

# UNITED STATES SENATE

Committee on Agriculture, Nutrition, and Forestry  
Washington DC

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July 31, 1997

Chairman Lugar, Committee members, thank you for this opportunity to present my views on the African Growth and Opportunity Act, now being considered by the Committee.

For the past 53 years, I have been continuously involved in agricultural research and food production programs in developing nations. My work began in Mexico in 1944 with the Mexican-Rockefeller Foundation cooperative agricultural program. This early foreign assistance program in agriculture led to the creation of the International Maize and Wheat Improvement Center, known by its Spanish acronym, CIMMYT, and the network of international agricultural research centers operating under the funding mantle of the Consultative Group for International Agriculture (CGIAR), a consortium of 54 governments (including the USA), international development banks, and private foundations.

For the past 11 years, I have been engaged in a grass roots agricultural effort with former President Jimmy Carter in more than a dozen countries of sub-Saharan Africa. In our non-governmental organizational partnership, called Sasakawa-Global 2000 and funded by the Nippon Foundation of Japan, we have worked with heads of state, ministries of agriculture, international development agencies, and more than 600,000 small-scale farm families. Through this collaboration, participating African farmers have proven that they can double, triple, and even quadruple basic food crop yields, using existing technology – improved varieties, moderate amounts of fertilizers of the right kind, and proper weed control and general agronomy.

During my career, I have seen much progress in increasing the yield and production of numerous crops, especially basic cereals, in many food-deficit countries. Clearly, the research that backstopped this progress has produced huge returns. Yet, even though the world's food supply has more than tripled during the past three decades, the so-called "Green Revolution" technologies have not solved the problem of chronic undernutrition for hundreds of millions of poverty-stricken people around the world. Why? Because they are simply too poor to purchase the food they need, despite its abundance in world markets. Nowhere is this problem more critical than in the 48 countries of sub-Saharan Africa, countries whose populations are likely to double over the next 25 years.

The World Bank reports that a 4% annual growth rate in African agricultural productivity over the next two decades is the minimum needed to achieve a noticeable reduction in the number of destitute people in the region (currently, about 50% of the people in sub-Saharan Africa barely survive on incomes of less than \$1 per day). However, many economists believe that to significantly reduce poverty, a minimum productivity growth rate of 5% to 6% is actually needed. Through the adoption of yield-increasing and labor-saving technologies – and the development of improved transportation and marketing infrastructures – African farmers can increase their incomes (and food security), even as agricultural prices decline in the marketplace. More plentiful, efficiently produced food in Africa will lead to lower real prices, which in effect means increased incomes for all consumers, but with special benefits for the poor, who spend a larger proportion of their incomes on food.

While greater diversification and expanded exports are certainly important agricultural development objectives that should be aggressively pursued, Africa's traditional subsistence food production systems must be transformed into modern, efficient production systems underpinned by agricultural science. This fundamental transformation – one that the USA itself went through, by the way, earlier in this century – must be accorded the highest priority by policy makers. In most African countries, consumers today pay too much for basic foods because of the inefficient, low-yielding technologies that are being employed, and the lack of adequate infrastructure. The current situation neither provides farmers with adequate incomes nor consumers with food at accessible prices.

The importance of infrastructure development is vividly demonstrated in Ethiopia, where record food grain harvests have been recorded during the past two years. But as Ethiopia's granaries have filled, second generation problems have come to the forefront. Earlier this year, Ethiopia, for the first time in its history, exported surplus maize (corn) to its neighbor, Kenya, which was experiencing serious drought in its lowland areas. However, the cost of moving this grain from Ethiopia to Kenya was about 6 times greater than what it would have cost to move the same amount of grain the same distance within the United States. This points to the dire need to improve Africa's infrastructure to ensure competitiveness of its agricultural products.

### **Investing More in Agricultural Research and Extension**

Today, the bulk of public sector agricultural research on food crops for sub-Saharan Africa is conducted by international agricultural research centers (IARCs) funded through the CGIAR, and by national agricultural research systems (NARSs) in the region, most of which are seriously under-funded at the present time. In addition, some relevant research is carried out by agricultural universities, both in developed and developing countries, although this is not too significant due to scarce research budgets. Publicly funded extension

organizations work with small-scale farmers to improve food crop production in virtually every country. In general, however, these extension services are still weak and poorly linked to research centers and to the farming community, despite considerable efforts by the World Bank and other organizations, including my own NGO, to strengthen them.

A critical linkage exists between IARCs, NARSs and these publicly funded national research and extension systems. The IARCs and NARSs generally operate across a wide band of the research spectrum, but emphasizing their comparative advantages. This means that the IARCs tend to focus on more upstream activities – a bit of fundamental or basic science (such as genetic engineering), a fair amount of strategic research (resulting in improved, widely adapted varieties and new general production methods), and quite a bit of applied research (which takes the outputs from basic and strategic efforts and applies them to problems of regional and international scope) – and NARSs tend to focus more on the applied and (very much so) on the adaptive research needed to ensure the effectiveness of new agricultural technologies in farmers' fields. Both IARCs and NARSs, however, in turn rely on publicly funded extension and educational systems to move appropriate new technology onto farmers' fields. My point here is that this fragile web of international research and extension partnerships – a system that has so far averted the massive famines in developing countries that were predicted for the latter half of the 20<sup>th</sup> century – is endangered due to inadequate and unstable funding. Any strategy aimed at optimizing investments in technology generation and transfer must include ways to fund at an adequate level and over the long run, the IARCs, the NARSs, and the local extension services. Funding one without the others will not result in the desired impact. It is critical that all levels of research and extension be financed such that the potential synergies of scientific networking between IARCs, NARSs, and local extension services are realized.

Let me note here that I perceive some danger that the international and national research centers are falling prey to scientific bandwagons (in no small part because of donor pressure) that will not solve Africa's food production problems. From my perspective, agricultural research managers at all levels need to spend more time on the ground, monitoring what is happening – or, indeed, what is not happening. Further, the scientists themselves must strengthen their interactions with extension workers and farmers. Too many have become detached from the realities in farmers' fields, preferring to measure their achievements by the genetic and information products they generate – including the learned papers they publish – rather than by adoption of their technologies in the countryside. This trend must be corrected. We must return to using the impact on farmers' fields as the primary measure by which to judge the value of research and to justify its continued funding.

Privately funded research and extension activities, while still quite modest in Africa, have tended to focus on cash and plantation crops – coffee, tea, cotton,

tobacco, sugarcane, and cocoa. Exceptions to this are found in South Africa, Zimbabwe, and a handful of other countries where private companies conduct some research and extension in food crops, primarily targeted at the large commercial farmers. However, the trend seen elsewhere toward more private sector research and extension, even in food crops, will also become more evident in Africa in future years.

Looking farther down the road, after years of research in universities and the private sector, the emerging science of biotechnology has the potential to improve, under conditions of adequate soil fertility, the yield, dependability, and quality of agricultural crops in ways that build upon – but go significantly beyond – the capabilities of traditional plant breeding. Scientists are gaining the ability to insert genes that give biological defense against diseases and insects, thus reducing the need for chemical pesticides, and convey genetic traits that enable crops to better withstand drought conditions.

With this powerful new genetic knowledge, scientists have the capability to pack large amounts of technology into a single seed. Despite current campaigns by extremist environmental groups, the products of agricultural biotechnology will no doubt spread rapidly among farmers in developed countries during the coming decades. But will these seed-borne breakthroughs also reach small-scale farmers in the developing world? Here, the answer is less certain.

Most biotechnology research is conducted by private sector institutions in industrialized countries, and these companies must seek appropriate financial incentives and protection of intellectual property rights if they are to extend the products of biotechnology research to the farmers of sub-Saharan Africa. Thorough, but reasonable, regulatory procedures governing biotechnology activities will be needed. Additional training and collaboration will also be required to strengthen the biotechnology capability of scientists in African countries.

But even with the necessary safeguards, will resource-poor farmers be able to afford the products of biotechnology research? This issue goes far beyond economics; it is also a matter for deep ethical consideration. Thus, it is critical to develop mechanisms to ensure that these new products reach the small-scale farmers of Africa. Public and private cooperation will be especially important in achieving these objectives. I believe we must give this matter serious thought.

### **Confusion in Policy Circles**

While many of us living in well-fed, industrialized nations are aware of the urgent need to improve food security in low-income countries, a debilitating debate between agriculturalists and environmentalists over what constitutes “sustainable agriculture” has confused – if not paralyzed – policy makers. Afraid of antagonizing powerful lobbying groups, many international agencies have turned away from supporting the science-based agricultural intensification programs so urgently needed in sub-Saharan Africa. The result has been

declining food security and accelerated environmental degradation. This policy deadlock must be broken.

Widespread adoption of realistic soil fertility restoration and maintenance strategies in Africa will be key to achieving needed agricultural growth rates. Soil scientist Pedro Sanchez, Director General of the International Center for Agroforestry Research (ICRAF), estimates that during the past 30 years, on some 100 million hectares (250 million acres) of African cropland, net soil nutrient losses per hectare amount to about 700 kg of nitrogen, 100 kg of phosphorus, and 450 kg of potassium. These net losses reflect the balance of nutrient inputs, including fertilizers, minus nutrient outputs, which are lost to the soil due primarily to crop harvest removals.

For those organic farming enthusiasts who think that organic fertilizers alone can replenish soil fertility and achieve agricultural productivity growth on the order of 4% to 6% per year, permit me to use the case of China to refute the argument. For centuries, Chinese and other east Asian farmers made the best use in the world of recycled organic matter, animal manure, night soil, and composted crop residues. Interestingly, the 400 kg/ha yield advantage in cereals that China enjoyed over India in 1960 was due fundamentally to the fact that Chinese farmers recycled their organic wastes while Indian farmers burned their cattle manure as a cooking fuel.

But by the early 1960s, and after the devastating famines of 1959-60 when as many as 30 million Chinese died of starvation, China realized that it could no longer depend exclusively on organic fertilizers to restore and maintain soil fertility to increase crop yields and crop production. Indeed, the organic fertilizer approach could give it only a 1% to 2% growth in food production, too little to meet the rapidly increasing needs of the nation. Since then, first with small-scale fertilizer plants, and later with large-scale factories, China has pursued an aggressive strategy to develop its fertilizer sector. These investments have paid off handsomely, as evidenced by China's remarkable agricultural growth over the past two decades, which has served as an engine of economic growth that has helped drive the development of all the country's other economic sectors.

This lesson must not be lost on Africa. We cannot lose sight of the enormous job before us to feed growing populations. We cannot turn back the clock. Environmentalists need to recognize the vastly different circumstances faced by farmers in different parts of the world, and assume different policy postures. For example, in Europe or in the US Corn Belt, the application of 400 to 500 kg of fertilizer nutrients per hectare of arable land can and does cause some environmental problems. But surely, increasing fertilizer use in sub-Saharan Africa from 10 kg of nutrients to 30 or 40 kg per hectare of arable land will not endanger the region's environment. Sensible fertilizer use in sub-Saharan Africa should not be seen as a problem, but rather as a key component in Africa's solution to environmental degradation.

### **Private Sector-Led Agricultural Development**

After three decades of disappointing performance by public-sector organizations in sub-Saharan Africa, most agricultural development professionals are looking to the private sector for new leadership. Experience in other parts of the world has shown that private enterprise is more efficient in delivering improved technology to farmers, and in developing marketing and credit functions.

Virtually all government leaders now agree that official development assistance will not be sufficient and that private capital from abroad is essential. For this to happen, we know that various economic and legal conditions have to be right, especially in agriculture, which is so dependent upon the economic and policy environment for strong growth.

Unfortunately, private capital is still not flowing into African agriculture at anywhere close to the rate envisioned by economic planners there. In 1995, sub-Saharan Africa attracted only 3% of the flow of direct foreign investment in the developing world, despite accounting for 15% of the developing world's population. If private sector capital flows do not pick up, the structural adjustment programs being implemented by many African countries are likely to result in much lower economic growth than has been anticipated.

Of course, only African governments can create the enabling regulatory environment for private entrepreneurs to mobilize the capital needed to develop vibrant agribusinesses and to ensure that healthy competition develops. Obviously, governments must also ensure that subsidized para-statal agribusinesses are not allowed to operate in ways that amount to unfair competition. Beyond this, governments can help promote private sector involvement through investments in general education and training, health care services, physical infrastructure, and in getting fiscal and monetary policies right.

For their part, the private sector has duties and responsibilities to fulfill. First and foremost, private companies must be good corporate citizens. They must refrain from seeking government privileges that result in monopolistic positions in the market; they must stand up for the fundamental values of the free market system. Second, they must be conscious of environmental and safety regulations in their manufacturing and salesmanship. Third, they must adopt a different perspective on profit making, and invest in local human resource development to ensure corporate viability over the long term.

### **Public Sector-Led Agricultural Development**

Notwithstanding its many potential virtues, however, we should also realize that privatization is not a panacea for all development efforts. There are many activities that public sector institutions must continue to undertake. In particular, most research and extension work for staple food crops, especially to serve small-scale farmers, will remain a public sector activity for the foreseeable future. Improving the quality and orientation of public spending for agricultural

research and extension can greatly help to raise the productivity of African small-scale producers.

We must also face up to the fact that sweeping reform of the public agricultural sector is still required. A number of the previous functions of ministries of agriculture, such as crop marketing boards, input supply, mechanization services, and various regulatory activities (but not obsolete plant and animal quarantine regulations) have been significantly reduced, if not eliminated. Yet many of the personnel previously assigned to these functions remain on ministry payrolls.

While we may wish it was not so, there are just too many developing country public sector employees relative to budgetary resources engaged in agricultural research, extension, and production activities. It is not unusual to find situations in which over 90% of available resources are going to salaries only – often for people who are poorly trained for the work they are assigned. This leaves precious little money for operational activities. In other words, many national research and extension programs are long on bodies and short on operational capital. The ranks of these employees need to be thinned in line with overall budgets, with the resulting savings used to bolster operational budgets. It is time to get on with this difficult job.

At this point, I must sound a word of caution about non-governmental organizations (NGOs), which are so much in vogue today in development circles. While such organizations have many virtues, in terms of flexibility and ability to work effectively at the grass roots level, NGOs also need to be accountable to African governments, both in terms of technical competence and their development orientation. Today, for example, there are a number of US and European NGOs that provide seed, fertilizer, and agricultural tools to farmers at no charge. On the surface, such practices seem reasonable, but this approach creates a psychology of dependence and undercuts efforts to develop private agribusinesses in small towns and villages to supply inputs and implements to farmers. (I have asked my own staff in Africa to document such cases, so that we can bring them to the attention of the Boards of Directors of these organizations.)

Certainly in the past, with no elections, African governments had little accountability to their people. However, with the trend toward democratically elected governments in Africa, I believe it is inappropriate, for donor organizations – including USAID – to seek to bypass public sector institutions and work directly with community-based organizations. Indeed, I sense growing antagonism among national governments in a number of countries to the overemphasis on this new approach to development.

### **Investing in African Agriculture is Good for U.S. Agriculture**

Historically there exists a strong correlation between developing countries that have the highest agricultural growth rates and those that have most increased their grain imports. Imports have grown, not because domestic production has

failed, but rather because rising incomes have sparked stronger domestic demand for grain and livestock products than expanded domestic production could satisfy. Further, developing countries with accelerated agricultural growth have tended to exploit their comparative advantages by specializing their trade, expanding their demand for certain crops in which they do not have a comparative advantage in production.

Rising agricultural incomes in agrarian-based economies result in greater overall economic growth, which in turn increases the demand for agricultural equipment and manufactured products. Although the severe indebtedness of many African countries weakens this correlation, accelerated growth in the agricultural sector will certainly lead to increased imports of U.S. agricultural and manufactured products. However, only by fostering an expanding global economy, one in which more people are able to achieve adequate consumption levels, can we reasonably assure a prosperous long-term future for an export-dependent U.S. agriculture.

In addition, U.S. investments in international agricultural research aimed at developing countries lead to significant spin-off benefits for U.S. agriculture. A recent study by the International Food Policy Research Institute, a Washington DC-based think-tank, shows that U.S. support of wheat varietal development done by the International Maize and Wheat Improvement Center in Mexico (CIMMYT) has resulted in tremendous benefits to U.S. wheat farmers. For every taxpayer dollar invested in CIMMYT wheat research over the past 20 years, U.S. wheat farmers have – by using the new varieties produced – been able to increase the value of their production by more than \$190. In total, the estimated net benefits accruing to U.S. agriculture from the use of CIMMYT wheats is on the order of \$9.0 billion per year. This is a fine example of “doing well by doing good.”

### **Peace and Prosperity in Africa Will Not Be Built Upon Empty Stomachs**

Twenty-seven years ago, in my acceptance speech for the 1970 Nobel Peace Prize, I said that the Green Revolution had won a temporary success in man's war against hunger. If fully implemented, the Green Revolution could provide sufficient food for humankind through the end of the 20<sup>th</sup> century. But I also warned that unless the frightening power of human reproduction was curbed, this success would be short-lived.

It seems to me that we have failed to educate policy makers about the strong linkages in the developing world between population growth, environmental degradation, and rural poverty. Without doubt, the reduction of rural poverty among small-scale farmers in Africa is a necessary condition for improved resource conservation. As Richard Leakey correctly points out, “you have to have at least one square meal a day to be an environmentalist.”

Certainly, the Green Revolution has not solved the problem of chronic undernutrition for hundreds of millions of poverty stricken people around the



world. But what would have been the situation had the high-yielding wheat and rice technological packages not been developed and introduced in Asia three decades ago? In India alone, wheat production has increased from 11 million in 1960-65 to 65 million tons in 1995-96. How would the additional 600 million people now living in India been fed, clothed, and housed **without the** introduction of science-based agriculture?

It will be the application of high-yielding agricultural science and technology – along with market reforms, trade liberalization, sound macroeconomic policies, and political stability – that will lead Africa into prosperity. **Without** agricultural growth there can be no sustained reduction in poverty. Yet we often forget that we still have not secured the agricultural production base. We must get back to the basics, and increase the rate of agricultural productivity and production.

I agree that new winds are blowing in Africa toward freedom and open markets and I applaud the bipartisan efforts of the U.S. Congress and the Executive Branch to improve the access of reforming African countries to U.S. markets, private investment capital, and debt relief. Africa is a sleeping agricultural giant waiting to be awakened. A vibrant agribusiness sector is central to her future prosperity and, importantly, to the **protection of her natural resources**. The African Growth and Opportunities Act now pending in Congress can help to secure the needed production base.

Well-focused agricultural research will certainly be needed to prime the “development pump.” For such research to achieve its full potential impact, however, large investments also will be needed in transportation, energy, communications, education, and health, as well as in agricultural input delivery, output marketing, and financial systems. While there is still a long way to go, there are very promising signs on the horizon. The emerging African leadership does have a more pragmatic, market-oriented vision of development. With increased private and public investment in agriculture and other sectors, I believe that the standards of living for millions of African people can be significantly improved over the next two decades. In addition, making African cropland as productive as possible is the key to reducing environmental destruction, by sparing areas for forests, wildlife habitat, and other uses. It will also add greatly to political stability, slow urban migration, and stem the tide of illegal immigration to Europe, the U.S., and other affluent nations.

I believe, too, that the United States has an historic opportunity to provide international leadership in this arena, to ensure adequate funding for international agricultural research, to help provide the necessary market access and incentives, and to encourage the political climate in which global trade that benefits all parties can flourish. I therefore strongly endorse the African Growth and Opportunities Act. It is, I believe, a welcome step in the right direction.