultural sector in Sub-Saharan Africa, and must be included in all future analysis. Leaving it aside for the moment, along with a number of small countries, it is possible to make some generalizations about agriculture across the continent.

Table A10 shows that ten countries account for close to 70 percent of the agricultural value-added of Sub-Saharan Africa in 1991. These are in descending order: Nigeria, Ghana, Cameroon, Ethiopia, Côte d'Ivoire, Sudan, Zaire, Kenya, Uganda, and Tanzania. It follows that generalizations about agriculture in Sub-Saharan Africa depend critically upon how agriculture has performed in these ten countries. If their progress is disappointing (for whatever reason), performance in the other countries would have to be extraordinary to pull up the average by much. Furthermore, the same ten countries account for almost half of the remaining reserves of cultivable land, according to estimates made by FAO in the mid-1980s (Table A10). Although expanding the area of land under cultivation has contributed only an estimated 0.7 percent per annum to the agricultural growth rate in the past (leaving the bulk of growth to come from intensification of production), several countries which have suffered from civil war in the past decades, or political instability and paralysis, happen to share among them a substantial proportion of the estimated remaining reserves of cultivable land.³²

Nigeria

Agricultural performance was poor during the oil boom of the 1970s, because of the overvalued Naira, public expenditure concentrated on sectors other than agriculture, a rapid exodus of labor from rural areas, poor rainfall over extended periods, price controls and trade restrictions, and the inefficient operations of parastatal marketing boards. Agricultural production revived in the mid-1980s, with average growth rates of 3.8 percent per annum during the period 1981-1987, and about 4 percent per annum for the period 1988-1989. These were based largely on a reversal of all of the factors mentioned earlier, together with state-wide Agricultural Development Projects (ADPs) which focused on extension and input distribution for small farmers, and on rural infrastructure. Net real returns from farming, and especially returns to labor, have increased three to four times since the mid-1980s. There has also been area expansion through shortening fallows and reduction of forests, but less significantly than before 1986. More important has been the spread in the north of small-scale (*fadama*) irrigation to supplement rainfall and extend cropping into the formally "dry" season.

It is not a coincidence that fertilizer consumption in Nigeria grew at 5.7 percent per annum from 1986 to 1991, and that in the four years from 1987 to 1991, Nigeria accounted for almost 80 percent of the total increase in fertilizer consumption estimated by FAO for the whole of Sub-Saharan Africa. A recent World Bank report concluded that "all available evidence strongly suggests that the fertilizer subsidy in its present form and size is no longer justified on economic grounds."³³ There have been substantial productivity gains in maize (improved varieties), yam (minisett technique), and cassava (improved varieties). While some further area and irrigation expansion are possible, the

opportunities are not large, and sustained growth will depend on suitable technology, better input supply, feeder roads, markets, and cost-effective irrigation. The main issues will relate to: the role and functioning of the public sector, the need to promote the workings of the market; technology development and dissemination; and ensuring sustainability through improved soil management.

Ghana

While economic growth has picked up substantially in the country as the result of economic policy improvement, the agricultural sector has remained a disappointing laggard, at least according to official statistics. These suggest a growth in agricultural production (value added) averaging about 1.6 percent per annum from 1988 to 1992. Fertilizer consumption, never more than minuscule in relation to the large agricultural sector, has not grown much and has in fact fallen in the last several years. Some possible reasons for the disappointing performance include the decline in world market prices for cocoa, failure to pass on to cocoa producers the benefits of devaluation so that the tax on cocoa production remains very high, lack of progress in tackling deep-seated problems of agricultural marketing (as shown by continuing extremely high transactions costs, arising from a number of infrastructure bottlenecks, foremost among them very poor rural roads),³⁴ a decline in real prices for cereals and root crops, and a long-neglected agricultural research system which has produced very few technical packages suitable for small, poorly-endowed farmers. One estimate of supply elasticities concludes that if real farm prices had been 30 percent higher between 1980 and 1990, agriculture would have grown faster by between 1.5 and 2 percent per annum.

A factor underlying all of the above is the development stage of agriculture in Ghana. Almost half the land cropped in any year (essentially the proportion planted to annual crops as distinct from tree crops) is still under a 3-4 year crop/fallow rotation which has been shortening as population pressure has increased. Without fertilizer, such a system is continuously removing nutrients from the soil. Fertilizer use on annual crops may be viable only with adoption of a full package of soil management techniques which would improve soil organic matter and structure in the context of a conversion from shifting cultivation to sedentary agriculture.

Cameroon

Like Ghana, a significant proportion of agricultural production arises from a shifting cultivation system. Although food production has increased faster than population, overall agricultural growth has been modest relative to the resource potential, Cameroon being still at the extensive margin of land use. Although Cameroon has a comparative advantage in most export crops, the high cost structure induced by oil revenues and the appreciation of the CFA Franc until January 1994 made it marginally competitive. Because nominal devaluation had been ruled out until early in 1994, and compensating export subsidies and import taxes have been hard to administer, Cameroon has only productivity increases as the way to increase agricultural output.³⁵ It has had some success with regard to maize, rice, and potatoes, which have tended to displace millet, sorghum, yam and cassava. The heavy government intervention in export crops hampered their development, and has been hard to shake off even with the reforms of the past few years. Recent successes with privatization of the banana trade provide some pointers for the post-CFA Franc devaluation period.

Ethiopia

With the second largest population in Sub-Saharan Africa, agriculture looms so large in the economy (85 percent of employment, 85 percent of exports, and 70 percent of the raw materials base for medium and large scale industry), and considerable remaining reserves of cultivable land, one would expect Ethiopia's agricultural sector to be larger than it is. But its value-added in 1991 was estimated to be less than one quarter as large as that of Nigeria. The figure alone expresses the

poverty of the country, and the poor performance of agriculture, whose growth averaged only 0.3 percent per annum during the long period 1974 to 1991.³⁶ Although cereal production grew faster than this during the 1980s (perhaps 1.6 percent per annum from 1975 to 1988), it fell substantially behind the population growth of 2.4 to 2.9 percent per annum. Even with massive increases in imports and food aid, there is little doubt that per capita *availability* fell during the 1980s. This dismal performance resulted from a combination of a command economy after 1974, recurrent drought and a long and devastating civil war, a narrow range of exports whose production declined significantly, and a very low technology base to begin with.

In early 1990, the government announced a package of economic reform measures in line with the profound changes needed in the incentive climate for agricultural production. Their full implementation would have substantially raised the rate of agricultural growth.

Together with a devaluation of the domestic currency, these reforms have been implemented, in part, by the new government which came to power in 1991. Progress has, however, been slow on dismantling controls, regulations, and state involvement in the economy. In the five years from 1988 to 1992, agriculture grew at 2.2, 0.08, 8.4, -9.4 and 6.1 percent respectively, in real terms. While drought will be a continuing constraint on agricultural development, a strong emphasis on good policies, deepening market reforms, massive investment in long-neglected rural infrastructure, and above all the high priority assigned to technology to raise fertilizer use and improve soil management, could result in a significant increase in agricultural growth.

Côte d'Ivoire

As with Cameroon, an overwhelmingly important factor affecting agricultural performance in Côte d'Ivoire has been its confinement within the CFA Franc zone. It has therefore been unable to adjust its nominal exchange rate in the desired direction, and has resorted instead to export subsidies and import taxes in an effort to "simulate" the effects of changes in the exchange rate. One author, describing the results as "fettered adjustment", has commented: "...adjustment has not taken place in Côte d'Ivoire. The case illustrates some of the repercussions of not adjusting, and in this sense, it offers insights into what the *counterfactual* to structural adjustment might entail."³⁷ From 1981 to 1987, value added in agriculture declined by an average of 5.7 percent per annum. Under the attempted adjustment program, agriculture has grown at about 2.3 percent per annum. There has been no increase in agricultural competitiveness, since the attempt to achieve real effective depreciation of the currency foundered on grounds of administrative awkwardness and financial infeasibility. There has been little market liberalization, and only cosmetic reforms in the parastatal sector. Any cost savings in coffee or cocoa from this source were overwhelmed by losses from plunging world prices. Government achieved neither the core aims of economic policy (macroeconomic balance, good resource allocation and improved competitiveness), nor its more basic objectives of growth and poverty alleviation. In fact, the incidence of poverty almost doubled over the second half of the 1980s, and export producers were among the groups hardest hit by increasing poverty. The January 1994 decision to devalue the CFA Franc offers a window of opportunity for countries like Cameroon and Côte d'Ivoire to renew their economic reform attempts. A greater market orientation among decision makers, one of the by-products of the reform attempts to date, should provide a launching pad for new attempts in the near future.³⁸

Sudan

"After decades of decline, Sudan is now one of the poorest countries in Africa with an average per capita income estimated to be in the range of US \$250 to US \$300 in 1992."³⁹ This devastating pronouncement, perhaps more than any comparable statements made about other countries in Sub-

Saharan Africa, sums up the difficulties in economic and agricultural development during the past few years. For Sudan is the biggest country in Africa (with 10 percent of the continent's land area), and has the third largest estimated remaining reserve of cultivable land after the year 2010, almost 47 million hectares (see Table A11). Two factors more than any others have negatively impacted upon agriculture during the past decade: war and rainfall fluctuations. As a result of the war, several million people have been displaced in the southern region. In spite of its having the largest irrigated agriculture in Sub-Saharan Africa, with irrigation schemes commanding some 4.4 million feddans of the 17 million under cultivation, Sudan's rainfed agriculture is large enough (and in recent years management of irrigation weak enough) to allow very large fluctuations in production (changes up or down of from 20 to 30 percent in a single year have been recorded in the past ten years).

To begin the 1990s, the government adopted an ambitious long-term plan, and commenced substantial economic reforms in early 1992, including currency devaluation, exchange rate liberalization, abolition of most export and import licenses, and liberalization of most domestic markets. Spurred by good weather and better production incentives in the form of higher producer prices, agricultural growth of over 20 percent was experienced in 1991/92 and 1992/93. It is too early to see whether positive growth will continue, since it will depend to a large degree on an end to the war, return to political stability, and restoration of the confidence of international donors who had largely abandoned the scene following the policy failures of the 1980s. If these problems are dealt with, however, Sudan obviously has enormous agricultural potential.

Zaire

Regarded as "probably the richest country in Sub-Saharan Africa in terms of its land, forest, water and ecological resources,"⁴⁰ Zaire's agricultural potential remains largely unrealized, victim to an agricultural research system virtually moribund since 1960, and the profound neglect of its transportation infrastructure, among other things. Fertilizer consumption is at a minuscule level (probably less than 10,000 tons of nutrients per annum), and the three-year effort (1987-1989) by the World Bank to introduce serious reforms in Zaire through structural and structural adjustment loans did not succeed. This failure was caused by the government's inability to control public expenditure, due to the virtual collapse of governmental authority. This nullified earlier reforms affecting the exchange rate, the revenue structure, public enterprise efficiency and the reorganization of the financial, agricultural and transport sectors. Together with the massive disruption caused by an ongoing political transition, this led to an unsustainable balance of payments situation, a sharp decline in the welfare of the population and prospects of continued decline in economic growth."⁴¹ As with Sudan, any government in Zaire will need to demonstrate sustained political commitment to implementing appropriate development measures and economic reforms if it is to recapture the confidence of international investors. But again, the potential in agriculture, livestock, fisheries and forestry is enormous.

Kenya

"Few country lending experiences have given the Bank so much cause of frustration...." Thus wrote an outside observer,⁴² commenting on the history of structural adjustment efforts in Kenya through the 1980s. Kenya was one of the first countries in Sub-Saharan Africa engaged by the Bank in structural adjustment lending, and the efforts have been repeated up to the present. The observer's comments need to be interpreted as referring especially to the pace of reform in Kenya, which has certainly been slow, and marked by many setbacks. Over the longer term, however, progress has been made. Liberalization of the maize market, and abolition of maize movement controls, have finally been achieved in early 1994. Looking back over the decade, there has been progress in reform; fertilizers policy, cereals marketing policy, output marketing for a variety of enterprises, including

cotton, dairying, sugar, and coffee. The main area where progress still remains to be accomplished is in the divestiture of the enormous parastatal sector which is ubiquitous in agriculture as in the other production sectors in Kenya.

As for many other countries in Sub-Saharan Africa, Kenya's agricultural performance is affected considerably by weather, and fluctuations from this source often obscure progress arising from other sources. From 1980 to 1991, agricultural GDP in Kenya grew at an average rate of 3.2 percent per annum, but in the 1988-1992 period, the average growth rate has been a disappointing 1.6 percent per annum. This reflects, in part, the falls in world market prices for tea and coffee, as well as a severe drought in 1992. Unfortunately, another severe drought in 1993, which reduced production of the staple cereal, maize, to two-thirds of its peak production, will reduce the growth rate for the third straight year, although there were offsetting positive developments for tea and coffee. The drought dealt a setback to dairying as well, but with better weather, dairying and horticulture are expected to realize very substantial growth. For dairying, this will be predicated also on liberalizing reforms in marketing and processing.

Uganda

Following long years of civil strife and economic deterioration, the agricultural sector has grown rapidly since the mid-1980s,⁴³ attaining a growth rate of 3.3 percent per annum between 1988 and 1992. This has enabled it, finally, to regain the levels of agricultural output last attained in the late 1970s. The growth of agriculture since the advent of the current government in 1986 has been led by rapid expansion of food production for a revived domestic market, and has been based largely on area rather than yield increases. The value-added from export crops declined between 1986 and 1990, responding to the reduced incentives for coffee production. This began to turn around in 1991, stimulated by economic reforms including the unification of market and official exchange rates, elimination of government-set processing margins for coffee, and abolition of the Coffee Marketing Board monopoly in exports. In 1992, earnings from coffee were converted at the market exchange rate, and the remaining export tax on coffee was dropped. This boost to coffee came at an opportune time, when food production was beginning to slow into the range of 2-3 percent growth following its earlier levels between 6 and 8 percent per annum. The reforms in coffee have been very successful, and provide a model for how to proceed in liberalizing the other export crops, especially cotton and tea. In both sub-sectors, a substantial agenda of reforms awaits, including divestiture of parastatal marketing organizations. The agricultural strategy for the future looks to technology generation and dissemination, infrastructure to allow exploitation of under used agricultural areas (and re-establishment of the necessary peace and security in the north of the country), availability of long-term finance from a capital market responding to reforms, and the establishment of freehold tenure.

Tanzania

By the early 1980s, Tanzania had come to be a heavily state-controlled economy, whose rigid economic system was battered by the shocks of the war with Uganda, and whose inadequate policies led to economic stagnation and a fall in per capita income lasting almost a decade. After a new government was elected in 1985, the Economic Recovery Program began in mid-1986, with reforms that at last began to work. These included: substantial currency devaluation (75 percent in real effective terms from 1987 to 1992); import liberalization; domestic trade liberalization; liberalization of foodgrain and export marketing; reduction of the fiscal deficit; export retention schemes and legalization of foreign holding; reduction in tariff levels; liberalization of cashew marketing (1992); elimination of price controls on everything except sugar, petroleum, and fertilizer; phasing out of petroleum and fertilizer subsidies; a hiring freeze and retrenchment in the civil service; and a few restructuring and performance contracts in parastatals. Under the reform program, per capita income

and consumption increased each year. There has been a major turnaround in economic performance in all major sectors, with industrial growth at 5 percent per annum during the period 1986-1991 (versus a 5 percent per annum decline over 1979-1985), solid growth in agriculture and a marked increase in food production (especially in 1989). There have also been increased sales of traditional exports, and a five-fold increase in non-traditional agricultural exports since 1985. There is some evidence of reduced poverty, though not much progress has been made in meeting basic needs because of a deterioration of social services.

8. Summary of Agriculture Growth Experience in the "Big Ten"

What can be gleaned from this brief outline of agricultural progress in the "big ten" countries? Over the recent period covered, *Nigeria*, *Kenya*, *Uganda* and *Tanzania* have come the closest to achieving the combination of policy reform and agricultural growth envisaged in the 1989 World Bank study. In *Nigeria*, the growth rate appears to have been close to, or slightly above the 4 percent per annum target, although the parlous state of statistical data in the country make for considerable uncertainty about actual achievement. *Nigeria* now appears to be turning its back on the policy reform gains of the past half decade. It will struggle to keep up what has been one of the most encouraging agricultural growth rates on the continent. Had it not been for two rather bad years from a weather point of view, *Kenya* may not have fallen much short of the target growth rates, and may approach it again in the near future, provided the very recent breakthroughs in policy reforms for maize and coffee can be sustained and deepened. Both *Uganda* and *Tanzania* appear to have broken through the target growth rate in the 1986-1992 period. Both still have an extensive margin to exploit for agriculture, with *Tanzania*, in particular, projected to have substantial reserves of cultivable land remaining after the year 2010 (Table A11). In *Ghana*, whose agricultural growth was probably in the vicinity of a disappointing 2 percent per annum, a continuing high tax on cocoa producers, neglect of research, and difficulties inherent in the transition from shifting to settled cultivation are the culprits. *Cameroon* and *Côte d'Ivoire* have been till very recently confined within the straitjacket of the CFA Franc Zone exchange rate arrangements, and in spite of efforts to adjust in other ways, have found the former restrictions associated with the exchange rate too overwhelming to overcome.⁴⁴ The way forward seems more promising, but considerable skill will be needed to take full advantage of the opportunities presented, and a sharp focus is needed on freeing markets from dirigiste forces, especially in *Côte d'Ivoire*.

Ethiopia and *Sudan*, have both been crippled by bitter civil conflicts during most of the period. Only over the past two years has *Ethiopia* embarked on a serious adjustment program, and progress so far has been slow. The war continues in *Sudan*, and as long as it does it will hinder progress. Enormous tasks of rehabilitation and raising the level of management of irrigated agriculture await the war's end. In *Ethiopia*, the legacy of the war will linger for many years, but a decisive government could bring about rapid progress, subject, of course, to the rather large weather-induced fluctuations in agricultural production, which must be expected to continue into the indefinite future, albeit with diminishing impact if a skillful job is done with diversification, and with developing some irrigation.

In *Zaire*, in a category by itself from the points of view of political constraints and breadth of problems across the board, almost everything waits to be tackled in a serious manner: policy, technology, infrastructure, rural development, and regaining the confidence of the international community after an extremely long period of frustration.

For 70 percent of Sub-Saharan Africa's agriculture, therefore, progress in the 1988-1992 period has fallen notably short of the hopes of 1989. Only three countries in the "big ten" reached close to the 4 percent growth target set by the Bank's 1989 study. With the exceptions of Zaire and Sudan, the short-term outlook is good, and were Sudan to end its war and focus wholeheartedly on the reforms it has begun, it would be possible to raise its rate of growth substantially. A positive short-term outlook also requires keeping up the reform momentum, especially in countries such as Nigeria and Tanzania, which have shown some signs of turning back. For Zaire, the short term cannot be regarded with optimism.

A group of smaller countries - *Benin, Chad, Guinea, Mauritius, and Togo* - has also achieved respectable agricultural growth rates, generally between 3 and 4 percent per annum over the period 1988-1992. Although collectively making up less than 10 percent of the continent's agricultural value-added, they have shown that the possibility for growth near the target is not confined to larger countries. For three of these smaller countries, liberation from the shackles of the CFA Franc exchange rate may add the ingredient which could push them over the target rate, if economic reforms are consonant with the new exchange rate regime. For *Angola* and *Mozambique*, with close to one-fifth of the remaining reserves of cultivable land between them, the most compelling "spark" for igniting growth will be an end to their respective civil wars, and consolidation of peace thereafter.

9. Conclusion

The target growth rate for agriculture of 4 percent per annum has proved elusive. Its importance has not diminished, however, and the need to exploit agriculture's growth linkages with the rest of the economy is even more urgent in 1994 than in 1989.⁴⁵ The past five years have not seen complete adoption in any country of the package of measures needed to achieve the desired growth rates. However, considerable movement in the direction of adoption has taken place. The degree of completeness of adoption appears to be directly related to the growth rates achieved. None of the elements of the package has been found to be dispensable, and some have been added as the strategy has developed. The fact that some countries have achieved the growth targets shows that it can be done. However, even in countries with rapid agricultural growth, targeted programs will be needed in rural areas to deal with the constraints faced by the desperately poor and destitute.

Table A1. Agricultural Growth (Value Added)

Country	Average Annual Percentage Change					1991
	1965-73	1974-80	1981-85	1986-89	1990	
<i>Sub-Saharan Africa</i> ^a	2.2	1.0	0.6	2.4	1.8	2.1
excluding Nigeria	2.1	2.1	0.2	1.9	1.1	1.0
Botswana	12.4	-1.3	-8.1	19.5	3.7	2.7
Lesotho	-	-1.2	-3.1	15.4	15.4 ^b	-
Cape Verde	-	-	4.0	12.0	-3.8	9.3
Congo, People's Republic of	4.1	2.2	2.0	7.2	0.1	-1.0
Mali	0.9	7.3	-6.4	7.0	-3.5	-3.2
Guinea-Bissau	-	-5.0	2.8	6.4	2.5	5.7
Mozambique	-	-	-2.4	6.2	1.2	-
Chad	-0.7	-0.2	6.3	6.1	8.9	20.0
Uganda	-	-	-	6.0	3.4	2.9
Zambia	2.0	0.9	2.3	5.7	-7.3	-
Togo	2.6	2.3	7.3	5.2	-1.2	-0.7
Benin	-	4.6	7.4	5.0	1.4	4.5
Comoros	-	-	-	4.5	2.8	3.9
Tanzania	3.1	0.3	3.5	4.5	2.9	-
Kenya	6.2	4.6	1.7	4.3	3.5	-0.7
Nigeria	2.9	-2.0	2.1	4.3	4.1	5.0
Ethiopia	2.1	0.9	-5.4	4.1	0.2	8.0
Sierra Leone	1.5	10.4	2.6	3.6	1.7	3.1
Côte d'Ivoire	4.9	4.5	-1.2	3.6	4.2	-1.5
Madagascar	-	-0.9	2.8	3.2	1.5	-
Burkina Faso	-	-0.5	1.7	3.1	-3.4	4.7
Somalia	-	14.0	2.2	3.0	1.3	-
Zimbabwe	-	-1.6	4.0	2.9	-6.6	-
Ghana	4.5	0.8	-0.4	2.7	-2.0	4.1
Zaire	-1.7	0.9	2.6	2.6	2.6 ^b	-
Guinea	-	-	-	2.5	3.1	2.2
Swaziland	8.0	3.8	0.5	2.2	2.2 ^b	-
Equatorial Guinea	-	-	-	2.0	3.1	-1.3
Senegal	0.2	-2.2	1.6	1.8	10.3	-3.0
Malawi	4.1	4.9	4.4	1.8	0.0	14.2
Burundi	10.6	1.8	1.1	1.5	5.6	2.2
Central African Republic	2.1	1.5	2.5	1.5	0.0	-3.1
Mauritania	-2.1	0.7	-1.1	1.0	-14.5	-
Gambia, The	4.5	-3.4	-3.7	0.9	-14.1	-
Gabon	-	-	2.7	0.1	3.3	-2.7
Cameroon	4.6	4.9	-1.4	-0.3	2.0	0.0
Sao Tome & Principe	-	-	0.1	-0.3	3.5	-
Djibouti	-	-	-	-1.0	-1.0 ^b	-
Angola	-	-	-0.5	-1.3	-1.3 ^b	-
Seychelles	-	0.7	-2.9	-3.8	12.9	-
Sudan	0.3	1.4	0.2	-4.7	-3.6	-4.2
Rwanda	-	8.3	0.2	-5.0	5.4	0.1
Mauritius	-	-5.6	1.8	-6.5	31.3	-2.8
Niger	-2.9	1.3	2.3	-	2.3 ^b	-
Namibia	-	-	-	-	-	-
Liberia	-	-	-	-	-	-
<i>North Africa</i>	3.3	3.6	4.4	2.5	-5.2	17.2
Algeria	2.5	5.9	4.5	3.4	-17.0	35.0
Egypt, Arab Republic of	2.6	2.6	2.9	2.2	1.7	1.8
Libya	-	-	-	-	-	-
Morocco	4.8	3.7	7.5	4.3	-6.7	20.3
Tunisia	6.6	0.8	5.5	-4.6	27.7	15.3
<i>All Africa (Excl. South Africa)</i>	2.5	1.6	1.5	2.5	-0.2	6.6
South Africa	2.5	2.5	-2.5	5.4	-9.4	-
<i>Comparator Countries</i>	3.1	2.1	5.4	4.7	5.6	1.8
China	2.8	2.0	9.0	3.3	7.5	3.2
India	3.3	1.7	2.9	7.1	4.2	0.0
Indonesia	4.8	4.1	3.0	3.5	2.5	0.9
South Asia (Excl. India)	2.2	2.4	3.6	1.9	6.3	3.3

a. Excluding South Africa

b. Previous available column figure repeated.

c. Bangladesh, Nepal, Pakistan, Sri Lanka

Source: National sources as collected by World Bank regional country economists and collated for the Global Coalition for Africa by the Trade and Finance Division, Technical Department, Africa Region, World Bank.

Table A2. Sub-Saharan Africa: Food Security

Country	Populations facing food insecurity 1980/82		Average daily supply of calories per capita		Average supply as percentage of minimum requirement ^a	Average annual cereal imports ('000 tons)		Index of per capita food production (1979-81=100)	
	(millions)	(percent of total)	1965	Average 1986-89		1974	1990	1964-66	1989-90
Sub-Saharan Africa	98	28	2,074	2,027	87	4,209	7,838	—	94
Angola	—	—	1,907	1,742	74	149	272	127	81
Benin	1	18	2,019	2,115	92	8	126	94	112
Botswana	—	—	2,025	2,251	97	21	87	134	113
Burkina Faso	2	32	1,882	2,002	84	99	145	113	114
Burundi	1	26	2,131	2,320	100	7	17	100	92
Cameroon	1	9	2,011	2,142	92	81	398	89	89
Cape-Verde	—	—	—	2,500	107	—	—	163	—
Central African Rep.	1	29	2,055	1,965	87	7	37	94	91
Chad	2	54	2,395	1,821	76	37	36	124	85
Comoros	—	—	—	2,059	88	—	—	114	—
Congo	0	27	2,260	2,519	114	34	94	110	94
Côte d'Ivoire	1	8	2,352	2,405	104	172	502	73	101
Djibouti	—	—	—	—	—	—	—	—	—
Equatorial Guinea	—	—	—	—	—	—	—	—	—
Ethiopia	15	46	1,853	1,684	72	118	687	111	84
Gabon	0	7	1,955	2,398	103	24	57	110	84
Gambia, The	0	19	—	2,339	98	—	—	152	—
Ghana	4	36	1,937	2,167	94	177	337	120	97
Guinea	—	—	2,187	2,007	87	63	210	106	87
Guinea-Bissau	—	—	—	2,437	106	—	—	140	—
Kenya	6	37	2,208	2,016	87	15	188	119	106
Lesotho	—	—	2,049	2,275	100	48	97	120	86
Liberia	1	30	2,158	2,344	101	42	70	95	84
Madagascar	1	13	2,447	2,174	95	114	183	105	88
Malawi	1	24	2,259	2,057	89	17	115	87	83
Mali	3	35	1,938	2,114	90	281	61	100	97
Mauritania	0	25	1,903	2,465	107	116	85	143	86
Mauritius	0	9	2,269	2,690	118	160	210	111	100
Mozambique	6	49	1,712	1,604	68	62	416	132	81
Niger	2	28	1,996	2,321	98	155	86	105	71
Nigeria	14	17	2,185	2,083	88	389	502	125	106
Rwanda	1	24	1,856	1,817	78	3	21	78	77
Sao Tomé and Príncipe	—	—	—	2,529	108	—	—	—	—
Senegal	1	21	2,372	2,162	91	341	534	156	102
Seychelles	—	—	—	2,117	91	—	—	—	—
Sierra Leone	1	23	2,014	1,813	79	72	146	99	89
Somalia	2	50	1,718	1,781	77	42	194	144	94
Sudan	3	18	1,938	1,981	84	125	186	89	71
Swaziland	—	—	—	2,554	110	—	—	68	—
Tanzania	7	35	1,831	2,186	94	431	73	87	88
Togo	1	29	2,454	2,110	92	6	111	118	88
Uganda	6	46	2,361	2,034	88	36	7	110	95
Zaire	12	42	2,187	2,079	93	343	336	110	97
Zambia	3	48	2,072	2,028	87	93	100	98	103
Zimbabwe	—	—	2,075	2,193	92	56	83	96	94

— Not available

a. Average per capita daily calorie supply data for 1986-89 divided by requirement established by WHO for each country.

Note: Food security is defined as access to enough food for an active and healthy life. The minimum daily calorie requirement to meet the energy needs of an average healthy person, as calculated by the World Health Organization for each country, is taken into account.

Source: Index of food production, cereal imports, per capita calorie supply 1965 from World Bank 1992B; except for Cape Verde, Comoros, The Gambia, Guinea-Bissau, Sao Tomé and Príncipe, Seychelles, Swaziland for which the source is World Bank 1989d. Per capita calorie supply 1986-89 is taken from UNDP/World Bank 1992 (Table 13-8).

Table A3. Sub-Saharan Africa: Population and Food Security, 1990-2020

<i>Scenarios</i>	1990	2000	2010	2020
Case I				
Population (millions with total fertility rate remaining at projected levels) ^a	494	664	892	1200
Food production (million tons of maize equivalent at current trend growth rate of 2 percent a year)	90	110	134	163
Food consumption (million tons with unchanged average per capita consumption) ^b	100	134	181	243
Food gap (million tons) ^c	10	24	47	80
Case II				
Population (millions as in Case I) ^a	494	664	892	1200
Food production (million tons at 4 percent annual growth)	90	133	197	292
Food requirement (million tons as in case I) ^b	100	134	181	243
Food gap (million tons)	10	1	-16	-49
Case III				
Population (millions, with total fertility rate declining by 50 percent by 2030) ^d	494	657	875	1169
Food production (million tons at 2 percent annual growth)	90	110	134	163
Food requirement (million tons) ^b	100	133	177	237
Food gap (million tons)	10	23	43	74
Case IV				
Population (millions, with total fertility rate declining by 50 percent by 2030) ^d	494	657	875	1169
Food production (million tons at 4 percent annual growth)	90	133	197	292
Food requirement (million tons) ^b	100	133	177	237
Food gap (million tons) ^c	10	0	-20	-55
Case V				
Population (with total fertility rate declining by 50 percent by 2030)	494	657	875	1169
Food production (million tons at 4 percent annual growth)	90	133	197	292
Food requirement (million tons, with rising per capita consumption) ^e	100	144	210	280
Food gap (million tons)	10	11	13	-12

a. Population growth at 3.0 percent per annum, as per Annex Table 1.

b. Average of 2027 calories per person per day.

c. Equals consumption requirement minus production; negative sign denotes production surplus. This equaled the cereal imports plus food aid in 1990.

d. Target.

e. Average per capita consumption rising to 2,200 calories per day by 2000 to 2,400 calories per day by 2010 and stabilizing at that level thereafter.

Source: K. Cleaver and G. Schreiber, *The Population, Agriculture and Environment Nexus in Sub-Saharan Africa*, Agriculture and Rural Development Series No. 1, Technical Department, Africa Region, World Bank, August 1993.

Table A4. Forest Area and Deforestation

Country	Forest and Woodland 1980 (thousand hectares)	Deforestation, 1980s		Reforestation, 1980s (thousand hectares per year)
		Percent per year	Thousand hectares per year	
<i>Sub-Saharan Africa</i>	678,900	0.6	3,764	229
Angola	53,600	0.2	94	4
Benin	3,867	1.7	67	0
Botswana	32,560	0.1	20	-
Burkina Faso	4,735	1.7	80	3
Burundi	41	2.7	1	3
Cameroon	22,300	0.8	190	2
Cape Verde	-	-	-	0
Central African Rep.	35,890	0.2	55	-
Chad	13,500	0.6	80	0
Comoros	16	3.1	1	0
Congo	-	0.1	22	0
Cote d'Ivoire	9,834	5.2	510	8
Djibouti	106	-	-	-
Equatorial Guinea	1,295	0.2	3	-
Ethiopia	27,150	0.3	88	13
Gabon	20,575	0.1	15	1
Gambia, The	215	2.4	5	0
Ghana	8,693	0.8	72	3
Guinea	10,650	0.8	86	0
Guinea-Bissau	2,105	2.7	57	0
Kenya	2,360	1.7	39	13
Lesotho	-	-	-	0
Liberia	2,040	2.3	46	3
Madagascar	13,200	1.2	156	15
Malawi	4,271	3.5	150	1
Mali	7,250	0.5	36	1
Mauritania	554	2.4	13	0
Mauritius	3	3.3	0	0
Mozambique	15,435	0.8	120	5
Niger	2,550	2.6	67	3
Nigeria	14,750	2.7	400	32
Rwanda	230	2.3	5	4
Sao Tome and Principe	-	-	-	-
Senegal	11,045	0.5	50	4
Seychelles	-	-	-	-
Sierra Leone	2,055	0.3	6	0
Somalia	9,050	0.1	14	2
Sudan	47,650	1.1	504	17
Swaziland	74	-	0	7
Tanzania	42,040	0.3	130	11
Togo	1,684	0.7	12	1
Uganda	6,015	0.8	50	2
Zaire	177,590	0.2	370	1
Zambia	29,510	0.2	70	3
Zimbabwe	19,820	0.4	80	6

Source: Draft data from Table 13, Deforestation and Reforestation, African Indicators Project, World Resources Institute, March 1991.

Table A5. Extent of soil degradation in major regions of the world, early 1980s

	Total						Productive Dryland Types					
	Productive Drylands			Productive Dryland Types			Productive Drylands			Productive Dryland Types		
	Area (million hectares)	Percent Degraded	Area (million hectares)	Percent Degraded	Area (million hectares)	Percent Degraded	Area (million hectares)	Percent Degraded	Area (million hectares)	Percent Degraded	Area (million hectares)	Percent Degraded
Total	3,287	87	2,586	62	570	60	131	30				
Sudano-Sahelian Africa	473	88	380	90	90	80	3	30				
Southern Africa	304	80	250	80	52	80	2	30				
Mediterranean Africa	101	83	80	85	20	75	1	40				
Western Asia	142	82	116	85	18	85	8	40				
Southern Asia	359	70	150	85	150	70	59	35				
USSR in Asia	298	55	250	60	40	30	8	25				
China and Mongolia	315	69	300	70	5	60	10	30				
Australia	491	23	450	22	39	30	2	19				
Mediterranean Europe	76	39	30	30	40	32	6	25				
South America and Mexico	293	71	250	72	31	77	12	33				
North America	405	40	300	42	85	39	20	20				

Sources: United Nations Environment Programs. This term used is "desertification", which has been substituted here with the term degradation which is more accurate.

Table A6. Evaluation of African Agricultural Research Institutions [(financing average per year (1990))]

Country	National Agricul. Research Sys./Inst. (NARS/NARI)		Dev. of Nat. Agricult. Research Master Plan (NARMP) ^b				Consolid. Fund. Mech (CFM)		Total Million \$ ^c	External financing Received	
	Acronym	Eval. ^a	None	Plan	Init.	Compl.	None	Init.	Million \$	Donor	
<i>CILLS Region</i>											
Burkina Faso	INERA/IRBET	2				X		X	7.57	5.66	WB/FR
Cape Verde	INIA	1		X			X		2.27	1.61	POR
Gambia	DAR/MOA	2			X			X	n.a	n.a	US
Guinea-Bissau	DEPA/MOA	1		X			X		n.a	1.04	POR
Mali	IER/INRZFH	2				X		X	6.01	3.55	WB/US/NL/FR
Mauritania	CNRADA	1		X			X		0.49	0.29	FR
Niger	INRAN	2				X	X		n.a	n.a	WB/FR
Senegal	ISRA	3				X		X	7.05	2.26	WB/US/FR
Tchad	BRA/IRCT/LRVZ	1			X	X			7.10	6.19	FR
<i>SADC Region</i>											
Angola	INIA	1	X				X		4.335	n.a	PRO/NORDIC
Botswana	DRA/MOA	2		X			X		5.849	n.a	US/CA/FAO/SIDA/FR/UK
Lesotho	ARD/MOA	1		X			X		6.043	n.a	US/UK/CA
Malawi	DRA/MOA	2				X	X		4.902	n.a	WB/US/UK/CA
Mozambique	INIA	1	X				X		n.a	n.a	POR/NORDIC/CA
Namibia*	DAR/MOA	1	X				X		n.a	n.a	FRG/US
Swaziland	ARD/MOA	1			X		X		2.472	n.a	US/UK/CA
Tanzania	DART/MOA	2				X		X	20.417	n.a	WB/UK/FRG/NORDIC/CA/IT
Zambia	DAR/MOA	2				X	X		3.576	n.a	WB/UK/US/BEL/CA
Zimbabwe*	DRSS/ARC	3			X			X	17.448	n.a	WB/US/UK/NORDIC/CA
<i>WCA Region</i>											
Benin	DRA/MOA	1	X				X		2.383	7.685	FR
Cameroon	IRA/IRZ	2				X	X		15.069	n.a	WB/US/FR/UK/FRG
C. Afr. Rep.	DRA	1	X				X		n.a	1.546	FR
Congo	DGRST	1		X			X		2.494	11.615	FR/UNDP/EDF
Côte d'Ivoire	IDESSA/IDEFOR	3		X			X		28.330	n.a	FR
Equat. Guinea	None Known	1	X				X		n.a	n.a	?
Gabon	DRA	1	X				X		2.494	0.334	FR
Ghana	CSIR/NARC	3				X	X		3.344	n.a	WB/US/UK/CA
Guinea	INRA/MOA	1			X		X		5.605	2.046	FR/IFAD/EDF
Liberia	CARI	1	X				X		5.247	n.a	US
Nigeria**	NARC	3				X	X		92.393	0.176	WB
Sierra-Leone	IAR/NARCC	1					X		0.946	n.a	UK
Sao Tome Pr.	None Known	1	X				X		0.164	3.25	?
Togo	DRA/MOA	1				X	X		6.174	n.a	FR
Zaire	INERA	2				X	X		3.820		WB/US/UNDP
<i>E.A. Highland, IGADD Region</i>											
Burundi	ISABU	2				X	X		4.381	n.a	WB/BEL/US
Djibouti	None Known	1	X				X		n.a	n.a	FR
Ethiopia	JAR	3				X	X		11.323	n.a	WB
Kenya	KARI/KEFRI	3				X	X	X	28.397	n.a	WB/US/UK/EC/NL/FR/CA
Rwanda	ISAR	2				X	X		2.004	n.a	WB/BEL
Somalia	ARI/MOA	1	X		X		X		0.322	n.a	WB
Sudan	DAR/MOA	2				X	X		13.683	n.a	WB
Uganda	DAR/MOA	2			X		X		n.a		WB/US
<i>Indian Ocean Islands</i>											
Comoros	None Known	1	X				X		n.a	n.a	FR
Madagascar	FOFIFA	3				X		X	7.318	n.a	WB/US/FR
Mauritius	FARC/MOA	4				X	X		5.546	n.a	?
Seychelles	DCR/MOA	2			X		X		n.a		?

- a. Evaluation Ratings: 5 (Asia Standard)
4 (Above Average)
3 (Average minimal acceptable standard)
2 (Below Average)
1 (Poor)

- b. None : No Master Plan
Plan : Master Plan planning in progress
Init. : Master Plan initiated and review completed
Compl. : Master Plan completed.

Table A6. (Continued)

- c. Present financing (even without master plan). Financial data for the CILSS region is data actual for 1990 taken from the Sahel Framework for Action (FFA), December 1991. Financial data for the other regions is average for 1980-85 taken from ISNAR Working Paper NO. 33: Organization and Management of Agricultural Research in Sub-Saharan Africa - Recent Experience and Future Direction, September 1990.

*Namibia and Zimbabwe: Agricultural services for commercial farmers are well developed.

**Nigeria NARS includes 18 individual institutes plus 2 agricultural universities.

Source: SPAAR Secretariat

Table A7. Fertilizer Use

Country	Fertilizer Consumption (100g/ha) ^a			% increase per annum
	1970/71	1985	1989/90	
<i>Sub-Saharan Africa</i>	33	32	89	-
Angola	33	-	74	-
Benin	36	66	18	-30.0
Botswana	15	4	7	12.0
Burkina Faso	3	46	58	4.8
Burundi	5	18	35	14.0
Cameroon	34	81	41	-15.0
Cape Verde	-	-	-	-
Central African Republic	12	15	4	-30.0
Chad	7	23	15	-9.0
Comoros	-	-	-	-
Congo	525	69	32	-16.0
Cote d'Ivoire	74	118	113	-0.8
Djibouti	-	-	-	-
Equatorial Guinea	-	-	-	-
Ethiopia	4	47	70	8.3
Gabon	-	0	27	-
Gambia, The	-	-	-	-
Ghana	11	44	31	-7.2
Guinea	44	2	11	40.0
Guinea-Bissau	-	-	-	-
Kenya	238	460	481	0.9
Lesotho	10	117	144	4.3
Liberia	63	100	107	1.4
Madagascar	61	32	36	2.4
Malawi	52	143	227	9.6
Mali	31	129	54	-19.0
Mauritania	11	103	116	2.4
Mauritius	2095	2615	3302	4.8
Mozambique	22	12	8	-8.5
Niger	1	10	8	-4.0
Nigeria	2	108	121	2.3
Rwanda	3	14	14	0.0
Sao Tome and Principe	-	-	-	-
Senegal	17	55	55	0.0
Seychelles	-	-	-	-
Sierra Leone	17	20	3	-46.0
Somalia	27	36	26	-6.7
Sudan	28	75	39	-14.0
Swaziland	-	-	-	-
Tanzania	31	76	93	4.1
Togo	3	69	83	3.8
Uganda	14	0	1	-
Zaire	6	10	10	0.0
Zambia	73	155	166	1.4
Zimbabwe	446	122	604	-0.6
India	137	504	687	6.4
China	410	1692	2619	9.1

a. Fertilizer consumption in terms of hundreds of grams of plant nutrients per hectare of arable land; *World Indicators 1992*, World Bank, 1992. And for 1986: World Bank. *World Development Report 1989*. Washington, D.C.

Table A8: Sub-Saharan Africa Irrigated Areas (thousand hectares)

	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
SUB-SAHARAN AFRICA	4741	4793	4868	4957	4882	5234	5242	5289	5349	5402	5440
excluding Nigeria	3911	3958	4028	4114	4036	4384	4387	4429	4484	4532	4565
Angola	..	..	..	..	..	..	..	..	..	..	..
Benin	5	5	6	6	6	6	6	6	6	6	6
Botswana	2	2	2	2	2	2	2	2	2	2	2
Burkina Faso	10	12	12	12	12	14	16	16	16	20	20
Burundi	58	60	63	65	66	68	70	70	72	72	74
Cameroon	16	16	18	18	21	22	24	26	28	30	30
Cape-Verde	2	2	2	2	2	2	2	2	2	2	2
Central African Republic	..	..	..	..	..	..	..	..	..	..	..
Chad	10	0	10	10	10	10	10	10	10	10	10
Comoros	..	..	..	..	..	..	..	..	..	..	..
Congo, People's Republic	4	4	4	4	4	4	4	4	4	4	4
Cote d'Ivoire	46	48	50	52	54	56	58	60	62	64	66
Djibouti	..	..	..	..	..	..	..	..	..	..	..
Equatorial Guinea	..	..	..	..	..	..	..	..	..	..	..
Ethiopia	162	162	162	162	162	162	162	162	162	162	162
Gabon	..	..	..	..	..	..	..	..	..	..	..
Gambia, The	12	12	12	12	12	12	12	12	12	12	12
Ghana	8	8	7	7	7	8	8	8	8	8	8
Guinea	68	70	14	16	18	70	70	22	24	25	26
Guinea-Bissau	..	..	..	..	..	..	..	..	..	..	..
Kenya	40	40	40	40	42	40	42	49	52	54	55
Lesotho	..	..	..	..	..	..	..	..	..	..	..
Liberia	2	2	2	2	2	2	2	2	2	2	2
Madagascar	682	718	755	790	826	860	880	890	900	920	930
Malawi	18	18	18	18	18	18	18	18	20	20	20
Mali	159	166	173	180	187	195	200	205	205	205	205
Mauritania	11	12	12	12	12	12	12	12	12	12	12
Mauritius	16	16	17	17	17	17	17	17	17	17	17
Mozambique	70	74	80	86	93	100	105	110	115	115	115
Namibia	4	4	4	4	4	4	4	4	4	4	4
Niger	24	30	30	30	30	25	32	32	32	40	40
Nigeria	830	835	840	843	846	850	855	860	865	870	875
Rwanda	4	4	4	4	5	4	4	5	4	4	6
Sao Tomé & Príncipe	..	..	..	..	..	..	..	..	..	..	..
Senegal	170	170	175	175	4	175	175	175	180	180	180
Seychelles	..	..	..	..	..	..	..	..	..	..	..
Sierra Leone	22	23	25	26	28	30	32	32	34	34	34
Somalia	150	105	105	110	110	190	112	114	116	118	118
Sudan	1790	1800	1818	1833	1848	1860	1870	1880	1890	1900	1910
Swaziland	58	60	60	60	62	62	62	62	62	62	64
Tanzania	120	122	124	126	127	129	146	150	153	150	152
Togo	6	7	7	7	7	7	7	7	7	7	7
Uganda	6	8	8	8	9	9	9	9	9	9	9
Zaire	7	8	8	8	9	9	9	10	10	10	11
Zambia	19	20	23	25	28	20	20	30	32	32	32
Zimbabwe	130	150	178	185	192	180	185	216	220	220	220

Source: Food and Agriculture Organization of the United Nations; World Bank BESD Database.

Table A9. Elasticities of Agricultural Output with Respect to Factors of Production

Study No. of Countries	Kawagoe Hayami, Rutan (22 LDCs)	Bhanta- charjee (22)	Hayami (38)	Hayami Rutan (38)	Evenson Kisley (36)	Nguyen (40)	Yamada Rutan (41)	Anile (66)	Mundlak Helling (58)	Darwan Zimbabwe ^a	Gezira Sudan ^b	Chiwesh Zimbabwe ^c	No. Nigeria ^d	Eastern Burkina ^e	Tshibaka Zaire ^f	Cleaver Cote d'Ivoire ^g
Factor																
Labor	0.534 to 0.608	0.30	0.45	0.40	0.20	0.35	0.35	0.40	0.40	0.06	0.33	0.07	0.36	0.74	0.34 to .44	0.45
Land	Insignif. to 0.094	0.40	0.20	0.10	0.10	0	0	0.15	0.20	0.82	0.37	0.51	0.42	0.20		(0.45)
Livestock	0.140 to 0.318	0	-	0.25	0.35	0.30	0.25	0.20	0.20							
Fertilizer	Insignif. to 0.162	0.30	0.20	0.15	0.10	0.15	0.25	0.10	0.10							0.10
Machinery	0.060 to 0.136		0.15	0.10	0.10	0.20	0.15									0.05
General Education																
Literacy Ratio	0.276 to 0.287															
School Enroll.	.405 to .405		0.45	0.40		0.25	0.25	0.25								
Tech. Education	0.166 to 0.178		0.10	0.15	0.10	0.20	0.15									
Research					0.10			0.20								
Infrastructure								0.20								
Rainfall								0.20								0.10

a. Smallholder, highland, rainfed, black soils, animal traction.

b. Medium-scale, irrigated, black soils, mechanized.

c. Smallholder, highland, rainfed, red soils, animal traction.

d. Smallholder, rainfed, red and brown soils, animal traction and hand hoe. Millet and sorghum accounted for 54 percent of acreage. Productivity expressed in sorghum, assuming a producer price of 1/2 shilling per kilogram.

e. Smallholder, rainfed, red soils, animal traction and hand hoe.

f. Factor elasticity is 0.44 for male labor and 0.34 for female labor.

g. Land was not specified as a separate input because of its close connection with labor. An expanding labor force clears new land using little in terms of modern inputs and equipment. The coefficient with respect to labor, therefore, measures the effects of labor and land together.

Sources: J. M. Anile, *Infrastructure and Aggregate Agricultural Productivity: International Evidence*, Economic Development and Cultural Change, Vol. 31, pp. 609-19, 1983.

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Table A10. Rating Countries by Performance

Countries Performing well in:				
Country	Agr. Policy ¹	Fertilizer ²	Extension ³	Infrastructure ⁴
Benin	x		x	
Botswana	x	x		x
Burkina Faso	x		x	
Burundi	x			
CAR	x	x		
Chad		x		
Congo	x			
Cote d'Ivoire		x	x	x
Gabon	x			
Ghana	x	x	x	
Guinea	x	x	x	
Kenya	x		x	x
Madagascar	x			
Malawi	x	x	x	x
Mali	x		x	
Mauritania		x		
Mauritius	x			x
Mozambique	x			
Niger	x		x	
Nigeria	x	x	x	
Rwanda	x	x		
Senegal		x		
Tanzania	x	x	x	
Togo	x	x	x	
Uganda	x		x	
Zambia			x	
Zimbabwe			x	x

¹ Countries were judged to be "performing well" regarding agricultural policy if they either reduced overall taxation of agriculture or raised real producer prices for agricultural exports in the period 1981/83-1989/91; the underlying data are in World Bank, *Adjustment in Africa*, Oxford University Press, 1994, Figs. 3.3 and 3.4.

² Countries were judged "performing well" regarding fertilizer, if fertilizer consumption (nutrients per hectare) increased at more than 3 percent p.a. from 1986 to 1991 (Table 3), excluding Congo which suffered a 10 fold decline in the 1970s and early 1980s.

³ Based on World Bank project supervision reports about the quality of national extension systems at the end of the period (see also Aruna Bagchee, *Agricultural Extension in Africa*, World Bank Discussion Paper 231, February 1994.)

⁴ S. Carapetis, H. Levy, T. Wolden, *The Road Maintenance Initiative*, World Bank Economic Development Institute and Economic Commission for Africa, September 1991. Kenya was added due to successful investment in rural roads since 1991.

Table A11. Sub-Saharan Africa: Agricultural Value-Added and Agricultural Land

Country	1991 Value-Added in Agriculture (\$m current)	Percent of Total for SSA	Cum. % of Total for SSA	Total Land (million ha)	Potentially Cultivable Land (million ha)	Remaining Reserves of Cultivable Land (million ha)	Percent of Total
Nigeria	12271	25.8	25.8	91.1	47.9	7.1	1.3
Ghana	3404	7.2	33.0	23.0	11.0	4.9	0.8
Cameroon	3172	6.7	39.7	46.9	31.5	21.6	3.8
Ethiopia	2822	5.9	45.6	110.1	24.9	7.0	1.2
Cote d'Ivoire	2754	5.8	51.4	31.8	14.1	5.5	1.0
Sudan	2625	5.5	56.9	237.6	63.5	46.9	8.4
Zaire				226.8	177.7	160.0	28.5
Kenya	1895	4.0	60.9	56.9	6.7	0.6	0.1
Uganda	1425	3.0	63.9	20.0	10.7	3.3	0.6
Tanzania	1352	2.8	66.7	88.6	36.6	20.2	3.6
Senegal	1129	2.4	69.1	19.2	9.7	3.7	0.7
Mali	1082	2.3	71.4	122.0	16.8	7.9	1.4
Zimbabwe	1082	2.3	73.7	38.6	15.9	10.5	1.9
Burkina Faso	1074	2.3	76.0	27.4	10.7	3.3	0.6
Niger	877	1.8	77.8	126.7	11.8	0.3	0.1
Mozambique	854	1.8	79.6	78.4	41.4	33.4	6.0
Guinea	850	1.8	81.4	24.6	7.5	2.0	0.4
Madagascar	822	1.7	83.1	58.1	32.8	28.3	5.0
Rwanda	812	1.7	84.8	2.5	0.9	..	0.0
Malawi	701	1.5	86.3	9.4	4.1	0.9	0.2
Benin	692	1.5	87.8	11.1	6.3	2.8	0.5
Zambia	603	1.3	89.1	74.1	51.1	44.7	8.0
Burundi	565	1.2	90.3	2.6	1.0	..	0.0
Togo	531	1.1	91.4	5.4	2.1	0.1	0.0
Chad	528	1.1	92.5	125.9	17.0	7.6	1.4
CAR	497	1.0	93.5	62.3	35.8	29.4	5.2
Gabon	425	0.9	94.4	25.7	12.9	12.4	2.2
Congo	356	0.7	95.1	34.2	21.7	20.7	3.7
Sierra Leone	319	0.7	95.8	7.2	2.6	0.4	0.1
Mauritius	248	0.5	96.3	0.2	0.1	..	0.0
Mauritania	226	0.5	96.8	103.0	1.4	0.3	0.1
Namibia	194	0.4	97.2	82.3	0.7	..	0.0
Botswana	190	0.4	97.6	58.5	1.7	..	0.0
Guinea Bissau	96	0.2	97.8	2.8	0.3	..	0.0
Lesotho	82	0.2	98.0	3.0	0.3	..	0.0
Sub-Totals	47528	100.0	100.0	2243.8	817.2	561.3	100.0
South Africa	4594						
Totals	52122			124.6	77.3	71.5	12.7

Note: Not recorded (Av. 1987-89 Agr. Value-Added [\$m of 1987] in parentheses): Angola (905), Cape Verde (37), Comoros (73), Djibouti (9), Equatorial Guinea (70), Gambia (55), Liberia, Sao Tome & Principe (16), Seychelles (13), Somalia (637), Swaziland, Zaire (2286). Sources: WDR 1993, pp. 244-245; ADI 1992, p.17.

Note: Estimates of Potentially Cultivable Land are based on knowledge of length-of-growing -period zones and crop requirements. "In theory, this will leave more than 550 million ha of potentially cultivable land still to be exploited, much of it in Central Africa. Many constraints such as the presence of trypanosomiasis and the instability of soils once the natural vegetation is removed will have to be overcome, however, before this land can be brought into use; its cultivation will require greatly increased use of inputs such as credit, fertilizer, improved seed and mechanization, and road and rail communications will also have to be improved. Moreover, much of it is already in use for forestry or grazing." FAO, *African Agriculture: The Next 25 Years. Atlas of African Agriculture*, 1986.p.52.

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Notes

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² Purchasing power is based on a common set of international prices applied across all countries that are served by the International Price comparisons project. See van Holst Pellekaan, Jack, Tim Marchant, and Antoine Simonpetri. 1994. *The Many Faces of Poverty in Africa*. Technical Department, Africa Region. Washington, D.C.: World Bank.

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²⁸ Other measures of performance such as food security, land tenure security, and soil conservation measures were too subjective to include.

²⁹ Countries excluded from the table include those for which data was not available.

³⁰ All data based on World Bank. Social Dimensions of Adjustment and Project-Data Bank; and World Bank, African Country Poverty Assessments/see following pages).

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