

PN-AAN-607/62
ISN- 31779

AFRICA: FOOD PRODUCTION TRENDS AND
PROSPECTS FOR THE 1980s

Bureau for Africa
Agency for International Development
May 1980

CONTENTS

	<u>Page</u>
SUMMARY	iii
I. The African Food Situation	1
Population	1
Food Production	6
Food Deficits	8
Nutritional Needs	16
Trade Patterns	17
II. Factors that Affect Production	20
Natural Resources	20
Land	22
Labor	23
Management	26
Food Policy	29
-- Historical Perspective	29
-- Pricing and Marketing Policy	31
Agricultural Research & Technological Change...	34
Financial Limitations	37
Infrastructure	38
-- Transport	38
-- Energy	41
III. Elements of a Food Production Strategy for the 1980s and Some Program Options	44
Efficiency of Use of Agricultural Resources ...	45
Expansion of Rainfed Agricultural Base	47
Intensification of Land and Water	49
Reduction of Loss/Pests and Disease	52
Alterations in Agricultural Policies	54

List of Tables and Figures

	Page
<u>Tables</u>	
1. Arable and Permanent Cropland Per Capita	5
2. Average Annual Percent Growth in Urban and Rural Populations	7
3. Trend-Based Projections of Food Deficits for Sub-Sahara Africa	12
4. Modern Input Use	15
5. Percent of Labor Force in Agriculture, 1960 and 1975	27
6. Selected African Countries: Energy-Related Indicators	42/43
<u>Figures</u>	
1. Index of Food Production Per Capita	2
2. Population Growth Rates	4
3. Yields for Cereals	9
4. Yields for Roots and Tubers	10
5. Yields for Pulses	11
6. Africa: Volume of Grain Imports, 1960-79	18
7. Africa: Price of Grain Imports, 1960-78	19
8. Africa: Balance of Trade, 1966-1976	20
9. Land Productivity Classes in Africa	21
10. Land Development Costs	24
11. Permanent Cultivation in Africa	25

AFRICA: Food Production Trends
and Prospects for the 1980's

Summary

Poor agricultural performance in Africa remains the main cause of persistent poverty, directly in the rural areas and indirectly in the cities. Millions of people are malnourished and their health is seriously threatened or so sufficiently impaired that their productivity is reduced. They have inadequate income to buy the food they need and are increasingly unable to assure subsistence food production in changing eco-systems. Recent evidence suggests that Africa faces a growing food crisis and large deficits, particularly in urban areas where there is considerable shift to imported foods. With worsening balance of payments and growing debt problems, many African countries will find it difficult to secure needed food grains from international markets or through concessional assistance.

The reasons for the generally unsatisfactory state of African agriculture are complex. They include a growing rural labor shortage with an aging rural population caused by emigration of the younger people; climatic extremes and a growing scarcity of easily cultivable land, the deficiency of applied farming research, the absence of a proven technological package and crop mix for the rising cost of improved technology (fertilizer and other inputs, pest and disease prevention, extension and management) lack of physical infrastructure (roads); centralized government interference in marketing and an incentive price that is all too often biased against agriculture, especially

in the form of over-valued exchange rates, lower producer prices and subsidized urban consumption.

Despite the discouraging trends of the 1960's and 70's, Africa has the physical potential to produce surplus food grains late in this century when global deficiencies are projected to reach new records. In fact, Africa has the greatest untapped agriculture potential of any developing region. The continent is blessed with major river basins and other water resources that can eventually contribute to closing the food gap and also diversify the region exports. The sub-Sahara has the theoretical potential for putting 14 million hectares under irrigation.

In rainfed agriculture, substantial new land potential exists, particularly in east and southern Africa. Of 230 million hectares of arable land, only 118 million is in crops. Expanding this cultivated area or intensifying production for higher yields could lead to substantial increases in food. This will be costly and difficult. New agriculture production systems are needed, ones that are more environmentally sound, capable of increased income generation, and cost effective, relative to crops produced and sold.

This paper attempts to present a current picture of African food production, to suggest some implications for continuation of those trends, and to outline some strategy and program options for altering this alarming situation.

The U.S. would welcome the opportunity to join in cooperation with African governments and international agencies in efforts to develop food and agricultural production and distribution strategies for individual countries. We are prepared to expand our participation in joint programs to increase the focus of resources on the critical problems burdening agricultural productivity. We would be prepared to participate in African agriculture development planning conferences which would provide the occasion for African governments to set forth their programs and priorities and to dramatize the importance of international action.

I. The African Food Situation

Sub-Saharan Africa is the only region of the world where per capita food production declined over the past 20 years (Figure 1). Only a handful of countries--Burundi, Ivory Coast, Rwanda, Sudan, Tanzania, and Zambia--held or improved upon the per capita production achieved in the early 1960's. All other countries showed moderate to severe declines. In Angola, Ethiopia, Ghana, Niger, Uganda, and Upper Volta per capita production in 1978 was less than 80% of their earlier record.

Population

Throughout much of Africa, relatively high rates of population growth and urbanization have coincided with poor growth in overall food production.

Africa's rate of population growth increased steadily over the last 20 years--2.3% in the mid-1950's to 2.8% in the late 1970's. Africa now has the highest population growth rate of any developing region (Figure 2).

Population growth rates will continue to be high over the next decade. Indeed, Africa is the only developing region where population growth rates will continue to increase throughout the 1980's (Figure 2). Growth rates are not expected to level off until about 1990--when they will be about 3% per year.

Index of Food Production Per Capita
(Base period 1961-65=100)

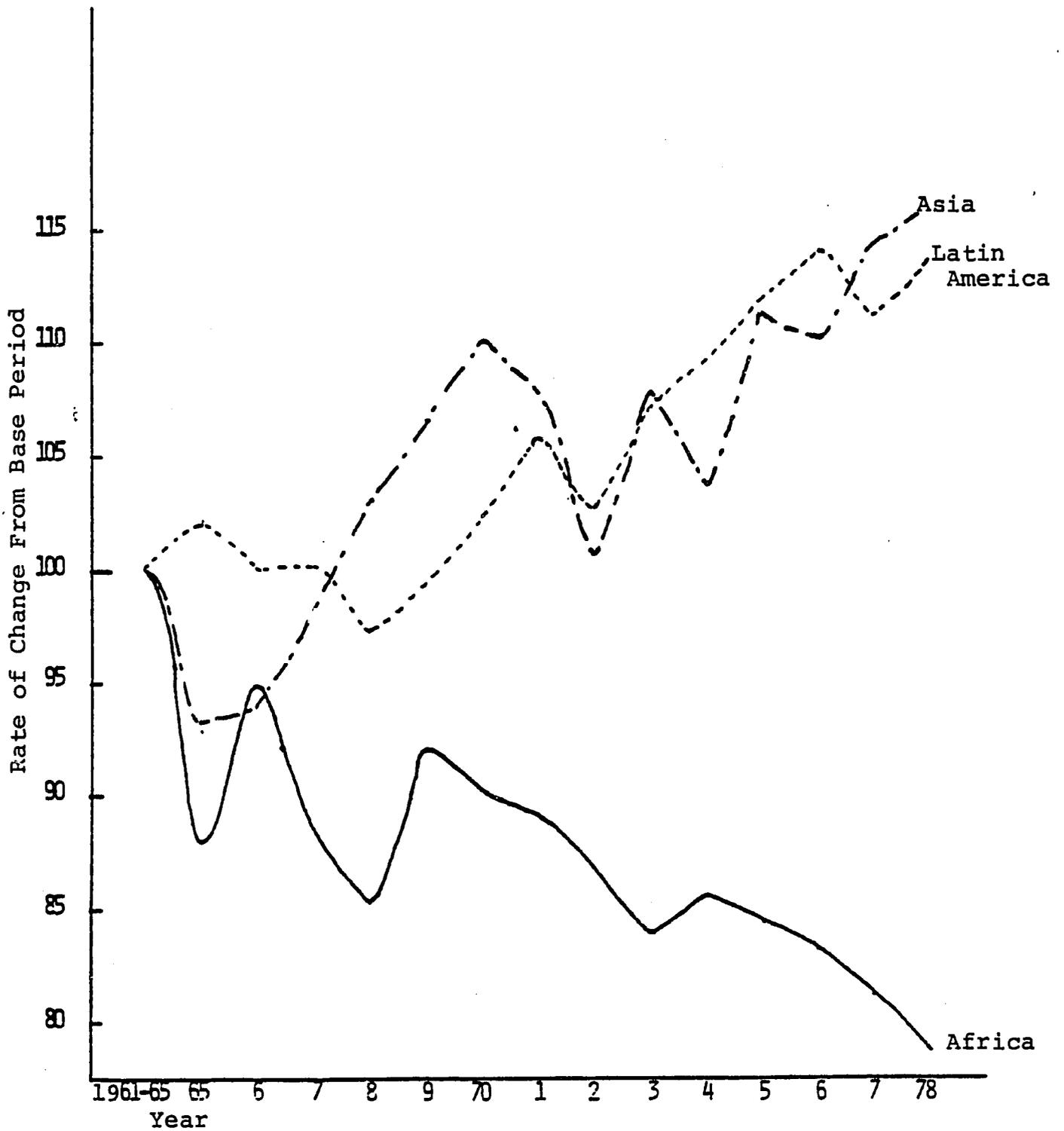


FIGURE 1

Source: USDA: Food Problems and Prospects in sub-Saharan Africa:
The Decade of the 1980's.

Attempts to slow population growth will have relatively little impact on the demand for food during the 1980's. Most of the growth in food demand projected for the next decade comes from the structure of the present population. African populations are young--often with as many as half their people under 15 years of age. The number of people in their reproductive prime will, therefore, grow during the next decade, while the infrastructure for reducing population growth is minimal.

Although there is seasonal underemployment, Africa is the only major developing region with little or no surplus labor in rural areas. Labor availability is a key factor in food production. Because of a poor technological base, food production is risky and almost totally dependent on unskilled family labor. The perception of survival is closely linked to the number of healthy offspring whose labor can be applied to the family farm. In addition, children are viewed and used as a source of insurance in old age. Given the high infant mortality rates and fragility of agriculture production, there are many real and perceived vulnerabilities, particularly in the rural areas, associated with any direct effort to reduce the number of pregnancies and units of family labor produced.

Africa is not overcrowded by global standards. On the contrary, it has more arable and permanent cropland per capita than any other developing region--about .5 ha/person (Table 1). In many places, growing population has not meant severe pressure

Population Growth Rates, 1950-2000

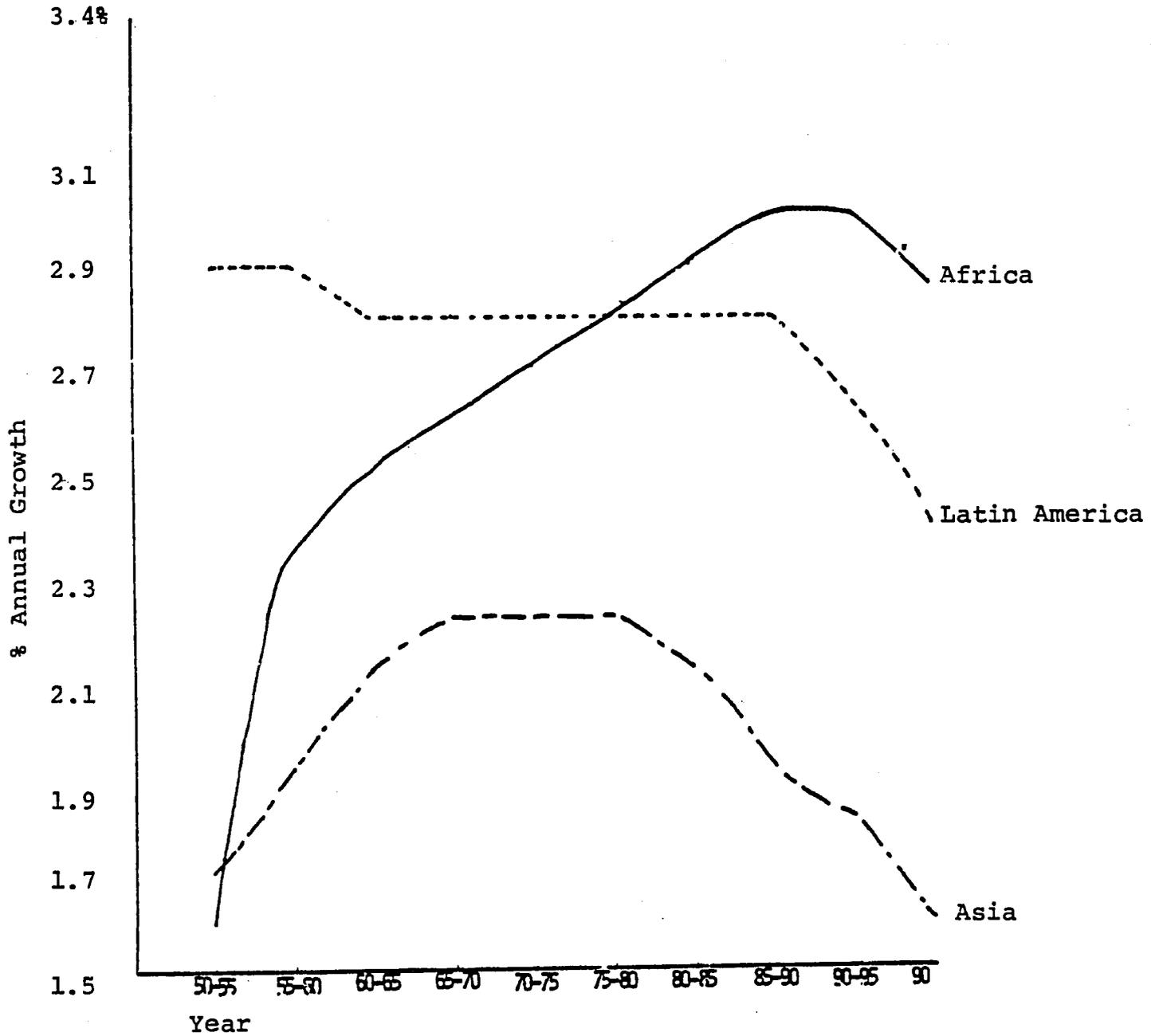


FIGURE 2

Source: Food Problems and Prospects in sub-Saharan Africa:
The Decade of the 1980's

Table 1—Arable and Permanent Cropland
Per Capita

Africa	0.54
Asia	0.20
South America	0.47

Source: FAO, Production Yearbook, 1978

on agricultural land. There are some caveats, however. Population is not evenly distributed, and where there are major concentrations of people--as along the coast and rivers in West Africa or in the East African highlands--there has been local population pressure. More important is the fact that traditional food production methods have been land extensive. In the face of rising population, there has been pressure on these cultivation systems which has, in turn, put pressure on the natural environment. Shorter fallow periods which degrade soil quality over time, and the excessive use of marginal land are two examples of such pressure.

Africa is the least urbanized region in the world, with less than a quarter of the population living in urban areas. However, urban areas are growing rapidly. Urban population growth rates of 5 percent or more per year are common (Table 2). With an annual growth rate of 5 percent, urban areas will double in population within 14 years. Many African countries, then, may have easily twice as many urbanites in 1990 as they did in 1975.

Food Production

Declining per capita food production cannot be explained by asserting that rapid population growth has absorbed the benefits of major improvements in food production. Aggregate food production has been relatively stagnant. Total food production in Africa has grown much less than in Asia or

Table 2.
 AVERAGE ANNUAL PERCENT GROWTH IN URBAN AND RURAL POPULATIONS,
 BY MAJOR REGION AND SUBREGION:
 1950-60, 1970-75, and 1980-90

	Urban Growth Rate			Rural Growth Rate		
	1950-60	1970-75	1980-90	1950-60	1970-75	1980-90
World Total	3.4	2.86	2.82	1.02	1.28	1.17
More Developed Countries	2.48	1.73	1.47	-0.26	-0.97	-1.21
Less Developed Countries	4.92	4.07	3.89	1.37	1.69	1.48
Africa	5.08	4.84	4.68	1.68	1.97	2.10
East Africa	5.64	5.67	5.43	1.98	2.37	2.50
Middle Africa	8.93	5.84	5.18	0.97	1.23	1.42
Northern Africa	4.68	4.53	4.22	1.56	1.65	1.61
Southern Africa	3.70	3.74	3.90	1.49	1.82	1.65
Western Africa	5.00	5.03	5.11	1.77	2.06	2.25

Notes: The definition of urban is that used by each country; there is some variation but most use 5000 persons as the lower limit.

These estimates have been prepared by the U.N. Population Division as medium variant, medium tempo of urbanization. They assume that urbanization decelerates after a nation is 50 percent urbanized. In some cases this may lead to underestimation for countries that continue to have high rates of rural-urban migration.

Source: "Trends and prospects in urban and rural population, 1950-2000. As Assessed in 1973-74," Population Division, Department of Economics and Social Affairs, U.N., April 1975 ESA/P/W.D. 54.

Latin America. In some countries--Angola, Ethiopia, Ghana, and Upper Volta--total food production actually declined between 1961/64 and 1978.

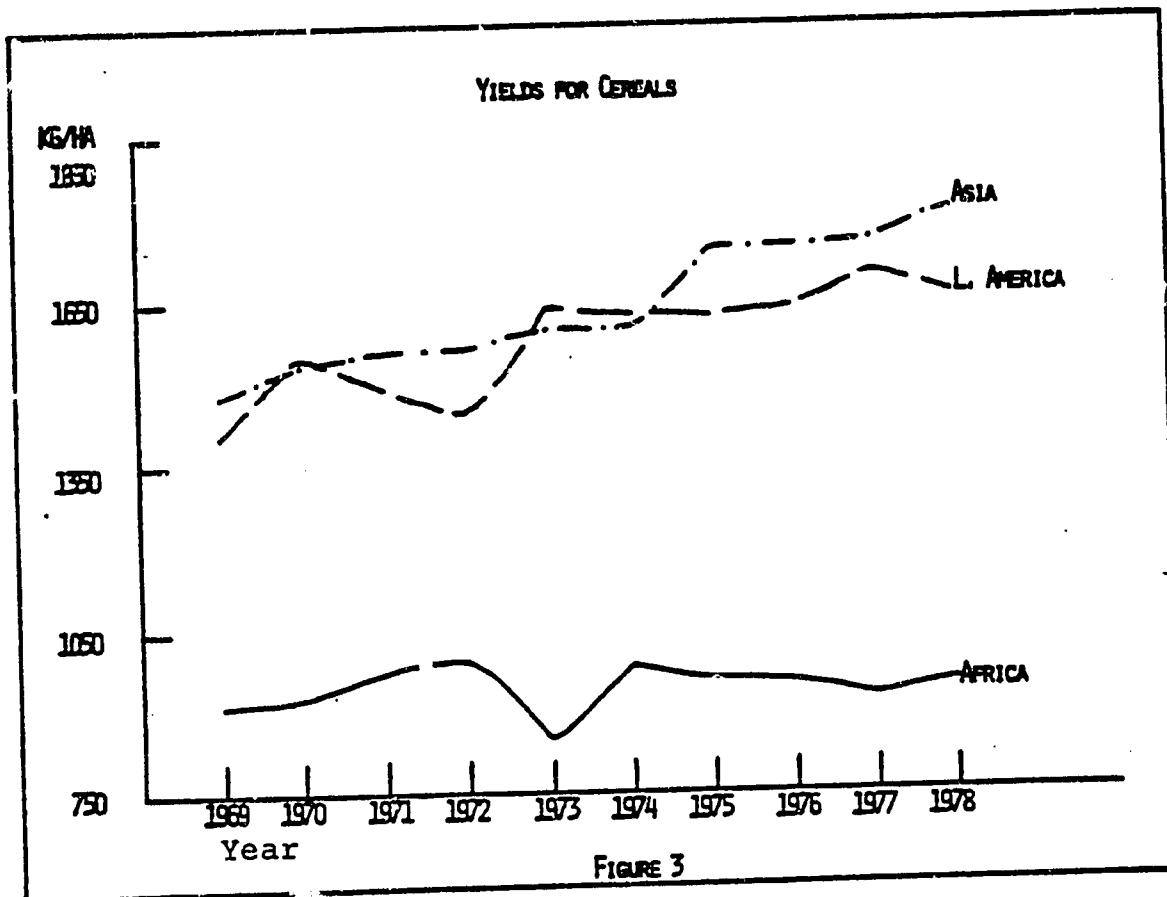
Productivity has also been low. African yields for major food crops are the lowest in the world, and are substantially below yields in other developing regions (Figures 3, 4, and 5). African cereal yields are about half those in Asia. Yields for pulses and roots and tubers are about two-thirds of Asian yields.

Food Deficits

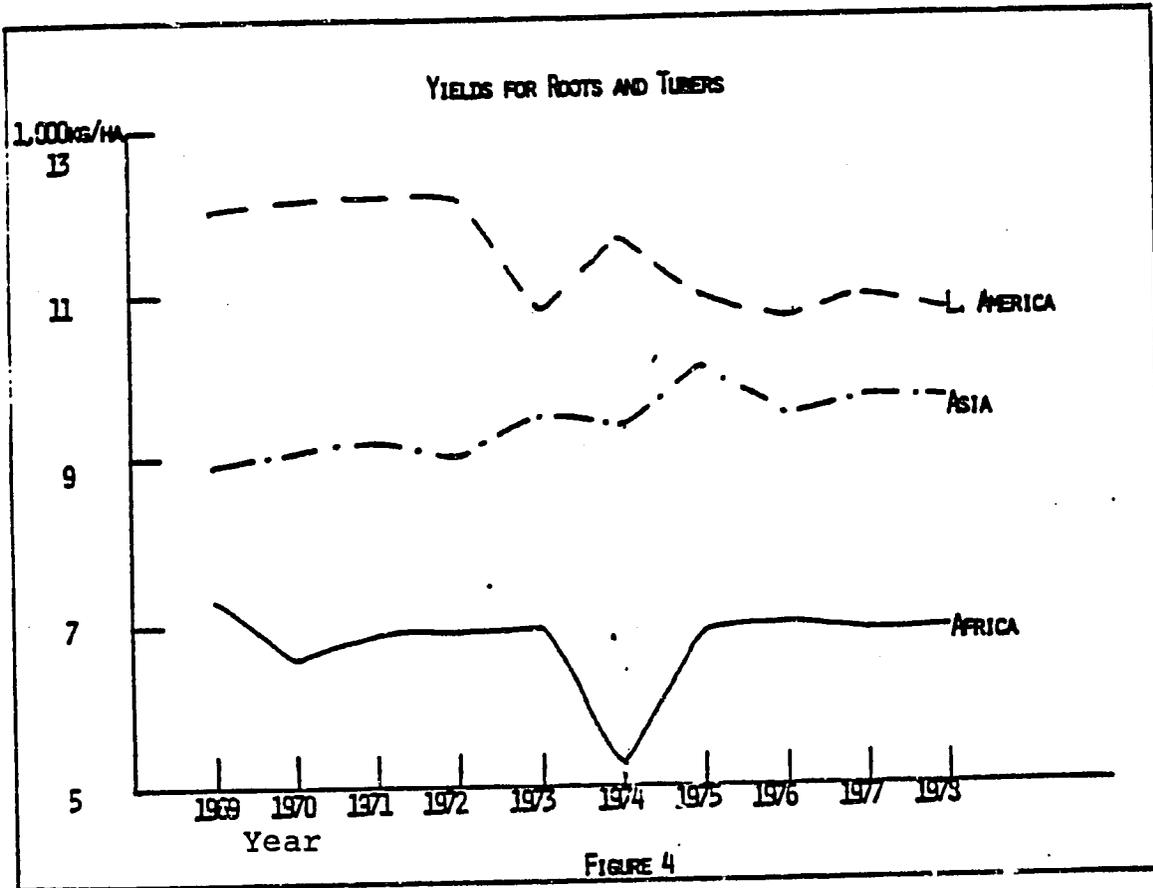
There are two major studies (FAO and IFPRI) which have focused on the future course of the African food situation. Both studies are concerned with "gap" analysis, i.e., food import deficits. These deficits are defined as the difference between the internally generated effective demand for food within the developing countries and the supply of food available from domestic production and both commercially and aid financed imports. (Table 3).

As Table 3 indicates, in 1990 the region of sub-Saharan Africa is projected to have food deficits ranging from 10.9 to 12.4 million metric tons.

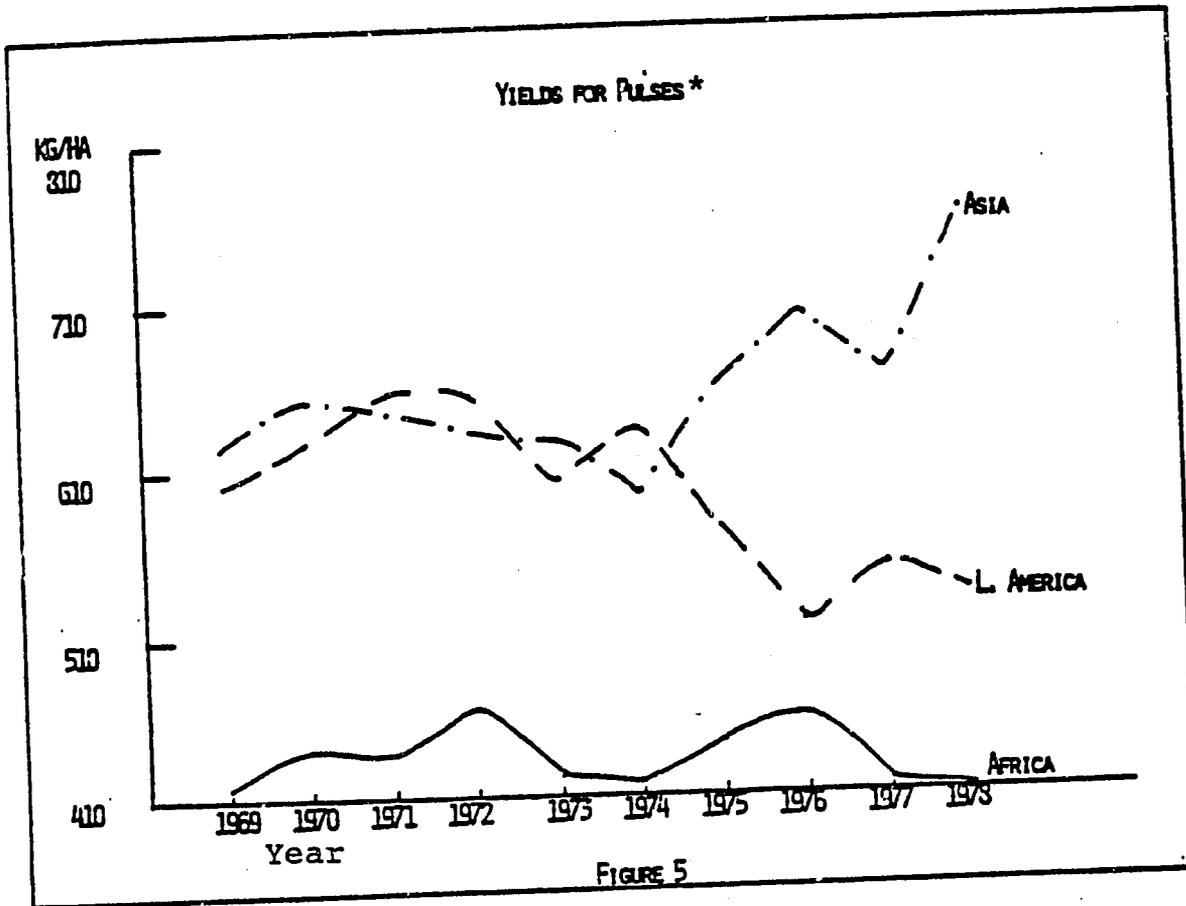
*The large variations between the two studies reflect technical differences (data sources, methodology assumptions, time frame and variables) as well as substantive differences (normative assumptions, assessment of trade-offs).



Source: Food Problems and Prospects in sub-Saharan Africa: The Decade of the 1980's, USDA.



Source: Food Problems and Prospects in sub-Saharan Africa:
The Decade of the 1980's, USDA.



Source: Food Problems and Prospects in sub-Saharan Africa: The Decade of the 1980's, USDA.

*Pulses: The edible seeds of various leguminous crops (such as peas, beans or lentils)--also a plant yielding pulse.

Table 3

Trend-based Projections of Food Deficits for Sub-Sahara Africa

(Million metric tons)		
	FAO (1985)*	IFPRI (1990)**
<u>Region</u>	-10,963	-12,442
Sahel	- 1,871	- 3,071
West***	- 4,684	- 9,435
East****	- 4,408	+ 64

*FAO figures are for cereals.

**IFPRI figures are cereal equivalents for subsistence crops.

***"West" includes IFPRI's category West minus the Sahel; and FAO's West and Central categories.

****East is as defined in FAO's single category East and Southern.

IFPRI, Food Needs of Developing Countries

FAO, Regional Food Plan for Africa

Growth in food production has depended heavily on expanded areas. In general, increases in area have accounted for most of the growth in food production, frequently offsetting declines in yields. Most food production takes place in the subsistence sector, where land extensive cultivation and elaborate cropping patterns are the major ways of managing the natural environment. Africa has the least "science-based" agriculture of any region in the world. Relatively few commercial inputs are used, and these are often applied to export crops rather than basic foodstuffs. Hence, for example, Africa uses less fertilizer than any other developing region (Table 4). In addition, relatively little effort has been made to provide systematic water control, despite expert claims that adequate water control alone could substantially increase yields. Africa has less than one-third the irrigation per hectare of South America, and less than one-twentieth that of Asia (Table 4).

Basic foodstuffs are produced primarily by unaided human labor. While the use of draft animals has been encouraged in some countries, these efforts are relatively recent and limited in scope. Mechanization is even more limited. Africa has fewer tractors per hectare of arable land than any other region in the world--less than one-sixth the number in Asia, and only one-eighth the number in South America (Table 4).

Changes in weather have a great impact on both production and yields. With little water control and few ways of dramatically increasing the amount of work which can be done in a short time, subsistence agriculture is vulnerable to changes in weather and variations in the timing of key seasonal changes. This vulnerability is reflected in dramatic variations in yields and total production.

Many of the reasons for relatively stagnant food production lie outside the farm sector, however.

- * Until recently, few African governments have had investment, marketing, or pricing policies which stimulated food production.

- * Few African countries have the staff of trained personnel which make it possible to develop and administer needed agricultural programs, or to reach a large number of small farmers with relevant knowledge, technology or input packages.

Table 4 -- Modern Input Use
(1977)

	Irrigated land as % of arable land	Tractors per 10,000 hectares arable land	Tons fertilizer per hectare arable land
Africa	1.8%	7	4.4
Asia	28.0%	45	45.4
South America	6.1%	57	38.8

Source: FAO Production Yearbook, FAO Fertilizer Yearbook,

- * Many countries have had an "urban bias" in development policies which affected not only food production policies, but the pricing of agricultural exports and the disposition of the revenue earned from them.

- * Until recently, major international donors had only limited interest in financing projects to increase food production within the subsistence sector.

- * Stable, relatively low, world market prices for cereals eased concern about growing imports, while concessional sales and food aid made imports financially attractive.

Nutritional Needs

Declining per capita food production has very serious nutritional implications. In most countries, per capita calorie availability falls below minimal nutritional standards. Even if there were no food distribution problems, there would be nutritional inadequacies in these countries. In 18 countries, per capita calorie availability was less than 90 percent of minimal requirements.

Nutritional problems are not generally diet composition problems. Traditional African diets usually provide adequate protein if calorie requirements are met. It is the supply of food, not the diet, which is most strongly linked to nutritional well being.

Trade Patterns and Financing of Grain Imports

One major response to relatively stagnant domestic food production has been to increase imports. Imports of cereals--the major traded staple food--tripled between 1960 and 1979 (Figure 6). The bulk of cereal imports were used to feed people in urban areas, often at relatively low prices. Imported grain was a cheaper way of meeting urban demand than stimulating and marketing domestic staple foods. In the early 1970's, however, the situation changed dramatically. The price of African grain imports rose from \$30 million in 1970 to over \$170 million in 1972 (Figures 6 and 7). Price increases far exceeded the growth in import volume.

Financing grain imports has become a more serious problem. The higher cost of grain has not been offset by increased export earnings in most African countries. For most African countries, the period since 1970 has brought serious balance of trade problems. Higher prices for oil caused serious balance of trade disruptions. The short-lived boom in key export commodities such as coffee, sugar, and copper which shored-up some countries' export earnings, did not offset the increased cost of imports after 1974 (Figure 8).

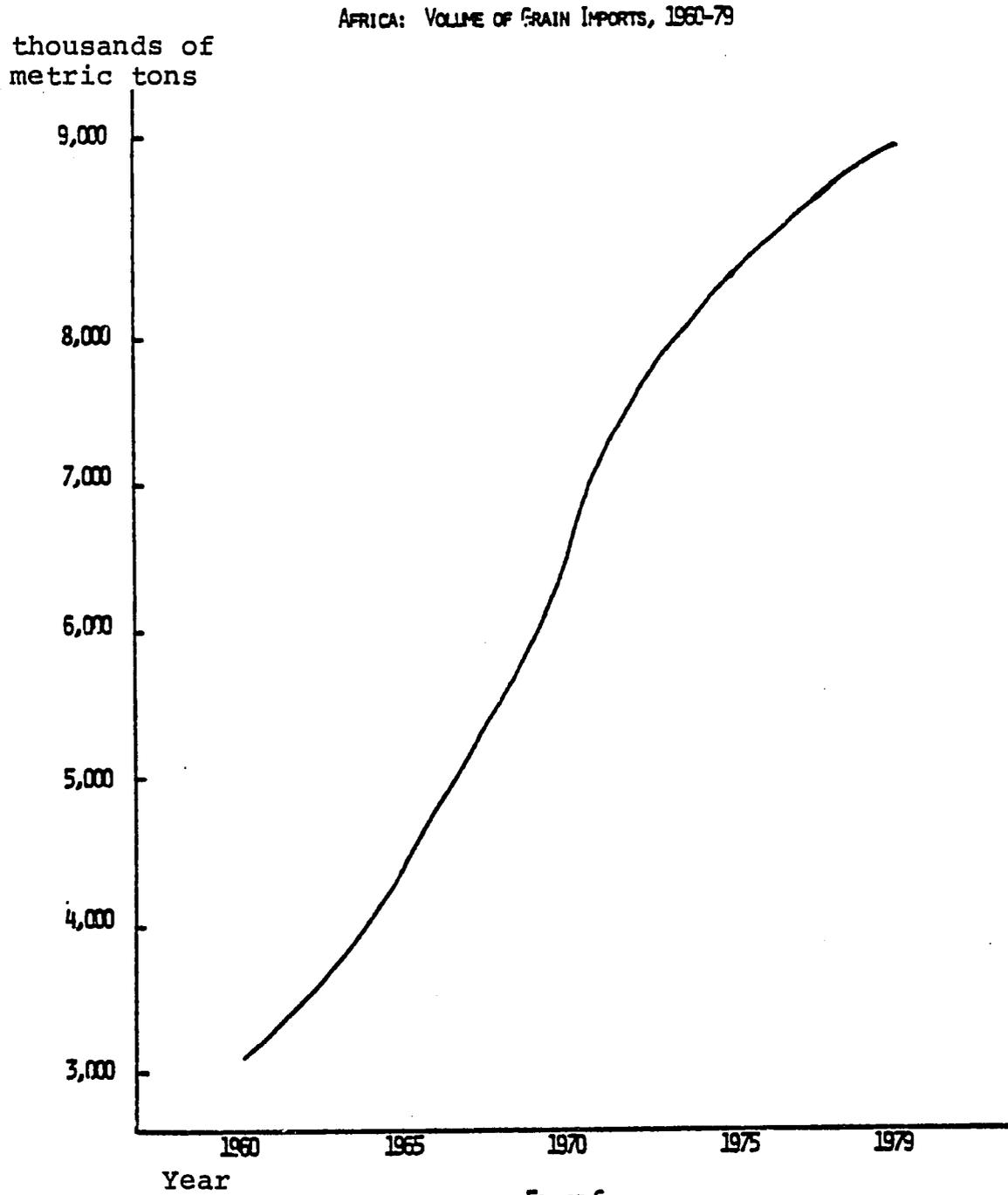


FIGURE 6

Source: Food Problems and Prospects in sub-Saharan Africa: The Decade of the 1980's, USDA.

AFRICA: PRICE OF GRAIN IMPORTS, 1960-78

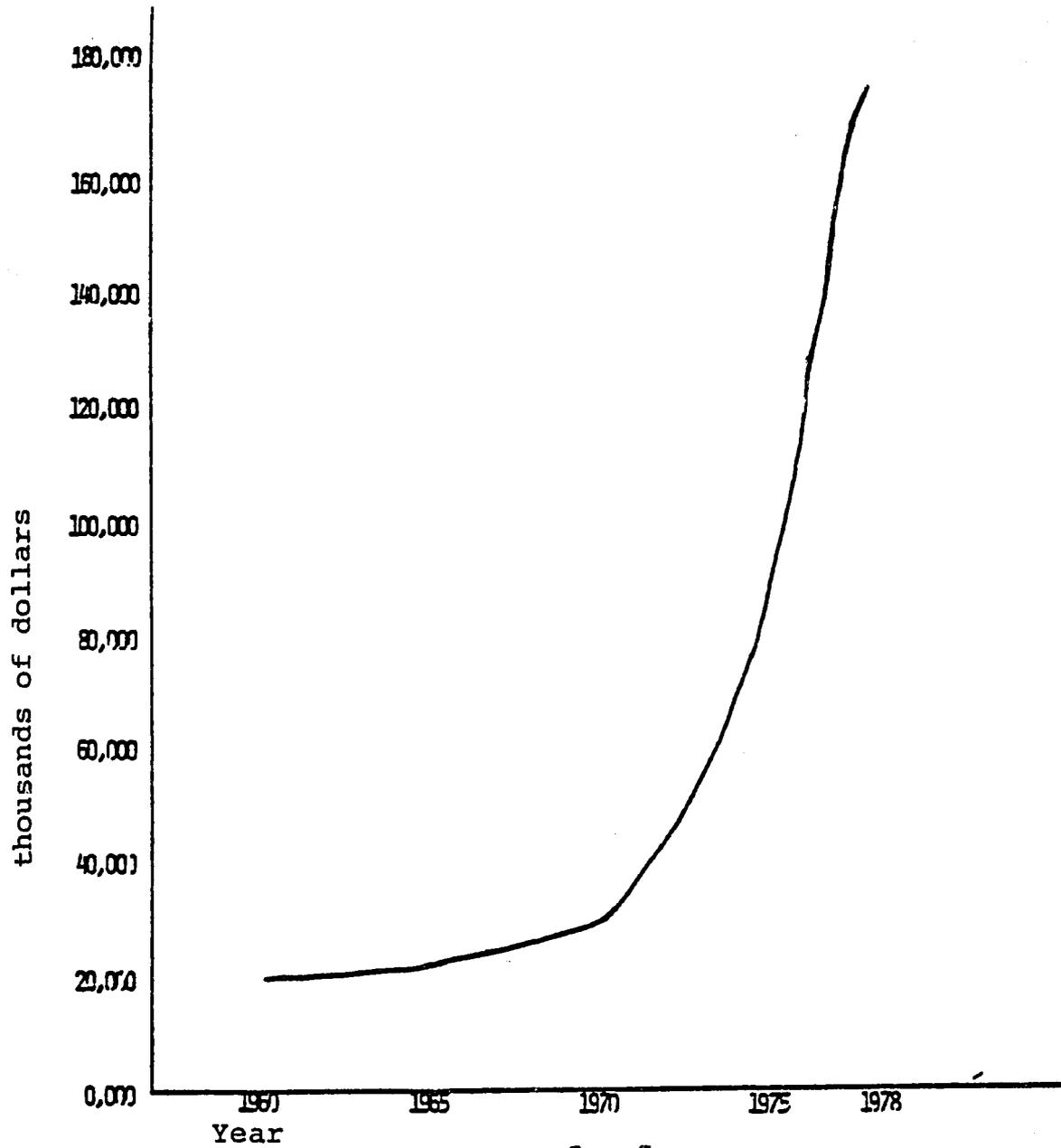


FIGURE 7

Source: Food Problems and Prospects in sub-Saharan Africa: The Decade of the 1980's, USDA.

AFRICA: BALANCE OF TRADE 1966-1976

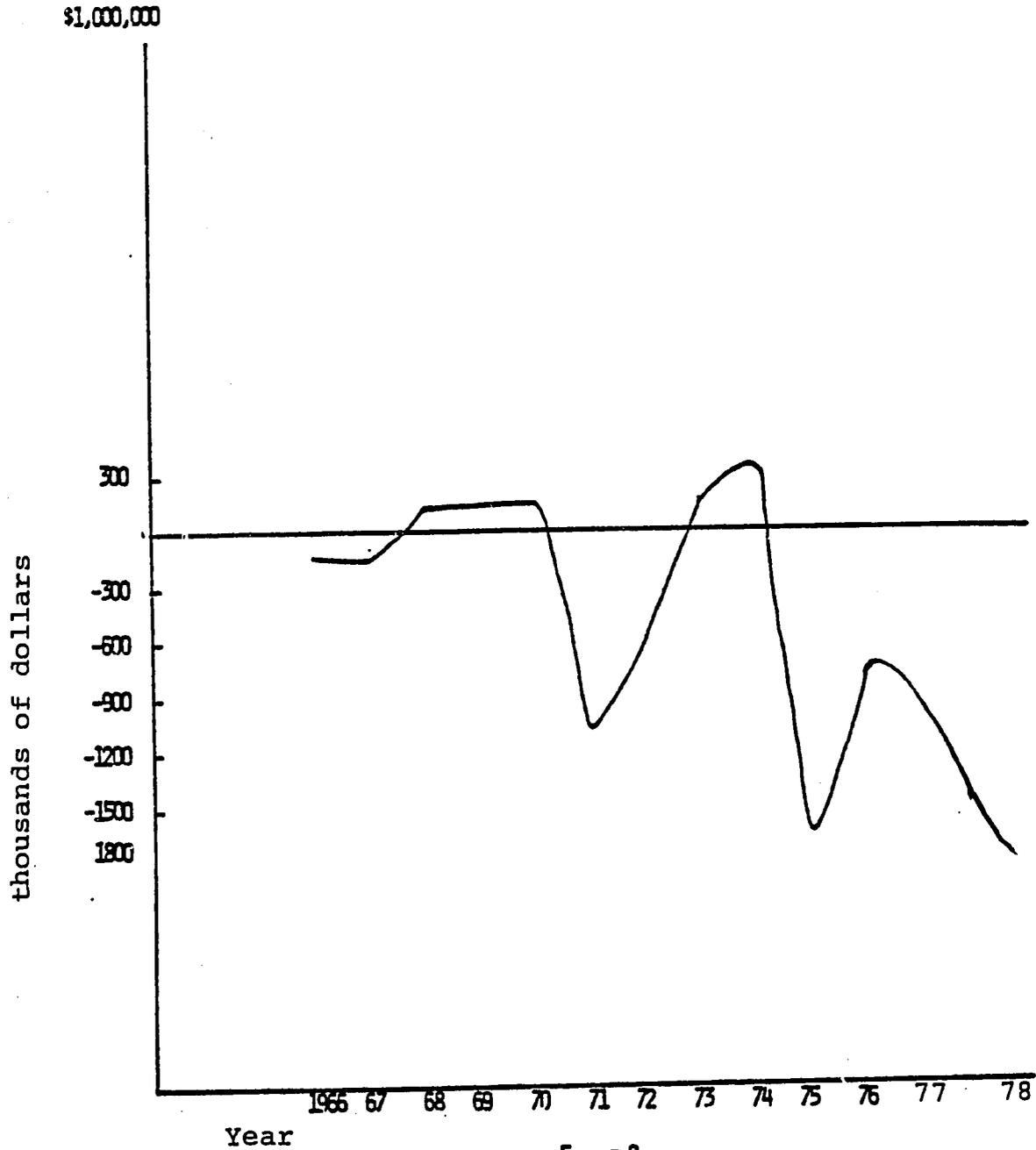


FIGURE 8

Source: Food Problems and Prospects in sub-Saharan Africa: The Decade of the 1980's, USDA.

II. Factors That Affect Production

Natural Resources

A combination of soil, temperature, and rainfall creates the environment within which agricultural production occurs. Because temperature is generally high all year, rainfall essentially defines Africa's major ecosystems

(Figure 9). These are:

- * humid lands, with a mean rainfall exceeding 1400 mm, often support tropical rain forests;
- * subhumid lands, with mean rainfall between 400-1400 mm per year, support woodland and crop production; variation in rainfall from year to year may limit agriculture--as it does in large areas of East Africa, the Sahel and Southern Africa.
- * arid lands, with a mean rainfall of less than 400 mm, will support only limited crop production without irrigation. Pastoralism is dominant.

Land quality and development costs very significantly. Africa has large quantities of land with good potential for agriculture. However, the cost of land development in the high potential region of central Africa is great--over \$3,000 per hectare. This land requires extensive clearing and soil conservation programs. Even moderate costs, however, may pose

LAND PRODUCTIVITY CLASSES IN AFRICA

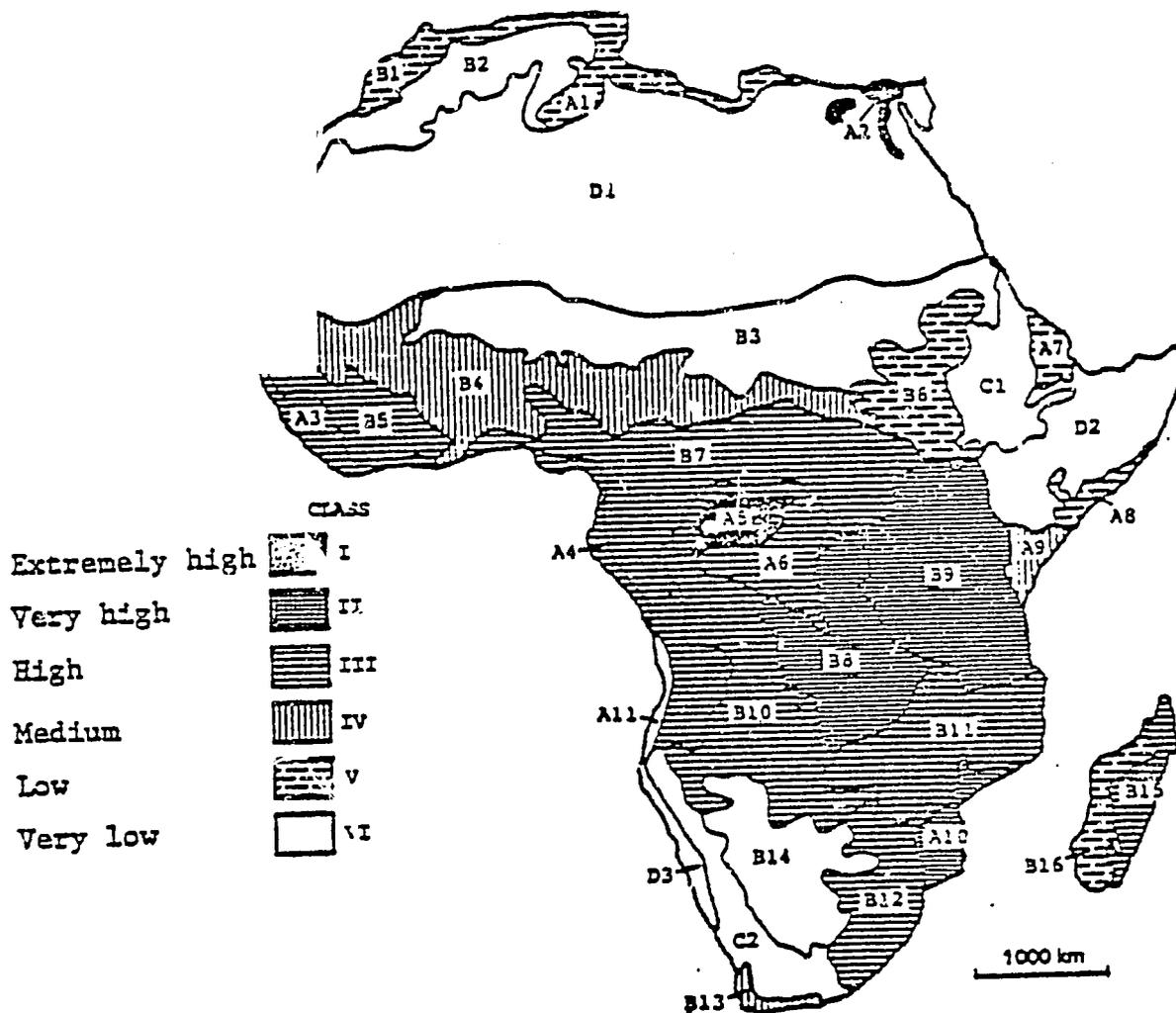


Figure 9

serious financial problems in many countries where domestic investment resources are extremely limited (Figure 10).

The fact that land has not been traditionally scarce, coupled with the rapid decline in soil fertility, led to very land-extensive cultivation and cattle raising practices.

As population pressure grows, and the demand for marketed crops increases, subsistence agriculture has been pressed to make a transition to more permanent cultivated based on techniques for restoring soil fertility through a combination of natural and manufactured inputs. Failure to make this transition successfully will mean both a deterioration of the natural resource base and greater rural poverty (Figure 11). Similarly, in some areas, increased population, expanded cultivation in semi-arid grazing zone, and a rising demand for marketed meat has begun to put pressure on traditional nomadic practices. Environmental damage and increasing poverty and malnutrition for pastoralists is likely if a successful transition to more viable sedentary practices is not made.

Land Tenure

Communal land tenure systems are associated with land extensive, mobile subsistence agriculture. Throughout much of the continent, individuals do not have permanent, transferable title to the land they cultivate. Membership in a tribe, family or community--plus a demonstrated intent to use the land--gives individuals the right to cultivate an established portion of

land. Hierarchical land control varies substantially. The basic pattern of communal land tenure, however, prevades the continent.

Some scholars argue that as the transition to more permanent, input intensive agriculture becomes imperative, changes in land tenure will also be necessary. There are two major claims. First without some relatively permanent stake in a well-defined piece of land, investment incentive will not be adequate. Communal holdings are vulnerable to the "problem of the commons." There is under-investment in measures which would benefit all those using the land because it is expensive--and sometimes self-defeating--for individuals to undertake them without wider cooperation. Second, if loans are to be made available to subsistence farmers, clear title to land is frequently preferred (or required) as a way of securing the loan. Abolishing communal subsistence land tenure may not be a necessary step toward more viable intensive cultivation. However, maintaining it would require attention to the special problems it creates, and developing effective ways of coping with them.

Labor Resources

Although there has been some decline in the portion of the labor force in agriculture, in most African countries it is still above two-thirds (Table 5). In most countries, the agricultural labor force is composed primarily of families cultivating land for their own subsistence. Plantation or estate labor and employment on state farms are less significant.

Land Development Costs

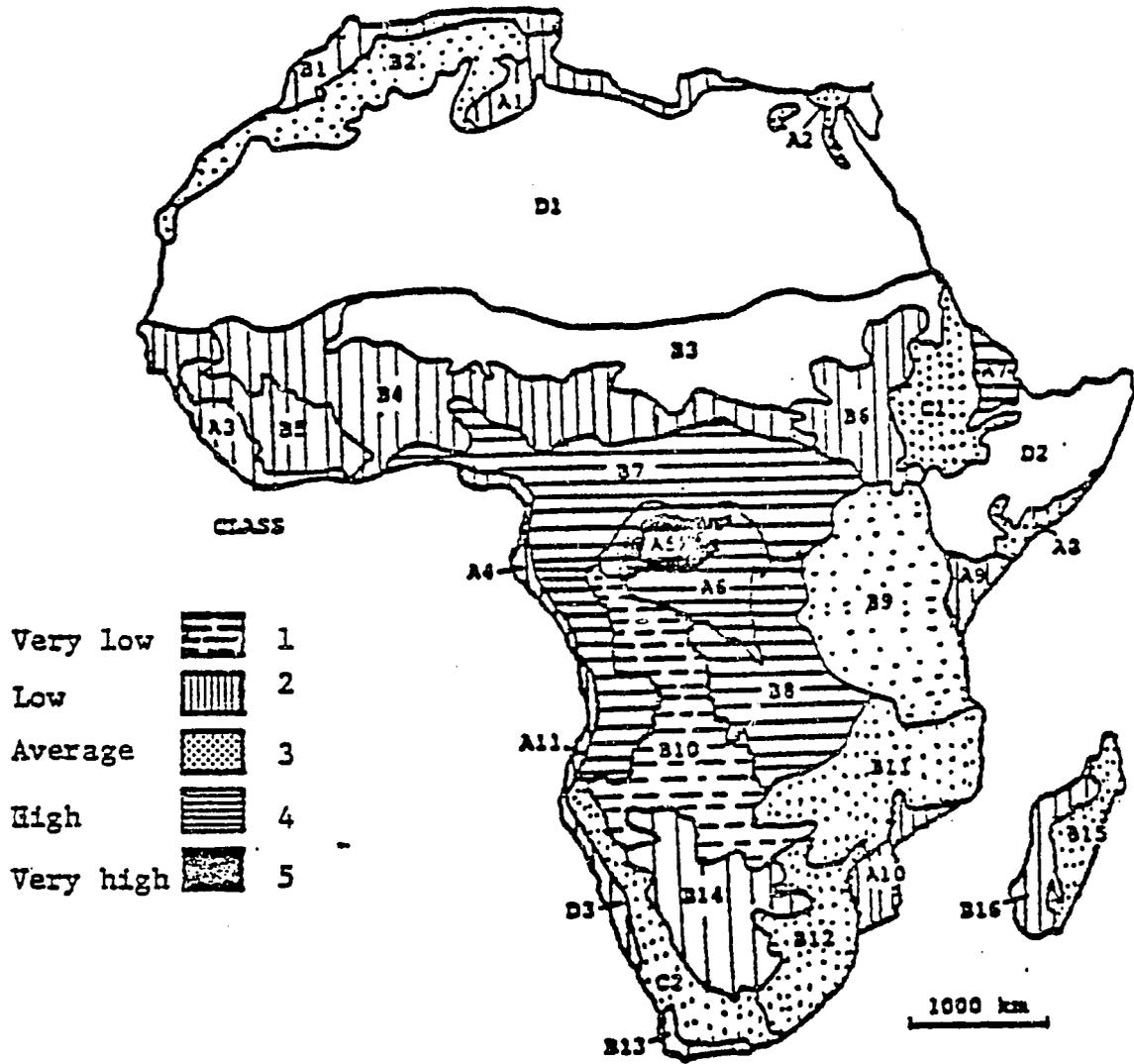


Figure 10

Permanent Cultivation in Africa

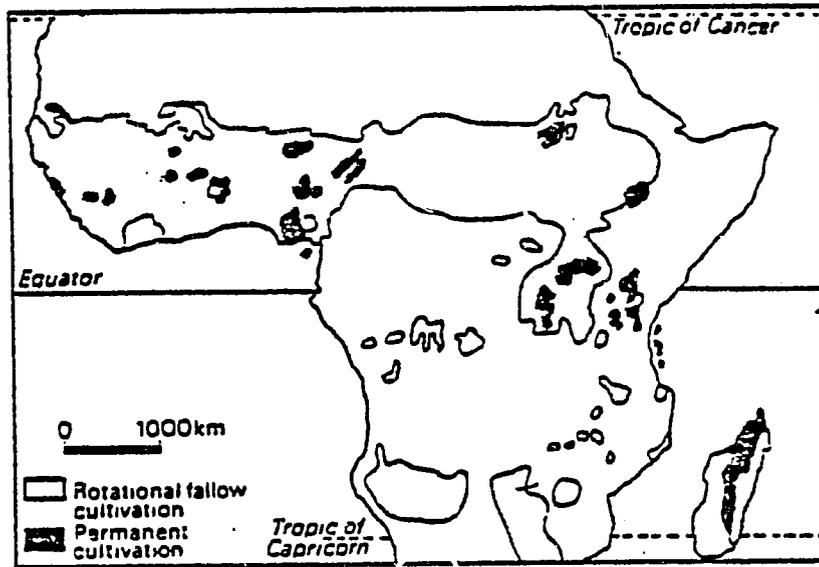


Figure 11

In general, there is not the problem of "surplus labor" which characterizes much of South Asia. There are several reasons. First, most areas have not experienced intense population pressure on land resources. Second, traditional subsistence agriculture is extremely labor intensive. In many areas, cultivation is done entirely with human labor, using simple tools. Land clearing--a key element of many shifting and rotational systems--is done by hand. Climate patterns often leave relatively short periods for land preparation, planting, and harvesting. Hence, many parts of Africa suffer from severe peak labor problems. Activities such as weeding--which could lead to yield increases--are suboptimally performed because labor is demanded for other tasks.

Women are frequently responsible for a major share of food cultivation. In some part of East and West Africa where export crops are grown by small farmers, men divert their labor primarily to export crops--women to food crops. In other areas, men engage in hunting and fishing, with women responsible for cultivating food crops. This has important consequences for extension and training programs designed to increase basic food production, for training and extension efforts have generally been male-dominated and male-oriented.

Management Resources

The historical records suggests that relevant management capabilities are weak. Lack of trained personnel, inefficient use of vehicles and processing equipment, inadequate cost accounting and control, and an inability to effectively implement and monitor

Table 5 - Percent of Labor Force in Agriculture, 1960 and 1975

	1960	1975
<u>Sahel</u>		
Chad	94	87
Mali	94	89
Mauritania	91	84
Niger	95	92
Senegal	84	77
Upper Volta	92	84
<u>West Africa</u>		
Benin	54	47
Cameroon	79	74
Ghana	64	54
Guinea	88	83
Ivory Coast	89	82
Liberia	81	73
Nigeria	71	56
Sierra Leone	78	68
Togo	79	69
<u>Central Africa</u>		
Angola	69	61
Central African Republic	94	89
Congo	52	36
Zaire	83	76
<u>East Africa</u>		
Burundi	90	85
Ethiopia	88	81
Kenya	86	79
Madagascar	93	84
Rwanda	95	92
Somalia	88	83
Sudan	86	79
Tanzania	89	84
Uganda	89	84
<u>Southern Africa</u>		
Lesotho	93	88
Malawi	92	82
Mozambique	81	68
Zambia	81	69

Source: World Bank, World Development Report.

policies in local areas plague most countries. The preference for heavy state involvement in the national economy makes government management a key, generally scarce, resource for which agricultural programs and institutions must compete.

Broadly based change in agricultural production systems requires the ability to train and manage agricultural field workers, and to make their work relevant to local farmers. In general, national research and extension capabilities are very limited. The number of rural families served by a single field agent ranges from 250 to 800. In practice, unequal distribution of field personnel, plus transportation difficulties, make contact with the bulk of farmers sporadic at best. For many countries, the situation reflects the historically low priority given to building extension services.

In many countries, research efforts and extension services are not effectively interfaced. Tanzania has attempted to introduce more explicit coordination. Research is oriented heavily to the production of food crops. There is one field worker for every 350 farm families. However, they are clustered around research stations. Hence, coverage is spotty. In addition, the research effort in many areas is not strong enough to give field workers much new knowledge to pass on to farmers. There has been a significant diffusion of high yielding wheat varieties, but primarily to large state farms--where contact and follow-up is easier.

Food Policy - Past and Present

Historical Perspective

Historically, most African governments--and the colonial regime which preceeded them--have not put much emphasis on improving local crop production. Colonial administrations generally believe that subsistence food production would take care of itself, without much investment in inputs, research or infrastructure. In at least some countries, this view seems to have endured after independence.

More emphasis has been given to promoting export crops--primarily because they are the major source of foreign exchange for many African countries. Even here, however, the record is mixed. Agricultural policy in Africa tends to be a derived policy: the intended beneficiaries of policies are groups other than producers themselves.

The dominant thrust of food policies--at least until the early 1970s--was to keep domestic food prices low. In part, these policies were responses to organized urban pressures--as, for example in Ghana and Nigeria. The management requirements for such policies are quite different from those required to stimulate domestic food production, as both countries discovered when they tried to shift gears to "Operation Feed Yourself" (Ghana) and "Operation Feed the Nation" (Nigeria). The key policy instruments for keeping food prices low were trade price policies and government controlled marketing institutions. Attempts to enhance food production and productivity would have required additional objectives and instruments. These include promoting change in

agricultural practices (e.g., via research and extension services), making new inputs available to farmers (e.g., via effective rural institutions and adequate transportation capabilities), and providing economic and social incentives for their use (e.g., price and loan policies). Relatively little was invested in such projects.

In the aftermath of the world price increases and supply uncertainties of the early 1970s, most African countries expressed interest in becoming more self-sufficient in key food crops.

While policy statements vary, several major objectives regularly occur. They are:

- * increase production of key food crops to limit or eliminate imports
- * improve agricultural productivity (frequently for both food and export crops)
- * provide greater national food security
- * stimulate export crop diversification
- * promote general rural development

These objectives are not always consistent. Furthermore, different countries would rank them differently and accept quite tradeoffs. However, in all countries achieving some mix of these objectives will require the skillful use of both price and marketing policy and management of the institutions which affect them. In addition, it will require the capacity to stimulate, support and diffuse technological change. This capacity, in turn, rests on the design and management of agricultural projects, the creation and effective management of institutions and infrastructure for training local agricultural technicians, and the ability to control

the costs of both marketing and production efforts.

Pricing and Marketing Policies

In many African countries, the government sets at least some retail food prices. Similarly, marketing of at least some key food crops is handled by government agencies in virtually all countries. However, the success with which governments enforce the prices which are set, both at the retail and producer level varies. Hence, there is often de facto a dual pricing and marketing structure. Official prices, tied to official marketing channels, co-exist with informal prices linked to unofficial marketing practices.

There is still considerable debate about the extent to which subsistence farmers are responsive to changes in producer prices. The nature of the marketing systems and pricing policies in many countries makes it hard to estimate the relationship between price and supply. There are several reasons.

- * Where official marketing agencies set relatively low producer prices and in informal market coincides (legally or illegally) with the state marketing process, it is hard to see a clear relationship between official prices and total supply. Small increases in official prices may produce little increase in supply because farmers respond to higher--though perhaps not increasing--informal market prices. The latter prices are generally not published, however, and testing this relationship is therefore virtually impossible.

* Where official marketing agencies set prices which are dramatically higher than past prices, and in excess of the market clearing price-- surpluses can rapidly develop. This suggests that at least at some level, price increases will stimulate increased production. Recent events in Tanzania suggest that this is true even for "subsistence" crops. When the producer price of sorghum and millet doubled, with guaranteed purchases of the output, marketing increased 20 times. Supply far exceeded government expectations.

* Relationships between price and output are affected by fluctuations in supply. These are particularly critical in subsistence production.

Most African countries are relatively small, open economies, unable to effectively insulate themselves from trends in important world markets. Hence, despite a variety of policies designed to maintain low food prices, in virtually every country for which data are available, consumers saw substantial increases in food prices during the 1970s. Similarly, consumers felt the impact of higher energy prices, and the higher price of imported industrial and consumer goods.

Virtually all governments attempt to control the marketing of at least some principal foodstuffs. In many cases, the producer price is too low to provide farmers with an economic

incentive to sell to the official agency. Control is not tight enough to prevent informal markets. There are several predictable results. The state becomes a residual buyer. This often means purchasing from areas where transportation is difficult, or where volumes are too small to efficiently use the marketing vehicles. The public agency, then, undertakes the high-cost marketing, while private operators handle lower cost marketing. This increases the operating costs of state marketing agencies. There is then pressure to revise official prices (down to producers or up to consumers), or to run an operating deficit. Where grading standards are lax or nonexistent, the official agency also receives a disproportionate quantity of poor quality grain.

On the other hand, when prices to producers are set above what the informal trade will bear, markets increase dramatically, leading to policy failure.

Some countries experience high marketing costs because of the choice of technologies used to process basic foodstuffs. The problem is common to both West Africa and Tanzania milling authorities. Large capital-intensive milling equipment is cheaper than competing small scale or hand techniques only if it is run at or near full capacity. Where official markets are low, or where centrally used processing means shipping the millet product long distances to consumers, costs are higher than competing technologies. Absorbing these cost increases official marketing costs, and creates a large economic incentive for informal processing as well as marketing.

Agricultural Research and Technological Change

Technological change has at least three dimensions:

- * spontaneous innovation and change among subsistence farmers
- * diffusion of technologies and inputs-- locally made or imported
- * creating an infrastructure for research and extension

Very little research has been done on spontaneous innovation among subsistence farmers. Yet, there is some evidence to suggest that changes in cropping patterns are major vehicles for adapting to changing natural and social conditions. Furthermore, social arrangements may be vehicles for changes in production potential--as is the case when social patterns between settled agriculturalists and nomads provide for fertilization of fields and limited "grain-feeding" of livestock. The need to research the potential alternative cropping patterns has already been established in other developing regions (e.g., Asia). Less emphasis has been placed on studying the social environment as a source of indigenous innovation, more on its role as a constraint to externally induced technology diffusion.

There has been no "green revolution" in Africa paralleling that in Asia. Indeed, as the earlier analysis indicated, improved varieties and modern inputs are not extensively used in food production. Nevertheless, there have been a number of attempts to create packages of inputs which will support improved cultivation practices among small farmers. Experience in some

countries suggests that yields from improved, or even moderately improved cultivation, may be substantial.

Where there are serious attempts to introduce new technologies, careful analysis is required to avoid choosing imported technologies which are poorly matched to local consumption or production situations. The choice of rice milling technology provides an excellent example. High volume industrial milling technologies have been adopted in several West African countries. When these are run at or near full capacity--as is the case in Mali--the milled rice is cheaper than that available from alternative local mechanized and hand technologies. Where transportation and marketing costs limit the market which can be efficiently serviced from industrial mills, however, they are not cost competitive.

Mechanization of agricultural production often involves imported tractors, rather than attempts to expand draft animal use where disease patterns permit cattle-keeping. Almost invariably, these efforts have provided inappropriate--despite the real need to overcome peak labor problems and provide deeper cultivation. There are multiple reasons: repair and maintenance difficulties, medium-term yield losses associated with inadequate soil conservation, and the high cost of tractors. The Stanford study concluded that full mechanization using tractors had a lower net social profitability than less mechanized techniques in every instance for which comparisons could be made. Intermediate mechanization, and animal traction were generally more

more profitable than manual cultivation, however.

There has been some diffusion of locally produced imple-
ments for animal cultivation in West Africa. Equipment produced
in Cameroon and Senegal has been exported to several Sahelian
countries. Attempts to develop and use such local technologies
are being made in Tanzania, and to a more limited extent in Kenya.
Relatively little emphasis has been placed on technological inno-
vations which would increase the speed and efficiency of hand
cultivation.

There are a number of regional institutions designed to
promote effective local technologies for disease and pest control.
These include the Desert Locust Organization for East Africa, the
Organization Commune de la Lutte Antiacridienne et de la Lutte
Antiaviaiare (the International Red Locust Control Organization
for Central and Southern Africa), the Inter-African Phytosanitary
Commission, and the Inter-African Bureau for Animal Resources of
the OAU's Scientific, Technical and Research Commission. A num-
ber of these institutions have both research and training facili-
ties.

In addition, attempts to improve local rice varieties
are underway at the West African Rice Development Association
(WARDA), and the Institute de Recherches Agronomiques Tropicales
et de Cultures (IRAT) and the International Institute for Tropical
Agriculture (IITA).

The spread of high yielding varieties of wheat and rice has been limited, however. Rice, in particular, is plagued by disease (blast). High yielding rice varieties have been tried on a limited scale (under 1,500 hectares) in Benin, Cameroon, Gambia, Ghana, Ivory Coast, Liberia, Mali, Mauritania, Niger, Senegal, Sierra Leone, Togo, Upper Volta and Zaire. High yielding varieties of wheat have been introduced, and widely diffused in Ethiopia, Kenya, Zimbabwe, Sudan and Tanzania.

Financial Limitations

Increasing agricultural productivity will require substantial investment in agriculture. Past investment in agriculture has, in general, been small. There are some exceptions. Chad, Congo and Rwanda spent 20 percent or more of total current revenue on agriculture in 1973; Senegal, Burundi, Malawi and Sudan invested more than 25 percent of total capital expenditure in agriculture.

New development plans generally call for slightly higher investment in agriculture. However, most African governments already face serious resource constraints. For some of the poorest, plans will be pursued only with external assistance.

African countries by and large, face serious balance of payment problems which act as a constraint to greater imports of agricultural inputs (e.g., fertilizer), as well as to undertaking many large-scale projects which require imported materials or expertise (e.g., irrigation). For many countries, food and energy imports take a large share of their export earnings.

Rural Infrastructure

Transport

Rural roads constitute the key link between farmers and the market. They not only provide access to agricultural inputs and services associated with new production technologies, but also reduce the cost of marketing agricultural output, thereby increasing the profitability of those technologies. They facilitate the flow of information and ideas, provide access to health services and education facilities, and encourage the expansion of trade and the development of rural industry.

Transportation has both direct and indirect impacts on agricultural production and food supply. Increased productivity does not necessarily bring an increased supply of food for family consumption, but it does increase food supply on a national level and it may also provide the producing farm family with the means to modify its diet with food purchases they could not otherwise make.

In order to increase agricultural productivity, various inputs must reach the farm. Such items as fertilizer and improved seed are but the first step. Farmers must also be taught how to use these inputs as well as how to apply better farming practices in general. The ability of extension service program to reach target groups, however, can be affected as significantly by transport constraints as can the supply of physical inputs.

Increased potential productive capacity does not automatically result in an increase in national food supply. It is

not just the arrival of the inputs but the conviction of the farmer that it is worth his while to use these inputs that results in an actual increase in production. The farmer must also be convinced that he has access to marketing services which will facilitate profitable sale and, in turn, distribution of his crop.

As a result of population distribution and topography in Africa, markets are usually distant from crop production areas. These may be urban areas or other rural areas which do not have the capacity to feed themselves or, alternately, whose seasonal growing patterns require shifting food from one area to another. Food crops may also be destined for marketing outside a country. Time is a very important factor in the transport of perishable food items and plays a significant role in the cost of food in the region.

Increased access to a region and for residents for a region to the national transport system can affect income generation both directly and indirectly:

- * Increased access can reduce tariff and time cost of transporting items to market, thus making them more competitive both in real and perceived terms.
- * Increased access can increase the number of buyers for agricultural products. If prices have been artificially held low by a monopolistic buyer, unit prices can also increase.

- * Prices paid for consumer goods may fall as a result of lower transport costs--resulting in a greater real income for the farmer--and the choice of items is also likely to increase.
- * Access may provide sufficient economies of scale to permit small-scale industrial development in remote areas, making local products more competitive and increasing local demand and return to the local producer.
- * Increase access leads to increased traffic. This in turn can stimulate such support services as garages and offer new opportunities for employment.
- * Transport projects can in themselves require labor inputs for construction and maintenance. Such employment could be short-term or seasonal and could provide either supplemental or permanent employment for underemployed workers in the agricultural sector.
- * Increased access can provide off-farm employment away from home either on a seasonal or temporary basis, in both farm and non-farm employment. This can be especially important in an economy with high underemployment in the agricultural sector.

Energy

There is a close relationship between agricultural development and energy use. The substitution of mechanical power and human and animal power and the increasing energy requirements of transport, marketing, and processing of inputs and outputs are both causes and effects of increasing agricultural productivity and incomes. The most widely used sources of energy are currently wood (particularly for food preparation) and petroleum (for on-farm mechanization, transport, and fertilizer production.)

Over the next 20 years, the price of imported energy (oil products) will very probably double, and possibly triple, compared to present prices. Thirty countries depend on imports--mainly of oil--for well over three-fourths of their commercial needs. Payments for these imports consume an increasing proportion of scarce export earnings. Kerosene, historically an early replacement for vanishing firewood, is already high in price and is in increasing short supply.

In 19 countries, firewood makes up more than four-fifths of total energy used - commercial and non-commercial combined. Already demands exceed sustainable supply (Table 6).

There are however a number of technical alternatives to reduce energy consumption in agriculture. For example, irrigation by gravity, electric or solar pumps, animal traction rather than power by tractors, greater use of agricultural waste and new agricultural techniques that yield nitrogen from other sources.

TABLE 6

SELECTED AFRICAN COUNTRIES:
SOME BASIC ENERGY-RELATED INDICATORS

Country	Energy import dependence imports as % of total commercial energy 1975	Exports (merchandise trade) U.S. %mil- lion 1976	Energy imports as a % of Mds export earnings	Total Energy Consumption: 1976			Population (millions) mid-1977
				Commercial energy consumption	Woodfuel consumption	Woodfuel consumption as a % of total energy	
				Per capita consumption, in kilograms of coal equiva.			
Algeria	Net exporter	5,061	2	729	30	4	17.0
Angola	Net exporter	535	2	166	461	74	6.6
Benin	100	51	43	49	300	86	3.2
Burundi	100	55	na	12	95	89	4.2
Cameroon	79	511	10	98	434	82	7.9
Central Afr. Rep.	89	52	16	41	439	91	1.9
Chad	100	63	27	23	347	94	4.2
Congo	Net exporter	182	8	142	565	80	1.4
Egypt	20	1,522	15	473	1.3	neg	37.8
Ethiopia	96	278	27	27	352	93	30.2
Gabon	Net exporter	na	na	1,279	1,013	44	.5
Gambia	100	na	na	84	208	73	.6
Ghana	78	804	18	157	452	74	10.6
Guinea	99	202	na	93	260	74	5.0
Guinea Bissau	100	na	na	58	373	87	.6
Ivory Coast	98	1,620	10	380	322	46	7.5
Kenya	97	656	54	152	430	74	14.6
Liberia	105	476	12	418	474	53	1.7
Libya	Net exporter	8,438	1	1,589	86	5	2.6
Madagascar	98	292	22	66	286	80	8.1

TABLE 6 (continued)

Country	Energy import dependence imports as % of total commercial energy 1975	Exports (merchandise trade) U.S. %mil- lion 1976	Energy imports as a % of Mds export earnings	Total Energy Consumption: 1976			Population (millions) mid-1977
				Commercial energy consumption	Woodfuel consumption	Woodfuel consumption as a % of total energy	
				Per capita consumption, in kilograms of coal equiva.			
Malawi	39	148	18	56	260	82	5.6
Mali	97	97	25	27	956	97	6.1
Mauritania	99	178	6	102	174	63	1.5
Mauritius	98	na	na	405	8	2	.9
Morocco	86	1,262	23	273	65	19	18.3
Mozambique	75	303	28	133	382	74	9.7
Niger	100	86	na	35	239	87	4.9
Nigeria	Net exporter	10,567	nil	94	430	82	79.0
Rwanda	68	81	11	17	382	96	4.4
Senegal	96	426	15	156	265	63	5.2
Sierra Leone	100	112	10	112	352	76	3.2
Somalia	100	85	10	47	443	90	3.7
Sudan	100	554	26	143	604	81	16.9
Tanzania	100	459	22	68	1,021	94	16.4

Source: Fuelwood and Other Renewable Energies in Africa. James Howe and Francis Gulick, Overseas Development Council. 31 March 1980.

III. Elements of a Food Production Strategy for the 1980s and Some Program Options

Closing the food gap in Africa will be a formidable task. The production growth rates necessary to cover the projected food deficits through 1990 range between 4.5% to 5%. For some African countries the magnitude of the challenge will be even greater since poor soils and unpredictable climate significantly expand risk and cost. With worsening foreign exchange difficulties, inflation in industrial countries and the risk that food grains could be increasingly politicized on world markets, most African nations believe that increased food supplies must come from domestic production. Some governments have adopted goals of "food self-sufficiency" for these reasons, tending to ignore the economic pitfalls of autarky policies.

Any food strategy for Africa must place simultaneous emphasis on two objectives, production on one hand and income and employment on the other. One of the main tests of a successful agriculture production strategy is whether or not the benefits of increased production and rural based growth go to the poor.

The strategies for improving food production are still complex, difficult, and in some cases still unclear. The actions that might be taken are often part of an indivisible pattern of interaction. Thus, action in one specific area is likely to be successful only if the other pieces of the "strategy mosaic" are also being addressed. There are no piecemeal or "magic" answers.

With these factors in mind, the strategy elements* might conveniently be placed in five categories:

- A. Improvements in the Efficiency of Use of Agriculture Resources.
- B. Increase in Arable Land Base.
- C. Intensification of Land, Water and Labor Use.
- D. Reduction of Losses Due to Pests and Diseases.
- E. Alternations in Agricultural Policies.

Improvements in the Efficiency of the Use of Agricultural Resources

The potential for increasing food production from existing rainfed systems has been generally underestimated and often neglected by agricultural planners. There is no apparent reason why yields from rainfed crops in well watered zones should not keep pace with those in Asia and Latin America. The suggested elements of a production strategy from existing agriculture resources would include:

- Improving access to markets, lowering of marketing costs and developing assured economic incentives. (More will be said later on pricing policies.)
- Modifications in existing agronomic practices; in planting, plowing, weeding, and use of tractors and animal traction.

*Corollary efforts are imperative in agricultural training, at all levels, and in improving the efficiency of transportation. Specific suggestions for these critical elements are not being presented since they are beyond the scope of this paper.

- Improving efficiency in the timely supply of inputs, particularly fertilizers, credit, insecticides, hand tools, improved seed and technical advice.
- Broader and more applied agriculture research. The most needed areas are in:
 - developing shorter cycle drought-resistant cereal varieties for semi-arid areas;
 - lowering the cost of technological packages for food crops, particularly fertilizer application;
 - testing more cost-effective small farmer irrigation systems;
 - research on making human labor more efficient and tasks easier;
 - the expanded use of leguminous species for lower cost nitrogen fixing and control of desertification;
 - research in mixed farming systems, to successfully combined food and cash crop production, small-scale livestock, poultry, fisheries and off-farm employment;
 - alternative sources, including organic wastes, etc. for improvement of soil fertility; and
 - research in adapted African technologies to improve locally proven technological measures which could be further developed.
- Accelerated training of African technicians, agricultural managers, etc. at all levels.

The reasonably good institutional base of agricultural colleges, research stations, technical schools and, in some places, cooperatives, can be more efficiently employed to support the production effort ahead. These institutions should be looked at to see where expansion of facilities, alteration of course-work or

other improvements are needed. Greater institutional support is needed, both from domestic or external sources. Some specific programs requiring broader assistance are:

- The Semi-Arid Food Crop program (SAFGRAD) for the Sudano-Sahelian region, which is designed to enlarge applied research in higher yielding drought resistant varieties of food grains.
- The West African Rice Development Association (WARDA) Phase Two program. This program will disseminate improved rice varieties and production techniques through strengthened extension services in most of West Africa.
- Support for the announced southern Africa program in regional research and food security. The planning for this African initiative is being undertaken by the Zimbabwe government in close cooperation with eight other majority-rule countries.
- Programs to stimulate the local manufacture of tools and farm equipment, both to lower cost of improved technology and to stimulate off-farm employment.

Production Increases Through the Expansion of the Rainfed Agricultural Base

FAO has estimated that the rainfed land in annual crops in 1976 was 185 million hectares while there is an ultimate potential of 466 million hectares. Per capita, Africa has 0.5 hectares of unused arable land compared to 0.2 in Asia. While the sub-Sahara is not yet running out of arable land, this should be taken with certain qualifications:

- Much of the higher quality new land that can be brought into cultivation is infested with onchocerciasis or trypanosomiasis or other endemic diseases. Some is pasture land.

- The opening of new lands will be costly, at a minimum of \$1,000 and \$2,100 per hectare. If human resettlement is involved, it will cost even more. In some areas, forests would have to be cleared. The elimination of disease is imperative and supporting services essential. New access roads and support infrastructure will be necessary.
- If expansion of cultivation is too rapid into new zones, pastoralists and wildlife will suffer. The social and environmental costs will have to be justified.
- Some of the "new land" would be prone to desertification and erosion if farmed. Farming systems consistent with sound ecological balance must be developed.

These qualifications notwithstanding, the settlement of opening up new lands offers significant opportunity for contributing to country and sub-regional food production strategies. Moreover, new lands development and resettlement may be unavoidable in areas such as the Mossi plateau and Kivu crescent where land, population, and livestock pressures point to a near-term Malthusian problem.

Some specific countries or areas where programs could be mounted are:

- Resettlement in the onchocerciasis-free zones now being opened for human habitation in Upper Volta, Ghana, Togo, and Benin. This program is estimated to cost \$600 million and is in its initial stages. Overall, the FAO estimates that 10 million new hectares of good soil can be farmed. Other areas now infested with onchocerciasis include southern sections of Chad, Senegal, and Mali.
- The estimated production potential of Sudan is 80 million hectares, of which only 10% is in cultivation. Major new lands programs are possible, in rainfed agriculture, particularly in the south.

- Large areas of Zaire, Angola, Zambia, and Mozambique with good soils and rainfalls are underutilized. Much is infested with tsetse fly, which would have to be cleared.
- Significant new lands potential also exists in Cameroon and southern Chad near the Logone and Chari Rivers.

The costs and benefits of new lands is difficult to quantify. However, given the environmental damage occurring to arable land in Sudano-Sudanian zones, the high rates of rural depopulation and urban growth, the ecological and sociological benefits from accelerated opening of new lands and assisting voluntary resettlement, would seem to argue for being less critical of high costs. Other benefits will only occur and be quantifiable after the areas are cleared, settled and farmed. Based on the above per hectare costs, a 1% increase in arable lands from such programs would cost over \$4.0 billion dollars.

Intensification of the Use of Land and Water Available

Only about 3 million hectares of the total land cropped in sub-Sahara Africa is irrigated. Half of this is in the Sudan. A conservative estimate places the irrigated potential of sub-Sahara Africa at 8.4 million hectares. Others have estimated 14 million hectares. The FAO suggests that 3 million new hectares will have to be put under double cropping in the next 15 years if the food gap is to be closed. This assumes a simultaneous and significant improvement in rainfed agriculture.

In many cases, enlarging irrigation will require the undertaking of comprehensive river basin programs. In some

areas, dams may be required for secure water management. In other instances, dams for irrigation may be premature until consumer or industrial demand for hydro electricity is sufficient and more is known about potential environmental damage on overall basins.

The costs of new irrigation has been very high in Africa. In 1975, it averaged \$2,200 per hectare. Since then the costs of engineering, equipment, and related infrastructure has escalated so rapidly that it is difficult to estimate the costs when any major construction or engineering is involved. Costs are increased even further when parallel actions must be taken in health, due to risks of water-borne disease associated with irrigation.

Irrigation projects usually succeed best when supported by a local institution that optimizes the interaction of the culture, people, land, water, and appropriate technology. The fullest participation of local populations is essential for small-holder irrigation projects.

In the immediate term, the strategy elements of irrigation expansion in Africa would include:

- Rehabilitation of existing irrigation perimeters. Higher cropping intensity and double cropping are possible with better water control, drainage, and improved technology. Programs of this nature are starting or could be developed for Sudan, Mali, Chad, Niger, Senegal and several other countries in West Africa.

- Research is needed specifically aimed at developing high yielding technologies that require fewer capital and non-renewable energy resources. Area specific agronomic research in the Senegal Basin and elsewhere is urgently needed to try to reduce the costs of irrigated production.
- Market research is also required to identify alternate food and cash crops that might be encouraged. Market information and access is important for any new irrigation.
- A large number of low cost, small farmer irrigation perimeters are immediately possible in several Sahelian countries, in Southern Africa, and Sudan, Somalia, Tanzania and Zambia. The CILSS/Club du Sahel working groups have just produced a second generation program of irrigation projects requiring feasibility studies and final design. As shown in the Senegal Basin, small perimeters are possible and economically feasible if farmers and families are fully involved. Organization of services must become less contractor and expatriate-oriented and more locally and entrepreneurially based.
- The acceleration of river basin planning in the Niger, Lake Chad, Gambia, and Kagera Basins. UNDP-led planning efforts have not yet received sufficiently strong support from riparian member states or outside donors.
- In addition, basin planning efforts should be started as soon as possible in the Zambezi, Okavango, Cunene and Ruvuma Basins in Southern Africa.

Fertilizer development must be accelerated. Volatile world prices have meant increased costs to farmers, particularly in landlocked countries. Opportunities for local manufacture exist in several African countries with oil, natural gas, potash, and phosphate deposits. Facilities for improving intra-African trade will need to be assisted if cost-effective

distribution of local manufactured fertilizer is to be possible.

General intensification of inputs in rainfed agriculture can also result in increased productivity. This is especially true when accompanied by more efficient land and other resource use. Fertilizers have already been noted. Greater application of animal power and more efficient use of hand tools has not been widely tested.

More information on and application of mixed farming systems could result in greater efficiency of labor in the production of both food and market crops, and opportunities for off-farm employment. The most promising areas for this are in the southern part of the Sudano-Sahelian zone and in east and southern Africa.

Reduction of Losses from Pests and Diseases

Although this is a specific action, it is worth separate mention because of its potential for immediate increases in food availability. With post-harvest grain losses up to 30% and losses for fruits and vegetables at 40% in some areas of Africa, it is surprising that greater investment has not been made in control activities. Losses vary greatly by region and relative to the intensity of pests or diseases. The most difficult problems are weaver birds, striga, grasshoppers and locusts, mould and other plant diseases.

In Africa, use of chemicals for controls is now the lowest in the world. Seed treatment in advance of planting

could also yield good results. Some of the newer pesticides that are environmentally safe and species-specific could be successfully employed in African production systems although the cost of application will have to be considered.

To date there has been sufficient experience in some locations of Africa to partly understand the nature of area specific pests and disease and to suggest some program possibilities. For instance:

- Locust and grasshopper programs in Sahelian and East Africa could be reinforced. Greater support is required both from external donors and African nations who are members of the regional organizations charged with control efforts. The experience of OCLAV could be built upon and reinforced to cover other countries where control is now insufficient.
- Subregional programs in weaver bird control could be reinforced or started in new areas. Additional research on weaver bird control methods is also needed. OICMA in West Africa has the most experience in regional control of granivorous birds and could be reinforced.
- National extension services could be strengthened in their capacities to provide insecticides and technical advice in integrated crop protection. Integrated pest management is essential to maintain natural environmental balances.
- Control of striga and other weeds should be made priority actions for national research and extension programs. This parasitic weed is thought to reduce sorghum and millet production by as much as 15% in most semi-arid areas.
- Applied research could be strengthened on "poly-culture" which is thought to suppress weeds and other pests.

- While African traditional grain storage is effective in semi-arid zones, improved storage is needed in more tropical areas where post-harvest losses are high.

As with other recommended areas of technical intervention, pest control may still be excessively costly relative to the value of increased food output. Ways must be found to deliver the known and effective technology of control, at reduced farmer cost.

Alterations in Agriculture and Macro-Economic Policies

In a large number of African countries, government policies may unintentionally act to discourage agriculture production. These policies generally fall into several categories:

- overvalued exchanged rates, which make imports cheap, but exports expensive;
- subsidized consumer prices for food, which tend to benefit urban dwellers at the expense of rural production. Large differentials in urban and rural wages also act as production disincentives and tend to encourage higher than normal rates of urbanization.
- state-run parastatal marketing boards, which have proven largely inefficient and excessively centralized. Private commercial trading on the whole, has not been eliminated and studies show that small farmers may be better served by better regulated private commercial marketing.
- industrial protection through tariffs and quotas which may be equivalent to a tax on agriculture.

Changing of policy to the benefit of local producers is not as easy as usually suggested by economists. A case in point is Liberia, which sought to limit rice imports and to

invest in local production. To establish incentives, the government raised producer and retail prices. This led to riots and the proposed increases in price were cancelled.

The "policy issues" of stimulating agriculture are complex and politically sensitive for most African countries. Nevertheless, alterations in policies are essential. The currently declining trends in agricultural productivity cannot be reversed as long as policies are in place that subsidize urban consumption at the expense of rural production. Some options for change would include:

- A more positive price discrimination in favor of agriculture, progressively implemented.
- Deemphasis of state monopoly or parastatal marketing boards. State purchasing agencies, properly decentralized, could act more as price stabilization entities through selective purchase.
- Policies to regulate or moderate the private trading in food grains while taking advantage of the potential marketing role that the private channel can play. This has greater advantages of efficiency over state boards and does not seem to compromise equity goals.
- Within the framework of general incomes policy, control of urban wage increases. This could be accompanied by measures designed to improve rural-urban terms of trade and greater direct investment in urban areas.
- Guaranteed minimum or "floor" prices and maximum or "ceiling" prices may be announced. In both cases, efficient statutory marketing authorities would be required to administer such policies.

- Price policies designed to support internal producer prices just above import parity levels, by paying producers a subsidy or by taxing or restricting imports. Countries would probably need to have a growth sector such as in minerals to temporarily support such a subsidy.

These suggestions are by no means all inclusive and their mention should not imply that implementation would be appropriate or possible. Policy alterations cannot be considered in isolation of other measures designed to stimulate production and to ease the price squeeze on poor urban consumers. Success could bring new sets of problems as governments could find themselves accumulating large surpluses which have to be sold at a financial loss or would require the creation of expensive storage. Over time, certain African countries would be surplus producers and others, due to poor resources endowment, chronically deficit. Therefore, the facilitating of intra-African trade, through elimination of trade barriers and improvement in transportation, could be important in establishing producer incentives, so that food crops could become export crops. This is now occurring between Cameroon and Nigeria.

Selected Bibliography

- Burki, Shahid J.; and Goering, T.J. A Perspective on the Foodgrain Situation in the Poorest Countries. World Bank Staff Working Paper 251. Washington, D.C.: International Bank for Reconstruction and Development, 1977.
- FAO, State of Food and Agriculture, 1978
Regional Food Plan for Africa Agriculture Toward 2000
- Food Research Institute, Stanford University and West African Rice Development Association, "The Political Economy of Rice in West Africa: A Summary of Principal Results" (mimeo), July, 1979.
- Gemmill, Gordon; and Eicher, Carl. "A Framework for Research on the Economics of Farm Mechanization in Development Countries." African Rural Employment Paper No. 6. Michigan State University, Department of Agricultural Economics, East Lansing, Mich., 1973.
- International Food Policy Research Institute, Report No. 3, 1977. Food Needs of Developing Countries: Projections of Production and Consumption to 1990.
- International Food Policy Research Institute, Investment and Input Requirements for Accelerating Food Production in Low-Income Countries by 1990, 1979.
- Linneman, Hans, et al., MOIRA: Model of International Relations in Africa.
- National Research Council. Postharvest Food Losses in Developing Countries. Washington, D.C.: National Academy of Sciences, 1978.
- National Research Council. World Food and Nutrition Study. Washington, D.C.: National Academy of Science, 1977.
- U.N., Preliminary Assessment of the World Food Situation, (Rome, 1974).
- U.N., World Population Trends and Policies 1977 Monitoring Report. New York, 1979.
- United States Department of Agriculture. Alternative Futures for World Food in 1985 (The Grains, Oilseeds, Livestock [GOL] model).
- United States Department of Agriculture. Food Problems and Prospects in sub-Saharan Africa: The Decade of the 1980's. Draft, 1980.