IFPRI

LECTURE SERIES 4

TOWARD SUSTAINABLE SMALLHOLDER AGRICULTURE IN SUB-SAHARAN AFRICA

George Benneh

TIONAL FOOD POLICY RESEARCH INSTITUTE

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IFPRI Lecture Series 4

Toward Sustainable Smallholder Agriculture in Sub-Saharan Africa

George Benneh

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Foreword

The International Food Policy Research Institute has had a longstanding interest in Sub-Saharan Africa, whose development problems are particularly urgent. Agriculture, the main source of employment in Sub-Saharan Africa, has not been able to produce enough food or income to keep up with the region's rapid population growth. The result is widespread poverty, hunger, and even famine. Increased agricultural production in Sub-Saharan Africa is therefore essential, but for the sake of future generations this growth must be sustainable, conserving the region's natural resources.

In this lecture, George Benneh addresses the challenges to achieving sustainable agricultural growth in Sub-Saharan Africa, with a focus on small farmers. These farmers are the backbone of African agriculture, yet little research is directed to meeting their needs. Benneh shows that achieving sustainable smallholder agriculture will require imaginative solutions that make use of both indigenous knowledge and new technologies. African agriculture faces a wide range of problems, but they are problems that can be overcome with the help of sound research and policy.

Per Pinstrup-Andersen
Director General

Toward Sustainable Smallholder Agriculture in Sub-Saharan Africa

George Benneh

Agriculture is the most important sector of the economies of Sub-Saharan Africa. It employs more than 60 percent of the adult population of most Sub-Saharan Africa countries, accounts for more than 30 percent of their gross domestic product, and contributes significantly to the foreign exchange earnings of most countries. The quality of life of the people of the region therefore depends largely on how well agriculture is doing. The increasing poverty and hunger of Sub-Saharan African people and the deteriorating physical environment to some extent reflect the poor performance of the agricultural sector. The Sub-Saharan African countries' share in global trade in agricultural products has declined; so has per capita food production. These trends do not augur well for the future of Sub-Saharan African countries. As the World Bank (1996b) has observed, most of the developing countries that grew rapidly in the 1980s, such as China, Indonesia, and Thailand, experienced rapid agricultural growth and achieved large improvements in diets in preceding years. Because poverty alleviation depends largely on improvement in food production, Sub-Saharan African agriculture is attracting a great deal of interest and attention among researchers, international organizations, and policymakers.

The focus of this lecture is smallholder farmers and rainfed agriculture in Sub-Saharan Africa. There are of course countries like Kenya, South Africa, and Zimbabwe where large-scale mechanized farming supported by science-based research and extension activities with high levels of external inputs is economically more important than smallholder rainfed agriculture. This lecture, however, concentrates on smallholder agriculture for four reasons. First, smallholder rainfed agriculture has generally been neglected by Sub-Saharan African governments and researchers (Lipton 1988). Second, the sector offers great potential for the evolution of farming systems that focus on people and on long-term ecological sustainability. Third, although Sub-Saharan Africa covers a large area comprising 48 independent states with different ecological and cultural zones, the main characteristics and

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problems of smallholder rainfed agriculture are broadly the same. It is therefore possible to discuss the topic on a continental level without being too superficial. Fourth, although modern agriculture has made a significant contribution to food production in parts of Sub-Saharan Africa, there is growing awareness of the high environmental and social costs associated with it (Anthony et al. 1979; Brown and Wolf 1985). The challenge African governments and researchers face is how to make smallholder rainfed agriculture more productive on a sustainable basis with minimal environmental impact. This is best discussed in the context of the increasing food gap in Sub-Saharan Africa.

THE FOOD GAP

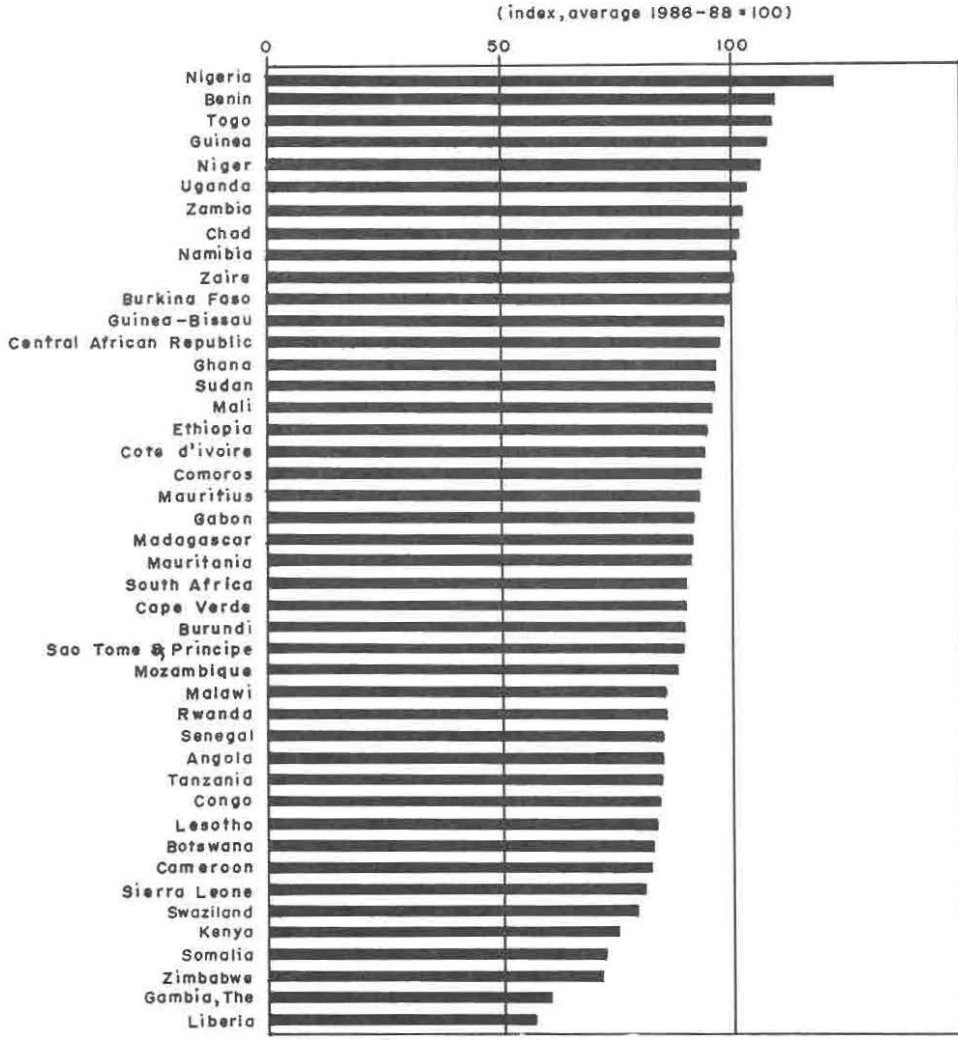
Decline in Food Production

Sub-Saharan Africa is the only region in the world where per capita food production has been on the decline over the past two decades. While the population has been growing at about 3 percent annually, food production has been growing less than 2 percent a year. The food production per capita index declined in 1993 in 33 out of 44 Sub-Saharan African countries for which data could be obtained (Figure 1). The food gap exacts a human price. It leads to a reduction in food intake by the population, since in rural Sub-Saharan Africa the population's main source of food supply is output from their farms. According to Cleaver and Schreiber (1994), the average supply of calories as percentage of the minimum requirement for the Sub-Saharan African population in the period 1986–89 was 87 percent. Ten countries, or more than 20 percent of Sub-Saharan African countries, recorded less than this percentage. It is estimated that 200 million people in Sub-Saharan Africa, or 40 percent of the population, are food insecure (Serageldin 1993). They lack economic and physical access to the food required to lead a healthy and productive life (IFPRI 1995).

Rising Food Import Bill

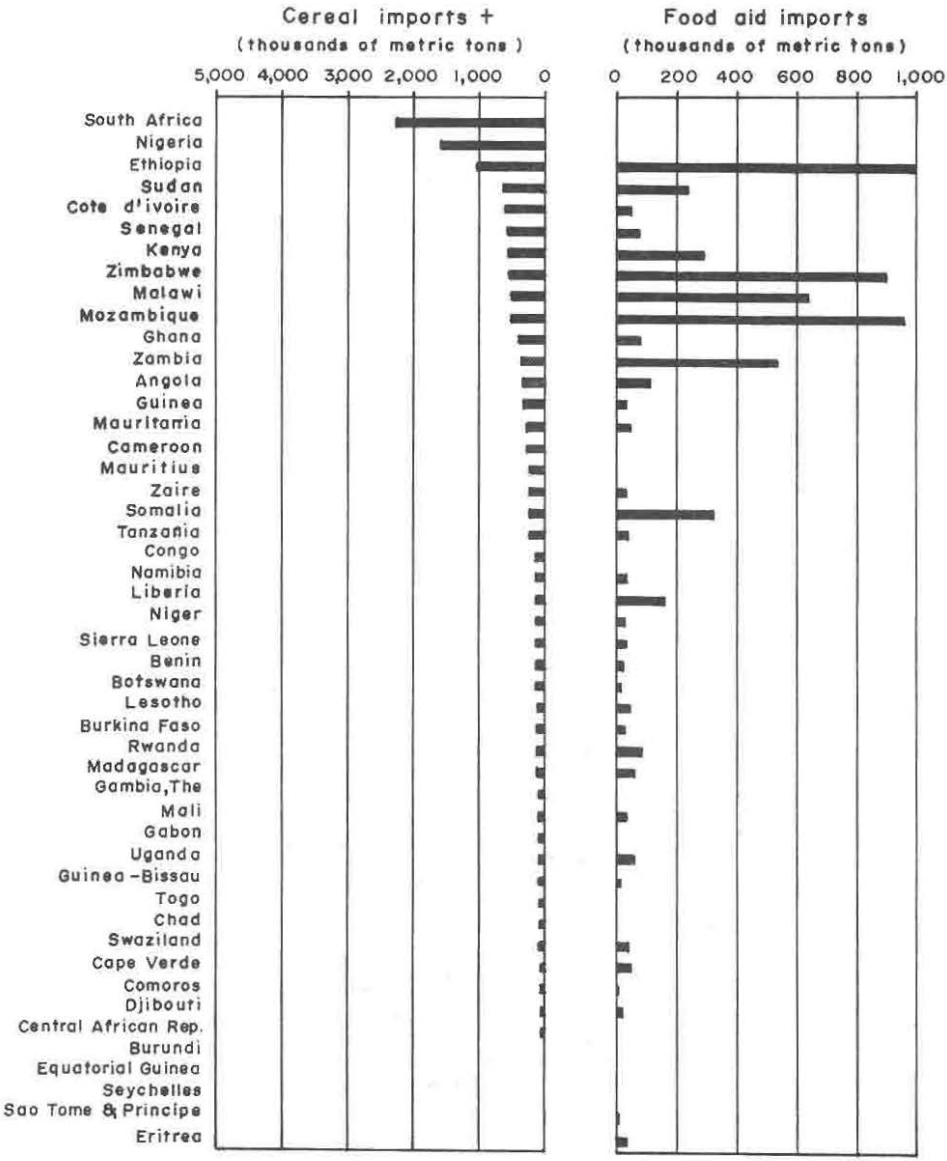
The economic price of inadequate food production is a rising food import bill. More than 50 percent of the aggregate food gap of Sub-Saharan African countries is met through commercial purchases, while most of the rest is covered by food aid. A number of countries including Angola, Ethiopia, Malawi, Mozambique, and Zambia have been major recipients of food aid (Figure 2). Food aid supplied about 15 percent of cereal imports in the early 1970s, 25 percent in the late 1970s, and 35 percent in the 1980s. It accounted for 41 percent of cereal imports of the region in 1987–88 (Yifru 1992). The increasing need to import food poses a challenge. Almost all the countries in Sub-Saharan Africa have severe balance-of-payments

Figure 1—Per capita food production index, 1993



Source: Adapted from World Bank 1996a.
Note: Data are for 1993 or most recent year available.

Figure 2—Food imports, 1993



Source: Adapted from World Bank 1996a.
Note: Data are for 1993 or most recent year available..

problems and are overburdened with external debt. The share of African exports in world trade fell from 2.4 percent in 1970 to 1.4 percent in 1990, and Sub-Saharan Africa's total debt increased from US$6.6 billion in 1970 to more than US$223 billion in 1995.

With such a serious food gap and weak economies, African governments are ill prepared to cope with emergency situations. Events such as the drought in the Sahel in the 1970s and in Ethiopia in the 1980s or the recent ethnic and political conflicts in Burundi, Liberia, Rwanda, and Zaire can produce major food crises that threaten many with starvation. If the current pattern of food production continues, responding to such emergencies will take most of the financial resources of several African countries and food aid programs.

The trend may indeed deteriorate as long as population grows faster than food production. Equally worrisome is the fact that the economies of many Sub-Saharan African countries are not strong enough to pay for large food imports. Two recent projections portray a gloomy picture. According to Per Pinstrup-Andersen and Rajul Pandya-Lorch (1995), by the year 2000 the production shortfall could be as much as 50 million tons of grain equivalent, more than three times the current level of imports. In the view of these authors, the region is not likely to have the necessary foreign exchange to import such large quantities of food. The World Bank estimates that Africa could have a food shortage of 250 million tons by the year 2020, more than 20 times the current food gap, if present trends continue.

Several factors account for the poor performance of the food sector of Sub-Saharan African agriculture. They include the constraints of the physical environment and deteriorating natural resource base, inefficient agricultural technology, inadequate land tenure arrangements, gender bias in policy formulation and implementation, rapid population growth, increasing incidence of rural poverty, poor socioeconomic infrastructure, the neglect of agriculture—especially the food sector—by governments and researchers, political instability, the noninvolvement of local communities in the design and implementation of agricultural programs and projects, and researchers' disregard of indigenous technical knowledge in their search for solutions to agricultural problems. The relative importance of each of these factors may vary from one country to another.

THE AFRICAN FARMER, THE PHYSICAL ENVIRONMENT, AND LAND DEGRADATION

Rainfall

Most smallholder farmers and herders in Sub-Saharan Africa depend almost entirely on the natural resource base: climate, soil, and vegetation

for crop and livestock production. Since about 70 percent of Sub-Saharan Africa lies within the tropics, temperatures are uniformly high, above 20° C., throughout the year and thus permit year-round plant growth. The most critical climatic factor is therefore the amount, distribution, and reliability of rainfall. Rainfall determines the crops farmers grow, the farming systems that are possible, and the nature and sequence of farming operations. The wettest parts of the region are in Central Africa and some areas of coastal West Africa and receive about 4,000 millimeters of rain a year. Rainfall decreases north and south of the equator to less than 250 millimeters in the desert regions.

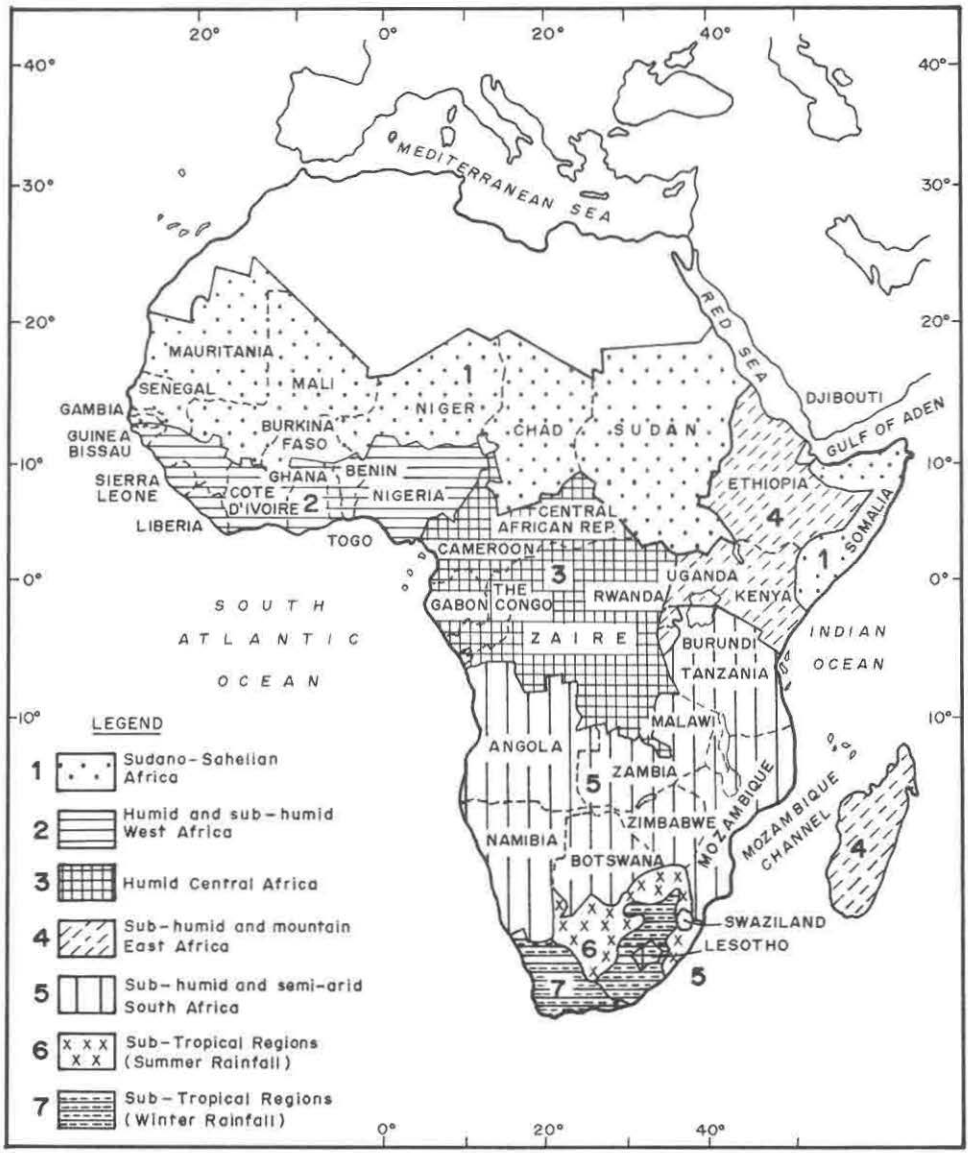
Using the two climatic factors—temperature and rainfall—that exert the dominant effect on production, the United Nations Food and Agriculture Organization (FAO) divided Africa into different agroecological zones based on the length of the growing period (Figure 3 and Table 1). According to the study, the 46 percent of the continent with a growing period of 1–74 days is completely unsuited to direct rainfed crop production. Only the 30 percent of Sub-Saharan Africa with growing periods of 120–179 days and 180–269 days is well suited climatically to rainfed production of millet, sorghum, and maize. Rainfall variability can often affect crop yields and lead to crop failures. In more than 50 percent of the land area in tropical Africa, rainfall reliability (expressed as the percentage departure from normal), ranges from 20 percent to more than 40 percent (FAO 1986). Drought is a major and inherent characteristic of the environment in a large part of Sub-Saharan Africa (Bonkoungou 1996).

Unreliable rainfall and frequent occurrence of drought, especially in the drier regions of Sub-Saharan Africa, not only affect food production, but also make resource-poor smallholder farmers reluctant to take risks in adopting agricultural innovations that require a financial outlay.

Irrigation

Without irrigation, nothing can be grown during the dry season or when the rains fail. Smallholder irrigation in Sub-Saharan Africa is limited mainly to dry riverbeds during the dry season and to the floodplains of large rivers, such as River Niger in Mali, and lakes, such as Volta in Ghana. Although some large-scale irrigation schemes exist in Sub-Saharan Africa, irrigation agriculture is relatively undeveloped. In 1981, Sub-Saharan Africa irrigated about 2.7 percent of its arable land, whereas Asia (excluding Japan) and Israel irrigated about 30.8 percent (FAO/UNFPA/IIASA 1983). Although the area under irrigation has since increased, only 8 percent of cultivated area in Africa is under irrigation, compared with 34 percent in Asia.

Figure 3—Major regions of Sub-Saharan Africa



Source: Adapted from FAO 1986.

Table 1—Land resource base of Sub-Saharan Africa

Region	Climate	LGP[a]	Soil	Vegetation	Major agricultural activities	Climate and soil constraints
		(days)				
Sudano-Sahelian Africa	Precipitation exceeds potential evapotranspiration from 2 to 7 months annually. Annual rainfall: 100–400 mm.	1–74	Most common soils are red to gray ferruginous leached soils with low natural fertility.	Predominantly desert (32%) and arid areas (36%).	Extensive grazing of sheep, goats, and camels. Cereals occupy 70% of cultivated land. Millet and sorghum account for four-fifths of cereal production. Dry season valley bottom farming.	Has shorter crop seasons than other semi-arid tropics with similar rainfall.
Humid and subhumid West Africa	Dominated by moist subhumid (47%) and humid (35%). Annual rainfall: 1,200–1,500 mm.	75–119	Acid soils in the humid areas, less leached and higher nutrient content in the drier savanna areas.	Forest in the humid and savanna woodland in the subhumid forest areas. Forest-savanna mosaic.	Suited for a wide range of annual and perennial crops and some small ruminants.	The alternation of wet and dry seasons leads to formation of lateritic crusts, which are not conducive to farming activities.
Humid Central Africa	Virtually humid throughout the year. Annual rainfall: over 1,500 mm.	180–260	Acid soils cannot be cultivated continuously under low-input farming.	Forest.	Suited for perennial crops and root crops such as cassava.	Fertility declines rapidly when vegetation is removed.

(continued)

Table 1—Continued

Region	Climate	LGP[a]	Soil	Vegetation	Major agricultural activities	Climate and soil constraints
		(days)				
Subhumid and mountainous East Africa	About 88% of East Africa has a single rainfall season. Temperatures decrease with altitude. Rainfall is generally not more than 1,200 mm.	120–179	Dark clay soils.	Grass steppes.	Wide range of uses. Temperate and tropical crop production and grazing in the semi-arid parts of the region.	Relative land scarcity due to differences in rainfall and high population density.
Subhumid and semi-arid Southern Africa	Up to 6 months humid rainfall. Arid to semi-arid conditions in 48% of the area.	1–74	Reddish chestnut, reddish-brown, and brown soils.	Montane forest and grassland.	Cereal cultivation and grazing in the drier parts.	Rainfall is inadequate and unreliable.

Source: Based on FAO/UNFPA/IIASA 1983.
[a]Length of growing period.

Soils

Increased agricultural production ultimately depends on the nature of the soil resource, its potential, its inherent constraints, and its management. Serious constraints such as shallow depth, poor drainage, salinity, or low inherent fertility may make an area unsuitable for crop production even though it may have excellent climatic potential. Although the region has some fertile soils, such as in the tropical highlands, there are vast areas where soils are acid and have low reserves of essential nutrients (Table 1). In Africa only 19 percent of the land area has no inherent soil fertility limitations (FAO 1984). African farmers have learned to identify different types of soils and their capacity to sustain crops by using indicator plants, soil color, and soil moisture relationships (Benneh 1974).

Pests and Diseases

Agricultural production in Sub-Saharan Africa is constrained by pests and diseases that make it impossible for farmers in some areas to practice certain types of farming. The dreaded disease trypanosomiasis, which is spread by the tsetse fly, prevents livestock production in a quarter of the region. Cultivation of the wetlands with the most fertile soils in Sub-Saharan Africa is generally constrained by the prevalence of river blindness and bilharzia. In parts of West Africa river blindness has, however, been eradicated.

It is often said that the smallholder farmer in Sub-Saharan Africa grows crops partly for pests. According to Odhiambo, "About 20–30 percent of our harvests are lost in the field and another 10–20 percent are lost in storage, on the average, through the depredation of insects as pests in themselves or as vectors of plant and animal diseases" (Odhiambo 1992, 68).

Land Degradation

Exacerbating the constraints of the natural resource base is land degradation, which results from processes such as soil erosion or soil loss by wind or water, salinization, and depletion of nutrients and organic matter. Deforestation and conversion to arable land can accelerate these processes (Lal 1987, 1996). In 1980 there were 646 million hectares of forest and woodlands in Sub-Saharan Africa. Around the same time, an FAO/UNEP study (1979) estimated that 3.7 million hectares of tropical Africa's forests and savanna woodlands were being cleared each year by farmers and loggers. Some 70 percent of the clearings in the humid forest zone and 60 percent of those in the dry woodlands are attributed to slash-and-burn cultivation.

The rate of deforestation varies from country to country. Seven Sub-Saharan African countries—Cameroon, Central African Republic, Congo, Côte d'Ivoire, Gabon, Madagascar, and Zaire—are among 20 countries in

Table 2— Sub-Saharan African countries with threatened closed forests

Country	Closed forest area	Annual deforestation rate
	(thousand hectares)	
Cameroon	16,500	100
Central African Republic	3,590	5
Congo	21,340	22
Côte d'Ivoire	4,458	290
Gabon	20,500	15
Madagascar	10,300	150
Zaire	105,750	182

Source: World Bank 1991.

the world with threatened closed forest (World Bank 1991) (Table 2). In Côte d'Ivoire, for example, it was estimated that during the period 1981–85 about 290,000 hectares of closed forest were being cleared annually. This represented about 7 percent of the total closed forest area in the country (Lufampa 1995).

As much as half of Sub-Saharan African farmland is affected by soil degradation and erosion, and up to 80 percent of pasture and range areas show signs of degradation (Cleaver and Schrieber 1994). Such estimates may be on the high side (Crosson and Anderson 1995), but they convey a notion of the scale of the problem until more reliable data are assembled. Table 3 summarizes the adverse effects of deforestation on soil productivity. Deforestation and soil erosion are undermining the very natural resource base on which African farmers and their families depend for survival. Deforestation also affects other aspects of rural life. Fuelwood and

Table 3—Worst-case scenario regarding the adverse effects of deforestation on soil productivity

Physical effects	Chemical and nutritional effects
Compaction, crusting, and increased strength	Loss of soil organic matter, nitrogen, and sulfur
Accelerated erosion	Leaching of bases
Loss of clay and soil colloids	Acidification
Drought stress	Reduction in soil biological activity
High soil temperatures	Disruption of nutrient recycling

Source: Lal 1996.

other products such as wild fruits and medicinal plants, which are of considerable importance for rural livelihoods and survival systems, become less available (Ellemann 1995; Ardayfio-Schandorf 1996). One consequence of reduced fuelwood is the increasing use of dung and crop residue as fuel, a practice that deprives farming systems of valuable inputs for maintaining soil fertility.

TRADITIONAL FOOD PRODUCTION SYSTEMS AND THREATS TO SUSTAINABILITY

African farmers have over centuries developed farming systems that have adequately responded to the challenges posed by their physical and socio-cultural environments. In the past these systems have been sustainable, providing adequate food to feed the population without causing much damage to the natural resource base. Although earlier writers such as Gourou (1952) identified only one farming system—shifting cultivation or slash-and-burn clearance—for the whole region, field studies undertaken since then by researchers in different parts of Sub-Saharan Africa have identified other farming systems. The major food farming systems include shifting cultivation, the bush fallow system or land rotation, the planted fallow system, compound or homestead farming, terrace farming, flood land cultivation, and transhumance pastoralism. Table 4 summarizes major characteristics of each system and indicates the driving forces undermining its stability.

By far the most important system of farming is the bush fallow system, which is widely practiced in all ecological regions of Sub-Saharan Africa. Although no distinction is usually made between shifting cultivation and bush fallowing, the latter is a more intensive system. It involves rotation of land within fixed farmland, whereas shifting cultivation in its original form was characterized by movement of cultivators from one site to another in search of virgin land without making a conscious attempt to return to former cultivated sites.

The bush fallow system is an extensive system of food crop production in which natural forest, secondary forest, or open woodlands are cleared and burnt. This system is often called slash-and-burn agriculture. Farmers carefully select sites for cultivation using indicator plants as guides, judging the luxuriance of plant growth and the volume of vegetative material that will produce the best chemical-yielding ash when burnt. Temporary clearings are cultivated until crop yields begin to decline, usually after two or three cropping seasons when the soil fertility begins to fall. Then the land is abandoned to return to forest or bush fallow for a period ranging from 4 to 20 years. During the fallow period, conditions such as low soil

Table 4—Traditional food farming systems and threats to sustainability

System	Major characteristics	Geographic spread	Threats to sustainability
Shifting cultivation	• Rainfed agriculture. • Slash-and-burn cultivation. • Simple hand tools. • Soil fertility restored by fallow vegetation. • Intercropping. • Communal tenure. • No permanent settlements. • Orientation is subsistence.	• Formerly widespread, now almost extinct.	• Increased population pressure.
Bush fallow system or land rotation	• Same characteristics as above; however, soil fertility is restored through land rotation within fixed area of farmland. • Permanent farm settlements. • Orientation is both subsistence and commercial. • Communal tenure, sharecropping, and renting.	• Widely practiced in all ecological regions of Sub-Saharan Africa.	• Increased population pressure. • Reduction in length of fallow. • Conversion of land to tree cropping and human settlements. • Expansion to marginal ecological regions, land degradation.
Planted fallow system	• Same characteristics as above, except more permanent cultivation. • Soil fertility restored by planted fallow (*Acioa barterri* and *Macrolobium macrophyllum*). • Agroforestry. • Family and individual ownership, sharecropping, and renting.	• Areas of high population density, such as Ibo, Aba, and Ibibio districts of eastern Nigeria.	• Increased population pressure. • Land scarcity. • Land degradation.

(continued)

Table 4—Continued

System	Major characteristics	Geographic spread	Threats to sustainability
Compound or homestead farming	• Permanent system of cultivation. • Soil fertility maintained through application of household refuse, night soil, and manure. • Mixed cropping. • Orientation is subsistence. • Family ownership.	• Densely settled areas in the different ecological zones. • Sometimes combined with bush fallow systems.	• Increased population pressure. • Land degradation.
Terrace farming	• Intensive cultivation as above. • Family or individual ownership. • Special terraces constructed to check erosion and control water. • Mixed cropping.	• Upland or hilly areas in different ecological zones.	• Occasional breakdown of terraces as a result of heavy rainstorms. • Lack of labor for maintenance. • Labor intensive, therefore unattractive if alternative land can be found.
Flood land cultivation	• Intensive seasonal cultivation. • Cultivation of different crops according to whether flood is rising or reducing. • Orientation is subsistence and commercial.	• Draw-down areas of major rivers, streams, and lakes. • Valley bottom during the dry season.	• Depends on long periods of adequate rainfall.
Transhumance pastoralism	• Nomadic grazing of livestock determined by seasonal rainfall.	• Arid regions.	• Grazing lands being encroached on by farmers. • National restrictions against cross-border grazing.

fertility, weeds, or pest outbreaks are overcome (Sanchez 1976). The system depends on natural capital with no external inputs. The farm implements are simple: hoe, machete, ax, and dibble stick. Chain saws are now frequently used instead of axes to fell trees.

Today, as a result of increased population pressure, fallow periods are being reduced. Where fallow periods are too short—less than two years—soil fertility deteriorates and crop yields decline. Between 1980 and 1985, nearly half of the 40 Sub-Saharan countries for which data exist recorded declines in yield growth rates for major cereal crops ranging from –0.5 percent to –16.9 percent (World Bank 1996a). Declines in crop yields force farmers to clear more forests and woodlands, including fragile and marginal lands where soil and climatic conditions are poorly suited to the cultivation of annual crops and yields are therefore low. Thus, much of the increased agricultural production in Sub-Saharan Africa has been achieved through expansion in cultivated area. According to the FAO, Africa's arable land expanded by 14 million hectares between 1973 and 1988. Most countries reflected this general experience. Between 1965 and 1985 untouched primary forests in Côte d'Ivoire were reduced by about 66 percent, whereas the area under cultivation doubled (Uhui 1993). The cultivated area in northern Nigeria increased from about 11 percent of the total area in the mid-1950s to 34 percent in 1990 (Mortimore 1995). There are a number of reasons why agricultural expansion on this scale cannot be sustained.

The rapid increase in population will make land less available to ensure the sustainability of the fallow systems as they are practiced by the majority of smallholder farmers today. The bush fallow cultivator requires more land in reserve or fallow than is being cultivated. Over the past few decades population pressure on cropped lands has increased sharply. According to Cleaver and Schrieber (1994), on average, per capita arable land in Sub-Saharan Africa declined from 0.5 hectare per person in 1965 to 0.4 hectare per person in 1980 and to less than 0.3 hectare per person in 1990. As they point out, the majority of African farmers face a critical dilemma: "A central element of their traditional farming system—the ability to shift round on the land—is being eliminated by population pressure, yet many of them continue to hang on to the system by reducing the length of fallow" (Cleaver and Schreiber 1994, 49). In Malawi, for example, increased population pressure on agricultural land is forcing smallholder farmers to undertake continuous cropping, often in cereal monocultures (Bunderson and Hayes 1995). As indicated in Table 4, one of the major forces threatening the sustainability of the traditional farming systems and contributing to the food gap is the demand for food by a rapidly increasing rural and urban population.

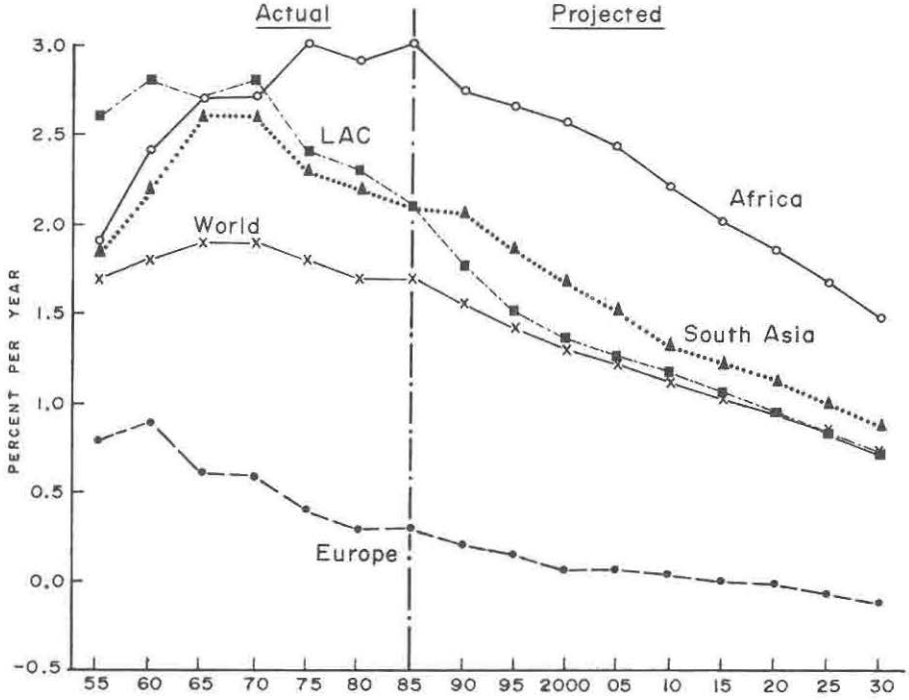
DEMAND FOR FOOD BY A RAPIDLY GROWING POPULATION

With an annual population growth rate around 3 percent, Sub-Saharan Africa is the fastest-growing region in the world. Its total population was estimated at 383.3 million in 1980. By 1995 it had increased to 590.3 million. Nearly half of the Sub-Saharan African countries recorded an annual population growth rate of 3 percent or more between 1988 and 1995 (World Bank 1996a). This means that their population would double in about 20 years, a demographic explosion unprecedented in human history. Although population growth in other parts of the developing world has been rapid, it has not been as fast as in Africa. When population growth peaked in Asia and Latin America in the 1960s, it never reached 3 percent (Figure 4).

Although Sub-Saharan Africa is the least urbanized region in the world, with more than 70 percent of its population living in rural areas, it is the most quickly urbanizing region. In 1995 it recorded an urban growth rate of 4.9 percent, the highest in the world. The rapid increase in urbanization in Sub-Saharan Africa is best illustrated by country experiences (Table 5). In Swaziland in 1960, for example, 4 percent of the population was urbanized. By 1990, this share had grown to 33 percent, and it is projected to rise to 45 percent by the year 2000. Similarly, the proportion living in urban centers in Botswana was 2 percent in 1960, increased to 28 percent in 1990, and is projected to reach 42 percent by the year 2000. In 1960 only one city in Sub-Saharan Africa had a population of more than 1 million. Thirty years later 18 had grown to that size (Venard 1995; Silitshena 1996). It is estimated that by 2030 more than half of the Sub-Saharan African population will be urban (World Bank 1996c).

Urbanization affects the food demand structure in a country. Although urban dwellers consume some traditional food staples, a large number of them consume more processed and often nonindigenous foods, such as cereals and imported livestock products. The demand for convenience foods, such as bread, rice, sugar, and milk, increases as the urban population grows. Few Sub-Saharan African countries other than Ethiopia and Kenya can produce wheat in any significant quantities. Rice production occurs mainly in Côte d'Ivoire, Ghana, Guinea, Madagascar, Nigeria, and Sierra Leone. Rice production is usually more expensive than buying imported rice. In Côte d'Ivoire and Ghana, where rice is produced locally, nearly 50 percent of the demand is met from imports. Even though urban agriculture is contributing to the needs of the urban population, not enough data exist on the situation in Sub-Saharan Africa for an assessment to be made on the extent of its contribution (UNDP 1996).

Figure 4—Population growth rates by region, 1955–2030



Source: Bos et al. 1994.
Note: LAC is Latin America and the Caribbean. Africa includes North Africa.

Table 5—Urban growth of selected Sub-Saharan African countries, 1960–2000

Country	Urban population			Urban population annual growth rate		Share of population in largest city, 1980
	1960	1990	2000	1960–90	1990–2000	
	(percent of total)			(percent)		(percent)
Angola	10	28	36	5.9	5.4	64
Benin	9	38	45	7.4	5.0	63
Botswana	2	28	42	13.5	7.9	n.a.
Burkina Faso	5	9	12	4.6	6.3	41
Cameroon	14	41	51	6.5	5.7	21
Chad	7	30	39	7.1	5.4	39
Côte d'Ivoire	19	40	47	6.5	5.5	34
Equatorial Guinea	25	29	33	1.5	4.0	n.a.
Ethiopia	6	13	17	4.8	5.8	37
Gabon	18	46	54	6.3	4.9	n.a.
Gambia	13	23	30	5.2	5.3	n.a.
Ghana	23	33	38	3.9	4.6	35
Guinea	10	26	33	5.3	5.8	80
Lesotho	3	20	28	8.6	6.3	n.a.
Malawi	4	12	16	6.5	6.5	19
Mali	11	19	23	4.4	5.2	24
Mozambique	4	27	41	9.5	7.2	83
Namibia	15	28	34	4.8	5.4	n.a.
Niger	6	20	27	7.4	6.7	31
Nigeria	9	29	37	5.8	6.2	17
Rwanda	2	8	11	7.4	7.6	n.a.
Senegal	32	38	45	3.5	4.4	65
Sierra Leone	13	32	40	5.2	5.1	47
Sudan	10	22	27	5.4	4.8	31
Swaziland	4	33	45	10.5	6.7	n.a.
Uganda	5	10	14	6.1	6.6	52
Zaire	22	40	46	4.8	5.0	28
Zambia	17	50	59	7.1	5.5	35
Zimbabwe	13	28	35	5.9	5.4	n.a.

Source: UNDP 1991.
Note: n.a. indicates not available.

The rapid growth of cities and urban centers is fueled largely by rural-urban migration in Sub-Saharan Africa. The impoverished rural areas are losing human resources—"environmental refugees"—particularly the youth, who could provide labor for improving food production. In some cases, the women are left behind to manage farms with limited resources.

Although large concentrations of population in urban centers and cities provide economic opportunities, including markets for staple food crops from rural areas, they also create environmental problems for the cities and

their hinterlands (Benneh 1990, 1994). The sprawling cities encroach on rich agricultural lands. According to FAO (1994), by 1988–90, urban areas occupied about 3 percent (24 million hectares) of the 797 million hectares in Sub-Saharan Africa with potential for crop production. It is projected that by the year 2010, a further 12 million hectares will be converted to urban land. The dependence of many urban dwellers and industries on fuelwood energy has contributed to deforestation of the surrounding areas of major cities.

RURAL POVERTY

The incidence of poverty seems to have worsened with the decline in agriculture, which is the major employer in Sub-Saharan Africa. For instance, the World Bank (1996b), states that about 45 percent of the approximately 590 million people in Sub-Saharan Africa live below the national poverty line. In 1993 an estimated 40 percent lived on less than US$1 per day. Using a human development index to estimate the quality of life in a country, the United Nations Development Programme (UNDP) ranked all African countries except Mauritius, Seychelles, and South Africa in the bottom 50 percent of the 160 countries in the world covered (UNDP 1992). Out of the 60 countries in the world that are classified as having a low quality of life, 45 are in Africa.

Poverty is predominantly a rural phenomenon in Sub-Saharan Africa. In most countries the level of absolute poverty, defined as the country-specific income level below which adequate standards of nutrition, shelter, and personal amenities cannot be assured (World Bank 1996a) is higher in rural areas than urban areas. In 1992 more than 60 percent of the population living in absolute poverty in Burkina Faso, Burundi, The Gambia, Malawi, Rwanda, Sudan, and Zaire were in rural areas.

Poverty not only affects agricultural production in Sub-Saharan Africa but also contributes to environmental degradation. Many poor farmers in effect mine the land to produce their crops and feed their livestock. They are too poor to adopt simple innovations: to add organic or inorganic fertilizers or to undertake soil or water conservation. Poverty can also shape one's attitude toward the environment. The poor are too preoccupied with today's survival to bother about long-term ecological sustainability. Achieving sustainable agriculture in Sub-Saharan Africa is therefore not simply a question of introducing improved agricultural technologies but, equally important, is an issue of poverty alleviation. It is for this reason that at the World Food Summit in November 1996 African ministers of agriculture emphasized the problems of Africa's external debt and the unequal terms of trade

and the impact these problems have on their economies. Repayment of debts and debt servicing has forced Sub-Saharan African countries to over-exploit forests, fisheries, and other natural resources to increase export earnings. Africa's deteriorating environment cannot be separated from issues of debt, trade inequality, and consumption patterns in the world.

The cost of natural resource depletion has not generally been estimated and has not been reflected in national income accounts. Policymakers who rely on gross national product (GNP) as a measure of national well-being may be lulled into a false sense of security since losses due to depletion of resources or environmental degradation are not accounted for. Such losses may be quite large. The Ghana Environmental Action Plan, for example, estimated that Ghana lost 41.7 billion cedis, the equivalent of 4 percent of GNP, in 1988 as a result of environmental degradation (EPC 1991).

Agriculture in Sub-Saharan Africa thus poses an interrelated challenge to policymakers, researchers, and international organizations. The challenge is a degrading natural resource base cultivated by an increasingly malnourished and poor people who are unable to produce enough food to break the vicious circle of undernourishment, poverty, and environmental degradation. To address this challenge will require more determined and committed effort on the part of African governments, researchers, and international organizations than has been forthcoming in the past.

THE NEGLECT OF THE FOOD CROP SECTOR

Sub-Saharan Africa had its green revolution during the colonial period, when research institutes such as the West African Cocoa Research Institute at Tafo in the Gold Coast (Ghana) pioneered and promoted the production of cocoa, palm oil, coffee, tea, cotton, and sisal for external markets. It is not surprising that Sub-Saharan Africa is an important exporter of these products even though the region's share in world trade in these products has declined. There were isolated attempts to improve staple food crop farming during the colonial period, but on the whole the sector was neglected (Richards 1985).

In the early 1960s a number of independent African governments, confronted by an increasing demand for cheap food by a growing urban population, decided to intervene directly in food production by establishing state farms or parastatal agricultural development corporations with the task of producing food on heavily capitalized, mechanized, large-scale farms (Idachaba 1987). Between 1960 and 1966 the Government of Ghana, for example, established 127 state farms. These consumed the bulk of the Ministry of Agriculture's budget, to the neglect of small-scale agriculture.

The state farms were so poorly managed that they provided less than 2 percent of total market output of most food commodities produced in the country during the period. After 1966, many of them were abandoned following a change in government.

The present food crisis in Sub-Saharan Africa is due partly to government neglect of the food sector and smallholders in particular. As Lipton (1988, 1248) remarked: "In most of Sub-Saharan Africa, smallholder agriculture is starved of every definable resource allocated by the government from fertilizer to skilled administrators and cabinet time." African governments have been aware of this neglect. The Lagos Plan of Action adopted in April 1980 by African heads of state observed that member states had not usually accorded the necessary priority to agriculture and had failed to give sufficient attention to policies promoting productivity and improvement of rural life. Agriculture has generally accounted for less than 10 percent of the planned development expenditures of many African countries. Indeed out of the 20 Sub-Saharan African countries for which data exist, 12 allocated less than 10 percent of total expenditures to agriculture between 1985 and 1989. This contrasts with the allocation of 31 percent in the First Five-Year Development Plan of India in 1951 and the recommended allocation of 20–25 percent by the Economic Commission for Africa (ECA 1989).

In countries favored with minerals, oil, and export crops, government investments in these sectors have produced unbalanced growth, which is detrimental to the development of a viable food production sector because it attracts young people to migrate from the rural areas. Practically nowhere has smallholder food production been seen as the engine of growth in national economic and social development over a long period.

The smallholder food production sector has also been neglected by researchers. This is partly because many of the African scientists and researchers have been trained in developed countries and their tendency has been to duplicate the western model of farming. They have often ignored local and indigenous knowledge, which, if tapped, could have contributed to the development of more balanced agricultural systems long ago. National agricultural research has tended to have a bias toward progressive and successful farmers at the expense of poor illiterate smallholders and to concentrate on export crops at the expense of staple food crops (Pinstrup-Andersen 1982).

Before the establishment of the International Institute of Tropical Agriculture in the late 1960s, staple food crops and farming systems in Sub-Saharan Africa received scant attention from the international research institutes. Sub-Saharan Africa has a wide variety of cereals, tubers, fruits, and vegetables all waiting for the attention of researchers. According to a

recent publication from the U.S. National Research Council, Africa has more native cereals than any other continent. It has its own species of rice as well as sorghum, millet, and several dozen wild grasses whose grains are eaten. As the publication points out, this is a food heritage that has fed people for generations. It is also a local legacy of genetic wealth on which a sound future must be built. Strangely, it has been largely bypassed in modern times. These lost plants have much to offer and not just to Africa. Indeed, they represent an exceptional cluster of cereal biodiversity with particular promise for solving some of the greatest food production problems of the next century (NRC 1995).

Important as the contribution of research to agricultural production is (Plucknett 1993), it is also clear that in the context of Sub-Saharan Africa, there are other policy steps that African governments need to take in order to promote sustainable agriculture. They include providing adequate infrastructure, doing away with gender discrimination, promoting peace and stability in their respective countries, removing constraints imposed by the land tenure system, and generally creating an enabling environment for promoting agriculture.

CUSTOMARY LAND TENURE AND AGRICULTURAL DEVELOPMENT

Development experts and policymakers have in the past argued that one of the major constraints to efficient agricultural development in Sub-Saharan Africa is the customary land tenure system. The following comment is a typical reaction of development agents, who often assess customary tenure in the context of introduced farming systems such as plantation agriculture, large-scale mechanized farming, and resettlement schemes: "To attempt to fit modern agriculture into traditional custom is impossible. To the technical worker it often seems that the efforts of others have been directed in this connection more to the preservation of anthropological fossils than the development of a modern agricultural economy" (Charter 1954, 1). When customary tenure is examined in relation to traditional farming systems of which it is a part, the conclusion is different (Benneh 1976). The results of detailed studies conducted in different parts of Sub-Saharan Africa suggest that customary land tenure offers security to farmers and need not be a disincentive to investment (FAO 1985; Bruce and Migot-Adholla 1993). As the FAO Round Table on the Dynamics of Land Tenure and Agrarian Systems in Africa observed, it is access to land, not security, that is the problem. Once farmers are possessed of the land, there is little evidence of insecurity or danger of eviction (FAO 1985).

Customary land tenure has been dynamic. It has evolved in response to government policy, the introduction of the cash economy, the cultivation of tree crops, the growing scarcity of good agricultural land, and the demand for land by migrant farmers who are not members of land-owning groups (Benneh 1976). In this dynamic process, access to land can be acquired under different customary tenure systems including communal, borrowing, renting, sharecropping, pledging purchase, and inheritance. The importance of each of these forms of tenure or their combinations varies between and within countries.

As good unclaimed agricultural land becomes scarce in most Sub-Saharan African countries, access through the communal land tenure system becomes less important because there is scarcely any unoccupied land to be claimed. FAO field studies in 1989 found that inheritance and sharecropping systems were the most important routes to land acquisition in the eight countries studied. The importance of access to land through inheritance has been confirmed by a more recent study (Saito, Spurling, and Mekonnen 1994). There is a need for detailed studies of the role of these indirect or secondary tenures in attempts at improving farming systems and eliminating poverty in Sub-Saharan Africa.

THE GENDER ISSUE

The issue of gender in agricultural production has attracted much attention in the literature in the last two decades (Dixon-Muller 1985; Boserup 1989; Momsen 1991). The prevailing view seems to be that even though women contribute significantly to agricultural production in Sub-Saharan Africa, they do not have as much access to resources such as labor, land, technology, credit, and extension as men. Although this is broadly true, recent studies indicate that the situation is changing in different parts of the region in response to demographic and socioeconomic factors (Saito, Spurling, and Mekonnen 1994; Benneh et al. 1995).

Although women have long been associated with subsistence food cropping, an increasing number are engaged in commercial farming. This is possible because in a typical farm household in Sub-Saharan Africa, women can establish their own farms independent of those of their husbands and the farms they jointly manage. Spouses normally keep separate accounts. Because of male migration from rural areas to cities, mining centers, or other centers of greater economic opportunities outside agriculture, women are becoming de facto farm managers controlling all the resources.

The increasing dependence on hired labor for farming activities has also diminished the advantage that men had over women in the control of the deployment of household labor. Women with capital acquired through

petty trading and other income-generating activities can afford to hire labor. Women are also gaining access to land through purchase, renting, and sharecropping systems. They are, however, discriminated against under traditional inheritance systems. For this reason a number of African governments including Ghana and Zambia have enacted laws that aim at eliminating unfair practices against surviving spouses, especially female spouses, and equalizing rights of succession for males and females. These acts, however, cover self-acquired properties such as land held by the deceased and not properties he held in trust for the community or his family.

These positive trends do not diminish the difficulties that women farmers face. There are few female extension workers, and male extension officers target men even though women constitute the majority of food farmers in Sub-Saharan Africa. Few of the farm technology improvements developed and introduced in Sub-Saharan Africa have been geared to the special needs and constraints of women or take them into account. Yet any effort to increase food production in Sub-Saharan Africa must address the needs of women as producers.

INADEQUATE INFRASTRUCTURE AND HIGH MARKETING COSTS

One of the major constraints in producing food for the market is the inadequate rural transportation network in Sub-Saharan Africa. Distances from villages to urban markets and to motorable all-weather roads are substantial. Where rural roads exist, they are often poorly maintained and become impassable during the rainy seasons. The problems of market intelligence, storage, and transport remain unsolved in many countries in Sub-Saharan Africa. Transportation costs are so high that it is the traders, and not the producers, who take the bulk of the profit. Agricultural marketing margins in five major African countries studied by Ahmed and Rustagi (1985) were typically twice as high as in four major Asian countries; higher transport costs accounted for 40 percent of the difference.

The marketing of food produce is largely in the hands of middlewomen, or market women. They buy the produce at the farm gate and bring the bulk of it to urban markets in hired trucks. Since most smallholder food crop farmers do not have access to institutional credit, market women often become their creditors. In Ghana some market women give loans to maize and yam farmers at the beginning of the farming season to enable them to employ hired labor. Repayment of the loan is often in kind—bags of harvested maize or tubers of yam—and the price of the commodity is

fixed at the time of the transaction, invariably to the advantage of the market women.

VIOLENCE AND FOOD SECURITY

Since independence Sub-Saharan Africa has witnessed instability caused by civil strife and ethnic conflicts in several countries, including Burundi, Liberia, Rwanda, Somalia, and lately Zaire. According to the FAO (1996), in Africa as a whole, 14 countries are reported to be in a state of war and another 18 are experiencing systematic violence. These conflicts result in large numbers of refugees who abandon their farms and create environmental havoc in the areas where they are forced to settle. With less than one-tenth of the world's population, the African continent has more than a quarter of the world's more than 10 million refugees. Such massive displacement of people disrupts agricultural production in areas from which the refugees flee. Although the governments of Tanzania and Zambia, with international assistance, have set aside land for refugees to settle, such schemes cannot easily be replicated because of their high cost.

This issue reinforces the need to adopt a holistic approach toward improving smallholder food farming in Sub-Saharan Africa. The food problem is a systems problem encompassing a broad range of system components: ecological, political, sociocultural, and economic. It can be solved through interdisciplinary research with the active collaboration of farmers and the support of policymakers.

CLOSING THE FOOD GAP: CAN SUB-SAHARAN AFRICA REPEAT ASIA'S GREEN REVOLUTION?

The success of the Green Revolution in Asia has raised expectations that Sub-Saharan Africa may achieve a similar transformation in its agriculture. On the face of it, there is no reason why this should not be possible. In a matter of a few decades, the application of the results of scientific and technological research undertaken by agricultural research institutes made it possible for a number of food-deficit countries in Asia to become food-surplus countries.

It is important to resist the temptation to make Africa a special case, but there are differences between Africa and Asia that must be borne in mind. Asia has the advantage of having one dominant staple food crop: rice. Sub-Saharan Africa has several: cereals such as maize, rice, sorghum, and

millet; tubers such as taro, yam, and cassava; and tree crops such as banana and plantain. The importance of these crops varies from one ecological region to another. The technology for using the wetlands of Africa is not yet available, and these wetlands are still sources of diseases such as malaria, river blindness, and bilharzia. Irrigation agriculture has been more widely practiced in Asia than Sub-Saharan Africa. Only 8 percent of the cultivated land in Sub-Saharan Africa is under irrigation, compared with more than 30 percent in Asia. Furthermore, the modernization of agricultural production in Asia has benefited from a stronger industrial base than exists in Sub-Saharan Africa. With the exception of a few countries, notably Kenya, South Africa, and Zimbabwe, inputs for modern agriculture must be imported from outside the region, making them expensive. Indeed, it is debatable whether economically viable, modern science–based agricultural production is possible in any country without a strong agro-industrial base to provide the needed inputs for agriculture and to process the raw materials from the agricultural sector.

On the other hand, Sub-Saharan Africa has the advantage of being the new frontier in the global expansion of modern science–based agriculture. It can, therefore, learn from the experiences of other regions, notably Asia's experience of the socioeconomic and environmental costs of the Green Revolution (Dahlberg 1979; Khosla 1989). One of the major issues confronting Sub-Saharan African agriculture is how to achieve improved agricultural productivity without causing social and economic cleavages and excessive environmental damage.

TOWARD SUSTAINABLE AGRICULTURE

In the past researchers have focused on transferring modern crop production models and techniques perfected in temperate zones to Sub-Saharan African countries. This model of agricultural transformation has been unsuccessful in many Sub-Saharan African countries. The search for sustainability should begin with the traditional farmer who has been operating a particular farming system. The farmer's indigenous technical knowledge of the environment should be tapped, problems encountered, and innovations introduced to solve them. It can be difficult for scientists to admit they have anything to learn from illiterate farmers, but it is only when these scientists have learned to listen to local people that they will be in a position to use their scientific knowledge to make indigenous farming systems more sustainable.

In the last two decades, researchers in Africa and elsewhere have been paying closer attention to indigenous technical knowledge. This observa-

tion by Kang, an Indonesian scientist who worked at the International Institute of Tropical Agriculture (IITA) in Nigeria, is revealing:

> When I arrived at IITA I thought we knew the answer to Africa's problems. We made contour bunds, but we still got tremendous erosion. We used chemical fertilizers, but the soil grew more acid. Then we started to look a lot more carefully at what African farmers themselves are doing. We found they were using trees and shrubs in the fallow period to restore soil fertility. But the problem with the fallow system is that it stays at a very low level of productivity. Yields fall off steeply if the plot is cultivated beyond the first year. We asked: "Can we improve the traditional system? Can we organize it?"

Kang was familiar with a practice in eastern Nigeria whereby farmers forced to intensify production by population density had integrated trees into their arable farming. Kang had the idea of systemizing and simplifying the practice so that it was easier to research and transmit to farmers. The result was alley cropping. The first field trials at Ibadan started in 1976.

As shown in Table 6, many traditional forms of land management, including intercropping, agroforestry, no tillage, and mulching, which have been refined over generations, provide useful insights into managing the land resource base of Sub-Saharan Africa on a sustainable basis. They are not, of course, panaceas for land use problems in Sub-Saharan Africa. Table 6 summarizes some of the areas that need to be researched to make them more sustainable. Given the diversity in ecological and socioeconomic conditions in Sub-Saharan Africa, no single improved system of farming will meet the requirements for sustainability everywhere. In some cases, the solution may be a mix of different techniques.

Sustainable agriculture does not mean that artificial fertilizers should not be applied. In areas where conditions ensure high yields and high economic returns, artificial fertilizers can be applied. However, research must be done to minimize the adverse environmental effects of their use.

STRATEGIES TO PROMOTE SUSTAINABLE AGRICULTURE

Although the goal of sustainable agriculture has been accepted by policymakers, researchers, and international organizations in Sub-Saharan Africa, there is a tendency to introduce single-component solutions, such as planting improved varieties or introducing stone-and-earth bunds or contour plowing. Important as these innovations are, a more comprehensive

Table 6—Improved indigenous farming techniques

Technique	Characteristics	Benefits	Research issues
Mulch farming	• Widely used. • Traditional mulches include layers of grass, crop residuals, fresh organic material from trees, bushes, and grasses, household refuse, live plants, and cover crops.	• Improves soil physical properties. • Adds plant nutrients. • Conserves soil water by decreasing losses due to runoff and evaporation. • Enhances the activity of soil fauna. • Improves soil structure.	• Insufficient availability of mulch in the drier parts of Sub-Saharan Africa. • Pest problems.
Conservation tillage, no tillage, zero or minimum tillage	• Seeding through a crop residue mulch or sod without plowing.	• Has greatest potential in areas with heavy soils where timeliness of cultivation is critical. • Maintenance of higher levels of soil organic matter. • Control of soil erosion.	• Problems of weeds and pests. • Not much is known about effect on root growth and crop performance.
Mixed cropping, intercropping	• Planting of different crops in the same field during the same season. • Combination of crops varies with local conditions. • Crops are grown according to some regular pattern or on random basis.	• Sometimes higher yields than crops from sole cropping. • Better control of pests, weeds, and diseases. • Provides diversity of crops grown. • Reliability of yields for some, if not all, of the crops grown.	• Sequencing of planting and spatial arrangements. • Types of crops to be intercropped in different ecological regions to achieve highest yields.

(continued)

Table 6—Continued

Technique	Characteristics	Benefits	Research issues
Agroforestry	• Collective name for land use systems that combine the cultivation of trees with other crops and/or livestock in order to optimize the economic and ecological benefits from the mixture.	• In areas where risk of erosion is high, it is an effective soil conservation measure.	• Selection of candidate trees and shrubs that not only improve the environment but also meet the needs of farmers, for example, through fuelwood. • Labor demands and economic returns.
Alley cropping	• An agroforestry system in which crops are grown in alleys formed by hedgerows of trees and shrubs, preferably leguminous plants. • Leaves and twigs are returned to the soil as green manure; woody parts may be used as fuelwood.	• Shrubs and trees act as a wind-break, facilitate nutrient recycling, suppress weed growth, decrease runoff, and reduce soil erosion.	• Choice of compatible tree species for different soils and environments. • Optimal design for intercropping tree crops with annual staples. • Labor demands and economic returns.
Application of manure	• The use of livestock manure for fertilizer.	• Eliminates the fallow periods. • Supplies nutrients to the soil. • Improves yields.	• Bulking and transportation of manure to fields. • Use of nightsoil as manure.

strategy that takes into account the issues discussed in this lecture is required to ensure greater impact in the rural communities of Sub-Saharan Africa. The following are elements of such a strategy:

1. There is a need to put people first. The achievement of sustainable agriculture ultimately depends on the motivation, perceptions, and attitudes of farmers. They must be made to feel for their environment at the same time as they exploit it to meet their needs.
2. The perception that the environment is fundamental to present and future livelihoods must be actively canvassed. Labor- and time-saving technologies must be developed for fuelwood and water collection, postharvest storage, and food preparation.
3. Local, national, and international research on sustainable agriculture must be supported, for various aspects of this complex field are awaiting investigation.
4. The role of women in sustainable agriculture and their special needs must be acknowledged and acted upon. All forms of discrimination based on gender with respect to access to land, credit, and other resources must be removed.
5. Wherever possible, inputs that make little demand on household finances should be used.
6. A means must be found to support household livelihoods when common access to resources such as grazing lands leads to increased degradation of the resource.
7. A land resource database should be prepared to provide the basis for delineating broad land categories according to their suitability for different uses.
8. Nonfarm income opportunities should be created to promote sustainable farming in poor households.
9. Efforts aimed at reducing the rate of population growth should be supported.
10. The tools of biotechnology and bioprocessing should be used to help enhance the efficiency and economics of smallholder agriculture.

CONCLUSION

Increased food production—above the rate of population growth—is urgently needed in Sub-Saharan Africa to ensure food security and poverty alleviation, especially in the rural areas. Meeting this goal will demand resolute action on the part of all stakeholders.

In its 1995 publication *A 2020 Vision for Food, Agriculture, and the Environment,* the International Food Policy Research Institute (IFPRI)

posed the question, "What if we do not take action?" The answer is simple. Unless action is taken with the utmost commitment and urgency on the part of national governments, researchers, and the international community, the already disastrous situation facing many countries of Sub-Saharan Africa risks reaching unmanageable dimensions. Today the world has the capacity to reverse the disastrous trend in Sub-Saharan Africa. The challenge is worldwide because

> A world of extreme poverty on the part of many and overt material excesses for some is an unstable world. A continuation of the dramatic widening of the gap between rich and poor experienced during the past 30 years will lead to more social and political instability, poor use of available resources, and falling living standards for all. We must act while we still have choices (IFPRI 1995, 41).

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