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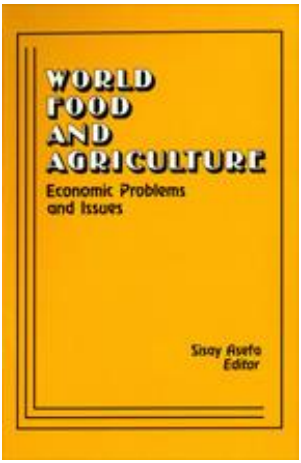

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Ending African Hunger

Six Challenges for Scientists, Policymakers and Politicians

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Nineteen-sixty is usually referred to as the beginning of Africa's independence movement because 16 African colonies won their independence in that year. Over the 1960 to 1985 period, however, at least 40 of the 45 countries in Sub-Saharan Africa wasted a generation in failing to develop their agriculture as an engine of growth of their national economies. After several decades of independence, Africa is still the poorest part of the world's economy and seven of every ten Africans live in rural areas. The dreams of African leaders of skipping stages of development and catching up with the rich countries in one or two generations have all but vanished, as despair, frustration and disappointment have become the code words in African political circles.

When African countries started to reclaim their independence in the 1960s, Sub-Saharan Africa was a modest net exporter of food—mostly groundnuts (peanuts) and palm oil to Europe. But Africa slowly lost its capacity to feed itself during the sixties. The situation deteriorated further in the seventies with the drought and famine in the Sahelian region of West Africa. During the 15-year period from 1970 to 1984, Africa's population grew at twice the rate of growth of food production. In 1985, 25 years after independence, 22 African states appealed to the international community for emergency food aid and 300,000 people died in the Great Ethiopian Famine.

In Africa's first 25 years of independence, only four or five of the forty-five countries in Sub-Saharan Africa gave priority to agriculture and to feeding their people. The remaining countries paid lip service

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to agriculture while emphasizing industrialization, state control and the taxation of agriculture. In this essay, I shall look back 25 years and examine why Africa wasted a generation in developing its agricultural base. I shall then look ahead and examine what can be done to end hunger in Africa over the next 25 years. I have taken the long view, i.e., the long pull—because there is little that can be done over the next five to ten years to slow population growth and end hunger in Africa.

Hunger can be defined as the inability of households to produce, purchase or acquire a calorie-adequate diet throughout the year. I shall focus on calories rather than protein because recent research has shown that, with the exception of pregnant women and nursing mothers, the protein needs of most people can be met if enough calories are consumed from multiple sources.

Although there are currently more hungry people in Asia than in Africa because of the sheer size of Asia's population relative to Africa, the most challenging and intractable problems of hunger and famine are in Sub-Saharan Africa: an immense land area of 45 countries, 7 colonial histories, and more than 1,000 different ethnic groups.[1] Moreover, most Asian countries have made enormous progress over the past few decades in controlling famine before it becomes a local or national disaster. For example, the last major famine in Asia occurred in Bangladesh in 1974 when 1.5 million people perished. In Africa, however, famine has not been brought under control. Famine in the Sahelian zone of West Africa in the early 1970s was followed by the Great African Famine in Ethiopia and Somalia of 1985.

Since Africa is an integral part of the international food equation, I shall examine the goal to end hunger in Africa in an international context, including the use of donor assistance and food aid in increasing food production and access to food. The hallmark of the world food equation of the late 1980s is underproduction of food in many African countries, overproduction in industrial nations such as the United States, Canada, Europe, Japan and Australia, and emerging overproduction of food in some Third World nations such as Brazil and India. For example, India recently joined the ranks of food aid donors when it delivered 100,000 tons of food aid to Africa in 1985. India plans to

donate 35,000 tons of grain to Africa in 1987. Although India's achievement of food self-sufficiency and its generosity to Africa are to be admired, it should be pointed out that roughly 200 million or one-fourth of India's population are hungry and unable to acquire a calorie-adequate diet. The hungry in India are the landless, jobless, poor, and the destitute who are unable to produce, purchase or acquire enough calories to lead a normal life. Under these circumstances, why should India ship food aid to Africa except to gain political capital? Th lesson that emerges from India's experience for Africa is that the expansion of food production and the achievement of national food self-sufficiency will not automatically end hunger.

It is important to debate African hunger in the United States because there is a great deal of misinformation and facile slogans being peddled on the need for Africans to produce more food and fewer cash crops, the belief that hunger can be ended simply by increasing food production and the belief in some circles that hunger in Africa is caused by multinational firms and international capitalism.

I have chosen to discuss six challenges for ending hunger in Africa:

1. The challenge of learning why the first generation of African political leaders, policymakers, and their foreign advisors undervalued agriculture and food production over the 1960-84 period,
2. The challenge of slowing rapid population growth,
3. The human capital challenge,
4. The challenge of focusing on the prime movers of increasing food and agricultural production,
5. The challenge of reducing poverty and increasing access to food,
6. The challenge of reordering foreign aid priorities.

The Challenge of Learning from the Mistakes of the First Generation of African Leaders and Their Foreign Advisors: 1960 to 1985

Two essential questions must be addressed in an analysis of the poor performance of agriculture in the postindependence period. First, what

role did African states assign to agriculture and the industrial sectors in national development strategies in the 1960s and 1970s? Second, what strategies were used by African states to increase food and agricultural production?

The postindependence experience provides a clear answer to the first question. Most western economic advisors to African governments in the 1960s promoted industrialization, rural to urban migration, and the taxation of agriculture. With the exception of a few countries such as the Ivory Coast, Cameroon, Rwanda, Kenya and Malawi, African political leaders undervalued agriculture and gave priority to industrial development at the same time the agriculture sector was usually heavily taxed to finance industrial projects and the urban symbols of modernization such as a soccer stadium, a new House of Parliament and a four-lane highway from the international airport to independence square in the capital city.

In the 1960s, most African heads of state did not believe in investing in the agricultural sector because of the view that industrialization offered the most rapid avenue to change the structure of African economies from traditional agrarian/export-dominated economies to modern industrial economies. But in practice, industrialization has proven to be more complex than imagined. Throughout Africa, industrial plants are now standing idle because of inefficiency, mismanagement, corruption and lack of markets. For example, while visiting Tanzania in October of 1985, I observed that the government-owned shoe factory in Morogoro that was financed by a World Bank loan was operating at 4.5 percent of capacity. I also observed that the cashew nut processing plants were standing idle because it was cheaper to ship raw cashew nuts to India for hand shelling because the unskilled wage in India was substantially lower than in Tanzania.

Why did most African heads of state impose such heavy taxes on agriculture for financing large-scale industrial projects? There is consistent evidence that African heads of state in anglophone and francophone states associated poverty and underdevelopment with colonial strategies of producing agricultural exports—sisal, cocoa, oil palm, rubber and coffee—for European markets. Whether the head of state was

espousing capitalism or socialism, there was a view that continued investment in export crops for overseas markets would be risky and would continue Africa's dependence on western markets. This point of view is reflected in the late Walter Rodney's immensely popular book in African universities—*How Europe Underdeveloped Africa* (1974).

Houphet-Boigny—the President of the Ivory Coast and Hastings Banda, Life President of Malawi, are shining examples of veteran politicians who promoted agricultural development over the past 25 years. Blessed with a rich natural resource base, adequate rainfall and an open-door policy to immigrants from neighboring countries, today the Ivory Coast is a middle-income nation with a per capita income several times higher than that of Ghana even though Ghana was by far the richest country in West Africa at independence in 1958. Malawi, a landlocked country with a poor natural resource base, is not only self-sufficient in maize, the staple food, but it has exported maize for seven of the past ten years.

Over the past three to five years there has been a growing awareness among new African leaders such as Prime Minister Robert Mugabe of Zimbabwe, President Diouf of Senegal, and President Mwinyi of Tanzania, that an agriculture-led development strategy should be pursued in economies where 70 to 90 percent of the people live in rural areas and petroleum and minerals are not available to generate adequate foreign exchange. However, because of the diversity of Africa's natural resource base and opportunities for development, there is no single agricultural development model that can be advocated for Africa. The relative emphasis that a national development strategy gives to industry, mining and/or agriculture must be sorted out on a country-to-country basis. But we can conclude after 25 years of independence that most African states are starting to give greater priority to investment in agriculture and less to industry than they did five to ten years ago.

The second question—how to develop agriculture—was answered in most African states in the 1960s by narrow assumptions about African farmers and herders and a belief in the ease of importing agricultural technology and models of production (e.g., large-scale farms and ranches) from industrial countries. In Africa, in the 1960s—as in Asia and

Latin America in the 1950s—farmers and livestock owners were assumed to be irrational, inefficient and bound to a culture of tradition and poverty. It was also assumed by many African leaders and their foreign advisors that large-scale farms, plantations and ranches were more efficient than small farms. Throughout most of the 1960s and 1970s, African governments, donors and foreign advisors assumed that food crop technology was "on the shelf" or that it could be imported from temperate climates in Europe and North America. It was further assumed that the adoption of improved technology could be speeded up by increasing the number of extension agents to "educate" farmers on the need to spend less time on feasts, festivals and sorghum beer parties and more time on increasing food production. Many African governments followed this advice and from 1959 to 1980, the 45 countries in Africa hired an additional 50,000 extension agents under the mistaken assumption that extension agents, rather than technical packages,[2] were the missing link in developing African agriculture.

With few exceptions, the first generation of African leaders, whether they were the leaders of civilian, military, radical or conservative regimes—were consistent in giving priority to industrial/urban development, exploiting farmers and rural people by imposing harsh taxes on export crops and giving rural people little voice in setting national agriculture policies and development priorities. The first generation also failed to understand that agricultural development is a slow, evolutionary and complex process that does not lend itself to rhetoric, ideology or to crash food production campaigns. Since most countries wasted a generation in developing their agriculture, the challenge for the second generation of African leaders is to learn from the mistakes of the past in addressing the challenge of developing African agriculture and ending hunger. But the bottom line is that many older African leaders must be replaced with a new generation who realize that Africa's poverty and underdevelopment is, to a large extent, the result of misguided national development strategies that gave priority to industrialization rather than strengthening the agricultural base as a precondition for industrial development.

The Challenge of Slowing Rapid Population Growth

Africa's 3.2 percent annual rate of population growth is the highest in the world. In fact, the total population in the region is estimated to increase from 460 million in 1985 to 730 million in year 2000, an increase of almost 300 million in just 15 years. The total fertility rate—the average number of children born during a woman's lifetime—is 6.9 in Africa, the highest in the world.[3]

Looking ahead, most population experts are of the opinion that fertility rates will remain high for the next 10 to 20 years because of the following reasons:

1. *Erosion of the Custom of Abstinence.* In many countries, the custom of abstaining from sex after a child is born ranges from 40 days in some Islamic groups to two years for some ethnic groups in Central and West Africa. When abstinence exceeds a year, it is usually continued until the child is weaned from the breast. This can lead to a spacing as much as four years between children. But the custom of abstinence is eroding, thus raising fertility.
2. *From Breast to Bottle Feeding.* The biological process of breast-feeding suppresses ovulation up to two years for the most prolonged breast feeders. But the aggressive advertising of powdered milk and baby formula is leading to a shift from breast to bottle feeding, thus contributing to higher fertility rates.
3. *Slow Adoption of Contraceptives.* Knowledge about contraceptives is low in Africa. Two-thirds of women in Cameroon have never heard of them. Among the women in Kenya exposed to contraceptives, only 12 percent use them. Fewer than 5 percent of women exposed to contraceptives in Senegal—a Moslem country—use them (Bongaarts, Odele and Lesthaeghe 1984).

African attitudes toward rapid population growth are changing, however. In 1984, 40 African nations met in Kenya and adopted the Kilimanjaro Program of Action for Population that calls for family planning services to be made available to all couples—either free or at subsidized prices. Zimbabwe has recently become the first African nation to achieve a statistically verified reduction in fertility levels. More than 35 percent of urban women now use contraceptives in Zimbabwe.

Two demographic lessons emerge from the historical experience of the past 25 years. First, African heads of state, donor agencies and scientists have underestimated the acceleration of the annual rate of population growth from 2.6 percent in th early 1960s to an Africa average of 3.2 percent today. Second, political leaders and population experts have underestimated the valid economic reasons why rural families want more children and the length of time and resources that would be required to slow population growth rates. Under conditions of surplus land and the lack of a state social security service, children can make a positive economic contribution to their families by fetching firewood, cutting grass for animals, as well as providing support for their parents in their old age.

Western science currently has no proven technology to slow Africa's rapid population growth. For Americans obsessed with technological fixes, it is difficult to realize that flooding Africa with contraceptives is not the answer. The high fertility and population growth rates can only be slowed gradually through more improvements in health, women's schooling, and the reduction of poverty and infant mortality.

In summary, rapid population growth will exert pressure on the natural resource base throughout the continent. Africa's current 3.2 percent rate of population growth is roughly triple the rate of growth of population in presently industrial countries like Denmark and the Netherlands at a comparable stage in their economic history from 1850 to 1900, and in Japan from 1878 to 1912. Because of Africa's rapid rate of population growth, policies for increasing food production and slowing population growth must be conceptualized as long-term efforts because fertility rates are simply not going to plummet over the next five to ten years. The agonizing lesson that flows from the historical experience since 1960 is that slowing the population growth rate—like increasing food production—is a slow, evolutionary, stepwise process.

The Human Capital Challenge

When African nations started to reclaim their independence in the early 1960s, illiteracy rates exceeded 90 percent in many countries and

drop-out rates were high. Moreover, the stock of university graduates was exceedingly low—around 100 in Zambia—at independence and the enrollment ratio of students enrolled in post-high school and universities was less than 1 percent. Moreover, Sub-Saharan African countries had one-fourth the number of skilled manpower per million people in 1970 that Asian countries had in 1960.

Looking back over the past 25 years, Africa has made enormous gains in education at all levels, especially up to around 1980. For example, the number of students enrolled in all levels—primary, secondary and post-secondary (includes technical schools and universities), increased fivefold over the 1970 to 1983 period. Despite these impressive achievements, however, there is growing evidence that 1980 was a turning point for education in Africa. Although total African expenditure on all levels of education grew from $3.8 billion in 1970 to $10.0 billion in 1980, total expenditure fell by 11 percent between 1980 and 1983. Moreover, the 8.4 percent annual rate of growth of primary schooling between 1970 and 1980 fell to 2.9 percent from 1980 to 1983. If the rate of primary school enrollment (2.9 percent) does not keep up with Africa's population growth of 3.2 percent, Africa's educational base will be eroded.

Africa's educational problems have been studied by a World Bank task force over the past two years. The core recommendation of the task force is to reduce the share of public investment on university-level education and to increase expenditures on primary and secondary education. This recommendation will be hotly criticized by leaders of African universities because they believe that shifting the relative mix of resources to primary and secondary schooling will make it difficult for Africa to develop its scientific capacity and reduce the number of expatriate teachers and researchers.

The development of higher education in Africa should be examined in historical perspective. When African nations became independent in the early 1960s, they were encouraged to import technology from industrial countries, to send Africans overseas for agricultural training and to rely on tens of thousands of teachers and technical advisors (technical assistance) to fill manpower gaps until students returned from

overseas training. The desire for overseas training was reinforced by African leaders such as President Senghor of Senegal, a distinguished poet and leader of Senegal from independence in 1960 until he volunteered to retire in December 1980. Although Senghor personally encouraged Senegalese students to study business administration in the United States, one can legitimately pose the question: Why did President Senghor wait until 1979—19 years after independence—to start undergraduate training in agriculture in Senegal? This is a puzzle that merits closer examination because Senegal is a profoundly agrarian country with 70 percent of its people engaged in agriculture. The 19-year time gap cannot be blamed on French colonial policies. It is a reflection of the ambivalent attitude that Senghor and most first generation African leaders had for developing indigenous scientific capacity in food and agriculture.

After 25 years of independence, Africa is still heavily dependent on international advisors in most scientific and technical fields. For example, in the early 1980s, about $4 billion or half of the annual official foreign aid (public) to Africa was used to pay the salaries, and "care and feeding" of approximately 80,000 western experts (about 40,000 school teachers, and 40,000 expatriate advisors, managers, teachers and scientists). But the provision of Western (and to a lesser extent Eastern Bloc) technical assistance to Africa is coming under heavy attack because of its high cost ($100,000 to $150,000 per person per year), its rapid turnover, and its uneven quality. Overseas training is also under heavy attack because of the growing awareness among Africans that it is a stop gap measure for the inevitable decision that will have to be made to strengthen Africa's capacity to train its students at home. Sending foreign advisors to Africa and training Africans in the United States are politically popular to American taxpayers. Both activities contribute to the 75 percent of all American foreign aid that is currently returned to the United States in the form of tuition payments, salaries paid to American advisors, and income derived from the sale of U.S. products—fertilizer, wheat, rice and tractors—for African states. But there is a puzzle in the human capital equation that should be critically examined. Why did the U.S. government take the long view in India

in the 1960s when it helped develop 23 new state agricultural universities and fund their development for the next 15 years? Why is the United States taking the short-run view in Africa in the 1980s?

Unfortunately little leadership is coming from Africa on educational reform. African universities are notoriously overstaffed, inefficient and expensive. For example, in 1980-81, Nigerian universities employed 52,000 staff (teachers, cooks, guards, servants) for a student population of 69,000. By contrast, 8,300 employees care for 67,000 students in the 16 public colleges and universities in the state of West Virginia in 1987 (*New York Times* 1987). Since virtually the total cost of a university education in Africa is paid for by the government, it is privately profitable for African families to send their children to universities. But the returns to society for university-level education are low under the present cost structure and priorities where students are trained in fields such as law, history, geography and political science instead of fields dominated by western advisors such as computer science, business administration, engineering and plant science.

Africa has inherited an elitist model of higher education from the British, French, German and Portuguese. Because of the bleak financial position of many African countries, higher education is now under stress and the quality of education is falling in many universities. A few countries are starting to introduce long overdue structural innovations, including the development of new university models that are relevant to the agrarian dominated continent. For example, Tanzania recently started a new agricultural university—Sokoine University of Agriculture—that is modeled after the Punjab state agricultural university in India, a university established in the 1960s with the assistance of U.S. foreign aid and technical support from Ohio State University. Ethiopia recently launched the Alemaya University of Agriculture at Alemaya.

The 25 major foreign aid donors in Africa, including the flagship donor—the World Bank—do not have a strategic plan on how to break the "iron grip" of fellowships for overseas training and providing technical experts to Africa. The time is ripe for a fundamental reexamination of human capital strategies in Africa. Most donors have retreated from investment in human capital. For example, Uma Lele

of the World Bank reports that World Bank lending to education in Africa declined from 10.6 percent of African allocation in the 1960s, to 7.5 percent during the 1970s, and 4.1 percent over the 1980-84 period (Lele 1987, p. 326). In fact, in fiscal year 1984, the World Bank allocated only two educational loans to Africa totaling $25 million. The major western donors are standing on the sidelines supplying fellowships for overseas training and short-term technical assistance while studiously avoiding making the long-term commitment of funds and teachers for long-term human capital institution building projects that were routinely offered to Columbia, Brazil and Argentina in the 1950s and 1960s and to India and other Asian nations in the 1960s and 1970s.

In a continent with large amounts of idle land and energetic people, what strikes one most about Africa's underdevelopment is the disproportionate stock of skilled people between Africa and the rich countries and between Africa and Latin America and Asia. The challenge now is to assess the experience of the first 25 years of independence and to lay the groundwork for helping African nations develop new models of education that are more cost-effective, relevant and sustainable.

The Challenge of Focusing Policy Attention on the Prime Movers of Increasing Food and Agricultural Production

Because of favorable rainfall throughout most of Africa in 1985-87, the short-term food outlook for Africa is good. In fact, 12 African countries had grain surpluses in 1987. However, because of rapid population growth, Africa faces a major agricultural production challenge. Food supplies will have to be doubled every 17 to 25 years to keep up with rapid population growth. The agricultural sector of African nations will also have to generate jobs, new income streams for rural people and foreign exchange to enable national economies to import capital goods such as tractors, construction material, and mining equipment. However, African heads of state are being inundated with fragmented advice from Western donors and their advisors on how to increase and sustain annual food production growth rates of 3 to 5 percent over the next generation.

Over the past 25 years of working on African development problems, I have noted that planning for increasing food and agricultural production in Africa is heavily biased by the faddish and narrow views of the several dozen major donors, private voluntary agencies and legions of Western academic specialists who typically play up the role of a single factor of agricultural change such as new technology or pricing policy. Many of these academic specialists are zealously promoting the current fad of donors or their discipline. For example, many plant breeders are understandably preoccupied with a technological fix to Africa's food problems and in placing more emphasis on regenerative agriculture. Anthropologists are rightly concerned with the cultural barriers to expanded livestock offtake rates. Agricultural economists typically focus on one issue such as: credit, land reform or raising farm prices, while general economists are concerned with overvalued exchange rates and measures to speed market liberalization.

In a world of increasing specialization and a concern for quick fixes, there is an urgent need to move beyond single factors of agricultural development and focus on what I call the five prime movers of agricultural development as a policy package over the long pull.[4] These five prime movers of increasing food and agricultural production are:

1. New technology produced by public and private investments in agricultural research.
2. Human capital and managerial skills produced by investments in schools, training centers, and on-the-job experience.
3. Biological capital investments (e.g., improving livestock herds) and physical capital investment in infrastructure such as dams, irrigation, and roads.
4. Improvement in the performance of institutions such as marketing, credit and national agricultural research and extension services.
5. Favorable economic policy environment.

A significant characteristic of the first four prime movers is their long gestation period (10 to 25 years). For example, experience has shown that it takes ten years of research, on the average, to produce a new plant variety, and another five to eight years to gain widespread farmer adoption. It takes 10 to 15 years of research on the average to develop

new technology for increasing livestock production. It takes 10 to 15 years of graduate study and on-the-job training for an agricultural research scientist to be productive. Unfortunately this time span is not being reflected in African development plans or in Western foreign aid programs that too often move from one short-term fad to another.

The second characteristic of the prime movers of agricultural development is their complementary nature and the need to develop an integrated investment plan for research, extension, training, etc. The payoff to investment to produce new food, cash crop and livestock and technology will be low unless there is an effective extension service to diffuse the new technology. Likewise, the payoff to investing in agricultural extension services in Africa has generally been low because many national agricultural research services have had little to offer to extension agents. For example, the decision of African states to hire 50,000 additional extension agents over the 1959 to 1980 period was a mistake in my judgment because there was little proven food crop technology available for the extension agents to extend with a few exceptions, such as corn in eastern and southern Africa. For example, although the French started research on millet—a crop that does well in low rainfall (300 to 450 mm)—in Senegal in 1931, there is still no breakthrough in millet research in Africa after five decades of research.

Let us now examine what can be done to step up food and agricultural production in Africa by concentrating on the five prime movers.

Technology Generation. There is growing support for the proposition that expanded rural income from multiple sources is a strategic variable in addressing the hunger and poverty in Africa. In short, combating hunger is a more complex process than merely increasing food production. Hunger can be combated by expanding the production and sale of food crops, export crops, livestock, food and income earned from rural off farm employment. Agricultural research that generates new production technology for food crops, export crops, and livestock, can be important sources of income generation for farmers and a means for families to produce food or the income to purchase an improved diet. There is lack of agreement in the scientific community on the extent of the backlog of improved food crop varieties that are "on the shelf" waiting for extension agents to diffuse them to farmers. For example,

Dunstan Spencer, an authority on African agriculture from Sierra Leone recently reported that probably less than 2 percent of total sorghum, millet and upland rice area in West Africa is sown with cultivars (varieties) through modern genetic research (Spencer 1986, p. 224). On the other hand, the Food and Agriculture Organization (FAO), of the United Nations, recently asserted that in Africa "except in arid and semi-arid areas without irrigation, food production can be roughly doubled with existing technology. Thus, the immediate need is to provide adequate supplies of fertilizer, improved seeds, tools. . . ."(FAO 1986, p. 61).

I am of the opinion that the FAO and many other agencies have overstated the amount of underutilized technology that is on the shelf waiting for farmers to adopt. The stock of on-shelf improved, farmer-tested food crop technology is limited today in Africa. The few notable exceptions include corn in eastern and southern Africa, hybrid sorghum in the Sudan, potatoes in Rwanda, cassava in West Africa, and wheat for the cool highlands of Ethiopia, Kenya, northern Tanzania and in Zimbabwe where it can be grown in the cool winter months (May-September) under irrigation. There is a growing realization that many of the national research services in Africa do not have the scientific capacity to borrow, screen, test and adapt agricultural technology from neighboring countries, regional institutes, the International Agricultural Research Centers (IARCs) and the global research system.

The strategic importance of an efficient national agricultural research capacity to develop new crop and livestock technology is illustrated by Zimbabwe's overflowing grain silos. Currently, Zimbabwe has corn in storage equivalent to two years of normal domestic consumption. Corn contributes about 50 percent of the calories in the average diet in Zimbabwe and it is the staple food in diets in most eastern and southern Africa. Zimbabwe's corn revolution is of special interest to African countries because the production of corn by small farmers (smallholders) tripled from independence in 1980 to 1986. The highlights of Zimbabwe's corn revolution are as follows:

- Zimbabwe's corn revolution has its origins in research on hybrid varieties that was launched in Zimbabwe (formerly Southern

Rhodesia) in the 1930s. Zimbabwe became the first country after the U.S. to introduce hybrid corn in 1950 after carrying out local research from 1932 to 1950. Subsequent research in the 1950s led to the development of a high yielding hybrid variety (SR-52) that was released in 1960 to commercial (large scale) farmers. The 28 years of local research (1932 to 1960) to develop the famous SR-52 hybrid corn variety (the Green Revolution crop of Southern Africa) makes a mockery of the three to five year agricultural research projects that are being currently peddled by foreign donors (Eicher 1984).

- Research from 1960 to 1975 developed shorter season varieties for small farmers in low rainfall areas. At independence in 1980, Zimbabwe had a backlog of corn varieties ready for delivery to small farmers. Today, 100 percent of the commercial farmers and roughly 85 percent of the small farmers use hybrid corn varieties, the highest of any African country (Rohrbach 1987).
- Public investments in roads, credit, extension and supporting services facilitated the expansion of hybrid maize production by smallholders from 1980 to 1986.
- Corn prices to farmers were raised from 1980 to 1986 but the inflation-adjusted prices have fallen since 1984. Hence, maize pricing policy by itself does not shed much light on Zimbabwe's maize revolution.

The message that emerges from Zimbabwe's corn revolution is that no single prime mover such as favorable corn prices was responsible for tripling of production by smallholders over the past six years. Zimbabwe concentrated on the five prime movers as a policy package over a period of decades and developed the preconditions for the "takeoff" in maize production starting at independence in 1980. This is the central finding that emerges from Zimbabwe's corn revolution—a message that is important for other African states, the U.S. Congress and foreign aid donors.

Human Capital and Managerial Skills. I have already commented on the great uncertainty on how to strengthen human capital in Africa. A major challenge facing educators and professional agriculturalists in

African and donor agencies is figuring out how foreign assistance can most effectively assist in strengthening Africa's indigenous scientific, technical and managerial capacity in food and agriculture. Starting with great confidence in the 1960s, the major donors and the U.S. foundations have retreated from investment in human capital in the 1970s and 1980s. For example, the World Bank only extended two educational loans to Africa in 1984.

Rural Capital Formation. Agricultural development in industrial countries has been fueled by the mobilization of family labor for clearing land, picking stones and building fences, an accretionary type of capital formation whereby family labor improves land productivity and the productivity of livestock herds over generations. Security of tenure plays a strategic role in converting family labor into capital formation because, with security, farmers can be assured that farm improvements can be passed on to the next generation. Unfortunately, in Africa there is a tendency for donors and private voluntary agencies to dole out subsidized credit instead of pressuring African governments to raise interest rates in post office savings banks, rural credit banks, etc., in order that farmers will have some incentive to save and finance their own farm improvements. There is a need for African planning to develop policies and institutions for African farm families to finance their own farm investments as the primary source of rural capital formation.

Rural Institutions. The fourth prime mover is strengthening the performance of rural institutions ranging from farmer irrigation associations to fertilizer, credit and seed companies. But there is a paucity of proven strategies on how to strengthen rural institutions such as national agricultural research, credit and extension services. Gunnar Myrdal, the Nobel Laureate in Economics from Sweden, recently observed that unfortunately most "ordinary" economists assume away institutions in their studies of Third World development (Myrdal 1984).

Favorable Economic Policy Environment. The fifth prime mover—favorable economic policy environment—is crucially important in facilitating the implementation of the first four prime movers. Currently in Africa, the major donors—led by the IMF and the World Bank—are pressing African states for policy reforms in exchange for additional

loans and grants. But there are few solid guidelines on the difficult art of restructuring institutions such as phasing out or abolishing government grain boards, abolishing fertilizer subsidies and increasing the role of private traders in delivering farm inputs and in marketing farm products. In Zambia, President Kaunda's regime came close to being toppled in November of 1986 when 15 people were killed in food riots following the government's decision to double the retail price of cornmeal—the staple food of the country—on the advice of the IMF and several influential western donors.

In summary, there is a need for African governments and donors to focus on the five prime movers of agricultural development as a policy package to strengthen the productive capacity of African agriculture over the long pull. Food aid can be used to buy time until investment in these prime movers pays off. But donors need to come to grips with long gestation investments by making an explicit, up-front commitment to financing human capital and institution building projects for 10 to 20 years in Africa, just as they did in Asia in the 1960s and 1970s.

The Challenge of Reducing Poverty and Increasing Access to Food

A comparative study of the causes of hunger in the United States, India and Zimbabwe would reveal that hunger is not simply caused by the insufficiency of national food production, but poverty, unemployment, landlessness, sickness and other factors. We have questioned India's motives in sending food aid to Africa when about one-fourth (200 million) of its population is hungry. Since each of these three countries has achieved national food self-sufficiency, one has to look beyond lagging food production as the cause of hunger and food insecurity. Since poverty is a major cause of hunger in both rich and poor countries, raising per capita incomes is a powerful instrument for helping reduce hunger in the long run. But the long run may take 20 to 30 years or longer to raise per capita incomes sufficiently to enable people to purchase an adequate diet. Therefore, the central policy question is: Do govern-

ments have an obligation to intervene in the short run to reduce hunger in rich and poor countries, including both food deficit and food surplus countries?

In the United States it took several decades of political debate before a consensus was reached on the need for the federal government to finance food stamps to enable the poor, sick, and the unemployed to acquire a calorie-adequate diet. Over the past 15 years under both Republican and Democratic administrations, the United States has invested $9 to 20 billion per year in food transfer programs. But food stamps and other public food transfer programs require careful economic analysis in the Third World. This is especially the case in Africa where the annual per capita income of one-fourth the countries is below $400[5] and the national economies are strapped to maintain—let alone increase—public expenditures on health, education and other basic services. For example, in Senegal the per capita income is lower today than it was at independence in 1960. In Zambia the average per capita income is now almost one-third lower than it was when President Kaunda took over from the British at independence (*Economist* 1987).

In 1987, one-fourth of the African countries (12) had food surpluses and three-fourths (33) had food deficits. The challenge in food deficit countries is to help increase food production especially among subsistence farmers. Increasing food production under conditions of rapid population growth requires attention to the prime movers of agricultural development over the long pull.

In 1987, 12 African countries had achieved national food self-sufficiency and had grain for sale to neighboring countries. But in most of these countries, malnutrition is still a major problem because the poor lack the means (e.g., jobs, income, and credit) to produce and/or purchase a calorie-adequate diet. There is growing awareness in African policy circles and among donors that expanded food production and the achievement of national food self-sufficiency will not automatically end hunger and that poverty must be addressed in a policy package to increase food intake among the malnourished.

Fortunately the rhetoric of national food self-sufficiency in many African countries is diminishing and more countries are starting to focus

on both sides of the food security equation—food availability—and increasing access to food by rural and urban households. Today there is growing awareness of the need for income and employment generating activities (e.g., cash crop production such as cotton and rural small scale industries) to help families acquire the means to increase their access to food.

The Challenge of Reordering Foreign Aid Priorities

Following the Sahelian drought in the mid-seventies, foreign aid to Africa was increased dramatically. For example, foreign aid to the Sahelian countries of West Africa increased at a 40 percent compound annual rate of growth over the 1971-78 period (Berg 1983, p. 45). Today most African countries are receiving two to three times more foreign aid on a per capita basis than their counterparts in Asia. Hence, one cannot make a blanket case for increasing foreign aid to Africa. In fact, in some African countries such as Tanzania, Sudan, Liberia, Senegal and Zaire, foreign aid has been a mixed blessing because of misguided macroeconomic policies, and low political priority to agriculture. In almost all African countries, aid is being delivered by a myriad of donor agencies in the form of short-term projects that do little to strengthen Africa's basic institutions such as schools, universities and national agricultural research services. Careful research would probably reveal that Africa has received too much official development assistance—especially since 1975—in the form of discrete short-term projects. In general, foreign aid has not lived up to its full potential in Africa because most donors shift from fad to fad (e.g., integrated rural development to basic needs to policy reform) and from subregion to subregion (e.g., Sahel to southern Africa).

Since the mid-1980s, most donors have shifted from project to policy-based lending under the belief that many of the tens of thousands of development projects across Africa (e.g., Kenya had around 1,000 development projects in all sectors in 1985) are not performing well because of adverse macroeconomic policies, excessive state control and

subsidies. But there is a basic inconsistency in IMF and World Bank appeals to African countries to reduce the level of subsidies in light of the heavy role that subsidies play in contributing to food surpluses in rich countries such as the United States, Japan and in Western Europe.

Since there are many recent book length treatments of foreign aid (Cassen and Associates 1986) the best one can do here in the limited space is to point up the complexity of aid and the difficulty of generalizing about the efficiency of aid across 45 countries in Africa. The most important lesson that donors should learn from the postindependence foreign aid experience is that Africa is an agrarian continent today as it was at independence in 1960. Donors should put their assistance behind the five prime movers of agricultural development over the long pull.

Summing Up

Cutting across the 45 countries in Sub-Saharan Africa is the extraordinary diversity of African people, their cultures, natural resource endowments, stage of development and opportunities for development. The more experience one gains in Africa, the more one avoids the facile Pan African generalizations such as Africa is a land surplus continent. From the past 25 years of Africa's struggle to develop nation-states, to forge national identities and to improve the welfare of African people, the following generalization flow about food and agriculture.

There is a need to grasp the immensity and diversity of the African continent and to seek insights into development problems and solutions on a subregional basis such as southern Africa, East Africa, Sahel, Central Africa, etc. For example, because of a backlog of proven varieties of its staple food—corn—the food outlook in southern Africa is reasonably optimistic over the coming five to ten years. On the other hand, in semi-arid regions such as the Sahel, the food outlook is pessimistic because of the lack of a proven technical package for the two staple foods consumed by rural people—sorghum and millet—and the lack of proven technology for the two urban crops, rice and wheat.

Rapid population growth will not slow down in the medium term of six to ten years. Flooding Africa with contraceptives will not bring about

a quick reduction in fertility rates. Rapid population growth of 3 to 4 percent per year requires food supplies to grow at 3 to 5 percent per year—an extraordinary difficult task judging from historical experience. Despite favorable weather in most of Africa in 1985 and 1986, Africa faces an enormous food production challenge until population growth rates slow down over the next 10 to 20 years.

There is a need for stepping up investment in scientific training in Africa, in reducing the number of fellowships for overseas training, and for strengthening Africa's research and teaching institutions over a time span of the next three to four decades.

Expanding food production in and of itself cannot end hunger in Africa. Since hunger exists in food surplus nations such as India and the United States, it follows that vigorous income and employment generation programs are critical in helping people increase their access to food. Presently there is little debate on food access in Africa because of the legacy of the drought, the preoccupation of Ministries of Agriculture in increasing production and the prevailing view that a food production shortfall rather than poverty is the main cause of hunger. A vigorous educational program should be launched to move policy debate beyond food self-sufficiency to include both sides of the food security equation—food availability through domestic production, storage and trade and access to food through home production, employment, purchase in the market and food transfers such as food aid.

NOTES

1. Africa will be used in the balance of this chapter to mean Sub-Saharan Africa.

2. A technical package contains two or more components (e.g., new seed, fertilizer) that a farmer/herder can adopt to increase crop or livestock production.

3. The total fertility rate in many industrial countries is 1.8 to 2.2.

4. See Eicher (1985) for an expanded discussion of the five prime movers.

5. The World Bank defines a poor country as one with an average per capita income of less than $400.