



**USAID**  
FROM THE AMERICAN PEOPLE

TITLE XII • REPORT TO CONGRESS • FISCAL YEAR 2003

# MOBILIZING SCIENCE AND TECHNOLOGY FOR SMALLHOLDERS



***“Fifty percent of the improvements in agricultural productivity in the Third World are from improved seed varieties in the last 20 years. Fifty percent. So there’s a relationship between science and technology and increasing incomes among poor people in rural areas.”***

—Andrew S. Natsios,  
Administrator

REMARKS TO USAID ADVISORY COMMITTEE

ON VOLUNTARY FOREIGN ASSISTANCE

WASHINGTON, DC MAY 14, 2003



**USAID**  
FROM THE AMERICAN PEOPLE

I am pleased to present the FY 2003 Title XII Report entitled Mobilizing Science and Technology for Smallholders. This report provides an opportunity to communicate the many accomplishments of USAID and our public and private partners during FY 2003, as well as to reflect on USAID's activities in science and technology during the United Nations International Year of Rice.

Rice exemplifies the importance of food crops in developing countries. In Asia, more than 2 billion people obtain 60 to 70% of their calories from rice and its products. In Africa, it is the most rapidly growing source of food and is becoming a significant source of food security in an increasing number of low-income food-deficit countries. Rice-based production systems employ nearly a billion people in rural areas, with about 80% of the crop grown by small-scale farmers in low-income and developing countries. Rice production, however, is facing serious constraints, including a declining rate of growth in yields.

USAID is committed to reversing this trend through continued support for agricultural research undertaken by the centers in the Consultative Group for International Agricultural Research (CGIAR), the International Fertilizer Development Center, the U.S. university-led Collaborative Research Support Programs (CRSPs), and other U.S. university-led science and technology initiatives, as well as at the country level with more than 80 country-based development assistance programs. As one of the themes of the Agency's new agriculture strategy, science and technology will continue to play a critical role in increasing agricultural productivity and generating more and better-quality food demanded by markets.

I look forward to informing you on the progress of our collaborative efforts to increase food security for all.

Andrew S. Natsios  
Administrator

# Table of Contents

Transmittal Letter	3
Executive Summary	7
<b>Mobilizing Science and Technology for Smallholders</b>	<b>10</b>
Introduction	10
The Role of Science and Technology in Future Problem Solving	13
Making the Right Choice	16
The United States – Uniquely Positioned to Lead in Science and Technology	18
USAID’s Approaches to Science and Technology Promotion and Investments: An Agency-Wide Effort	22
Future Directions	30
<b>Annex One: BIFAD Report: Activities and Recommendations</b>	<b>33</b>
SPARE Sub-Sector Reviews	33
SPARE Recommendations to BIFAD	35
BIFAD Meetings	36
The 2003 BIFAD Award for Scientific Excellence	37

<b>Annex Two: Agricultural Obligations</b>	<b>39</b>
Overview	39
Economic Growth, Agriculture, and Trade Bureau	40
Africa Bureau	43
Asia and the Near East Bureau	45
Latin America and the Caribbean Bureau	47
Europe and Eurasia Bureau	49
Bureau for Democracy, Conflict, and Humanitarian Assistance	52
<b>Annex Three: International Meetings</b>	<b>57</b>
<b>Annex Four: New Agricultural Activities</b>	<b>59</b>
<b>Annex Five: Key Agricultural Activities and Highlights of Agency Accomplishments</b>	<b>63</b>
Key Agricultural Activities	63
Highlights of Agency Accomplishments	67
<b>Annex Six: Education, Training, and Outreach</b>	<b>83</b>
Education and Training Highlights	83
Information Dissemination and In-Field Training Highlights	85
Workshop and Conference Highlights	87
<b>Annex Seven: Field Support</b>	<b>89</b>



# EXECUTIVE SUMMARY

This report summarizes the implementation of Title XII of the Foreign Assistance Act by the U.S. Agency for International Development (USAID) in FY 2003. USAID's agricultural activities are guided by the priorities outlined in five key documents: the Title XII legislation, USAID's Foreign Aid in the National Interest, the U.S. Action Plan on Food Security, the respective bureaus' and missions' strategic plans, and the recently adopted agriculture strategy. The main body of this report highlights those activities of USAID and its Title XII partners that contributed to one of the strategic themes of the agricultural strategy; accelerating agricultural science-based solutions, especially using biotechnology, to reduce poverty and hunger. It examines the history of USAID's engagement in science and technology to increase agricultural productivity, the lessons learned, accomplishments, and future directions for Agency investments in research and development. The report's annexes describe financial obligations and program accomplishments in agriculture.

During FY 2003, USAID invested approximately \$692 million in agriculture and environmentally

related activities that addressed the objectives of the Title XII legislation. In agricultural research and training, USAID's major implementing partners were the Collaborative Research Support Programs (CRSPs), which mobilized the resources and expertise of more than 50 U.S. universities and their counterparts in developing countries, the International Fertilizer Development Center (IFDC), the 16 international agricultural research centers (IARCs) supported by the Consultative Group on International Agricultural Research (CGIAR), and U.S. university members of the Agency's Biotechnology Initiative.

In FY 2003, USAID launched several new initiatives, including the Presidential Initiative to End Hunger in Africa (IEHA). This initiative signals the U.S. government's commitment to finding clear political and technical options for reversing the trends of hunger and poverty in Africa. IEHA focuses on promoting agricultural growth while building an Africa-led partnership to cut hunger and poverty. The primary objective is to increase agricultural growth and rural incomes rapidly and sustainably. Initial efforts concentrate on a key country in each of three regions (East, Southern, and West

Africa). These countries (Uganda, Mali, and Mozambique) are leaders in policy reform, public investment, and government commitment to agricultural growth and poverty reduction. They have the greatest potential for rapidly influencing regional agricultural productivity and economic growth through trade and technology diffusion.

Other new activities launched in FY 2003 include:

- The Bean Global Development Alliance (GDA), Pulses for Health Alliance, a partnership between the American Dry Bean Board, the National Dry Bean Council, Bush Brothers and Company, J.J. Heinz Company, World Vision International, the Bean/Cowpea Collaborative Research Support Program (CRSP) at Michigan State University, and USAID. This alliance draws upon research conducted by the Bean/Cowpea CRSP on food-based solutions to infectious diseases to implement a broad agenda of interventions.
- The BIFAD Long-Term Training Initiative, aimed at reversing the ten-year decline in U.S. support for Africans studying for graduate degrees in agriculture-related subjects. The Initiative's ultimate

goal is to strengthen African institutions and develop in-country training capacity and leaders so that Africans receive training at African institutions rather than seeking it abroad.

- The Program for Biosafety Systems, which aims to stimulate economic growth by raising agricultural productivity in an environmentally sustainable way. This ten-year program will help countries develop biotechnology regulatory systems to meet their broader goals in agriculture, food security, environment, and trade policy while ensuring the safety of new biotechnology products.

During FY 2003, USAID supported agricultural activities in over 70 countries to address regional and worldwide strategic priorities. Agricultural obligations were made by the four regional bureaus as well as two pillar bureaus, Economic Growth, Agriculture and Trade (EGAT) and Democracy, Conflict, and Humanitarian Assistance

(DCHA), and the Policy and Program Coordination (PPC) Bureau.

Among the regional bureaus, Asia and the Near East (ANE) manages one of USAID's largest agricultural programs aimed at reducing hunger, food insecurity, and poverty in post-conflict countries as well as supporting a variety of agricultural policy reforms and agri-business development initiatives in transformational countries. USAID's programs in Latin America and the Caribbean (LAC) continue to focus on assisting sub-regional trading blocs with trade matters, improving the institutional infrastructure to help the poor access markets, and, in coca-growing regions, provide people with viable, legal jobs and other means of earning income as alternatives to cultivating coca and producing and trafficking in illegal drugs. The primary emphasis of USAID's assistance to the countries of Europe and Eurasia (E&E) remains helping the region transform to a market

economy through the development of a more competitive marketplace, privatization of state-owned assets, institutionalization of land reform, and the development of economically sound and environmentally sustainable energy and natural resource sectors. In Africa, the Bureau focused primarily on the implementation of the Initiative to End Hunger in Africa. The Bureau of Democracy, Conflict and Humanitarian Assistance (DCHA) provided funding for agricultural activities through its Office of Foreign Disaster Assistance and its Office of Food for Peace, which administers the Title II (P.L. 480) Food for Peace Development Program.

Over the next year, USAID will implement the Agency's Agriculture Strategy while working to integrate the Agency's New Business Model into its agricultural programs. It will also determine the scope of agriculture activities most relevant for fragile and transformational country partners.

JAN HOWARD



A USAID project in Nicaragua financed the building of a modern, mechanized wet mill that improves coffee quality and protects the environment.



E. A. "SHORT" HEINRICHS, PROGRAM DIRECTOR, IPM CRSP

# MOBILIZING SCIENCE AND TECH

## INTRODUCTION

Smallholders in developing and transition countries today are increasingly market-oriented and woven into both international networks of scientific research and technological development and global trade and investment. They rely on improved seeds produced by international breeding programs, fertilizer formulated according to standards

established by research and industry, information from private buyers, and publicly funded agricultural extension programs.

While many still produce for home consumption, a rising portion of the smallholders' harvests today travel to domestic, regional, and, increasingly, international markets to be processed and consumed by shoppers in distant cities and

foreign lands. International and domestic standards for food safety determine how much of the crop makes it across national borders. A smallholder's ability to earn a profit from his or her farm labor is shaped not only by the vagaries of local weather and soil, but also increasingly by world trade standards, changing consumer preferences, and advances in science and technology.

A Bangladeshi farmer examines pumpkin plants for insect damage. The IPM CRSP, in collaboration with the Bangladesh Agricultural Research Institute (BARI), is developing and transferring vegetable Integrated Pest Management technology through farmer participatory research. Alternatives to pesticides such as sex pheromone traps have been very effective in controlling insect pests. Farmers are excited about the trapping procedure and refer to the traps as “the magical box.”

## SCIENCE AND TECHNOLOGY

This report reflects Title XII legislation in adopting a wide **definition of agriculture** that includes forestry and fisheries, related natural resource and environmental activities, and other elements in the food, feed, and fiber systems beyond production, including processing, marketing, and nutrition. It focuses on science and technology (S&T) and the associated processes of research and development (R&D).

**Science** is viewed as knowledge that is organized in a systematic way that is testable and verifiable. **Research** is the systematic examination and investigation aimed at the discovery of new knowledge. **Technology** is the practical application of knowledge gained through research: science at work. **Development** is the process of applying new research and knowledge, often in the form of a technology.

Farmers are not the only actors in the broader “agricultural” sector. This term also includes those who fish the oceans, rivers, and streams as well as those who use aquaculture techniques to produce supplies of the food commodity for which demand is growing most rapidly, who tend to livestock herds in traditional nomadic patterns or in capital-intensive production units,

tions. Increased productivity results in a lower per-unit cost of product, that is, grain, meat, timber, or other agricultural products. Lower food costs are particularly important for low-income consumers, who spend a high proportion of their limited resources on their daily consumption needs.

The doubling and tripling of yields that has occurred worldwide in the

of the new technologies found their incomes growing, farm laborers found work, and marketing firms provided production inputs and handled the outputs. All of this contributed to overall economic development.

Productivity gains can also translate into environmental benefits for society as a whole, as research-based productivity gains make non-sustain-

# NOLOGY FOR SMALLHOLDERS

who harvest the natural abundance of forests and rangelands, and who undertake agroforestry and plantation forestry.

Increasing productivity is the key to realizing new market opportunities for all involved in agricultural production. Higher productivity of crops and livestock makes it possible to expand food supplies to meet the needs of growing popula-

last 40 years was largely the result of major genetic improvements in grains. Wheat, rice, and maize are now cheaper by half, in real terms, than they were 40 years ago. Beyond consumers, other groups have also benefited from the productivity increases spurred by scientific breakthroughs and the development of new technologies. The farmers who were early adopters

able use of marginal lands less profitable, while reducing pressure to use such marginal lands. Forests and forest margins, hillside watersheds, coastal zones, and other fragile areas are less likely to be exploited if more appropriate farming areas are productive and sustainable. Threats to biodiversity from habitat destruction are more likely to decrease if such farming systems are adopted.

## RESOURCE-SAVING AGRICULTURE FOR SOUTH ASIA

USAID Missions in India and Bangladesh are sponsoring new agricultural tillage practices that bring farmers higher yields, lower costs, fewer weeds and pests, substantial savings of water, fuel and other inputs, and large reductions in nitrous oxide and carbon dioxide emissions. Direct seeding of wheat, rice, and pulses using zero-tillage drills

saves an average of 30–40% of water in rice-wheat systems, and can reduce production costs by 25–35%. Adoption of zero-tillage is accelerating, with farmers reporting using 75% less diesel fuel while improving yields. Farmers also gain by being able to fit an additional cropping season into the rotation and often choose high-value vegetable, oilseed, or

feed crops. A partnership drawing on the International Maize and Wheat Improvement Center (CIMMYT), the International Rice Research Center (IRRI), the Soil Management Collaborative Support Program (CRSP), Texas A&M University, national research organizations and NGOs is responsible for this successful program.

A recent study estimated that the increases in productivity of seven major crops in developing countries saved 100–250 million hectares (250–600 million acres) of land from being converted to agriculture, leaving it as grassland, forest, or wetlands (Nelson and Marelda, 2000:42). Science and technology (S&T) can also help make agricultural production more sustainable and resource-efficient, leading to conservation of soil, water, and biodiversity.

In short, S&T offers opportunities for increasing productivity sustainably across a range of agro-ecosystems. Research advances permit expanded use of genetic resources as methods are developed to better conserve, categorize, and use them. Agro-biodiversity is conserved both in situ, where a full range of species maintains the complex set of interactions of their natural ecosystem, and through an array of ex-situ methods, such as gene banks, other seed and tissue culture collections, frozen embryos for livestock, and field collection of crops' wild relatives. Using molecu-

lar tools, scientists are now able to identify genetic diversity, including important traits such as pest and disease resistance, nutritional enhancement, and drought tolerance. The knowledge that is gained allows scientists to be more strategic, accelerating the pace at which new gains are realized from research.

The need for S&T is urgent. Continuation of the impressive gains in agricultural productivity made during the period of the 1960s-1980s cannot be taken for granted. "Food Security: New Risks and New Opportunities" (von Braun, et al., 2003), an overview of the world food situation, shows that progress in achieving food security and related gains actually slowed during the 1990s and suggests that picking up the pace is likely to be more difficult than in the past. The study concludes that "accelerated global public investment in public goods, including agricultural research, broadly defined" (von Braun, et al., 2003:4) will be required to get on track to achieve the World Food Summit and Millennium Development Goals.

The findings reflect a range of regional trends. Population growth in sub-Saharan Africa is still outpacing productivity increases in that region. In other regions, rapid urban growth means that fewer farmers must meet the needs of larger consuming populations. At the same time, the rate of increase in yields for three of the world's major crops—rice, wheat, and corn—has been slowing down. While billions of people depend on rice as their major staple, there has been no detectable increase in the highest attainable level of yield for rice varieties in 37 years (Cassman, et al., 2003:324).

Without continuing yield increases through both genetic improvements and production-enhancing technology, pressure on fragile lands will increase, threatening both biodiversity and the many environmental services that it provides. Food and fiber production systems in the coming decades will also face new environmental challenges due to increasing stress on water supplies and deteriorating water quality, as well as declining soil fertility due to salinity or poor management. Water supplies need to be



USAID TANZANIA

In Tanzania, USAID helped organize village women into a farmers' association to produce seaweed, then connected them to a commercial buyer. The buyer provided the association with technical assistance, inputs, and a reliable market for their product.

more sustainably and efficiently managed to get "more crop per drop." Climatic changes may also pose new problems in terms of increased variability in rainfall patterns and longer-term changes resulting in reduced adaptability of traditional systems

of production. These changes will not be limited to on-farm systems, but will also include those involving forests, wetlands, and marine ecosystems, all of which provide life and livelihoods for great numbers of people.

## THE ROLE OF SCIENCE AND TECHNOLOGY IN FUTURE PROBLEM SOLVING

The International Food Policy Research Institute (IFPRI) has identified the need for increased attention to agricultural research and investment in its computer simulation of three global scenarios through the year 2050 (von Braun, et al., 2003). Each scenario employed different assumptions to predict future levels of agricultural productivity and the impact of various levels of productivity on the global food security situation. The scenarios modeled the effects of three different policy paths: (i) increased investments in agricultural research and development; (ii) policy failure, that is, current or lower levels of investment in agricultural research and development; and (iii) technology and resource management failure.

Under the optimistic projections of the first scenario, the progressive policy action scenario, with high levels of investment in agricultural research and development, cereal yields could be expected to double by 2050. Such growth would keep pace with demand and help preserve more fragile land areas by reducing incentives for crop-

ping and other agricultural use. Research progress on plant traits, pest and natural resource management, and post-harvest storage would help reduce pressure on resources, lowering conflict over water, land, and watershed uses. The implied investment requirements for direct agricultural productivity enhancement under this scenario are just under \$20 billion annually, with more than half intended for rural roads, just under a third for public agricultural research, and the remainder (11%) for irrigation.

In the second scenario, the policy failure scenario, it is assumed that as a result of political conflicts, investments in agricultural infrastructure and research and development (R&D) are low. This scenario leads to flat global cereal yields, associated with increased competition for land, water, and resources, as well as higher prices that limit access to food, especially for the poor. Africa and South Asia would likely suffer extensive environmental degradation and civil strife related to non-sustainable use of, and



E. A. "SHORT" HEINRICH, PROGRAM DIRECTOR, IPM CRSP

The IPM CRSP is assisting farmers in Tamil Nadu, India, in the production of pesticide-free, high-quality vegetables through the development and transfer of vegetable Integrated Pest Management technology. Collaboration with Tamil Nadu Agricultural University is targeting the brinjal fruit and shoot borer using biotechnology to develop insect resistant plants.

competition for, resources. This is consistent with analyses of conflict and unrest in the Horn of Africa, which identified food insecurity and conflict over resources as key factors leading to failed states and broadened civil strife. The investment requirements under this scenario are still substantial: \$13.2 billion annually, with a distribution similar to the optimistic scenario.

In the last scenario, the technology and resource management failure scenario, low agricultural investments, reflected in annual expenditures of only \$8.3 billion, lead to

low levels of agricultural technology development and stagnating productivity growth. A 10% drop in yields is projected, equivalent to the loss of the entire Indian cereal crop. Under this grim scenario, hunger and conflict increase, and environmental damage to forests, wetlands, and other natural areas is severe and widespread.

It is not surprising to note decreases in the rate of growth in agricultural productivity given current population challenges, the stagnation and/or decline in public support for agricultural research

and investment in technology adaptation and extension, and little private investment in the crops, livestock, fish, and natural resource management needs of developing countries (Rosegrant and Cline, 2003). If this process continues, IFPRI predicts dire impacts. Under both the policy failure and the technology and resource management failure scenarios, the number of malnourished children would rise to over 180 million by 2015, up from 166 million in 1997, rather than declining sharply. Moreover, by 2050, the number would sta-

## KNOWLEDGE FOR HIGHER INCOMES AND A HEALTHIER ENVIRONMENT

In Bangladesh, thousands of some of the world's poorest farmers have reduced fertilizer use and ceased spraying insecticide on their rice fields, increasing incomes by a whopping 17% in one year. The International Rice Research Institute's (IRRI) Livelihood Improvement Through Ecology project has trained

farmers to use science to optimize their fertilizer use. Trained farmers reduced insecticide use by 99%, and their neighbors are following their lead, reducing their spraying by 90%. Word has traveled fast to villages nearby, where insecticide use has dropped by a third. Farm families are using the

income gains to buy more land for cultivation and pay school fees for their children. Through success case replication, the country estimates that at the rate the new techniques are spreading, more than 10 million farm families will be using the new system—and saving money—in 10 years.



BEN BARBER, USAID

USAID/Afghanistan funds well building programs across the country. In a village in Ghazni province, a man channels water pumped from a well as it irrigates apple trees and fields of vegetables.

bilize at levels more than double those of the optimistic scenario, in which the number of malnourished children would drop to 55 million. Thus, under the second and third scenarios, the Millennium Development Goal of halving the number of hungry people by 2015 would be missed by far. The difference that small increases in annual investments (\$7–12 billion) in rural infrastructure and agricultural research and development

could make for agricultural productivity enhancements is substantial and would be most effective if accompanied by simultaneous investments in the social sectors, particularly education and access to clean water.

Also affecting these scenarios is the challenge posed by HIV/AIDS, particularly in Africa. The imperative to increase labor productivity in areas with declining labor availability due

to the ravages of HIV/AIDS makes research progress in agricultural production and natural resource conservation ever more important. HIV/AIDS patients, weakened by disease, are also more vulnerable to other maladies when malnourished. The provision of micronutrient-enriched staple crops could be an important key for improving the diets and health status of poor consumers, particularly those infected with HIV/AIDS.

## BENEFITS OF INVESTMENTS IN AGRICULTURE RESEARCH AND DEVELOPMENT

Recent studies have consistently found high rates of return to investments in agricultural research and development (R&D) in developing countries. Alston, et al. (2000) in their review of 292 studies that examined over 1800 rates of return estimates found a median rate of 44.3%. Looking at aggregate measures

of rates of return, Thirtle, et al. (2003) reported rates of return of 22% in Africa and 31% in Asia.

The International Food Policy Research Institute, examining the impacts of investments in agriculture R&D in developing and middle income countries, found

that every additional Baht investment in agricultural R&D in Thailand increases agricultural productivity by 12.6 Baht. In India, for every one million Rupees spent on agricultural research 157 poor people are lifted above the poverty line with about as many urban people as rural people affected.

## MAKING THE RIGHT CHOICE

Science and technology, combined with supportive policies that foster their use and increase their effectiveness, can render the worst-case scenarios unlikely. However, the best-case scenario will not be attained without a strong commitment to scientific R&D at both the national and the international levels. This will require a willingness to fund scientific research over a sustained period

and a commitment to long-term training to sustain research capacity. Most important is recognizing that the long-term benefits of sustained investment in R&D far outweigh short-term gains.

What is needed to make the case for appropriate research and development investments? Part of the answer lies in an appreciation for the power of science and research to provide new tools for solving

problems and sustainably increasing incomes.

- Increasing agricultural productivity resulting from R&D provides spillover benefits to the rural economies of developing countries. When producers spend their wages on locally produced goods and services, employment expands in the rural non-farm sector, leading to economic growth and poverty reduction.

ANDREW LEVIN, AG DVLP OFFICER, USAID NIGERIA



USAID disseminated short-season, high-yielding cowpea varieties through community-based farmer associations in northern Nigeria, increasing grain yields 5 times over traditional varieties and raising net farm income by over \$500 per hectare. One quarter of all participants are women.

Studies indicate that \$0.25 to \$1.00 of additional income in the local non-farm economy is generated for each additional dollar of income created by agriculture (Hazell and Haddad, 2001).

A second component of the answer lies in the link between technological change and productivity gains that enable conservation of soil, water and biodiversity.

- The combination of benefits from R&D—productivity and income—has also been demonstrated in long-term economic studies of the world’s two largest developing countries, China, and India (Fan, et al., 2004; Fan, Thorat, et al., 2004). In both cases, agricultural R&D was shown to have had the largest effect per unit of expenditure (of the study variables) on increasing agricultural gross domestic product (GDP), and the second largest effect on poverty reduction (just after education in both countries). The China study concluded that “increased investment in agricultural research is a ‘win-win-win’ (growth, poverty and equity, and food security) national development strategy” (Fan, et al., 2004:413).

Third, USAID can continue to lead in linking agricultural and natural resource advances to health and nutrition. Strategic investments in agriculture and resource management can help combat micronutrient malnutrition, malaria, and water-borne diseases.

- Studies have consistently found high rates of return on investments in agricultural R&D in developing countries. Alston, et al. (2000) examined more than 1,800 rates of return estimates and reported a median rate of return from all studies of 44.3%. Thirtle, et al. (2003) report rates of return to agricultural R&D of 22% in Africa and 31% in Asia. Plant breeding for higher crop yields is one of the better-known examples of applied science and technology in agriculture, while advances in crop and forest management, improved animal breeds, fertilizer, and new methods for controlling pests and diseases and managing water and soil resources have also led to increased production across the agricultural sector, often in conjunction with lower production costs and improved health and nutrition.

Finally, there must be an appreciation of the human resources and long-term training required to marshal science to solve the problems of hunger, poverty, and environmental degradation.

- Although agricultural S&T investments have provided significant benefits in the past, R&D is a cumulative, ongoing process requiring long-term investments. Developing countries must continue to invest in agricultural research to keep up with the ever-changing natural and economic environments. Countries must have the scientific skills and institutions to



JAN HOWARD

In Nicaragua, USAID helped finance a drying facility for processing cardamom for export. The mill will be upgraded in the future with machinery that will sort cardamom seeds by quality, allowing producers to receive higher export prices.

be able to undertake research or adapt foreign technologies to local conditions. This suggests that a major key to success in these endeavors is sustained investment in people via education and training programs.

The effective deployment of technology can lead to enormous economic, environmental, and social gains. A study published in 2003 (Raitzer, 2003) estimates that the economic value of benefits derived from just three agricultural S&T innovations developed by the Consultative Group on International Research (CGIAR) is estimated to approach \$15 billion. These benefits were largely generated from: 1) new, higher-yielding rice varieties in Latin America, Asia, and West Africa; 2) higher-yielding wheat in Asia, North Africa, and Latin America; and 3) cassava mealybug biocontrol in Africa. The benefits total almost twice the aggregate cumulative investments made by the CGIAR in the production of these new technologies.

## AGRICULTURAL REHABILITATION IN AFGHANISTAN

After more than two decades of war and upheaval, a consortium of CGIAR-supported research centers, U.S. universities, the Food and Agriculture Organization of the United Nations (FAO) and NGOs are bringing new hope to farming communities in Afghanistan. Led by the CGIAR's International Center for Agricultural Research in the Dry Areas (ICARDA), major progress has been made in providing improved crop

seed, increasing incomes, and reducing reliance on food assistance. Supported by USAID/Kabul, ICARDA has joined with the University of Vermont to develop IPM management of destructive pests of wheat. Cornell University led soil mapping efforts, and the Global Livestock CRSP and ICARDA worked together to bring the benefits of their rangeland research in countries of Central Asia to their neighbor

to the south. UC-Davis and the Asian Vegetable Research and Development Center have provided new, improved germplasm and techniques to Afghanistan's horticultural industries that traditionally made the country an important exporter of fruits, vegetables, and nuts. High-value commodities are a key aspect of the Afghan government's strategy to curb the illicit production of opium poppy.

## THE UNITED STATES— UNIQUELY POSITIONED TO LEAD IN SCIENCE AND TECHNOLOGY



No country is better positioned than the United States to lead in bringing science and technology to bear on solving agricultural and natural resource challenges in the developing world. A comprehensive 2001 RAND study on the S&T capacity of 150 countries ranked the United States as the global leader in S&T. Ranking developed and developing countries by the number of scientists and engineers in each country, the number of journal articles published and patents obtained, the percentage of GDP spent on R&D, and the total number of universities and

research institutions, the United States was consistently at the top of 22 countries identified as the most scientifically advanced (Wagner, et al., 2001). A significant percentage of this S&T capacity is already directed toward agricultural and natural resource problems: public and private U.S. investment in agricultural R&D totals over \$8.9 billion (1998 figure adjusted to 2001 nominal dollars) each year, with major research undertaken at 105 land-grant institutions, the U.S. Department of Agriculture (USDA), and by the private U.S. agribusiness community (USDA ERS, 2003). Yet there is a clear need to engage these resources further to

USAID/MOZAMBIQUE

Celestina Jochua, an M.S. graduate in plant pathology, and former advisor Dr. James Steadman, professor of Plant Pathology at the University of Nebraska-Lincoln. Ms. Jochua was sponsored by USAID/Mozambique during her M.S. program to study a bean disease that affects small farms in Mozambique. Her graduate program utilized expertise available in the Bean/Cowpea CRSP.

confront the challenges of the developing world.

USAID has long been involved in agricultural research and development. In the 1950s and 1960s, there was an explicit assumption that agricultural research and development for the U.S. agricultural sector was readily transferable to the developing world. This assumption, though realized in some cases, was largely dashed by the realities of developing-country agriculture.

Following the general failure to transplant agricultural technology from the United States to developing countries, USAID and other donors began to devote more attention to agricultural research and development in developing countries

throughout the 1960s and 1970s, including the provision of support, in partnership with the Rockefeller Foundation, for the International Rice Research Center (IRRI) in the Philippines and the International Rice and Maize Improvement Center (CIMMYT) in Mexico. In 1962, USAID initiated a research program with special budgetary support, although through the 1960s research funding was constrained by an Agency manual order on direct, visible efforts abroad to increase food productivity (Commission on International Relations, 1977). Agency policy changed in 1968, and in 1971, the Consultative Group on International Agricultural Research (CGIAR) was formed, with USAID as a charter member, to support

international research on major food crops being carried out by the international agricultural research centers that followed the CIMMYT and IRRI example. In 1976, BIFAD (Board for International Food and Agricultural Development) was established as a presidentially appointed body to advise the Administrator of USAID and to help bring U.S. university research capacity to bear on problems of developing-country food and agriculture.

By the 1980s, the Green Revolution's record of productivity increases drew attention to the need for additional research funding to maintain gains and further increase productivity. However, the lack of Green Revolution impacts in Africa

**THE COLLABORATIVE RESEARCH SUPPORT PROGRAMS (CRSPS)**

The CRSP program, implemented under Title XII, mobilizes the capacities of U.S. land-grant and other eligible universities as well as their public and private partners in the United States and other countries for global research on problems affecting food, agriculture, forestry, and fisheries, improved human capacity and institutional resource development, and services to support the entry of rural industries into world markets. Each CRSP is a community composed of U.S. universities, USAID and its country missions, national agriculture research and extension systems (NARES) of developing countries, national universities, other U.S. federal agencies, international agricultural research centers (IARCs), private agencies, industry, private voluntary organizations (PVOs), and other developing country institutions. CRSP scientists from the United States and partner countries work in close collaboration with one another for the mutual benefit of their countries, carry out international agricultural research and training around identified constraints to food production, storage, marketing, and consumption. There are currently nine CRSPs:

*Broadening Access and Strengthening Input Systems (BASIS) CRSP (Wisconsin)*

*Bean/Cowpea CRSP (Michigan State)*

*Global Livestock CRSP (California-Davis)*

*Integrated Pest Management (IPM) CRSP (Virginia Tech)*

*International Sorghum/Millet (INTSORMIL) CRSP (Nebraska)*

*Peanut CRSP (Georgia)*

*Pond Dynamics/Aquaculture CRSP (Oregon State)*

*Soil Management CRSP (Hawaii)*

*Sustainable Agriculture and Natural Resource Management (SANREM) CRSP (Virginia Tech)*

## BREAKTHROUGH IN RINDERPEST CONTROL

USAID and the University of California at Davis have worked together to develop a vaccine for rinderpest, a serious disease of domesticated and wild cattle in sub-Saharan Africa and Asia that can cause losses reaching hundreds of millions of dollars. Using recombinant DNA technologies, a very promising vaccine has been developed which has several advantages over previous vaccines: it provides complete protection and it is heat- and light-stable, inexpensive to produce, and predictable and safe. It has undergone extensive trials under confined conditions, and field trials are now being initiated in Kenya. The project also included the development of a diagnostic test that distinguishes vaccinated cattle from those that have been exposed to the virus. Once approved, the vaccine will be delivered through partnerships with both the public and private sectors.

and Central America led to an emphasis on more location-specific research, particularly farming systems research. Donors funded considerable expansion of developing-country national agricultural research systems as well as the international agricultural research centers (IARCs) through the CGIAR.

The 1990s saw the completion of many institutional development activities at the country level. Local capacity was in place and USAID was seeking new approaches to ensure the sustainability of development efforts. At the same time, development assistance resources were reduced with the end of the Cold War; the United States and other governments undertook broad budget cutbacks.

Relatively high world food stocks and low prices combined with changes in

the priorities of development assistance led to a sharp drop in USAID's funding for agriculture and agricultural research. From 1985 to 1996, total USAID support to international agricultural research decreased by 66%, with a parallel decrease in USAID technical staff in agriculture. Support to national agricultural research systems decreased by 71%. These declines, which may be understated, came just as developing-country research systems faced increasing challenges in responding to economic restructuring and environmental limitations on production systems. Nevertheless, during the 1990s, USAID continued its support for the CGIAR and the Collaborative Research Support Programs (CRSPs) and launched the Agricultural Biotechnology Support Project (ABSP).

A renewed commitment to agriculture was announced in the FY 2000

REVERIE JURBA, PRETORIA/PPD



With USAID and other donor assistance, South African women are learning how to start and operate hydro-farms commercially. The project teaches unemployed, low-income women how to grow and market vegetables using a minimum of water, allowing them to start their own garden and farm businesses. The produce shown here is already destined for high-quality markets in South Africa.

## INTEGRATED PEST MANAGEMENT

The tiny gall midge drastically decreased hot pepper exports from Jamaica from 800 tons in 1997 to 300 in 2001, reducing incomes for thousands of people. Due to quarantine restrictions, shipments with even small numbers of the midge required fumigation with methyl bromide. The additional cost contributed to a decline in hot pepper exports, while pesticide use increased the risk that shipments would be rejected. A task force was formed with financial and technical support from the

USAID-funded IPM CRSP, the USAID Jamaica Mission, and the Food and Agriculture Organization of the United Nations (FAO). Task force activities included port/packing house inspection, collaborative research, insect identification, field monitoring of the gall midge populations, training, and post-harvest management. Pest incidence was monitored using geographical information systems (GIS) technology, with a web-based surveillance activity established in 17 districts to monitor seasonal dis-

tribution of the pest. The technology is used to forecast gall midge outbreaks and to assist in the certification of pest-free areas and seasons. A computerized tracking system was also developed, allowing port-intercepted hot peppers to be traced back to the farm of origin. As a result of the program, interceptions decreased dramatically from 104 in 1998, to 0 in 2000, with only 10 in 2001. In 2002, USDA/APHIS lifted the mandatory fumigation requirement provided that the infestation rate remained low.

Title XII Report, "Agriculture in the New Century." USAID's recently released agricultural strategy, Linking Producers to Markets, reflects this commitment. The strategy articulates four key themes to guide USAID investments and to help rural populations increase the productivity and competitiveness of their agricultural efforts.<sup>1</sup> The overarching goal of linking producers to markets will be achieved by:

- Expanding trade opportunities and improving the trade capacity of producers and rural industries
- Improving the social, economic, and environmental sustainability of agriculture
- Mobilizing science and technology and fostering capacity for innovation
- Strengthening agricultural training and education, outreach, and adaptive research

As one of the themes of the new agricultural strategy, science and technology will play a critical role in generating more and better-quality goods demanded by markets. In advancing S&T for the benefit of producers, USAID is committed to collaboration with its many partners: U.S. universities, the USDA, IARCs, including those supported by the CGIAR, many regional research centers, national agricultural research systems (NARS), non-governmental organizations (NGOs), private voluntary organizations (PVOs), farmers' organizations, community natural resource management groups, and civil society organizations.

Supporting the USAID Agriculture Strategy is the joint USAID/Department of State Strategic Plan for Security, Democracy, and Prosperity for Fiscal Years 2004-2009. The strategy addresses the need for science and technology to meet the Economic Prosperity and Security Goals. As the USAID/State plan

makes clear, "[a] productive agricultural sector is a critical engine for economic growth in many developing countries, particularly in Africa. It is also critical for food security, improved nutrition and health, and environmental sustainability and security both in developing and transition countries." The plan aims to "promote the adoption in low-income countries of new technologies deriving from agricultural research and development by mobilizing science and technology from developed as well as developing countries."

<sup>1</sup> The first two themes of the Agency's Agriculture Strategy—expanding trade opportunities and improving the trade capacity of producers and rural industries and improving the social, economic, and environmental sustainability of agriculture—were addressed in the Title XII Reports for FY 2001 ("Bringing Farmers into Global Trade") and FY 2002 ("Integrating Natural Resource Management and Agriculture"). The fourth theme—strengthening agricultural training and education, outreach, and adaptive research—will be addressed in the FY 2004 Title XII Report.



JAN HOWARD

(Left) Karelia Moreno teaches farmers to grow export quality organic vegetables on USAID's model farm in Jinotega, Nicaragua.

(Below) In Bangladesh, eggplant grafting technology is being transferred to farmers through a collaborative effort between the IPM CRSP, Bangladesh Agricultural Research Institute (BARI), PhilRice, AVRDC and CARE - Bangladesh. Grafting controls bacterial wilt disease, increasing fruit yields 2-3 times and incomes by 300%, all without the use of pesticides.

## USAID'S APPROACHES TO SCIENCE AND TECHNOLOGY PROMOTION AND INVESTMENTS: AN AGENCY-WIDE EFFORT

USAID's commitment to agricultural science and technology for development is expressed at an international level as well as through support to more than 80 country-based development assistance programs. Through international leadership, direct investment in S&T, and public and private partnerships, USAID advances both agricultural research and the dissemination of agricultural technologies.

ners at home and abroad in pursuing new ideas and solutions to the problems of hunger, poverty, and environmental degradation.

As a member of the G-8, the United States advocates coordinated attention to increasing

agricultural productivity and ending famine, especially in Africa. Working with the New Partnership for Africa's Development (NEPAD), an Africa-led initiative to increase economic growth on the continent, the Agency has made agricultural research and technology training a key element of its Africa agricultural development program. The United States has advanced

### I. INTERNATIONAL LEADERSHIP

There is a continuing dialogue in the United States and internationally on what constitute the key global and regional challenges in agriculture and natural resource management that call for a science and technology response. The United States is an active participant in many of these dialogues and studies and works with a wide range of part-



E.A. "SHORT," HEINRICHS, PROGRAM DIRECTOR, IPM CRSP

## THE CONSULTATIVE GROUP ON INTERNATIONAL AGRICULTURAL RESEARCH (CGIAR)

The CGIAR is a strategic alliance of countries, international and regional organizations, and private foundations supporting 15 international agricultural research centers that work with national agricultural research systems, the private sector, and civil society. The alliance mobilizes agricultural research to reduce poverty, foster human well-being, promote agricultural growth, and protect the environment. The United States is a charter member of the CGIAR and a leading supporter of the 15 centers it sponsors. The 15 centers and the locations of their headquarters are as follows:

<i>CIAT: International Center for Tropical Agriculture (Colombia)</i>	<i>ICRISAT: International Crops Research Institute for the Semi-Arid Tropics (India)</i>	<i>IRRI: International Rice Research Institute (Philippines)</i>
<i>CIFOR: Center for International Forestry Research (Indonesia)</i>	<i>IFPRI: International Food Policy Research Institute (USA)</i>	<i>IWMI: International Water Management Institute (Sri Lanka)</i>
<i>CIMMYT: International Maize and Wheat Improvement Center (Mexico)</i>	<i>IITA: International Institute of Tropical Agriculture (Nigeria)</i>	<i>WARDA: West Africa Rice Development Association – The Africa Rice Center (Cote d’Ivoire)</i>
<i>CIP: International Potato Center (Peru)</i>	<i>ILRI: International Livestock Research Institute (Kenya)</i>	<i>ICRAF: World Agroforestry Centre (Kenya)</i>
<i>ICARDA: International Center for Agricultural Research in the Dry Areas (Syria)</i>	<i>IPGRI: International Plant Genetic Resources Institute (Italy)</i>	<i>ICLARM: WorldFish Center (Malaysia)</i>

an S&T perspective at major world summits. The 2002 World Food Summit: five years later and the 2002 World Summit for Sustainable Development both recognized the important role of agriculture and agricultural research in alleviating hunger and supporting agriculture-led growth. The United States is providing additional leadership in this area through the Presidential Initiative to End Hunger in Africa (IEHA). This USAID-led initiative recognizes that increased agricultural productivity and more competitive markets are essential elements of economic growth in Africa. Science and technology comprise one of the focal strategies of IEHA to bring about increased agricultural productivity.

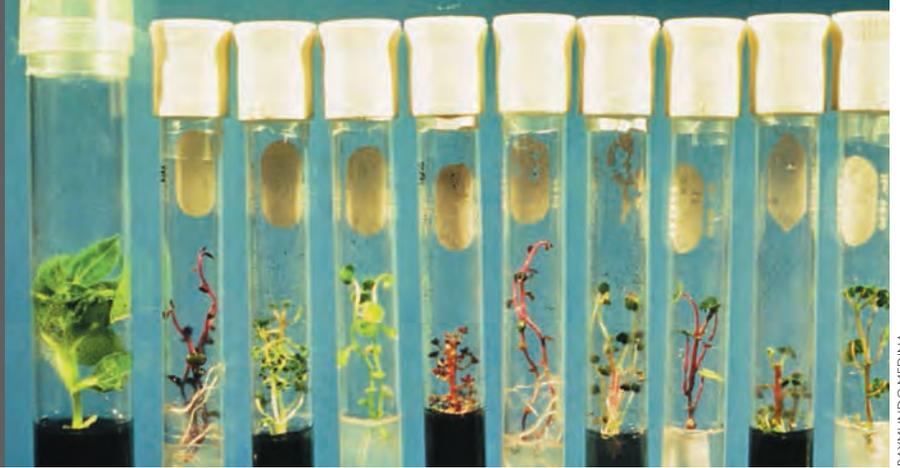
Within USAID, the Bureau of Economic Growth, Agriculture, and Trade (EGAT) and Policy and Pro-

gram Coordination (PPC) provide technical leadership and coordinate Agency positions in international fora. Key international activities include:

- **Ministerial Conferences on Science and Technology in Agriculture:** In a follow up to the *World Food Summit: five years later*, the Secretary of Agriculture convened a series of Ministerial Conferences on Science and Technology. In June 2003, the USDA, along with the Department of State and USAID, sponsored the first international conference on this topic in Sacramento, California. Since then, two regional conferences have taken place, one at the International Institute for Cooperation in Agriculture (IICA) in Costa Rica in May 2004 and another in Burkina Faso in June 2004.

- **United Nations Millennium Project:** The Millennium Project is an independent advisory body commissioned by the Secretary General of the United Nations to provide him with recommendations, by June 2005, on the best strategies for meeting the Millennium Development Goals (MDGs). As part of this process, several task forces have been established, including one on Hunger and another on Science, Technology, and Innovation (STI). The interim report from the Hunger Task Force highlights the need to raise agricultural productivity, focusing particularly on raising the output of small-scale farmers. The interim STI report discusses the importance and the role of global research efforts and notes the example of the CGIAR.

USAID provided over \$25 million to the CGIAR system in FY2003, which in turn funded the activities of numerous agricultural research organizations. At the International Potato Center (CIP), an assortment of rare in vitro roots and tuber plantlets may provide the foundation for promising new potato varieties.



RAYMUNDO MEDINA

- **The International Assessment of Agricultural Science and Technology for Development (IAASTD)**—co-sponsored by the World Bank, the World Health Organization (WHO), the United Nations Development Program (UNDP), the United Nations Educational, Scientific and Cultural Organization (UNESCO), the United Nations Environment Program (UNEP), and the Food and Agriculture Organization (FAO)—will provide decision makers with the information they need to reduce hunger and poverty; improve rural livelihoods; and facilitate equitable, environmentally, socially, and economically sustainable development through the generation of, access

to, and use of agricultural knowledge, science, and technology. IAASTD was formally initiated at an intergovernmental plenary in August 2004 and is scheduled to complete its report in 2007.

- **InterAcademy Council (IAC) Study on Agricultural Productivity in Africa:** The IAC was created by the world's science academies to provide high-quality scientific advice to international bodies and other institutions. The report, *Realizing the Promise and Potential of African Agriculture: Science and Technology Strategies for Improving Agricultural Productivity and Food Security in Africa*, released in 2004, makes a series of recom-

mendations around the themes of improving agricultural productivity through science and technology, building impact-oriented research, knowledge and development institutions, creating and retaining a new generation of agricultural scientists, enhancing the role of markets and policies, and initiating a series of pilot programs to put the recommendations into action.

## 2. INVESTMENT IN RESEARCH AND DEVELOPMENT

Agricultural S&T is addressed through a range of R&D activity, from the laboratory to the field to post-harvest storage and processing. Research encompasses a similar

## AGROFORESTRY FOR RENEWABLE ENERGY

In the remote village of Chalpadi in the Indian State of Andhra Pradesh, oil extracted from the seeds of the local tree *Pongamia pinnata* is being used as bio-fuel to run an off-the-shelf diesel engine to produce electricity. The local government helped with \$8,000 to establish a local grid, but the local community is responsible for its operation and

maintenance. This task is assigned to the women's self-help group, which levies a tariff of 1 kilogram of pongamia seeds per family per day. The system has been running well for two years. USAID/ New Delhi is working with the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) and several NGO and local government partners to use pongamia-based biofuel to power irrigation pumps. The women's group is producing seed, extracting oil, and

selling irrigation water to local farmers as a woman-owned business enterprise. The state government has plans to replicate the project in some 100 villages. A pilot project with a capacity of 10 tons of biodiesel production per day for use in public transport has been proposed for the city of Hyderabad. This private-sector initiative is expected to substantially lower urban vehicular pollution while providing employment and income opportunities for the rural poor.

range of activity—from “upstream” basic to “downstream” applied studies. USAID works across most of these activities.

**Basic research** is principally focused on the generation of new knowledge. Although USAID programs stand to benefit from the advances that this research generates, the Agency does not fund basic research. Many other agencies and institutions, including the USDA and the National Science Foundation, are sponsors of basic research.

**Strategic research** is problem-oriented but remains long term in nature. It connects upstream research to the needs of those working in the applied and adaptive end of the range and provides a vital bridge between cutting-edge research and problems of poor people in developing countries. USAID supports such research through its global CGIAR funding and through the CRSP and other university-led programs.

The Economic Growth, Agriculture, and Trade (EGAT) Bureau supports most of the strategic research activities of the Agency. EGAT invests in a wide range of S&T programs: crops and livestock production, fisheries, aquaculture, forestry, water resources, biodiversity, climate change, and living aquatic resources. The research programs provide missions with a range of technical and policy options for achieving conservation and sustainable development goals. In many of these EGAT-sponsored research programs, investment



JANI HOWARD

USAID/Nicaragua trains farmers in the use of organic fertilizers and natural pest controls. With these methods farmers like Deyvis Rivas reduce production costs while protecting the environment and their own health.



MARTHA CIFUENTES/PAIF COLOMBIA

This USAID/Columbia project created job opportunities for 597 displaced families through the cultivation of yucca, chili, and vegetable crops.

timelines are long, with investments often linked to outcomes 5–15 years in the future. Other EGAT programs are multilateral in nature, engaging partners such as the World Bank, the International Fund for Agricultural Development (IFAD), foundations, and other bilateral donors, or are linked to a range of multilateral agreements and conventions.

**Applied research**, which involves moving and refining upstream research to address specific targets, is an important activity for USAID and many of its partners. USAID missions and regional bureaus focus on this level of research when shorter-term impacts are needed

and there is evidence of an “on-the-shelf” technology containing solid results from upstream research.

Regional bureaus and missions make investments that underpin efforts to develop regional S&T capacity, particularly where there are limited country-level resources. The analysis and subsequent investments vary across regions, depending on assessments of both needs and opportunities. Thus, the emphasis varies between food security-oriented research investments and those targeted at natural resource management challenges. Activities supported include regional collaborative research networks that link public and private institutions with complementary capacities and

## NUTRITION: COMBATING “HIDDEN HUNGER”

EGAT and the Bureau for Global Health have teamed up to launch new efforts to fight micronutrient malnutrition by developing crops rich in micronutrients such as Vitamin A, iron, and zinc. Known as biofortification, this technique promises to deliver important vitamins and nutrients to poor and vulnerable groups at low cost. USAID’s health and agricultural programs are supporting “Harvest Plus,” a CGIAR program aimed at producing crop varieties richer in essential nutrients. The Bureau for Africa, the Bureau for Asia and the Near East, and USAID Missions in India, Bangladesh, and elsewhere are also contributing to Harvest Plus and other biofortification activities. U.S. universities and other

research organizations are active partners in this global coalition. Key investments include:

**Golden Maize:** This alliance of the University of Illinois, Iowa State University, Monsanto Corporation, CIMMYT, IITA, Wageningen University in the Netherlands, and several African partners is using biotechnology to increase the beta-carotene (pro-Vitamin A) content of maize in Africa. The EGAT and Africa Bureaus jointly fund this effort.

**High Beta-Carotene Sweet Potato:** The Bureau for Africa, EGAT, and Missions in the region have joined together to develop, adapt, and disseminate

sweet potatoes rich in this vital nutrient as a means to combat its deficiency and associated health problems. Partners include CIP and Michigan State University. South African research partners, supported by the Africa Bureau, announced last year that feeding trials proved conclusively that these sweet potatoes increase children’s serum levels of Vitamin A.

**High Beta-Carotene Mustard Oil:** USAID/New Delhi and EGAT have joined in supporting a public-private partnership to develop mustard oil rich in pro-Vitamin A. Monsanto Corporation donated the technology to a U.S.-Indian collaboration that includes Michigan State University.

objectives. Policy research in areas such as trade, biotechnology and biosafety, and cross-boundary management of natural resources are important areas for USAID regional research investments. An additional investment target is sub-regional organizations focused on science, technology, and policy.

USAID bilateral missions invest in building national S&T capacity within and outside national institutions, often with partnerships involving NGOs and the private sector, and often drawing upon U.S. university research. Missions also provide support for training programs (degree and non-degree) related to agricultural and natural resource research.

**Adaptive research** tailors applications to a specific locale or environment, making the application more suitable and more readily adoptable by end users. USAID projects, which often involve international and local NGOs, frequently focus on adaptive research goals as a way of achieving immediate impact in specific areas.

The Office of Foreign Disaster Assistance (OFDA) funds adaptive research at CGIAR-supported research centers and U.S. universities to provide technologies to rehabilitate production systems. These technologies, which include higher-yielding, better-adapted crop varieties, are then disseminated by private voluntary organizations as part of OFDA relief operations

**Development:** At the “D” end of the R&D range of activities, this activity focuses entirely on adoption and ex-

tension of technologies and resource management practices.

### 3. PUBLIC-SECTOR PARTNERSHIPS

To advance strategic, applied, and adaptive agricultural research, USAID engages partners from various public organizations in support of Title XII objectives. These organizations—government research institutes, universities, public laboratories and testing facilities—provide critical, low-cost agricultural R&D resources to producers. Such public support of research is well justified for developing-country agriculture. In many cases, low-income producers do not provide a sufficiently strong demand to encourage adequate private sector investment in R&D. This absence of demand justifies public R&D to provide the needed knowledge and technologies in the form of public goods. Thus, public R&D investments stimulate agricultural development and may also encourage further investments by the private sector. Targeted public investment in agricultural R&D promises new, appropriate, and low-cost technologies for the neediest producers that might otherwise fail to develop.

- **USAID’s Collaborative Agricultural Biotechnology (CABIO)** Initiative, for example, engages a number of U.S. universities, including Cornell, Michigan State, the University of California-Davis, the University of Minnesota, and other U.S. research organizations such as the USDA and the Donald Danforth Plant Science Center. In addition



In Nicaragua, USAID supports field trials of new corn varieties in an effort to increase yields.

to public-sector partners, USAID leverages the investments and technical expertise of the private sector in the area of biotechnology. Partnerships with corporations such as Monsanto, Syngenta, and Dupont-Pioneer have facilitated access to proprietary technology, scientific expertise, and experience with biosafety regulation to assist with public sector

## **AFRICAN AGRICULTURAL TECHNOLOGY FOUNDATION (AATF) GLOBAL DEVELOPMENT ALLIANCE**

---

The African Agricultural Technology Foundation (AATF) is a Global Development Alliance public-private partnership led by Africans and designed to respond to the needs of resource-poor farmers in sub-Saharan Africa. AATF is funded by the Rockefeller Foundation, USAID, and the United Kingdom's Department for International Development (DFID). Its goal is to increase private-sector engagement in the development of technologies for African farmers, particularly biotechnologies, to promote food security and poverty reduction. On the private-sector side, multinational companies (Monsanto, Syngenta, and Pioneer) are donating proprietary technologies for Africa. In pursuing its mission, the AATF links the needs of resource-poor farmers with potential technological solutions, especially biotechnology applications. It acquires technologies through royalty-free licenses or agreements and moves these technologies through development with African research and seed companies into the hands of farmers. AATF projects currently under development include: Striga Control in Cereals, Insect Resistant Maize for Africa, Pro-Vitamin A Enhancement in Maize and Rice, Cowpeas Production and Utilization, and Production of Bananas and Plantains. AATF Home Page: [www.aftechfound.org/index.php](http://www.aftechfound.org/index.php)

development of bioengineered crops for developing countries.

- **Consultative Group on International Agricultural Research (CGIAR)** centers also have many contacts with advanced research organizations in developed countries, as well as an extensive presence in developing countries beyond their headquarters. Eight percent of USAID's core funding is used to strengthen and increase collaborative programs between CGIAR centers and American universities and other research institutions. Recent surveys suggest that some 50 U.S. institutions are engaged in cooperative activities with the CGIAR, including many universities within and outside the land-grant system, several major research institutions, such as the Donald Danforth Plant Science Center and the Institute for Genomics Research (TIGR), and several environmental NGOs.
- **USAID-sponsored Collaborative Research Support Programs (CRSPs)** are implemented by some 50 land-grant institutions in 34 states and engage with partner scientists in 50 host countries. These are often long-term relationships that provide important capacity-building outcomes in both U.S. and developing-country institutions. CRSPs provide degrees and short-term training to thousands of researchers from developing countries in addition to their long-term collaborative research activities.

Thus, between the CRSPs, CGIAR centers, other international agricultural research centers, and biotechnology and environmentally-oriented research programs, few developing countries are without a USAID-sponsored science and technology presence. Increasingly, partnerships are also bringing private-sector institutions to the table.

## **4. PRIVATE-SECTOR PARTNERSHIPS**

USAID works extensively with private-sector partners to advance science and technology in developing countries. The private sector plays a significant research role in many developed countries, but in developing countries, the lack of market opportunities limits private-sector interest in investment. Small and relatively poor farmers, limited protection of intellectual property rights, and more limited transportation and marketing systems make the prospects for financial return on research investments too risky. Private seed companies, however, are increasingly evident. They target plant-breeding programs, often using genetic material developed in the public sector and producing seed that has significant value-added for farmers. While the private sector is becoming more active in the plant-breeding area in some larger countries such as India, the primary research tasks in most countries are still left to the public sector.

Despite the current limited nature of private-sector S&T, there are



USAID/COLUMBIA

Farmer Victor Manuel Arrieta is part of the USAID-financed Alternative Development Program in Colombia. Under the program, he eradicated one hectare of coca and replaced it with aloe and plantain.

great opportunities to engage the developing world's private enterprises in the commercialization of new technologies and their delivery to producers. This is especially true in the area of input supply, such as seed multiplication and sales and fertilizer delivery systems. Research on appropriate rates of fertilization will have little impact on farmers' productivity unless a reliable supply of fertilizer is available through knowledgeable dealers. Experience shows that the private sector is generally more effective at establishing such supply facilities and maintaining them over time as a reliable customer base is built. Through partnerships, USAID recognizes and works to bridge the complementary capacities of the private and public sectors in support for agricultural S&T research and dissemination.

USAID's primary public-private alliance mechanism is the Global Development Alliance (GDA).<sup>2</sup>

Through the GDA, alliances are made with local, national, or multinational companies, NGOs, or other partners to achieve explicit development objectives. While host-country governments and other foreign aid donors are welcome members of alliances, the key is to engage private-sector talent and know-how. Alliance partners share resources, risks, and rewards in pursuit of development objectives that can be better achieved by working together. In any GDA, at least a 1:1 resource matching between USAID and alliance partners is required. Alliance partners benefit from USAID's expertise, worldwide networks, long-term, in-country presence, and credibility in developing countries, in addition

to the shared funding commitments of alliance projects.

One clear use of the GDA mechanism is leveraging the formidable research capacity of multinational firms to create products relevant to the staple food crop sectors in developing nations. In some cases, existing technologies may be made freely available for use or further public research in countries where large commercial markets are unlikely. In other cases, GDAs are employed to disseminate existing technologies to underserved areas.

<sup>2</sup> An alliance is an agreement between two or more parties to jointly define a development problem and jointly contribute to its solution. The purpose of a public-private alliance is to bring about greater development impact through the combined strengths of multiple partners.

## FUTURE DIRECTIONS

The IFPRI study, “Food Security: New Risks and New Opportunities” (von Braun, et al., 2003) notes that progress in achieving food security slowed during the 1990s and that picking up the pace will likely be more difficult than in the past. Achieving food security requires that certain components be in place, including political stability, infrastructure improvements, human and institutional capacity, and a sustainable resource base. In addition, an accelerated global investment in public goods, including agricultural research, is key to increasing agricultural productivity.

Effort is needed on many fronts. During the next five years, USAID will work in four areas of science and technology for a food-secure, prosperous and environmentally sustainable future. These are:

- **Policies, strategies, and governance:** The potential of science, research, and technology is either constrained or unleashed by the policy environment. Policy is important at every level, from ensuring equity and access to food among the very poor to fostering transparent and efficient marketing and pricing. At the macroeconomic

level, appropriate trade and phyto-sanitary policies have a major impact on agriculture and food systems. Biosafety, regulatory, and intellectual property policies have also emerged as key determinants of countries' ability to benefit from the science, technology, and information revolutions. Agricultural and natural resource policies help strike a balance between the sustainable use of resources and environmental services. USAID will support good policy and governance to provide a supportive context for science and technology to help lead people out of poverty. As new science emerges, new policy responses will be needed, as in the case of biotechnology, where biosafety policy plays a critical role in facilitating access to and

The IPM CRSP projects in Bangladesh, India, and the Philippines are networking to develop no-pesticide approaches to manage pests on brinjal (eggplant), including grafting to control bacterial wilt and pheromone bait traps to control the fruit and shoot borer.

E. A. "SHORT" HEINRICH, PROGRAM DIRECTOR, IPM CRSP



development of the technology. Similarly, new objectives in terms of conservation and environmental services will require innovative policy approaches. Finally, true partnerships will thrive when strategy and policy are implemented by institutions in an environment of good governance.

- **Support technology development and application:** An enhanced ability to identify, track, and integrate new traits into crops and livestock through the use of genomics and bioinformatics as well as conventional breeding methods will lead to gains in both productivity and incomes, particularly as markets demand products for specific end uses. To address the needs of its principal customers—the poor and hungry—USAID will focus on drought tolerance, disease resistance, nutritional quality, and industrial processing gains, so that more producers than ever before will be able to benefit from science and technology. Links to markets and trade will impose new requirements for grades and standards, and technology must be ready to meet these requirements. New technologies are also needed to foster the sustainable use of natural resources with the result that agriculture will increasingly be understood as a key aspect of environmental management. The Agency will work with advanced research institutions and continue to sup-

port its developing-country partners in their efforts to develop and apply improved agricultural technologies to meet the needs of smallholder producers and processors.

- **Expand public and private-sector partnerships and networks:** USAID will expand its engagement with the private sector to ensure that research contributes to improving access to and capturing value from markets. In cutting-edge research, such as biotechnology, private funding exceeds that of the public sector. The development of new alliances is essential in bringing to bear the best science and technology for development outcomes. Communication advances will assist researchers in working together through virtual teams, making strategic planning, data sharing, and results analysis easier and less expensive.
- **Foster science and technology innovation capacity and national innovation systems:** Science and technology capacity building is an integral aspect of USAID's research and development investments. Programs aimed at capacity building will link research programs with human and institutional capacity, taking into account the special needs of a country or region. Distance education technology coupled with research in developing-country settings will be viewed as

an integral part of the globalization strategy of U.S. universities. Science education opportunities will increasingly offer innovative programs that build on research partnerships, combining coursework in various venues, research in environments suitable for investigating important problems (e.g., national agricultural research system or international agricultural research center sites), and opportunities for continuing appointments at researchers' home institutions. New ways of upgrading skills, whether through degree education or focused shorter-term training, will provide a means for strengthening institutions and helping them to be full partners across the full range of agricultural science and technology activities.

In sum, science and technology in agricultural development will play a critical role in linking producers to markets. More than ever before, efforts must be tailored in strategic ways to fit local needs and specific problems. The availability of that technology will depend on the underlying science and investment in appropriate research and education in developing countries. Working with its traditional partners and with new partners, USAID can make the Title XII vision of a world without hunger and famine a reality. Forgoing the use of science to open new paths forward would betray both our rich heritage and the promise of a brighter future.

## REFERENCES

- Alston, Julian M., Connie Chan-Kang, Michele C. Mara, Philip G. Pardey, and T.J. Wyatt. *A Meta-Analysis of Rates of Return to Agricultural R&D: Ex Pede Herculem?* Research Report 113. Washington, D.C.: International Food Policy Research Institute, 2000.
- Cassman, Kenneth G. "Ecological intensification of cereal production systems: Yield potential, soil quality, and precision agriculture." *Proceedings of the National Academy of Sciences*, 96(May):5952-5959, 1999.
- Commission on International Relations, National Research Council, Study Group
14. *Supporting Papers: World Food and Nutrition Study. Volume V: Agricultural Research Organization*. Washington, D.C.: National Academy of Sciences, 1977.
- Fan, Shenggen, Linxiu Zhang, and Xiaobo Zhang. "Reforms, investment, and poverty in Rural China." *Economic Development and Cultural Change* 52(2)(January):395-421, 2004.
- Fan, Shenggen, Sukhadeo Thorat, and Neetha Rao. *Investment, Subsidies, and Pro-Poor Growth in Rural India*. Draft report prepared for DFID. Washington, D.C.: International Food Policy Research Institute, 2004.
- Hazell, Peter and Lawrence Haddad. *Agricultural Research and Poverty Reduction*. Food, Agriculture, and Environment Discussion paper 34. Washington, D.C.: International Food Policy Research Institute, 2001.
- Nelson, Michael and Mywish Maredeia. *Environmental Impacts of the CGIAR: An Initial Assessment*. Rome: TAC Secretariat, United Nations Food and Agriculture Organization, 2000.
- Raitzer, David A. *Benefit-Cost Meta-Analysis of Investment on the International Agricultural Research Centers of the CGIAR*. Rome: Science Council Secretariat, United Nations Food and Agriculture Organization, 2003.
- Rosegrant, Mark W. and Sarah A. Cline. "Global food security: Challenges and policies." *Science* 302(December):1917-1919, 2003.
- Thirtle, Colin, Lin Lin, and Jenifer Piesse. "The impact of research-led agricultural productivity growth on poverty reduction in Africa, Asia, and Latin America." *World Development* 32(12):1959-1975, 2003.
- United States Department of Agriculture (USDA), Economic Research Service (ERS). *Data: Agricultural Research Funding in the Public and Private Sectors*. www.ers.usda.gov/data/agresearch-funding/ Updated October 27, 2003.
- von Braun, Joachim, with Maria Soledad Bos, Mary Ashby Brown, Sarah A. Cline, Marc J. Cohen, Rajul Pandya-Lorch, and Mark W. Rosegrant. *Overview of the World Food Situation – Food Security: New Risks and Opportunities*. Washington, D.C.: International Food Policy Research Institute, 2003.
- Wagner, Caroline S., Irene Brahmakulam, Brian Jackson, Anny Wong, Tatsuro Yodo, *Science and Technology Collaboration: Building Capacity in Developing Countries*. MR-1357.0-WB (March). Santa Monica, CA: Rand Science and Technology Policy Institute, 2001.

# BIFAD REPORT: ACTIVITIES AND RECOMMENDATIONS



In Guatemala, the IPM CRSP develops and applies sustainable pest management technology for the production of high-quality vegetables.

E.A. "SHORT" HENRICHS, PROGRAM DIRECTOR, IPM CRSP

The Board for International Food and Agricultural Development (BIFAD) was established in 1975 under Title XII—"Famine Prevention and Freedom from Hunger"—of the Foreign Assistance Act, as amended (most recently in 2000). Its primary role is to advise the USAID Administrator on global agricultural development priorities and issues, assist in implementing the U.S. foreign assistance program, and assess the impact of Title XII programs. BIFAD also works to strengthen the relationship between USAID, land-grant and other eligible universities, and their public and private partners, enabling them to mobilize the resources needed for developing and applying agricultural science to solve food, health, nutrition, rural income, and environmental problems.

- [www.usaid.gov/our\\_work/agriculture/bifad](http://www.usaid.gov/our_work/agriculture/bifad)

The President appoints the seven members of BIFAD, the only White House-appointed board advising USAID's Administrator. At least four members are from the U.S. university community. In carrying out its mandate, BIFAD relies especially on the efforts of its working sub-committee, the Stra-

tegic Partnership for Agricultural Research and Education (SPARE). SPARE members include leaders from the university community and USAID professionals highly experienced in agricultural development.

## SPARE SUB-SECTOR REVIEWS

In fall 2002, BIFAD asked SPARE to undertake a strategic evaluation of three sub-sectors in USAID's agriculture portfolio: fisheries/aquaculture, integrated pest management, and sustainable agriculture. The reviews were intended to assist the Agency in rethinking its agricultural program—specifically, to assess the effectiveness of program composition in these sub-sectors.

Three expert panels undertook the evaluation of the sub-sectors, submitting their first drafts in spring 2003 and their final reports in June 2003. The key findings of the three expert panels are summarized below.

## FISHERIES/AQUACULTURE

The world's fisheries are increasingly under stress from population and natural resource pressures. Fisheries play a crucial role in the world economy, as well as in the

world's nutrition. Yet compared with other sectors of the world food economy, the fisheries and aquaculture sectors are ill-planned, underfunded, and neglected by all levels of government.

The panel envisions USAID as a world leader in channeling high-quality, need-directed technical assistance to fisheries and aquaculture to developing countries. These efforts should mainly build capacity through education and training, but applied research should also be included. The expert panel specifically recommended that USAID:

- Devote more efforts to global fisheries and aquaculture, mobilizing the United States' formidable expertise in the area and promoting use of the Internet and other electronic resources for training, trading data, and sharing solutions.
- Broaden and intensify its training and leadership development efforts for the sub-sector in both the United States and developing countries.
- Integrate fisheries and aquaculture into programs in other sectors—agriculture, natural resource management, forestry, food processing, community development, waste management, and water management (reservoirs, irrigation)—from the beginning, not as an afterthought.
- Help ensure innovative management schemes for both coastal

and inland fisheries, with attention to property rights, co-management, the use of marine protected areas, and environmental sustainability.

- Help develop more accurate and reliable data-reporting systems for fisheries and aquaculture.

### **INTEGRATED PEST MANAGEMENT (IPM)**

USAID has a long, distinguished record of support for IPM and now conducts a large and complex array of IPM-related programs. Because USAID's IPM activities are so diverse, their funding is from disparate sources, and the activities are often embedded in other programs (e.g., commodity collaborative research support programs), the expert panel chose to focus on broad issues, with particular attention to the Economic Growth, Agriculture, and Trade Bureau's Collaborative Research Support Programs, core funding for the Consultative Group on International Agriculture Research system, and in-country mission programs identified with IPM.

The IPM panel specifically recommended that USAID:

- Develop a vision for IPM and strategically plan for it in its agriculture agenda, with a focus on regional pest problems threatening food security.
- Focus on investments in habitat

management and other traditional cultural control practices in solving IPM-related problems—always as part of regionwide and/or landscape-level strategies.

- Revisit Regulation 216 with a view to developing a more coherent policy on the use of pesticides within sound IPM practices.
- Develop and use tools for systems modeling and for geographic information systems (GIS) throughout all its IPM research and implementation.
- Have USAID's Economic Growth, Agriculture, and Trade Bureau coordinate the development of IPM guides customized for regional and country-specific clients, possibly through the IPM Collaborative Research Support Program.

### **SUSTAINABLE AGRICULTURE**

USAID is involved in many activities that fall under the broad theme of "sustainable agriculture," including dozens launched within the past decade. This work has been strengthened by USAID's ability to link closely and effectively with other groups involved with the sector. However, there is little solid documentation of actual on-the-ground impact of sustainable agriculture activities supported by the Agency, and more systematic evaluation and impact assessment are badly

needed.

The expert panel believes that the sustainable agriculture paradigm should cut across all issues and themes related to agriculture. Rather than considering sustainable agriculture one of four “strategic directions” for the sector, the panel maintains that USAID should not undertake any activity in agriculture that does not lead to sustainability and reap its benefits, including ensuring sustainability of USAID projects after completion, when project participants take over the activities. Even when giving humanitarian or emergency agricultural assistance, the Agency should ask how these activities fit the sustainable agriculture paradigm.

The panel suggested that USAID develop a sustainability checklist to be used in assessing any proposed agricultural investment, just as environmental assessments are used. It also recommended that USAID:

- Create an overall sustainable agriculture vision and strategy—for work that is long-term, holistic, interlinked, highly adaptive, and far more oriented toward evaluation and impact.
- Develop stronger mechanisms and partnerships for supporting and coordinating sustainable agriculture work, linking investments to progress in sustainable agriculture and setting up a non-governmental organization

(NGO) advisory panel to draw on NGOs’ grassroots sustainable agriculture experience.

- Increase its focus on and support for water-related agricultural investments, given that water is and will continue to be a significant constraint on sustainable agriculture in many of the world’s poorest regions.
- Continue work in rural poverty alleviation through such sustainable agriculture-friendly means as community-based natural resource management, new non-farm rural income sources, and interventions to increase market access.
- Consider biodiversity in programming, including “wild” (non-domestic) elements of agro-ecosystems.

In addition to synthesizing valuable information and making a number of recommendations for each sub-sector, the expert panels made several cross-sectoral recommendations. The sustainable agriculture report, in particular, stressed that USAID should make **sustainability** a fundamental, not secondary, criterion for all its investments in agriculture and related sectors.

The panels noted that they had found it difficult to weigh the relative importance of each sub-sector to USAID’s overall mission. They therefore urged USAID to

conduct a more general review of the Agency’s agriculture program. This review would assess how well USAID’s agriculture portfolio fits with its new agriculture strategy and the 2000 Title XII legislation, as well as pinpoint gaps and redundancies.

## SPARE RECOMMENDATIONS TO BIFAD

SPARE forwarded to BIFAD the following recommendations from the strategic evaluation of these three agriculture sub-sectors: aquaculture/fisheries, integrated pest management, and sustainable agriculture.

## ALL AGRICULTURAL RESEARCH AND DEVELOPMENT PROGRAMS

- Given the urgent need for USAID to re-engage in building institutional and human capacity, universities and USAID should work with international agricultural research centers, NGOs, and private-sector partners to seek innovative and efficient ways to conduct educational programs. This should include the use of information technologies such as the Internet.
- To help reverse the decline in USAID’s monitoring and evaluation efforts and to take advantage of new, advanced tools, the present impact assessment task force, composed of USAID, international agricultural research centers, and university staff from the CRSPs

### FISHERIES/AQUACULTURE PANEL

**Barry Costa-Pierce**, *Chair*  
University of Rhode Island,

**James Kapetsky**  
Fisheries and Aquaculture  
Science Consultant

**Ron Hardy**  
University of Idaho

### IPM PANEL

**Andrew Gutierrez**, *Chair*  
University of California, Berkeley

**Ronald Stinner**  
North Carolina State University

**Marcos Kogan**  
Oregon State University

### SUSTAINABLE AGRICULTURE PANEL

**Jeff McNeely**, *Chair*  
World Conservation Union

**Paul Mueller**  
North Carolina State University

**Hans Gregersen** (*emeritus*)  
University of Minnesota

and other universities, should design a standardized database for use in planning and implementing USAID programs.

- USAID should take the lead in integrating biotechnology into efforts to solve development problems. That said, USAID should avoid overemphasizing technology when many of the basic problems facing the rural poor involve tenure, access to markets, social factors and other elements that have little to do directly with technology.
- The research community should pay greater attention to markets and marketing research as they engage in agrosience research (crop production, livestock, etc.).
- Community-based approaches should be considered when designing new programs and projects in order to help ensure that proposed solutions to problems are appropriate, fair, and sustainable.

- Communications with USAID partners both in the university and donor communities and with other USAID sectors needs to increase, and linkages with the collaborative research support programs, non-governmental organizations, and the private sector should be strengthened.

### COLLABORATIVE RESEARCH SUPPORT PROGRAMS (CRSPS)

- The CRSPs should strengthen and improve their linkages with the international agricultural research centers, non-governmental organizations and the private sector.
- The CRSP Guidelines should be revised to reflect recent discussions and decisions.
- To foster free and open competition, the management entity (ME) of all CRSPs should be openly competed every 10 years, beginning with the Sustainable Agriculture and Natural Re-

source Management (SANREM) and IPM CRSPs.

- The IPM and SANREM CRSPs should also pilot the use of the Leader With Associate (LWA) procurement mechanism to see if it fits with the existing CRSP budgetary and programmatic structure.
- The Pond Development/Aquaculture (PD/A) CRSP should be extended.

### INTERNATIONAL AGRICULTURAL RESEARCH CENTERS (IARCS)

- A panel of U.S. and IARC scientists should be convened to find greater synergies between IARCs and various bilateral USAID programs in agriculture and natural resource management (NRM).

### BIFAD MEETINGS

BIFAD held four meetings (the 135<sup>th</sup> through the 138<sup>th</sup>) during FY 2003, in

October 2002 and in January, March, and June 2003. The main issues addressed and recommendations made by BIFAD in FY 2003 were:

- **CRSP renewals.** Among the sub-sector review recommendations forwarded to BIFAD, SPARE recommended that CRSPs be re-bid at the end of each ten-year program. As SPARE noted, the CRSPs' strong relationships with U.S. land-grant universities have yielded very good results. At the same time, the development issues that USAID faces are constantly changing. It is important to offer USAID's many potential university partners the chance to propose new approaches and different visions for solving agricultural development problems. Free and open competition should govern participation in the CRSPs so that the extensive human and institutional resources found in the U.S. university community can be fully brought to bear.

BIFAD thus recommends that the Management Entity (ME) of all CRSPs be openly competed every ten years with the concept of the ten-year competition reviewed in connection with the CRSP guidelines. The SANREM and IPM CRSPs are the first up for renewal. In addition, USAID will pilot the use of the Leader with Associate (LWA) procurement mechanism for these two CRSPs

to test its fitness for wider CRSP use.

- **Long-term agricultural training.** After a number of years in which there has been minimal support and coordination for master's and Ph.D. degree training in agriculture, BIFAD has advised the Administrator that the Agency needs to re-emphasize this area of development and capacity building. A proposal, *Renewing USAID Investment in Global Long-Term Training and Capacity Building in Agriculture and Rural Development*, was published and distributed in June 2003.
  - [www.usaid.gov/our\\_work/agriculture/bifad/long\\_term\\_training\\_june26-03.pdf](http://www.usaid.gov/our_work/agriculture/bifad/long_term_training_june26-03.pdf)
- BIFAD has proposed that initial efforts be focused on three target areas under the Initiative to End Hunger in Africa (IEHA)—Mali, Mozambique, and the Eastern Africa Region—so that USAID and its partners can coordinate efforts and integrate goals. USAID's Africa Bureau and its Economic Growth, Agriculture and Trade Bureau provided funding to launch the initiative. Assessment teams visited Mozambique and Mali and presented their reports in October 2003. Further information about this initiative can be found

in Annex Four, "New Agricultural Activities."

- **USAID-university relations.** A study on the status of relations between USAID and its university partners and on how to strengthen this relationship was completed by Ken Sherper. University members of BIFAD and Economic Growth, Agriculture, and Trade Bureau staff have reviewed the findings and will present their recommendations at a future BIFAD meeting.

## THE 2003 BIFAD AWARD FOR SCIENTIFIC EXCELLENCE

Since 1998, BIFAD has recognized researchers who bring innovation and dedication to areas that support USAID's development efforts. The 2003 awardees were Dr. Douglas Maxwell, University of Wisconsin, and Dr. Darrel Rosenow of Texas A&M. Dr. Maxwell's work with the Bean/Cowpea CRSP applied molecular approaches to geminivirus control in beans, helping to save the bean industries in several nations. Dr. Rosenow's work with the INTSORMIL CRSP has greatly increased scientific capacity in many countries and has led to the genetic improvement of sorghum germplasm for better resistance to drought and disease.



RUSSELL YOST, UNIVERSITY OF HAWAII

Ing. Ricardo Maria collects geo-referenced soil samples for a diagnosis of constraints to food production in one of the most promising provinces of Mozambique. Ricardo is carrying out the field phase of his M.S. degree in Soil Science at the University of Hawaii as part of the INIA/CRSP graduate degree program.

### BIFAD MEMBERS FY 2003

**M. Peter McPherson, Chair**  
*President, Michigan State University*

**Mike Deegan**  
*President and CEO, ACDI/VOCA*

**Stewart Iverson, Jr.**  
*Majority Leader, Iowa State Senate, and farmer*

**Anthony Laos**  
*President and General Manager, Stauffer Seeds*

**William DeLauder**  
*President Emeritus, Delaware State University*

**Carol Lewis**  
*Dean, School of Natural Resources and Agricultural Sciences, University of Alaska, Fairbanks*

**Sharron Quisenberry**  
*Dean, College of Agriculture and Life Sciences, Virginia Technical Institute*

### BIFAD Secretariat

**Curtis Nissly**  
*Title XII Officer, USAID/EGAT Office of Agriculture*

### SPARE MEMBERS FY 2003

**Robert E. Evenson, Chair**  
*Professor of Economics Director, International and Development Economics Program, Yale University*

### Rob Bertram

*Team Leader, International Resources and Biotechnology, USAID/EGAT Office of Environment and Science Policy*

### Winfrey B. Clarke

*Interim Associate Dean for Agriculture and Director of Research, Virginia State University*

### David J. Sammons

*Associate Dean and Director, International Programs in Agriculture, Purdue University*

### John B. Swanson

*Team Leader, Agricultural Productivity USAID/EGAT Office of Agriculture*

### Dennis Weller

*Chief, Emergency Programs UDAID/DCHA Food For Peace Office*

### SPARE Secretariat

#### Roger Bloom

*Team Leader, Agricultural and Rural Policy and Governance USAID/EGAT Office of Agriculture*

#### Susan Thompson

*Senior Policy Advisor, USAID/EGAT Office of Agriculture*

ANNEX TWO

# AGRICULTURAL OBLIGATIONS

## OVERVIEW

USAID supports agriculture activities in more than 60 countries through the regional bureaus for Africa (AFR), Asia and the Near East (ANE), Europe and Eurasia (E&E), and Latin America and the Caribbean (LAC); bilateral and regional missions; and its pillar bureaus Economic Growth, Agriculture and Trade (EGAT) and Democracy, Conflict and Humanitarian Assistance (DCHA). Agency agricultural programs are summarized below and in Annexes 3 and 4.

Approximately \$745.7 million was invested in agriculture activities in FY 2003 to address the goals set out within the strategic objectives (SOs) of USAID's field missions, regional and pillar bureaus. Addi-

tional objectives were identified for focus countries and regional missions under the President's Initiative to End Hunger in Africa (IEHA).

Following the guidelines set out in the 1961 Foreign Assistance Act (as amended) and Title XII, funding for FY 2003 activities was distributed through the following funds:

- Development Assistance (DA)
- Economic Support Fund (ESF)
- P.L. 480 Title II
- Assistance to Eastern Europe and Baltics

In Nigeria, women are involved in collecting and marketing milk and milk products, which benefits rural households by providing income and better nutrition.



ANDREW LEVIN, USAID/NIGERIA

**TABLE I.**  
**USAID AGRICULTURAL OBLIGATIONS BY BUREAU, 2001–2003 (THOUSAND \$)**

BUREAU	FY 2001	FY 2002	FY 2003		
			AGRICULTURE	ENVIRONMENT	TOTAL
AFR	102,187	113,602	129,183	0	129,183
ANE	86,122	117,345	132,805	151,310	284,115
E&E	48,800	85,279	70,355	0	70,355
LAC	24,864	61,862	100,189	30,448	130,637
EGAT	35,171	35,272	43,830	30,018	73,848
DCHA	5,957	6,900	56,406	0	56,406
PPC	414	545	1,200	0	1,200
<b>TOTAL</b>	<b>303,515</b>	<b>420,805</b>	<b>533,968</b>	<b>211,776</b>	<b>745,724</b>

- Assistance to Independent States of the Former Soviet Union
- Andean Counterdrug Initiative
- International Disaster Assistance

### USAID REORGANIZATION

In FY 2003, USAID's Global Bureau was reorganized into two pillar bureaus—Global Health (GH)

and Economic Growth, Agriculture, and Trade (EGAT). Within the new EGAT Bureau, three offices now administer USAID agriculture programs: the Office of Environment and Science Policy (ESP); the Office of Agriculture (AG); and the Office of Natural Resources Management (NRM). Additional agriculture-related programs are administered by the Office of Food for Peace (FFP) and the Office of Foreign Disaster

Assistance (OFDA) in the new Bureau for Democracy, Conflict and Humanitarian Assistance (DCHA); by EGAT's Office of Poverty Reduction; by EGAT's Office of Education; and by the bureaus for the four regions. All these units are charged with furthering food security, human and institutional development, and economic growth and diversification through USAID's agriculture programs.

## EGAT • ECONOMIC GROWTH, AGRICULTURE, AND TRADE BUREAU

The Bureau for Economic Growth, Agriculture, and Trade (EGAT) reorganization was completed on October 1, 2002. As one of the Agency's three pillar bureaus, EGAT provides technical leadership and expertise to missions worldwide, manages programs and projects that support global and transboundary research and innovation, and administers project mechanisms that enable all bureaus and missions to rapidly access technical expertise and training services.

Agricultural and environmental research continues to be a focal activity to address the Agency's objective of improving economic growth in developing countries. The Consultative Group on International Agricultural Research (CGIAR) and the Collaborative Research Support Programs (CRSPs), both managed by the EGAT Bureau, are major

USAID-funded programs that work in close collaboration with U.S. university and agribusiness communities, the international agricultural research system, and interested non-government organizations (NGOs). Partnerships with the U.S. university, NGO, and agribusiness communities are also important in the implementation of the Agency's interim agriculture strategy that links producers to markets through activities to develop value-added chains and strengthen post harvest food industry development.

Funding obligations for agricultural activities in the EGAT Bureau amounted to approximately \$73.8 million in FY 2003 including sustainable agriculture activities coded as environmental activities. With the reorganization of EGAT, three offices share responsibility for the bureau's agricultural portfolio, the

Office of Agriculture, the Office of Environment and Science Policy, and the Office of Natural Resources Management.

### OFFICE OF AGRICULTURE (EGAT/AG)

EGAT/AG provides field support, donor and interagency coordination, and technical leadership for Agency programs that address all aspects of agriculture including farming and livestock production, as well as the marketing and processing activities required before products reach the consumer. The office has three teams:

- **The Agriculture/Rural Policy and Governance Team (AG/ARPG)** supports development of agricultural/environmental policies and regulations and strengthening institu-

**TABLE 2.**  
**ECONOMIC GROWTH, AGRICULTURE, AND**  
**TRADE BUREAU AGRICULTURAL OBLIGATIONS (THOUSAND \$)\***

	<b>FY 2001</b>	<b>FY2002</b>	<b>FY2003</b>
Consultative Group on International Agricultural Research (CGIAR)	26,650	26,900	25,460
Collaborative Research Support Programs (CRSPs)	21,246	22,443	21,860
International Fertilizer Development Center (IFDC)	2,300	2,300	2,300
Partnerships for Food Industry Development (PFID)	1,000	1,575	2,474
Biotechnology and Biodiversity Interface Program (BBI)	2,000	0	0
Agricultural Biotechnology for Sustainable Productivity (ABSP) <sup>1</sup>	2,377	0	0
Collaborative Agriculture Biotechnology Initiative (CABIO)	0	2,800	0
Biotechnology Initiative <sup>2</sup>	0	0	6,439
Program for Biosafety Systems	0	0	1,500
Food Security II/III (FSII/III)	400	400	0
Agricultural Policy Analysis Project III (APAP III)	61	0	0
Rural and Agricultural Incomes with a Sustainable Environment (RAISE) <sup>3</sup>	281	131	180
Integrated Water Resource Management Program	0	0	2,229
Long Term Training	0	0	300
Collaborative Development Research (CDR)	0	0	2,457
Global Development Alliances (GDAs)	0	0	1,000
Rural Finance	0	0	500
HIV/AIDS Program	0	0	250
Poverty Reduction	0	0	350
Impact Assessment	0	0	250
Program Support <sup>4</sup>	1,728	2,695	3,448
BIFAD Support <sup>5</sup>	[150]	0	0
Utah State Irrigation Program	1,000	0	0
Dairy Directive – Central Grants Only	1,598	1,528	3,000
<b>TOTAL</b>	<b>60,641</b>	<b>60,772</b>	<b>73,848</b>
<b>(Minus sustainable agriculture activities coded as environment activities)</b>	<b>[25,470]</b>	<b>[25,500]</b>	<b>[30,018]</b>
<b>TOTAL</b>	<b>35,171</b>	<b>35,272</b>	<b>43,830</b>

\* This table includes obligations coded as environmental activities.

1. ABSP II included in CABIO obligations in FY 2002.
2. ABSP II, BBI, and CABIO obligations included in FY 2003 Biotechnology Initiative.
3. FY 2001 includes Environment Center contribution to joint financing of this activity.
4. Includes RSSA staff, AAAS staff, short term technical assistance, and purchase orders.
5. Included in Program Support.

tions to foster good governance, promote social and economic sustainability, and spark environmentally sustainable rural growth.

- **The Agricultural Technology Generation and Outreach Team (AG/ATGO)** provides assistance aimed at raising yields in crop and livestock systems. Payoffs include lower production costs, higher profits, better nutritional quality and other consumer benefits. The team works closely with the biotechnology team on using biotechnology in plant and animal research and development.
- **The Agribusiness and Markets Team (AG/AM)** works on overcoming obstacles to trade by promoting effective functioning of markets for end products. It also provides support for technologies and practices that reduce food waste and post-harvest losses and that improve efficient storage and distribution systems as well as analyzing value chains for commercial markets.

### OFFICE OF ENVIRONMENT AND SCIENCE POLICY (EGAT/ESP)

EGAT/ESP provides technical leadership on international environmental and science policy issues. The office has three teams:

- **The Multilateral Policy and Conventions Team (ESP/MPC)** man-

ages USAID's engagement in major environmental and agricultural agreements, including the Convention on Biological Diversity, the Bio-safety Protocol, and agreements on endangered and invasive species. The team works to coordinate approaches both multilaterally and within USAID's programs.

- **The International Research and Biotechnology Team (ESP/IRB)** ensures oversight and coordination within the Agency of the overall agriculture, environment, and natural research management portfolio of research, policy and regulatory activities related to biotechnology as well as managing USAID's engagement with international agricultural research institutions such as the Consultative Group on International Agricultural Research.
- **The Global Climate Change Team (ESP/GCC)** assures oversight of and reporting on USAID activities in support of the U.S. government's international strategy on climate change and coordinates USAID's involvement in climate change research activities.

### OFFICE OF NATURAL RESOURCES MANAGEMENT (EGAT/NRM)

EGAT/NRM is tasked with the oversight and management of Agency

programs that affect the sustainable use of natural resources: forests, biodiversity, land, and water. The office helps to develop, implement, and evaluate Agency policies, strategies, and resource allocation priorities affecting biodiversity, water, forestry, sustainable agriculture, and sustainable natural resource management. The office has four teams:

- **The Land Resources Management Team (NRM/LRM)** promotes development of environment-friendly systems for managing land. These systems improve or conserve the land's quality while offering households and communities new opportunities to increase their incomes.
- **The Water Team (NRM/W)** ensures an integrated approach to water management for all purposes, including aquaculture.
- **The Biodiversity Team (NRM/B)** helps to conserve plant and animal biodiversity by providing technical, analytic, and project assistance worldwide.
- **The Forestry Team (NRM/F)** gives technical, analytic, and project assistance to support the conservation and sustainable use of the world's forests.

## AFR • AFRICA BUREAU

In spite of the positive and often sustainable results of many USAID programs in Africa, a number of economies fell short of expected growth in FY 2003. The overall picture of African economies runs from the high performers such as Ethiopia, Rwanda, and Uganda, which grew at rates of 6% or higher, to the weaker countries, where gross domestic product (GDP) actually stagnated or declined (as in Zimbabwe). As a whole, sub-Saharan Africa's regional economy grew only 3.2% in FY 2003, down from 4.3% the previous year. The lower growth rate reflects many of the common problems still plaguing Africa: poverty, HIV/AIDS, political corruption, civil war, and natural disasters.

To achieve sustainable growth for Africa, USAID works through innovative programs with partner nations, agencies, and universities. The Africa Bureau cooperates with its regional and national missions in focusing on agriculture and economic growth, which are two of its major strategic objectives.

For the United States, African development represents a vital investment in global peace and safety in an area that is a growing source of goods as well as a huge potential market. Reducing poverty, mitigating AIDS, easing conflict, and promoting democracy are crucial to

U.S. security and regional stability. Africa is poised to increase its importance in the U.S. energy sector, as its oil resources can partially limit the United States' reliance on Middle Eastern oil. As a result, continued U.S. financial support for Africa programs benefits both domestic security goals and the development goals for the region.

In agriculture, Africa Bureau programs have focused primarily on the President's Initiative to End Hunger in Africa (IEHA), launched in FY 2002. In partnership with other agencies, institutions, and universities, the Bureau has been working to identify core investments with the highest potential for raising smallholder producers' productivity and income. The Africa Bureau has also been building alliances and synergies to complement these investments and pull in additional resources for a wider impact. Many of these programs/investments include research, production, and distribution of new hybrid (biotechnological) crop varieties and improved farm practices.

In the area of economic growth, the Africa Bureau launched the Trade for African Development and Enterprise (TRADE) Initiative. Key to this new program is the establishment of Regional Trade Hubs for Global Competitiveness to provide trade capacity-building

services to sub-Saharan African countries. These hubs have already been successful in making Africa more competitive in global markets by promoting U.S.-African business linkages, enhancing the competitiveness of African products and services, expanding the role of trade in the general economy and in poverty reduction efforts, improving the public service sector, and helping African governments to formulate effective trade policy.

Because such a large part of Africa's exportable products come from farming, the Bureau's trade expansion work has been of particular importance to the agriculture sector. One of the economic growth team's major accomplishments was negotiating an agreement between the U.S. Department of Agriculture (USDA) and USAID missions to assign three staffers from USDA's Animal and Plant Health Inspection Service (APHIS) to the TRADE hubs to guide African exporters in meeting the United States' strict regulations for importing agricultural goods. The Bureau spearheaded and is funding this activity pursuant to a Presidential-level directive.

During FY 2003:

- Twenty-one research activities were carried out through the Sustainable Tree Crops Program

**TABLE 3.**  
**AFRICA BUREAU AGRICULTURAL OBLIGATIONS (THOUSAND \$)**

COUNTRY	FY 2001	FY 2002	FY 2003		TOTAL
			AGRICULTURE	ENVIRONMENT	
Angola	1,443	2,703	2,568	0	2,568
Benin	0	320	300	0	300
Burundi	0	3,000	0	0	0
Democratic Republic of Congo	3,000	1,000	4,875	0	4,875
Eritrea	3,528	2,320	1,500	0	1,500
Ethiopia	5,694	3,444	4,000	0	4,000
Ghana	3,775	3,671	3,375	0	3,375
Guinea	500	0	1,000	0	1,000
Kenya	6,797	6,035	5,184	0	5,184
Liberia	3,270	2,665	2,168	0	2,168
Madagascar	500	0	1,000	0	1,000
Malawi	4,493	4,109	3,350	0	3,350
Mali	6,179	6,373	9,000	0	9,000
Mozambique	11,798	10,317	13,400	0	13,400
Nigeria	4,700	6,896	6,483	0	6,483
Rwanda	3,884	2,874	2,925	0	2,925
Senegal	762	2,400	2,250	0	2,250
Sierra Leone	1,000	1,116	1,082	0	1,082
Somalia	0	800	1,000	0	1,000
South Africa	6,699	5,591	5,637	0	5,637
Sudan	0	3,000	5,000	0	5,000
Tanzania	0	1,957	2,000	0	2,000
Uganda	5,867	8,121	12,000	0	12,000
Zambia	4,181	5,601	5,258	0	5,258
Zimbabwe	0	200	375	0	375
<b>REGIONAL</b>					
REDSO/ESA & GHAI	3,297	7,157	8,450	0	8,450
Southern Africa	0	4,000	9,789	0	9,789
West Africa Regional Program	2,559	1,629	7,175	0	7,175
Africa-Wide (AFR/SD & DP)	21,261	16,303	8,039	0	8,039
<b>TOTAL</b>	102,187	113,602	129,183	0	129,183

(STCP). Activities included integrated pest and disease management for cocoa; germplasm improvement and the production and widespread dissemination of quality planting materials to farmers; rehabilitation of existing tree crop farms and establishment of new farms on already deforested lands; improvement of post-harvest practices to ensure quality; and identification and analysis of policies and institutions to improve the competitiveness of the West African tree crops sector.

- USAID-supported TRADE and IEHA activities produced regional and international results, includ-

ing a reported 11% increase in aggregate trade value for selected commodities (cotton, livestock, coffee, maize; target 7%) and a 24% increase in trade value for specialty coffee from the region.

- USAID continued to pioneer new technologies for adoption by national governments, private firms, and non-governmental organizations. The cassava, bean and potato/sweet potato networks supported by USAID met targets for dissemination of new technologies (target: 23, actual: 23), and exceeded targets for the number of organizations disseminating technologies (target: 325,

actual: 404).

- The rise in crop yields for sorghum, millet, cassava, and sweet potato came to over 600,000 metric tons in Tanzania, Malawi, and Zimbabwe. With substitution, this converts to a savings of over \$117 million on likely food aid for these countries during 2003/2004.
- Due to USAID support in Kenya, 22 improved maize varieties were released by seven seed companies as of August 2003, compared to only 13 varieties released by just four seed companies in 2002.

## ANE • ASIA AND THE NEAR EAST BUREAU

Afghanistan remains a high priority for EGAT and for USAID's agricultural development strategy. USAID supports programs to redevelop the agriculture sector in Afghanistan and provide food security for the entire nation. A large component of the agriculture program is aimed at stopping the production of opium (poppy cultivation) and introducing alternative crops.

In Vietnam, USAID is rapidly expanding programs to meet the growing demand of this newly emerging nation. USAID programs are working to support increased

openness in trade and to help farm entrepreneurs diversify and commercialize new cash/export commodities to stimulate economic growth. During FY 2003:

- Afghanistan produced more than 4.3 million metric tons of wheat, nearly enough to meet the national demand of 4.8 MT. Experts attribute the nearly 40% increase in production to USAID's contribution to private sector supplies and its targeted distribution of both improved seeds and fertilizers.
- USAID's fishpond and rice field

aquaculture program in Bangladesh helped farmers to start 11,925 new ponds and rice plots through a successful rural livelihoods improvement effort. New demonstrations covered a total of 1,563 hectares of land, spread out over more than 30 districts. Another long-running effort—the Home Gardening project—assisted six central nurseries, 2,000 village nurseries, and over 86,000 gardeners during its final six months, with approximately 90% of the beneficiaries being women. Since its inception in 1993, this project has

**TABLE 4. ANE BUREAU AGRICULTURAL OBLIGATIONS (THOUSAND \$)**

COUNTRY	FY 2001	FY 2002	FY 2003		
			AGRICULTURE	ENVIRONMENT	TOTAL
Afghanistan	0	6,920	14,197	3850	18,047
Bangladesh	2,050	1,500	2,500	8,870	11,370
East Timor	8,072	10,000	10,000	0	10,000
Egypt	53,019	63,475	55,375	13,050	68,425
India	337	1,187	5,187	21,900	27,087
Indonesia	4,975	1,363	1,363	16,141	17,504
Jordan	14,469	14,850	15,980	29,020	45,000
Lebanon	0	6,000	0	7,000	7,000
Mongolia	0	0	0	0	0
Morocco	0	0	0	2,294	2,294
Nepal	500	500	1,500	3,747	5,247
Philippines	1,000	1,150	1,150	13,667	14,817
Sri Lanka	0	0	0	250	250
Thailand	0	0	0	750	750
Vietnam	0	0	0	1,000	1,000
West Bank/Gaza	0	5,400	21,300	1,600	22,900
Regional Program	1,700	5,000	4,253	28,171	32,424
<b>TOTAL</b>	<b>86,122</b>	<b>117,345</b>	<b>132,805</b>	<b>151,310</b>	<b>284,115</b>

worked with more than 870,000 rural families.

- In Lebanon, USAID targeted olive oil production and marketing. A thorough survey of the olive oil markets in Europe and North America examined marketing trends, pricing, labeling, quality requirements, high-value niche markets, and principal distribution channels. Results of the survey were presented in a workshop and posted on the Web. Awareness trainings held in the field drew 179 participants, from in-

dividual growers to staffers for cooperatives, extension service centers and the Ministry of Agriculture.

- In order to exploit fully the potential gains from agriculture, programs in policy reform, biotechnology, water management, information technology, World Trade Organization (WTO) accession, and environmental sustainability are seen as prudent investments for the overall ANE region.
- USAID's agricultural work in Asia

and the Near East also focuses on sub-regional interventions. Reflecting the intrinsic regional differences under the Asia/Near East umbrella, the ANE Agricultural framework proposed specific sub-regional interventions that focus on: agriculture sector policy reform, water management, and market access in the Near East; food security, water management, and removal of government interventions in South Asia; and promoting effective trade reaching pre-crisis levels and institutional reform in East Asia.

## LAC • LATIN AMERICA AND THE CARIBBEAN BUREAU

The Latin America and Caribbean (LAC) region has evolved from decades marred by internal wars and authoritarian regimes to relative peace and stability. Centralized economies have begun making the transition from state monopolies to privatized competitive markets. In the highly interwoven areas of economic growth, trade, agriculture, and environment, the Summit of the Americas continues to influence the region's foreign policy agenda and has forged greater commitment among the hemisphere's 34 nations to address common priority areas. Of particular interest to agriculture is the key role of free trade agreements, including the North American Free Trade Agreement (NAFTA), the U.S.-Central American Free Trade Agreement (CAFTA), the proposed Free Trade Area of the Americas (FTAA), and the U.S.-Andean Free Trade Agreement currently being negotiated. These trade agreements offer the prospect of enormous benefits. However, the LAC countries must be prepared to both use and secure these markets, especially in responding to the demands that increased competition will bring.

Preparation for and negotiations on free trade agreements have been ongoing throughout the LAC region. Bolivia, Brazil, the Dominican Republic, Honduras, and Nicaragua have been involved in programs targeting this subject. During FY 2003:

- USAID/Brazil sponsored FTAA outreach events in six major cities to engage public opinion makers and industry delegates in serious, factual discussions of FTAA and free trade, highlighting NAFTA as a successful model. The mission also sent a group of journalists and three of the Minister of Agriculture's key advisors to Mexico for an objective assessment of the NAFTA experience.

Other steps in preparing the LAC countries for wider trade focus on improving policies and institutions. Rural financial services, including micro-finance and small/medium enterprise credit, are basic institutions needed for rural development.

- *Since their inception in FY 1995, USAID's micro-finance programs in Nicaragua have provided loans to over 110,000 rural and urban micro-entrepreneurs, of which 86% were women. During the FY 2001–2003 strategy period, 24 rural credit unions were strengthened through USAID technical assistance. With USAID help, (1) membership grew from 5,039 to 27,000; (2) savings deposits grew from \$79,089 to \$3 million; and (3) loan arrears rate plummeted from 38% to 9.4%—the lowest levels in the history of the project. The credit unions were able to operate safely and become self-sustaining after USAID funding ended.*

Other assistance puts the needed infrastructure in place and prepares private sector businesses to take advantage of expanding markets.

- Launched in September 2002, the Jamaica Cluster Competitiveness Project (JCCP) works toward sustainable economic growth by making selected Jamaican business clusters more competitive. In FY 2003, key government and private-sector stakeholders committed to collaborate on the effort. Three clusters have been selected—agribusiness, tourism and entertainment—with about 120 firms actively participating.
- In Haiti, USAID-funded community-based organizations (CBOs) increased their marketing share to 23% of Haiti's mango exports. This has increased competition in the marketing chain, raising farm-gate prices by as much as 44% in key producing areas. The Hillside Agriculture Project successfully tested the use of collection/washing centers as feeder stations to the larger central packing houses, cutting post-harvest losses substantially.

Programs that increase income through higher market values, diversification of crops, new techniques, and more efficient production have produced the most extensive agricultural successes in the LAC region.

**TABLE 5. LAC BUREAU AGRICULTURAL OBLIGATIONS (THOUSAND \$)**

COUNTRY	FY 2001	FY 2002	FY 2003		
			AGRICULTURE	ENVIRONMENT	TOTAL
Bolivia	1,575	1,000	21,630	3,432	25,062
Brazil	0	0	411	2,808	3,219
Colombia	n/a	n/a	36,000	5,000	41,000
Dominican Republic	0	100	0	0	0
Ecuador	0	0	3,150	0	3,150
El Salvador	2,105	2,650	5,415	2,944	8,359
Guatemala	4,180	3,822	4,322	149	4,471
Guyana	n/a	n/a	0	0	0
Haiti	7,900	4,900	4,399	0	4,399
Honduras	1,943	800	5,900	994	6,894
Jamaica	0	0	750	850	1,600
Mexico	0	0	0	0	0
Nicaragua	5,165	5,690	8,140	240	8,380
Panama	n/a	n/a	0	5,000	5,000
Paraguay	0	0	0	0	0
Peru	1,396	1,300	1,090	5,874	6,964
Regional Programs	600	4,600	8,982	3,157	12,139
<b>TOTAL</b>	<b>24,864</b>	<b>61,862</b>	<b>100,189</b>	<b>30,448</b>	<b>130,637</b>

- Honduras' Agribusiness Development Center (CDA), established with USAID funds in February 2000, has worked directly with 700 lead partners and 8,000 farmers (60% of whom are small or micro-entrepreneurs). An estimated 50,000 additional farmers benefit indirectly. Overall, small-holder farmers' incomes have risen by an average of 177%. CDA's diversification efforts stimulated an almost \$4 million increase in crop exports. It is expected that by the program's end (September 2004), CDA will have increased the annual non-traditional agricultural exports and local sales by \$50 million over a 4.5-year period, generating nearly \$11 in new additional

sales for each USAID dollar spent.

- In FY 2003, technical assistance and training under the Dairy Enterprise Initiative for Honduras and Central America enabled producer groups to organize and operate 49 new milk collection centers, which will benefit nearly 1,300 dairy farmers, increase productivity by 36%, and raise farmers' incomes by over \$7 million per year (over \$5,500 per farm).
- With USAID technical assistance for their strategic planning, competitiveness clusters in the Dominican Republic expanded their vegetable exports to the United States and Europe. The members worked with

their buyers to develop minimum quality norms and grade standards and are working together to build a centralized packing house and a productivity center.

In the coca-growing regions of Latin America, all aspects of agricultural development are integrated to provide alternative development (AD) programs. Activities under USAID's AD strategic objective provide people with viable, legal jobs and other ways of earning income than cultivating coca and producing and trafficking in illegal drugs. The program helps develop sustainable infrastructure, national and export markets, and organizations to ensure sustained economic growth and social well-being in these regions.

Beneficiaries are primarily local farm families. Extensive AD efforts are underway in Bolivia, Colombia, Ecuador, and Peru.

- Efforts by USAID and the Colombian government under Plan Colombia are having a major impact on illicit agriculture. From the end of 2002 to July 2003, total coca-growing area in Colombia dropped from 109,000 hectares to about 69,000 hectares, with the help of viable new alternatives both on- and off-farm. Legal crops supported by USAID in poppy areas reached 147% of the planned target, and social and productive infrastructure projects achieved 195% of planned progress.

- Under the Peruvian auto-eradication program, USAID helped more than 11,000 families to produce legal crops on 23,100 hectares; improved 1,251 kilometers of roads, 18 bridges, 124 potable water systems, 7 electricity systems, 4 irrigation systems, and 157 schools/health posts. In the Peru-Ecuador border region, almost 1,000 small farmers improved their legal production for local consumption and markets. And a USAID guarantee covered a portion of the costs of new sugar cane seedbeds, leveraging a multi-million dollar investment in a major coca-growing area by a U.S.-Peruvian energy company. In total, USAID investments of about \$10 million should leverage more

than \$60 million in non-public resources.

Major programs integrating agriculture and natural resource management are also operating throughout the LAC region. Much of this assistance supports the creation and management of protected areas.

- Bolivia has become a world leader in “green” (sustainable) wood exports, which have risen from 10% of all wood exports in 2000 to roughly 25% in 2002. *While Bolivian exports as a whole fell in 2003, the value of certified forest products exported continued to rise, reaching an estimated \$15 million—up more than \$1 million from 2002.*

## E&E • EUROPE AND EURASIA BUREAU

The E&E Bureau has chiefly focused on strengthening democracy, human rights, good governance and conflict resolution skills, as well as helping the region transform to a market economy after Soviet rule. Many of the Central and Eastern European Countries (CEE) have made substantial progress, though ethnic conflict in the Balkans set those countries back. The Former Soviet Union (FSU), including the Central Asian Republics (CAR), have had mixed success. Particularly in the CAR, restrictions have retightened with the ongoing war on terrorism.

Many USAID agriculture programs are integrated to develop a more competitive marketplace, to priva-

tize state-owned assets, to institute land reform, to develop economically sound and environmentally sustainable energy and natural resource sectors, and to hasten the growth of private enterprise. Particularly in the CEE countries, providing direct technical assistance in business management, marketing, agricultural trade, and linking sectors has produced results. During FY 2003:

- USAID strengthened the Albanian Agribusiness Council's role in serving the interests of farmer associations and agribusiness by participating in Albania's negotiations of free trade agreements with neighboring countries.

- Institutional links were developed across 21 farm associations and 20 private agribusiness processors in four sub-sectors in Kosovo. Twenty-three milk collection points improved their handling and business management. Marketed dairy sales of participants rose an average of 40%. Six feed mills signed agreements with 62 farmers for 6,900 metric tons of feed. These linkages are crucial to better coordination of the market chain.

Direct technical assistance to improve quality has added value to products, as well as laying the groundwork for competing in the difficult Western European markets.

**TABLE 6. E&E BUREAU AGRICULTURAL OBLIGATIONS (THOUSAND \$)**

COUNTRY	FY 2001	FY 2002	FY 2003		
			AGRICULTURE	ENVIRONMENT	TOTAL
Albania	2,300	7,923	4,200	0	4,200
Armenia	10,300	7,540	10,120	0	10,120
Azerbaijan	700	4,350	10,707	0	10,707
Bulgaria	800	450	1,200	0	1,200
Croatia	0	3,800	6,740	0	6,740
Federal Republic of Yugoslavia & Serbia	1,000	1,715	2,188	0	2,188
Georgia	3,500	6,918	9,525	0	9,525
Kazakhstan	1,300	949	379	0	379
Kosovo	0	3,973	500	0	500
Kyrgyzstan	1,500	3,146	518	0	518
Macedonia	3,200	3,144	2,475	0	2,475
Montenegro	500	0	257	0	257
Moldova	5,500	7,034	11,554	0	11,554
Romania	1,600	3,488	1,700	0	1,700
Russia	6,800	555	520	0	520
Tajikistan	400	5,696	490	0	490
Turkmenistan	100	300	100	0	100
Ukraine	4,800	9,291	6,674	0	6,674
Uzbekistan	1,200	13,644	278	0	278
Central Asian Republics Regional	0	1,000	80	0	80
Central & Eastern Europe Regional	2,600	283	117	0	117
Eurasia Regional	700	170	33	0	33
<b>TOTAL</b>	<b>48,800</b>	<b>85,279</b>	<b>70,355</b>	<b>0</b>	<b>70,355</b>

- USAID's new agribusiness competitiveness program in Croatia is strengthening the marketing chain from producers to final markets. The project helped a major fresh-produce supplier meet the U.S. military's strict quality standards. Two pilot projects introduced a new technology that improved yields and quality in fruit and vegetable production. A major food processor has committed to transferring the new technology to its local growers next year.
- Improvements in economic legislation, credit, and support to market-driven agricultural sectors are giving agricultural entrepreneurs new opportunities throughout the region.
  - In Romania and Ukraine, recent laws allow warehouses to issue receipts that producers use for collateral, paving the way for new loans for farm projects. In Ukraine, this opened a \$23 million line of credit to two Ukrainian commercial banks and a \$120 million line of credit to three grain-trading companies.
- The agricultural policy project developed 50 legislative and regulatory acts oriented toward market reform and convinced the government to reject nine regressive economic laws.

To help entrepreneurs add value to products and create new ones, programs in Bosnia and Herzegovina, Croatia, Kosovo and Russia have explored timber processing, secondary processing, and non-timber forest products.

- In Bosnia-Herzegovina, USAID launched a three-year project to create competitive agribusiness clusters—and, ultimately, jobs—through vertical and horizontal integration of the sector. USAID will support development of producers' organizations to help members farm more efficiently and market more effectively. At the same time, USAID will help agro-processors to develop links to supermarkets and national distribution channels.
- In Russia, 120 firms dealing in non-timber forest products and secondary wood processing are generating new sales in excess of \$2 million, providing about 500 new jobs, while seven business associations made significant steps toward sustainability.

After over 70 years under the Soviet Union, the Central Asian Republics (CAR) must confront a legacy of arbitrary boundaries, poor infrastructure, and ethnic/religious tension. However, while confronting political instability, extremist ideology, and security concerns are high priorities for the United States, USAID is also focusing on resource

use and on reinvigorating the CAR's agricultural and business sectors.

The regional nature of many of Central Asia's development challenges requires coordinated and integrated assistance from USAID. In particular, each country's decisions on the use and management of water resources will have important implications for its neighbors. All five CAR countries are in the Aral Sea Basin and depend on its water resources for irrigation, industrial, and domestic use.

The reclamation of farmlands lost due to a crumbling and inefficient irrigation system is one of USAID's largest agricultural projects in the CAR region.

- Much of Tajikistan's irrigated area is served by pump stations, which serve about 80,000 people farming an estimated 20,000 hectares. Over the past year, USAID has rehabilitated nine of these stations with new pumps, motors, electrical systems, and building repairs for an estimated benefit of \$250,000–\$1 million annually, depending on crop yields.
- Water user associations are being formed in Uzbekistan, where people are receiving training in water-saving cropping practices that also mitigate conflict. Where used, these practices, along with improvements to the region's irrigation system, should increase productivity by 5% (or \$10 million) annually.

USAID programs that support producer associations and access to credit increase income via higher market values, diversification of crops, new techniques, and more efficient production. Though not widespread in the CAR region, these programs are resulting in success.

- In the Kyrgyzstani section of the heavily farmed Fergana Valley, USAID programs helped strengthen agribusiness by building SME capacity, improving access to credit, and giving technical assistance on modern farming practices. A complementary project introduced 140 new varieties of 17 fruits and vegetables, identified existing varieties of tomatoes and cucumbers ideal for processing, and helped an association of agro-input retailers develop a business plan. The association's membership nearly doubled, bringing its revenues to \$20,000—up from \$2,000 in 2002.
- Another small enterprise program helped to bring \$800,000 to a new joint venture to hatch and farm carp and other fish species for local and regional markets. USAID also joined a local entrepreneur in establishing a fish-farming company that will produce over 3,000 tons of fish a year for distribution within Uzbekistan and neighboring Kazakhstan. Sales are expected to exceed \$3 million per year, including about 25% from exports.

## DCHA • BUREAU FOR DEMOCRACY, CONFLICT, AND HUMANITARIAN ASSISTANCE

The United States gives more to countries in crisis than any other nation in the world. USAID is the agency responsible for directing contributions to thousands of non-profit partners and international organizations like the World Food Program and UNICEF. In tandem with these organizations, the Agency helps those affected by disaster to cope and then to start over, converting crises into opportunities to promote peace, democracy, and economic growth.

During FY 2003, DCHA and its co-operators were heavily engaged in managing the aftermath of the war in Iraq, but DCHA was also at work in many other countries throughout the world. DCHA incorporates agricultural activities into its work through its Offices of Foreign Disaster Assistance (OFDA) and Food for Peace (FFP).

### OFDA • OFFICE OF FOREIGN DISASTER ASSISTANCE

As legislated by Congress, the mandate of the Office of Foreign Disaster Assistance (OFDA) is to save lives, alleviate human suffering and reduce the economic impact of natural and man-made disasters worldwide. OFDA seeks out the most vulnerable with its emergency assistance, including the malnourished, nursing and pregnant women, child- and women-headed households,

the elderly and the handicapped. Besides giving monetary and material assistance during humanitarian crises, OFDA helps vulnerable communities prevent, prepare for, or mitigate the effects of disasters.

OFDA plays a key role coordinating the USG response to foreign disasters, and in FY 2003 assembled the largest Disaster Assistance Response Team (DART) ever for the Iraq intervention. This was a major endeavor, consuming more staff, time and resources than any other activity during the fiscal year. OFDA funded over \$81 million in humanitarian assistance for Iraq in FY 2003. Also during FY 2003:

- Drought has afflicted several regions of Ethiopia for nearly two decades, with 10-12 million people facing ongoing food insecurity, widespread malnutrition and outbreaks of malaria and measles. OFDA responded to this continuing crisis with more than \$31.7 million in funding for emergency activities in water/sanitation, health, nutrition and agricultural rehabilitation.
- OFDA seed programs have provided a lifeline to hundreds of thousands throughout Ethiopia. Through innovative seed distribution methods, OFDA programs targeted 300,445 households across the country in FY2003, en-

abling farmers to plant crops on land that might otherwise have been left fallow. Through OFDA-funded interventions, farmers could choose the varieties and crops that they wanted to plant, increasing crop diversity and minimizing risk associated with planting only one crop.

- Agriculture in West Africa's Sahel region is highly vulnerable to variations in rainfall. Climate forecasts are critical to deciding what and when to plant, as well as whether to try new techniques that might increase farm production and lessen the impacts of unpredictable weather. OFDA, partnering with the National Oceanic and Atmospheric Administration (NOAA) and the African Center of Meteorological Application Development (ACMAD), has supported the development of West African climate forecast capabilities, including extensive data-sharing and the training of scientists and meteorologists in the region in making and using forecasts. OFDA, NOAA, and ACMAD are also working to disseminate climate information to the resource-poor rural population using the radio and internet technology through the RANET program.
- The livelihoods of many people in Sudan, Ethiopia, Somalia, Dji-

bouti, and other countries in the Greater Horn of Africa depend on livestock. Both livestock and humans in the Horn are at risk from recurring epidemics of a vector-borne disease called Rift Valley Fever, which breaks out in years when rainfall is exceptionally high. With funding from USAID's REDSO and OFDA, the International Research Institute for Climate Prediction, the Drought Monitoring Center in Nairobi and the World Meteorological Organization began working with a group of livestock trade organizations in the Horn of Africa and the Middle East to predict weather associated with fever outbreaks. These early warnings will be used to identify threatened areas and target surveillance and control measures during high-risk periods.

### FFP • OFFICE OF FOOD FOR PEACE

Nearly 800 million people in the world are food-insecure. Many live in sub-Saharan Africa and South Asia. Chronic poverty—the persistent lack of economic opportunity either to produce enough food or to trade labor for income needed to buy enough food—is the chief cause of food insecurity.

USAID, through funding provided by Public Law 480, Title II, donates commodities to cooperating sponsors—private voluntary

organizations, cooperatives, and international organization agencies. These donations aim to address the needs of food security both through five-year development projects and through emergency food assistance.

FY 2003 was a year without precedent for global food security and FFP. It was marked by multiple food emergencies, most notably in Africa. FFP's highly successful efforts throughout Eastern and Southern Africa as well as in the Middle East (Iraq and Afghanistan) averted widespread famines and saved millions of lives. At the same time, FFP continued to support critical developmental programs serving chronically undernourished communities, as well as ongoing emergency programs in Sudan, Angola, and the Democratic Republic of Congo. These efforts were achieved with over \$2 billion in FY 2003 resources. FFP funded Title II work from several sources—the Bill Emerson Humanitarian Trust and the De-

velopment Assistance, Child Survival and Health, International Disaster Assistance and Economic Support Funds. While complex, this approach proved to be successful.

FFP's successes were not easily achieved. As Iraq became a prior-

**TABLE 7.**  
**OFFICE OF FOREIGN DISASTER ASSISTANCE OBLIGATIONS ALLOCATED TO FOOD SECURITY AND AGRICULTURE IN FY 2003 (THOUSANDS \$)**

COUNTRIES	AMOUNT
<b>AFRICA</b>	
Angola	4,482,783
Burundi	1,569,774
Democratic Republic of Congo	10,486,647
Eritrea	1,137,211
Ethiopia	11,574,244
Gambia	682,392
Senegal	837,838
Sierra Leone	35,000
Sudan	11,898,560
Zambia	371,499
Zimbabwe	4,248,577
<b>ASIA AND NEAR EAST</b>	
Afghanistan	3,425,446
India	264,225
Indonesia	131,443
Iraq	3,532,713
<b>LATIN AMERICA/CARIBBEAN</b>	
Argentina	20,190
Haiti	50,000
Paraguay	50,000
Global Programs	1,607,241
<b>TOTAL</b>	<b>56,405,783</b>

ity, it diverted management and staff attention and exposed serious inadequacies in FFP staffing. Notwithstanding these constraints, over 1 million metric tons of food were delivered to Ethiopia alone and 26 million Iraqis were fed after the war despite a complete breakdown in the public distribution system in that country.

Longer-term programs and programs aimed at increasing food security continue to be a major focus of the office:

- In FY 2003, USAID and ChevronTexaco entered into a five-year public-private alliance in Angola, where large numbers of Angolans displaced by decades of civil war are returning to their original homes. A relief program was approved in March 2003 for a consortium that includes CARE, Catholic Relief Services, Save the Children, and World Vision. It combines direct food distribution with development activities to reestablish farm livelihoods in six rural areas to which the bulk of Angolans are returning. ChevronTexaco added \$4 million to FFP's commitment of about \$43.3 and USAID Africa Bureau's \$3 million.

Title II Agriculture and Natural Resource Management (ANRM) community-level programs give technical assistance and training to smallholder farmers and their families worldwide to address a leading cause of food insecurity: low or

**TABLE 8. TITLE II (P.L. 480)  
EMERGENCY AND DEVELOPMENT FUNDING THROUGH THE  
FOOD FOR PEACE OFFICE: TWENTY LARGEST RECIPIENT  
COUNTRIES IN FY 2003 (THOUSAND \$)**

COUNTRY	EMERGENCY	DEVELOPMENT	TOTAL
Ethiopia	331989	25338	357326
SACR	138880	0	138880
Iraq	137424	0	137424
Sudan	115105	0	115105
Angola	105903	1792	107695
Uganda	59290	18097	77387
Eritrea	65165	2622	67788
	48978	0	48978
India	0	44849	44849
DR of Congo	43835	0	43835
Bangladesh	0	38576	38576
Haiti	3609	33008	36617
Kenya	12466	22574	35040
Bolivia	0	31443	31443
Indonesia	15375	14358	29733
Peru	0	26678	26678
Burundi	24228	0	24228
Tanzania	22867	0	22867
Ghana	0	20345	20345
Sierra Leone	18906	965	19871
<b>TOTAL</b>	<b>1144018</b>	<b>280645</b>	<b>1424663</b>

variable farm productivity. During FY 2003, Title II ANRM programs reported many impressive accomplishments:

- A study found an increase of 528% in the amount of cassava produced and 138% in the amount of grain produced be-

tween FY 2001 and FY 2003 by the 75,500 farmers who trained with Agricultural Cooperative Development International (ACDI) Uganda.

- Rice yields rose 505% after 3 years of program implementation for 15,000 Bangladeshi farmers

trained in improved production technology by World Vision.

- The number of months that grain is available rose—from 2 months in 1999 to 6 months in 2003—for 7,500 farmers participating in FHI Kenya’s program. Similarly, the length of the “hungry season” fell from an average of about 4.5 months in 2000 to about 2 months in 2003 among the 7,800 farm families in ADRA Guinea’s program.
- There was an 80% jump in the proportion of the 3,200 Bolivian families in CARE’s program who reported that their farm income had risen substantially—at least 5%—compared with the previous year.

Increasingly, FFP programs move beyond immediate food relief, linking short-term relief efforts to long-term development strategies. This shift is supported by USAID, which sees food aid-supported activities as a means of reducing vulnerability over the long term and not merely as an end in themselves—even in an emergency environment.

- In FY 2003, the percent of programs that have developed resettlement or rehabilitation plans linking relief to development was 76.7%—a significant increase over the baseline (63%), though not meeting the target of 88%. The increase seen in this indicator over the years reflects a paradigm shift from general food distribution to activities that

promote self-sufficiency such as Food for Work (FFW), Food for Agriculture (FFAg), Food for Training (FFT) and Food for Asset Creation (FFAC).

- In Sierra Leone, the Title II program has made significant gains in offering rehabilitation that links relief and development. The FFW, FFAg, and FFT programs helped to re-establish social and physical infrastructure and farm production destroyed during the conflict and provided vocational and technical skills to youth, women and the disabled. By mid-2003, 26,412 acres of rice farms were returned to productive capacity and 12,081 beneficiaries had completed skills training.

USAID/IRAQ

In Iraq, a wide range of USAID programs focused on increasing agricultural production and marketing are critical in the efforts to stabilize the country.





JUAN MUNOZ, CHIEF OF ECONOMIC SERVICE CENTER, UCAYALI

Shipibo-Conibo artisans in Peru exported around \$150,000 in pottery to the U.S. market with assistance from USAID/Peru's Poverty Reduction and Alleviation (PRA) project.

# INTERNATIONAL MEETINGS

**U**SAID sponsored two international meetings supporting the U.S. agricultural development agenda in 2003:

## **MINISTERIAL CONFERENCE AND EXPO ON AGRICULTURAL SCIENCE AND TECHNOLOGY, JUNE 23–25, 2003, SACRAMENTO, CA**

*[www.fas.usda.gov/info/agexporter/2003/November/pgs 4–9.pdf](http://www.fas.usda.gov/info/agexporter/2003/November/pgs%204-9.pdf)*

USAID, the U.S. Department of Agriculture (USDA) and the U.S. Department of State co-sponsored the conference, with 117 countries represented and nearly 120 ministers in attendance. Overall, about 925 people participated in the conference and expo.

The conference focused on the critical contributions science and technology can make to alleviating world hunger and poverty through increasing agricultural productivity in developing countries in an environmentally sustainable way. During the conference, delegates discussed the relationship between regulatory practices and innovation, as well as the policy and institutional frameworks needed to facilitate technol-

ogy transfer and indigenous research and development.

The conference was one of the largest gatherings of developed and developing country ministers ever to address these issues, and the extensive interaction of foreign delegates was a significant outcome. Science and technology ministers expressed a high level of interest in delivering solutions, and new priorities were identified to help guide the use of resources and cost-sharing in the future. Priorities identified include:

- understanding what agriculture technologies are suited to developing countries,
- making applied research and technology accessible to farmers,
- strengthening market infrastructure,
- expanding the knowledge base by revitalizing local and national research capacities,
- promoting public-private partnerships to leverage resources and increase knowledge sharing,
- recognizing water quality and availability as special problems,
- facilitating the dissemination of technology through supportive

policies and regulations, and

- emphasizing the need for integration of programs to address the HIV/AIDS crisis.

At the Agricultural Technology Expo, which ran concurrently with the conference, the strongest interest was generated by technologies related to precision farming, irrigation, biotechnology, irradiation, satellite imaging, water purification, and organics. As one private sector exhibitor noted, his company made more contacts with senior policy-makers from developing countries in three days than it had made in the previous year. Moreover, a number of discussions between foreign delegates and companies at the expo are expected to lead to new business deals.

Significant outcomes of the Ministerial Conference and Expo are summarized below.

- An Illinois-based water conservation company announced a partnership with Namibia to reduce evaporation from reservoirs in that country.
- Burkina Faso's Minister of Agriculture returned from the conference as an enthusiastic convert

to the possibilities that biotech offers his country's agricultural sector. In a meeting with the U.S. Ambassador shortly after his return, the Minister asked for close cooperation with the U.S. government and U.S. businesses in implementing a new biotech program.

- Monsanto reached an agreement to cooperate with the Government of Burkina Faso in implementing a two-phase biotech plan, to include cotton, corn, and perhaps rice.
- The Donald Danforth Plant Science Center and several African nations discussed field tests for biotech cassava.
- One key Asian minister offered to help the U.S. government deliver the message on the possibilities of biotechnology to other countries.
- A Bulgarian minister gained a positive view of biotechnology and pledged support for a new law that paves the way for commercializing biotech crops in Bulgaria.
- The delegation from Zambia requested assistance with policy making using science-based approaches and with improving evaluation of biotechnology products.

### **PAVING THE WAY FORWARD ON RURAL FINANCE: AN INTERNATIONAL CONFERENCE OF BEST PRACTICES, JUNE 2–4, 2003, WASHINGTON, D.C.**

Sponsored by the Agriculture/Rural Policy Team of EGAT's Office of Agriculture and the Microenterprise Team of EGAT's Office of Poverty Reduction, this conference was overwhelmingly successful in bringing together USAID staff, the private sector, practitioners, donors and civil society to share their knowledge, experience and vision for the development of rural financial systems. Participants included staff from 25 USAID missions, including Bolivia, Bosnia and Herzegovina, Azerbaijan, El Salvador, Ethiopia, Guatemala, Guinea, Afghanistan, Kenya, Mexico, Moldova, Morocco, Mozambique, Nigeria, Peru, and Rwanda. Also in attendance were more than 400 participants representing over 42 countries and bilateral/multilateral organizations including the British Department for International Development, Germany's Deutsche Gesellschaft für Technische Zusammenarbeit (GTZ), the Swedish International Development Corporation Agency, the World Bank, the International Finance Corporation, the Inter-American Development Bank, the Asian Development Bank, the African Development Bank, the Food and Agriculture Organization of the United Nations, and the International Fund for Agricultural Development.

Discussion centered on rural financial market development based on lessons from both successes and challenges in agricultural finance, financial liberalization, risk management and microfinance. Case studies provided the context for further dialogue during the breakout sessions. The case studies examined subjects such as savings mobilization, rural finance in the age of HIV/AIDS, and financing vendors in input markets. Conference participants also had an opportunity to network and develop ideas about future projects and collaboration.

Significant outcomes of the International Conference of Rural Finance Best Practices include:

- A synthesis paper that summarizes key issues from the conference and informs the USAID Strategies on Finance and Agriculture, as well as the EGAT Rural and Agricultural Finance Initiative;
- Agreement between participating donors on a set of principles to guide programming in rural and agricultural finance;
- The establishment of several donor working groups to coordinate efforts in the areas of research, training/tool development, and information management/access; and
- The initiation of several EGAT follow-on activities to collect and share best practices and leading innovations with field missions.

## ANNEX FOUR

# NEW AGRICULTURAL ACTIVITIES

**D**uring FY 2003, USAID implemented a number of new activities that both build on lessons learned and fill significant gaps in the Agency's agricultural portfolio.

### **IEHA: THE AGRICULTURAL INITIATIVE TO END HUNGER IN AFRICA**

Formally launched August 29, 2002, at the World Summit on Sustainable Development, the Agricultural Initiative to End Hunger in Africa (IEHA) is a Presidential Signature Initiative. Recognizing that hunger in Africa is one of the most significant development challenges facing the world today, the Initiative signals the U.S. government's commitment to finding clear political and technical options for reversing the trends of hunger and poverty in Africa.

IEHA focuses on promoting agricultural growth while building an Africa-led partnership to cut hunger and poverty. The primary objective of the Initiative is to increase agricultural growth and rural incomes in sub-Saharan Africa rapidly and sustainably. To grow out of poverty, smallholder farmers and agricultural firms need to generate income and profits from their products and services.



USAID works with women in Niger to increase the diversity of crops they grow. Growing off-season, irrigated market garden products such as tomatoes increases food security and the incomes of farmers in the region.

Initial efforts concentrate on a key country in each of three regions (East, Southern, and West Africa). These countries (Uganda, Mali, and Mozambique) are leaders in policy reform, public investment, and government commitment to agricultural growth and poverty reduction. They are representative of the key eco-

nomical and agricultural characteristics of their regions. These countries also have the greatest potential for rapidly influencing regional agricultural productivity and economic growth through trade and technology diffusion. The Initiative will be expanded in the future to include a total of nine countries.

## EPIQ II

In response to a growing and well-demonstrated demand from USAID missions and regional bureaus, the **Environmental Policy Indefinite Quantity Contract II (EPIQ II)** has been implemented by USAID's Economic Growth, Agriculture, and Trade Bureau to provide quick-response short-, medium- and long-term technical assistance and advisory services to USAID environmental policy and institution-strengthening programs. EPIQ II provides assistance on:

- Environmental Policy to strengthen the capacity of host governments and non-governmental groups to identify and analyze environmental policy priorities and strategies, engage in dialogue about policy, design and carry out effective policy interventions, and evaluate and monitor program performance, making changes as needed.
- Multilateral Environmental Agreements to support research and coordinate regional and multilateral agreements to address pressing environmental concerns.
- Global Climate Change to promote sustainable development that minimizes the associated growth in greenhouse gas emissions and reduces vulnerability to climate change impacts.

- Public-Private Partnerships to build on reform-driven changes such as structural, legal, and regulatory reforms to construct public-private partnerships for sustainable, broad-based economic development.
- Institutional Development to strengthen the capability of key government, non-government, community and people's organizations, and other institutions, as appropriate, to support environmental policy activities; and to promote the sustainable financing of institutions with environmental policy responsibilities.
- Linking Environment and Economic Growth to support the connection between economic growth and environmental quality, which can shape the ways donors, national governments and other development actors allocate resources.

## RURAL AND AGRICULTURAL FINANCE INITIATIVE

Since the June 2003 conference, *Paving the Way Forward on Rural Finance*, the Economic Growth, Agriculture, and Trade Bureau's Offices of Agriculture and Poverty Reduction have been working together to craft a unified rural and agricultural finance initiative. Activities under the initiative include a summary paper

that synthesizes the lessons learned from the conference, which will be used to reach USAID missions and to provide input into the Agency's agricultural and financial strategies. A five-year research plan on best practices in rural finance and an agenda for regional training have also been developed.

## BEAN GDA/PULSES FOR HEALTH ALLIANCE

This Global Development Alliance (GDA), the Pulses for Health Alliance, is a partnership between the American Dry Bean Board, the National Dry Bean Council, Bush Brothers and Company, H.J. Heinz Company, World Vision International, the Bean/Cowpea Collaborative Research Support Program (CRSP) at Michigan State University, and USAID. The Alliance draws upon research conducted by the Bean/Cowpea CRSP on food-based solutions to infectious diseases to implement a broad agenda of interventions that include:

- generating scientific knowledge through research food-based solutions to health problems in developing countries;
- educating health professionals and consumers on dietary solutions through international conferences and media campaigns;
- working with NGOs to integrate dietary interventions into

comprehensive HIV/AIDS, child survival, and food-aid programs in Africa; and

- expanding production and market opportunities for dry beans and pulses in both developing and developed countries.

### **BIFAD LONG-TERM TRAINING INITIATIVE**

The BIFAD Long-Term Training Initiative is intended to reverse the ten-year decline in U.S. support for Africans studying for graduate degrees in agriculture-related subjects.

In June 2003, the Board for International Food and Agricultural Development (BIFAD) proposed an initiative to address the crisis. After assessment missions to three IEHA focus countries/regions—Mali, Mozambique, and the Eastern Africa Region—the Bureau of Economic Growth, Agriculture, and Trade, in collaboration with BIFAD, launched the initiative with a Request for Applications for a pilot project to train several students from Mali. The Mali pilot project and the two regional pilot projects to follow are to encourage missions to incorporate long-term training in their strategic plans. Working with the Bureau of Economic Growth, Agriculture, and Trade is the Association Liaison Office for University Cooperation in Development, with funding from the Africa Bureau and

the Bureau of Economic Growth, Agriculture, and Trade.

The initiative's ultimate goal is to strengthen institutions and develop in-country leaders so that Africans receive training at African institutions rather than seeking it abroad. To learn more, see the June 2003 report, "Renewing USAID Investment in Global Long-Term Training and Capacity Building in Agriculture and Rural Development".

- [www.usaid.gov/our\\_work/agriculture/bifad/](http://www.usaid.gov/our_work/agriculture/bifad/)

### **AGRICULTURAL BIOTECHNOLOGY SUPPORT PROJECT II (ABSP II)**

ABSP II was launched in October 2002. Led by Cornell University, this project is carried out by a consortium of institutions comprising eight U.S. universities, six international agriculture research institutions of the Consultative Group on International Agricultural Research, and multiple public and private sector institutions in the United States and developing countries. The goal of the project is to promote safe and effective development of genetically engineered crops in developing countries and address associated policy issues, specifically intellectual property rights (IPR). Initial efforts include conducting participatory priority setting activities in India, Bangladesh, Indonesia and Philippines and identifying key

technologies for further development.

### **PROGRAM FOR BIOSAFETY SYSTEMS**

In May 2003, USAID launched the Program for Biosafety Systems (PBS), a core program in the Agency's biotechnology portfolio. The program aims to stimulate economic growth by raising agricultural productivity in an environmentally sustainable way. Awarded to a consortium of international organizations led by the International Service for National Agricultural Systems (ISNAR), this ten-year program will help countries develop biotechnology regulatory systems to meet their broader goals in agriculture, food security, environment, and trade policy while ensuring the safety of new biotechnology products.

### **AFRICAN AGRICULTURAL TECHNOLOGY FOUNDATION**

FY 2003 also saw the launch of the African Agricultural Technology Foundation (AATF), a joint venture with the Rockefeller Foundation and the British Department for International Development. The AATF will leverage private sector investment in developing agricultural technologies, including bioengineered crops, to benefit African small farmers. In 2003, the AATF established its headquarters in Nairobi, Kenya, and

identified its first round of priority technologies, including maize varieties resistant to **Striga**, a devastating parasitic weed; provitamin A-enhanced maize; and insect-resistant maize varieties. The AATF model seeks to leverage the expertise and complementary resources of international technology companies, African research organizations, local African companies, and non-governmental organizations through partnerships that span the entire technology chain, from development of new technologies through their delivery to farmers.

### FOOD SECURITY III

The overall goal of Food Security III, a cooperative agreement with Michigan State University, is to increase food security—access for all, at all times, to enough food to lead an active and healthy life—in African countries as part of a broader-based, market-oriented, sustainable economic growth strategy. The activity carries out applied policy research, outreach, and in-service training to find ways to increase

household access to food supplies, either domestically produced or imported.

The research program focuses on three priority themes: improving food systems performance, understanding rural household income and livelihood dynamics, and understanding food security/natural

resource management interactions toward a greener and safer food security. In addition, current analyses of HIV/AIDS and food security are being expanded to cross-country analysis of rural community-level responses to adult deaths from HIV/AIDS in Southern and Eastern Africa.

USAID/CENTRAL ASIAN REPUBLICS



USAID activity in Uzbekistan aims to identify agricultural marketing opportunities or underserved agricultural markets and identify groups of farmers who are positioned to serve target markets both domestically and internationally, then facilitates the search for appropriate financial support to producers.

# KEY AGRICULTURAL ACTIVITIES AND HIGHLIGHTS OF AGENCY ACCOMPLISHMENTS

USAID agricultural activities are implemented by a number of Agency operating units including the Economic Growth, Agriculture, and Trade (EGAT) pillar bureau, regional bureaus and missions throughout the world, and non-emergency programs in the Democracy, Conflict, and Humanitarian Assistance (DCHA) pillar bureau in partnerships with universities, international research centers, non-governmental and private voluntary organizations, the private sector, and other U.S. government agencies.

This annex describes key Washington-based agricultural programs and highlights major accomplishments for FY 2003 in the following areas:

- I. Agricultural production
- II. Agribusiness, markets, and trade
- III. Agricultural policies and institutions
- IV. Rural development, including natural resource management

## KEY AGRICULTURAL ACTIVITIES

The Agency implements its programs through partnerships formed

by various consortia. One important partnership is with the U.S. university community through the **Collaborative Research Support Programs (CRSPs)**. Drawing upon a broad range of expertise from USAID, U.S. universities and their public and private partners, national agricultural research systems (NARS) in developing countries, international agricultural research centers (IARCs), U.S. agribusiness, private voluntary organizations (PVOs), developing-country colleges and universities, private agencies, and other U.S. government agencies such as the U.S. Department of Agriculture (USDA), the CRSPs works to solve food, health, nutrition, rural income, and environmental problems in programs that benefit both developing countries and the United States.

There are currently nine Collaborative Research Support Programs:

- **Broadening Access and Strengthening Input Market Systems (BASIS) CRSP**

— [www.basis.wisc.edu](http://www.basis.wisc.edu)

The BASIS CRSP seeks to improve rural prosperity by making markets work for all. The CRSP targets global constraints by undertaking and disseminating collaborative, policy-oriented research.

- **Bean/Cowpea CRSP**

— [www.isp.msu.edu/CRSP/](http://www.isp.msu.edu/CRSP/)

Participants in this CRSP, from the Latin America and Caribbean region, sub-Saharan Africa and the United States, collaborate on researching all aspects of production and post-harvest food handling, from improved production technologies and strategies through food processing and the development of value-added products, especially for urban markets.

- **Global Livestock (GL) CRSP**

— [www.glcrrsp.ucdavis.edu/](http://www.glcrrsp.ucdavis.edu/)

This CRSP's activities have three major goals: (1) to improve livestock production while tracking its effects on the environment, (2) to explore ways to integrate livestock farming systems with the rational use of natural resources (such as wildlife), and (3) to improve the nutrition of people in target areas by making animal products more available and more widely used.

- **Integrated Pest Management (IPM) CRSP**

— [www.ag.vt.edu/ipmcrsp](http://www.ag.vt.edu/ipmcrsp)

The IPM CRSP focuses on technology development and dissemination to reduce the use of pesticides via projects in Africa,

South and Central America, the Caribbean, Asia and Eastern Europe.

- **International Sorghum and Millet (INTSORMIL) CRSP**

– [www.intsormil.org](http://www.intsormil.org)

INTSORMIL works in developing countries and in the United States to improve the production, marketing, and use of grain sorghum and pearl millet and to strengthen capacity to generate, adapt, and apply improved technology to local conditions.

- **Peanut CRSP**

– [www.griffin.peachnet.edu/pnut-crsp.html](http://www.griffin.peachnet.edu/pnut-crsp.html)

This CRSP tackles production problems to increase farmers' profits. Its research addresses not only agronomic factors but also social and economic ones, to ensure that the new technologies it proposes are usable.

- **Pond Dynamics and Aquaculture (PD/A) CRSP**

– [www.pdacrsp.oregonstate.edu](http://www.pdacrsp.oregonstate.edu)

The PD/A CRSP works to define the principles underlying sound aquaculture management and improve production practices in order to provide more jobs and dependable, inexpensive sources of animal protein.

- **Sustainable Agriculture and Natural Resources Management (SANREM) CRSP**

– [www.sanrem.uga.edu/default.cfm](http://www.sanrem.uga.edu/default.cfm)

SANREM helps develop decision support methods and tools and assists decision makers in using them to plan, manage, and make policy for sustainable agriculture and natural resource use, at local, municipal, provincial, and national levels.

- **Soil Management (SM) CRSP**

– [www2.ctahr.hawaii.edu/tpss/research\\_extension/soilresearch/sm-crsp/index.html](http://www2.ctahr.hawaii.edu/tpss/research_extension/soilresearch/sm-crsp/index.html)

This CRSP conducts interdisciplinary research and training on such issues as soil management (combating erosion, acidity, compaction, and nutrient or water deficiencies) and soil-based carbon sequestration to stem global warming.

Other partnerships with U.S. universities play an important role in Agency agricultural activities, including the Coastal Resources Management II (CRM II) Project, the Food Security III Cooperative Agreement, the Agricultural Biotechnology Support Project II (ABSP II), and the Partnerships for Food Industry Development (PFID).

- **Coastal Resources Management II (CRM II) Project**

This project, a partnership between the University of Rhode Island Coastal Resources Center and USAID, completed its final year in FY 2003. Its work contributed at both the global and key country levels to enabling and achieving increased conservation

and sustainable use of coastal and freshwater ecosystems.

- **Food Security III Cooperative Agreement with Michigan State University**

The primary goal of FS III is to increase food security in African countries through market-oriented sustainable economic growth. Strategies to accomplish this include mitigating food-sector instability, changing the factors affecting trends in food prices, and increasing farmers' incentives to invest in soil conservation practices.

- **Partnerships for Food Industry Development (PFID)**

PFID is a university/food industry joint technical assistance program that supports field operations strengthening food industries in USAID host countries and promotes competitive participation in the global trading system. Michigan State University leads one partnership, which focuses on the fruit and vegetable sectors; Louisiana State University leads the other, focusing on meats and seafood. Both universities work with a number of public and private sector partners in the United States and developing countries.

- **Agricultural Biotechnology Support Project (ABSP) II**

This project, led by Cornell University, identifies constraints on agricultural productivity in de-

veloping countries and relevant technologies to address these constraints in the near-term future, meaning three to five years. The project brings together public sector and commercial research efforts in an integrated product-development program and works to improve the capacity and policy environment for the use, management, and commercialization of agricultural biotechnology in developing countries and transition economies.

USAID also has major partnerships with **international agricultural research centers (IARCs)**. These institutions have made significant contributions to improving food security through the development of new varieties of crops on which farmers in developing countries depend. Their focus includes all major staple crop production, pest management, and the management of natural resources.

- **International Fertilizer Development Center (IFDC)**

The International Fertilizer Development Center is dedicated to providing sustainable, effective solutions to soil management and fertility issues. It works with USAID and the Consultative Group on International Agricultural Research centers to raise farm productivity by developing and transferring both plant nutrient technology and agricultural marketing expertise. IFDC has conducted technology transfer

activities in over 120 countries and has helped to develop human resources and institutional capacity in 150 countries through over 600 training programs.

- Coordinated by the IFDC, the **Integrated Soil Fertility Management and Agribusiness Development (ISFM)** project provides support to seven West African countries and over 25 governmental and non-governmental organizations. The aim is to develop and promote more intensive—and yet sustainable—technologies from the farmer's field to the regional level. The project emphasizes better soil management to make external inputs, such as inorganic fertilizers, more efficient. Besides working directly with over 3,000 farmers, the project reaches many others through “open field” days, farmer-to-farmer exchanges, information campaigns, and study tours.

- **Consultative Group on International Agricultural Research (CGIAR)**

This group, composed of 16 IARCs, works to help increase food security and reduce poverty in developing countries by conducting research, forging partnerships, building capacity, and supporting better policies. In so doing, it promotes sustainable agricultural development based

on environmentally sound management.

CGIAR initiatives are programs of high-impact research targeting complex issues of overwhelming global and/or regional significance (and global impact) that require partnerships among a wide range of specialized institutions in order to deliver results. Ongoing initiatives include:

- The **Biofortification Challenge/Harvest Plus Program** is a global alliance of research institutions and implementing agencies. It combines traditional breeding with biotechnology to increase the nutritional quality of staple foods to remedy widespread malnutrition and micronutrient deficiencies. By producing staple foods whose edible portions are denser in bioavailable minerals and vitamins, a process known as “biofortification,” scientists can offer farmers crop varieties that can improve the nutritional status of hundreds of millions of people.
- The **Rice-Wheat Consortium (RWC) for Indo-Gangetic Plains** comprises international agricultural research centers, national agricultural research organizations from Bangladesh, India, Nepal and Pakistan, and advanced research institutes. For some 10 years the RWC has developed and actively

promoted several practices that increase farm-level productivity, conserve natural resources, and limit environmental harm. Such practices are critical to the future of this crowded region, where more than 300 million people depend largely on the rice-wheat crop rotation for food and livelihoods.

- Knowing where people—especially poor people—live and what conditions they face, such as rainfall, problem soils, crop production, pests and diseases, and inadequate roads, markets, and processing centers, can have significant impact on reducing rural poverty. CGIAR's **Spatial Analysis Research Group (SPARG)** works to pinpoint where help is most needed and to identify development options best suited to different locations, assisting donors in identifying best options for reducing rural poverty. Researchers use specialized software and database systems that allow them to create maps of each factor and analyze spatial patterns in depth.

**Other Agency agricultural activities** involve consortia of private firms, non-governmental and private voluntary organizations, universities and/or other research institutes.

- **Agriculture and Nutrition Advantage**

This project works with African partners in Ghana, Nigeria, Kenya, Mozambique and Uganda to reduce hunger and undernutrition through promotion of greater linkages among agriculture, nutrition, and gender.

- **Biotechnology Partnerships in Africa**

As USAID has increased its biotechnology efforts over the last three years, Africa has become a major focus, reflecting high demand from a number of African countries to take part in this new scientific technology as well as the urgent need to harness all available tools to address the growing problems of food insecurity and malnutrition in the region. In addition to supporting development of technologies that will address the problems of African agriculture, USAID has partnered with several national, regional, and pan-African organizations to strengthen their leadership in biotechnology.

- **Cocoa SUCCESS Alliance**

With demand rising, cocoa is an important source of income to hundreds of thousands of smallholder farmers in East Asia. Cocoa plantings also have important environmental benefits, letting farmers preserve traditional tree crops and forest as intercrops shading the cocoa.

The USAID-supported Sustainable Cocoa Extension Services for Smallholders (SUCCESS) alliance aims to improve the quantity and quality of smallholder-grown cocoa in Indonesia, the Philippines and Vietnam and strengthen partnerships between local governments, universities, farmer groups, and the U.S. private sector. The partnership emphasizes good farming methods and effective integrated pest management practices.

- **Dairy Directive**

USAID supports a number of activities connected to the dairy industry in developing countries. These projects, implemented by the regional bureaus and field missions, provide safe, nutritious, and affordable food to local populations, foster the growth of small businesses, and empower stakeholders—especially women—by creating jobs and other opportunities for more income. These projects also help transfer technology and build markets to help small farmers increase their incomes and reduce rural poverty.

- **Integrated Water and Coastal Resources Management Indefinite Quantity Contract (Water IQC)**

The Water IQC provides a mechanism for supplying technical expertise in the design and implementation of strategies and

programs in integrated water and coastal resources management through three consortia of engineering and consulting firms, non-governmental organizations, other international organizations, and U.S. universities.

- **John Ogonowski Farmer-to-Farmer Program**

The goal of this program is to help developing countries improve their agricultural production and raise farmers' incomes. To accomplish this, Farmer-to-Farmer sends highly experienced short-term volunteer consultants in response to requests from host country government agencies and non-governmental organizations. Volunteers represent a wealth of experience and expertise. Farmer-to-Farmer enlists senior agriculture practitioners, scholars, business people, and gender-in-agriculture specialists for its projects.

- **Sub-Regional Research Organizations in Africa**

This program brings together African national agricultural research systems (NARS) and international institutions to tackle the pressing capacity constraints of these organizations. Current activities include finding innovative ways to finance institutional operations and sharing scientific knowledge and technology across countries. The Forum for Agricultural Research in Africa (FARA), the West

African Council for Agricultural Research and Development (CORAF/WECARD), the Association for Strengthening Agricultural Research in Eastern and Southern Africa (ASARECA), and the Southern African Centre for Co-operation in Agriculture and Natural Resources Research and Training (SACCAR) are the primary sub-regional organizations participating in the program.

## HIGHLIGHTS OF AGENCY ACCOMPLISHMENTS

Most of the Agency's agricultural activities cut across traditional divisions of agriculture programming with objectives that are broader than increased crop yields or improved natural resource management. Current activities recognize that agricultural-led economic growth requires strong linkages to markets, access to assets, and the right policies and support institutions in place to ensure increased rural incomes from production improvements. Agency programs have activities that seek, among other objectives, to identify new markets, develop new products, reduce resource degradation, as well as increase human and institutional capacity in developing countries. The breadth of activities undertaken by Agency agricultural programs are highlighted in the FY 2003 accomplishments in this section.

## I. AGRICULTURAL PRODUCTION

### A. PARTNERSHIPS WITH U.S. UNIVERSITIES

#### Bean/Cowpea CRSP

Through the efforts of the Bean/Cowpea CRSP's lowland breeding team, led by the University of Puerto Rico and La Escuela Agrícola Panamericana (Zamorano), a new bean variety known as Carrizalito was released in **Honduras** in 2003. This small red bean cultivar has good yield potential and is resistant to Bean Golden Yellow Mosaic.

In **West Africa**, collaboration by national cowpea breeders, the International Institute of Tropical Agriculture (IITA), and U.S. scientists from the University of California, Riverside resulted in the release of three cowpea varieties in the region:

- *Apagbaala*, developed by the Savannah Agricultural Research Institute (SARI) and released in May 2003 in Ghana. It is high grain-yielding, resistant to the parasitic Striga weed, and heat-tolerant during reproductive development.
- *Marfo-Tuya*, also developed by SARI, was released in May 2003 for cultivation in the Guinea and Sudan savannah zones of Ghana. This variety

yields well in low-fertility soils, tolerates heat during reproductive development, and resists Striga.

- *Yacine*, developed by the Institut Sénégalais de Recherches Agricoles (ISRA) and released in Senegal in 2003. *Yacine* resists cowpea aphid, major strains of aphid-borne mosaic potyvirus and bacterial blight, and has early maturity as well. *Yacine* is adapted for dry grain production under rain-fed conditions in the Sahelian zone of northern Senegal.

#### **Integrated Pest Management (IPM) CRSP**

In **Bangladesh**, on-farm demonstrations of IPM packages were conducted from 2001 to 2003, with full farmer participation. The technology packages, developed by researchers collaborating with farmers in a technology diffusion study, include organic soil amendment practices using poultry manure, mustard oil cake and burning sawdust. Using these organic approaches, farmers received 33% higher yields in cabbage and 49% in eggplant, and 1.5 times higher economic returns.

Also in Bangladesh, a special bait trap introduced to control cucurbit fruit fly worked so well that farmers called it “the magic trap.” Hundreds of fruit

flies were caught in the traps every day before they could reach the farmers’ sweet gourd crops, lowering fruit infestation and damage 58–76%, producing 50–60% higher yields and fetching 51–59% more in economic benefits.

IPM tactics are being used to manage several severe insects, diseases and weeds on eggplant in Bangladesh. One of these tactics, grafting technology, combats the devastating soil-borne disease known as bacterial wilt. The grafting technique so dramatically controls the disease that Bangladeshi eggplant growers can grow the crop where they never could before, and they have increased yields by 250% and net income by 400%. In June 2003, IPM CRSP-Bangladesh partners—Pennsylvania State, Ohio State and Purdue universities—collaborated with the Bangladesh Agricultural Research Institute and CARE-Bangladesh on technical exchange and support to improve livelihoods among vegetable farmers in Bangladesh. Eggplant-grafting technology is being transferred to thousands of vegetable farmers through this collaborative effort, and the technology is being spread to other IPM CRSP partner countries as well.

In **Mali**, an FY 2003 economic analysis of IPM packages in

green bean production revealed that the use of insect traps was far superior to the farmers’ normal practice (three applications of Decis insecticide, chemical fertilizer and organic fertilizer). On average, this IPM technology yielded \$2,221 per hectare of green beans produced, compared to \$1,353 per hectare for the normal practice.

#### **International Sorghum and Millet (INTSORMIL) CRSP**

Broad-based germplasm development and distribution continued in **Mali, Nicaragua, El Salvador, Zambia and South Africa**. The CRSP completed its Mali Sorghum Collection effort and was able to identify some unique, elite-appearing exotic cultivars. In addition, recent work developing and evaluating experimental sorghum hybrids has found elite hybrids with potential for wide cultivation in Ethiopia’s lowlands.

#### **Pond Dynamics and Aquaculture (PD/A) CRSP**

Tilapia are a valued species for aquaculture in **Nepal**, but their need for expensive supplemental feeds is a potential deterrent for farmers. One solution proposed by CRSP researchers is to raise tilapia together with grass carp: the carp eat grass and then the carp waste nourishes algae and microorganisms

that in turn are eaten by the tilapia. During FY 2003 researchers tested various combinations of carp and tilapia to determine which stocking ratio provided the highest yields. These data give invaluable guidance to farmers looking for low-cost supplemental feeds.

Choosing among the many aquaculture production strategies now available can be difficult for a farmer. In FY 2003 the Aquaculture CRSP conducted a series of research station and on-farm trials to compare various production scenarios. In **Bangladesh**, an on-farm trial established which of five different production regimes would best suit a farmer in a given production situation, assuming various combinations of fish and varying levels of resources for supplemental feeds. An aquaculture regime using a specially devised CRSP fertilization program produced the highest annual yield, giving 3.6 tons per hectare annually compared with 1.7 tons for the traditional production regime.

Research conducted by Aquaculture CRSP scientists at Sagana Fish Farm, **Kenya** had earlier identified management practices that could improve fish production, but proof of these benefits was needed before farmers would adopt them. CRSP partners con-

ducted on-farm tests under realistic conditions, finding that improved management more than tripled fish production in one set of trials and quadrupled it in another (the actual increase was 420%). Farmers participating in the tests had enormous increases in revenues from the ponds that many had, in fact, never made money from before the trials.

#### **Soil Management (SM) CRSP**

This CRSP more than doubled its core funds this year through additional support from missions, other donors, and the Consultative Group for International Agricultural Research (CGIAR) Centers.

A new soil preparation method developed by CRSP scientists will enable farmers in **South Asia** to produce healthier rice seedlings for transplanting, according to FY 2003 field reports. The farmers place a clear plastic sheet over a small seedling plot, using the sun's heat to kill weed seeds, pests and pathogens. Fields transplanted with seedlings from these solarized and sterilized plots yield up to 45% more rice. Other simple, effective technologies introduced in the area during FY 2003 include treating seeds with micronutrients, resulting in yield increases of up to 40%, and setting up a system

of raised beds, resulting in yield increases of 20–40% and reducing irrigation water use by 40–60%.

The SM CRSP has developed and introduced a portable, easy-to-use soil test kit allowing extension agents and farmers in developing countries to test soils for missing nutrients and to prescribe the correct amount and type of fertilizer to use. A private firm in **Thailand** now manufactures the kit for sale around the world. It is widely used by the Thai extension service and was introduced in **Africa** and **East Timor** by the SM CRSP in FY 2003. Using the kit in East Timor, proper diagnosis of missing nutrients resulted in farmers' doubling and tripling maize yields.

#### **B. PARTNERSHIPS WITH INTERNATIONAL AGRICULTURAL RESEARCH CENTERS**

USAID-supported CGIAR research resulted in the dissemination of new, higher-yielding rice and sorghum in **Africa**, improved policies and guidelines for famine prevention and mitigation, higher incomes from **Asian** fish farming, and reduced use of pesticides in Asian rice production. In **Latin America**, local agro-biodiversity has been increased with the restoration

of native potato varieties to high-altitude farms.

CGIAR activities also helped to develop the **African Agricultural Technology Foundation (AATF)** partnership, which will engage the private sector in providing agricultural technology and know-how to smallholder farmers in Africa. USAID partnerships with African organizations such as the Forum on Agricultural Research in Africa and with the governments of Kenya, Uganda and Nigeria worked to build a common vision of integrating biotechnology into African development.

As part of the CGIAR Initiative **Biofortification Challenge/ Harvest Plus**, USAID-supported centers have developed a maize variety with higher levels of vitamin A, iron and zinc to improve food security in Nigeria; beans with higher iron and zinc in Kenya; high-beta-carotene sweet potatoes in Uganda, Tanzania, South Africa and Kenya; and high-vitamin A indigenous vegetables in Tanzania, Mozambique and Malawi. A human nutrition trial completed in South Africa in FY 2003 showed that school-aged children who ate high-vitamin A orange-fleshed sweet potatoes improved their vitamin A status.

### **International Maize and Wheat Improvement Center (CIMMYT)**

In 2003, production of open-pollinated maize varieties with tolerance to drought and low soil nitrogen increased fourfold in **Southern Africa** with more than 250,000 hectares planted in Angola, Malawi, Mozambique, South Africa, Tanzania, Zambia and Zimbabwe by about a quarter million families. The new varieties have helped to catalyze the seed industry in Southern Africa, with seven local seed companies, mostly small and medium-sized, producing this seed, including some that were established to meet the accelerated demand for the new varieties. The varieties have also shown themselves to be suitable in **Kenya, Nepal** and drought-prone areas of **India**. The new varieties were the result of a long-term collaboration between the center and partners in the region's national agricultural research systems. The Swiss Development Cooperation, the Rockefeller Foundation and USAID all contributed to this effort.

### **International Center for Agricultural Research in Dry Areas (ICARDA)**

Lentil is a staple of the **Bangladeshi** diet and is often called "poor man's meat" because of its high protein and micronutri-

ent content. But demand for this legume often outstrips production. Scientists from the Bangladesh Agricultural Research Institute (BARI) and ICARDA have collaborated to develop high-yielding and disease-resistant lentil varieties. In 2003, lentil yields rose from less than 1 ton per hectare using traditional cultivars to up to 2.5 tons per hectare using one of the new varieties. The new varieties have been planted on about 40% of Bangladesh's lentil-producing farmland (60,000 hectares) and farmers are reaping an additional 28,000 metric tons of lentils annually. This translates to increased revenues of over \$12.6 million and has helped to boost the nation's economy while improving Bangladeshis' food security.

### **International Rice Research Institute (IRRI)**

Rice farmers in **Vietnam's** Mekong Delta generally use high quantities of seed, nitrogen fertilizer and pesticides. In a large-scale trial (over 2,000 farmers) undertaken by IRRI scientists, farmer participants found that they could sharply reduce use of all three inputs without compromising yield. This savings on inputs and labor resulted in higher profits. To scale up adoption of the three reduction practices, a multimedia

campaign called “Ba Giam, Ba Tang” (“three reductions, three gains”) was launched in March 2003 in several Vietnamese districts. The campaign materials—a poster, a leaflet, a radio drama, and a TV drama—motivated 90% of the campaign area’s farmers (about 40,000) to adopt the practices. These results encouraged four provincial governments to provide an estimated \$250,000 to launch their own campaigns for 2004 targeting about 1 million farmers cultivating 730,000 hectares of rice. In December 2003, the Vietnamese Ministry of Agriculture and Rural Development gave the initiative the “Golden Rice Award 2003” for the best innovation benefiting farmers.

New hybrid rice varieties developed at IRRI are yielding 1–1.5 more metric tons per hectare than the usual high-yielding, but inbred varieties found in tropical **Asia**. These new hybrids show better adaptability when irrigated, saving about 20% in water use. During 2003, the area under the new rice hybrids expanded to 280,000 hectares in India (40% increase), 100,000 hectares in the Philippines (170% increase), and 600,000 hectares in Vietnam (25% increase). Bangladesh and Indonesia started commercializing the new hybrid rice varieties with adoption on about 10,000

hectares and 5,000 hectares respectively. It is estimated that the million hectares planted in these new hybrid varieties in 2003 required approximately 20,000 tons of seed (worth \$40 million at \$2 per kilo) which was produced primarily by the private sector.

#### **International Fertilizer Development Center (IFDC)**

Fertilizer with improved nitrogen efficiency (known as urea super granules, or USG) was introduced on 400,000 hectares in **Bangladesh**. Over 1,000 Bangladeshi micro-enterprise firms are producing USG. This technology was also introduced in Nepal and Vietnam, where average rice yields with USG were 32% higher than with traditional practices.

Integrated Soil Fertility Management (ISFM) technologies were disseminated through ISFM farmer groups in 16 pilot areas in **seven West African countries** (Benin, Burkina Faso, Ghana, Niger, Nigeria, Mali and Togo). More than 3,000 farmers participate actively in the ISFM farmer groups.

Fertilizer was distributed to 200,000 needy **Afghan** farmers, resulting in 62,000 tons of additional wheat production. In addition, training was provided for 600 dealers in farm supplies.

An important finding of the Integrated Soil Fertility Management and Agribusiness Development Project (ISFM) is that, in many cases, farmers can use fertilizers most effectively by applying them on their more fertile soils rather than on their poorest and most depleted soils. Farmers in northern **Togo** increased maize production by almost 1,000 kg/ha using 50 kg/ha of urea on fields near the farmers’ households, where the soils tend to be higher in organic matter, while the same dose produced an increase of only 370 kg/ha on the poorly structured, acidic soil of fields in the bush.

### **C. USAID MISSION ACTIVITIES**

#### **Angola**

Thanks to USAID micro-finance activities, farmers expanded their cultivated areas, improved the quality of their produce, increased productivity on a per-hectare basis, and sold 1,445 metric tons of vegetable crops (90% of total harvest), which generated some \$685,000 in cash.

#### **Lebanon**

USAID/Lebanon implemented a program to diversify agriculture products and production practices, focusing on forage development, including the planting, harvesting, and pack-

aging of alfalfa and corn. In FY 2003, some 267,714 metric tons of these grains were produced, resulting in a 20% net income savings on the cost of animal feed and 10% increase in milk production benefiting 279 farmers.

#### **Mali**

Production of paddy rice in the USAID-supported Office of Niger zone, where improved irrigation is practiced, increased 9% from 2001/2002 to 2002/2003. The Office of Niger's paddy-rice production represented about 60% of Mali's total paddy-rice production in 2002/2003.

#### **Uganda**

The Agency supported research on the productivity of temperate fruits, including apples, pears and plums. Approximately 21,000 apple rootstock seedlings were raised, and, of these, close to 10,000 were grafted and disseminated as grafted or rootstock seedlings. Yields of the most promising apple cultivars rose from 37 to 51 quality fruits per tree per harvesting season in FY 2003. Interest in growing temperate fruit trees continued to rise in the southwestern and other highland areas of Uganda, with demand for planting materials from 10 districts outside Kabale as well as from neighboring Rwanda.

## **D. OTHER AGENCY ACTIVITIES**

### **Agriculture and Nutrition Advantage**

The project organized representatives from 18 of **Ghana's** public agencies, non-governmental organizations and donors to increase the use of food-based strategies to reduce micronutrient deficiencies; helped to develop action plans for nine pilot sites to plan and implement community-based actions supporting such strategies; and worked closely with the Ministry of Agriculture to integrate nutrition into agricultural training institutions' curricula.

In **Mozambique and Uganda**, the project helped national agricultural research institutions build nutrition objectives into their research agendas. And, in **Nigeria**, the project helped support the launching of the National Policy on Food and Nutrition and the development of its plan of action. A USAID-supported nutritionist has been seconded to work in the National Planning Commission's National Committee on Food and Nutrition.

### **Dairy Directive**

Through USAID's **Kenya** Dairy Development Program (KDDP), the Land O' Lakes

consortium trained 21,020 smallholder dairy farmers (33% women) in artificial insemination, animal husbandry, and dairy business management. This far exceeded the target of 6,000 farmers.

## **II. AGRIBUSINESS, MARKETS, AND TRADE**

### **A. PARTNERSHIPS WITH U.S. UNIVERSITIES**

#### **Bean/Cowpea CRSP**

In **Central America**, the **Andean region**, and two regions of **Africa**, this CRSP has adopted a value-chain strategy to guide it in designing, planning and conducting research and training activities to overcome region-specific problems in the bean and cowpea sectors.

A study conducted by the Bean/Cowpea CRSP in 2003 revealed that the increasing availability of value-added bean products is transforming the bean industry in **Central America**. The bean processing industry is growing rapidly in Costa Rica, El Salvador, Nicaragua and Honduras. Supermarket chains now sell 67 value-added brands of beans. Exports currently are limited, but niche markets for value-added products have potential to grow in the future.

### Integrated Pest

#### Management (IPM) CRSP

Thanks to the efforts of **Jamaica's** National Hot Pepper Task Force, which was aided by the IPM CRSP, the U.S. Department of Agriculture (USDA) revised the mandatory fumigation requirement for Jamaican hot peppers—an important export. IPM CRSP also helped Jamaicans set up a traceability system which includes a Web-geographic information system field-monitoring database for hot pepper producers, a major step toward meeting the import conditions set by the USDA. The traceability system is being extended to other Jamaican crops, to help ensure that they too meet health and quality standards. This traceability system is being adopted by several other Caribbean nations.

### International Sorghum and Millet (INTSORMIL) CRSP

INTSORMIL-supported research on new sorghum cultivars is making a difference in **Mali**. Over 11 tons of N'Tenimissa sorghum was produced through contracts with about 50 farmers in four villages. This superior new grain was stored and marketed separately, adding value to the crop by preserving “brand” identity. N'Tenimissa's successful use in new commercial food products

showed that introducing improved cultivars can stimulate new market uses for sorghum.

The sale of sorghum-based cookies and of N'Tenimissa flour, along with a new effort marketing a syrup, a drink and other new sorghum products, all promote economic growth and improve Malians' nutrition. Building on this work, a private entrepreneur successfully arranged for the production and harvest of other identity-preserved grains in Mali with the assistance of Mali's Institut d'Economie Rurale. The new cultivars are related to N'Tenimissa but show better adaptation to local growing conditions.

### Peanut CRSP

In **Bulgaria**, the Peanut CRSP is working to develop the food industry's ability to process and market peanut products, both locally grown and imported. The Bulgarian food testing institute must be able to certify the products according to EU requirements, and to support industries in optimizing peanut products for their targeted markets.

The CRSP has helped the Bulgarians develop the necessary facilities, and the institute reached a milestone in 2003 when it formalized its certification process.

### Food Security III Cooperative Agreement with Michigan State University (MSU)

In **Mali**, project support to regional trader and market information networks led to the opening of the Guinean market to Malian cattle exports (a new border market has been built). The project also helped to keep the maize, livestock and fish trade going between Mali and Côte d'Ivoire (critical to maintaining Mali's income growth and food security) despite the rebellion in Côte d'Ivoire.

Also in **Mali**, surveys conducted by MSU and the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) on the rate and quality of adoption of environmentally sound farming practices in Mali's Upper Niger Valley led the Office de la Haute Vallée du Niger (OHVN) to set up a locally funded monitoring process to track the impact of OHVN's natural resource management programs.

### Partnerships for Food Industry Development (PFID)

In **Ghana**, PFID conducted a supply chain analysis comparing Ghanaian and Costa Rican pineapple exports. This provides an opportunity for both countries to learn together. Ghanaian exporters particularly stand to benefit, since Costa

Rica has been quite successful in improving its pineapple supply chain. PFID has also been actively supporting the development of a Ghanaian food industry association. Several meetings were coordinated by PFID's office in 2003, which has led to the election of a board of directors as the first step in establishing an efficient, privately run organization that will speak for the industry.

In **Guatemala**, the project undertook two analyses of production bottlenecks, one of frozen vegetables for export and another of snow pea production and export. The first examined the search for an alternative plastic twine to stop physical contamination of frozen broccoli. The second studied the tolerance of snow peas for the pesticide **Chlorotalonyl**. Both studies were discussed with exporter associations during a workshop on strategic planning. The results of these analyses should enable growers and exporters to reduce losses in production and export and to produce a higher quality product for the international market.

PFID assisted **Moldova** in the development of its seafood industry by providing training courses for fish farmers in collaboration with Propiscicola (an association of small-scale fish farmers) and the Agency

for Consulting and Training in Agriculture; by advising on reconstruction of a refrigeration facility; by supporting case studies on freshwater fish processing to help processors expand to commercial levels; and by promoting the expansion of freshwater fish processing from a trial to a commercial level by developing protocols and monitoring procedures with five fish plants. One plant processed 13.26 tons of freshwater fish during the first three months of its operations under the new procedures. This came to 69.8% of that plant's total sales volume for the previous year, allowing it to add eight new jobs at the plant.

PFID worked in **Ukraine** on establishing and training a livestock evaluation team and developing Ukraine's Livestock Auction Standing Order to help farmers meet the regulatory requirements and gain market share for the meat industry. This led to commercial sales of 6,000 head of livestock in two locations in Volhyn oblast and one location in Cherkasy oblast. Sellers' prices for livestock increased 6–8% and total savings for processors came to nearly \$27,000.

PFID helped increase the flow of information to Ukrainian producers by setting up a poultry information sub-system on the Ministry of Agrarian Policy's

website to provide electronic access to input, regulatory and best-practice information; by distributing instructions for refrigerating, freezing, thawing and storing commodities via electronic and printed media through a new "cold chain" technical directory; and by developing a fish-related databank and interface that lists standards, 456 enterprises, and 1,703 products.

PFID helped to form the Azov Sea Basin Association (ASBA), an important step forward for the fisheries sector in Ukraine. Reports in 2003 revealed that members' harvest volumes had risen by an average of 20%, and that association members have greater access to markets in Russia, Estonia, Poland, Romania and Belarus. Moreover, members' costs of production fell, while sale prices went up due to higher quality and better marketing. Several ASBA members who formerly operated in the "shadow sector" can now produce on a large enough scale to participate in the formal economy. Six regional information and advisory centers for the Union of Ukraine Refrigeration Associations were established, and their staffs organized, with PFID assistance. PFID also helped to form a 13-member team of experts on meat processing, refrigeration, freezing and storage.

## B. PARTNERSHIPS WITH INTERNATIONAL AGRICULTURAL RESEARCH CENTERS

Though it is crucial to the world's health, raising the food-safety bar for farm products can jeopardize the economic well-being of developing nations already struggling to compete for world market share. In 2003, CGIAR programs began to promote techniques and policies to help developing countries raise their food-safety standards—for both domestic use and export—without putting small farmers out of business. As one early step, a food safety and security seminar was organized for about 70 researchers and policymakers in September 2003. The International Food Policy Research Institute (IFPRI) simultaneously launched a new publication on the topic, with 17 policy briefs and case studies.

In 2003 the CGIAR's Spatial Analysis Research Group (SPARG) worked in **Uganda**, where expanded production of cash crops seems a promising option for some communities. SPARG analysts first identified the number and locations of communities where expansion appears feasible—places with low population density, suitable climate and terrain, and relatively easy access to markets. Then they assessed

the potential loss of benefits from forests and wetlands if farming expands. The results will allow national policymakers, local officials, and communities themselves to make more informed judgments about their options.

## C. USAID MISSION ACTIVITIES

### Guatemala

The Development Credit Authority, working with Banco del Café, provided 1,838 loans for a total of approximately \$10 million, many of them to micro- and small businesses in the Zona Paz area. The Mission also works with the Partnership for Food Industry Development (PFID) to develop market intelligence for the fruit and vegetable sectors. Early successes of the productive-enterprise alliances include the development of two commodities—pineapple and chocolate-covered macadamia nuts—for potential export.

### Haiti

Thanks to USAID-funded activities to improve production, processing and marketing in FY 2003, Haitian Bleu coffee achieved historic high marks in both quality and volume exported, attracting interest from new distributors in Japan and Europe. U.S. roasters praised the coffee as being the highest

quality they had seen since the inception of the Federation of Native Coffee Producers (FACN), and Nordstrom's Department Store promoted Haitian Bleu as part of its 2003 gourmet coffee sales campaign. A financial restructuring of FACN completed in FY 2003 with USAID support has put the federation on a solid financial footing, allowing it to earn a small net operating profit—its first ever.

### Kenya

ACDI/VOCA, the lead implementer in the USAID-supported Kenya Maize Development Program, trained 1,618 farmers and traders in post-harvest handling activities, including harvest timing, cleaning and drying, bagging, and pest management. The program organized the first-ever farm business fair, with some 5,000 maize farmers and traders attending to learn about services and products from some 23 private companies.

### Nepal

The Tree Crops Alliance, a USAID Global Development Alliance (GDA), arranged for a U.S. specialty coffee exporter, Holland Coffee Company, to train members of three Nepal-based firms—Highland Coffee Company, Everest Coffee Company, and Nepal Coffee Producers Association—in semi-wet

processing of Nepali coffee. The Holland Coffee Company pledged to buy all coffee processed to its specifications and to market it in the United States as specialty coffee. The GDA also helped promote non-timber forest products, helping a Nepal-based alliance to organize communities, establish a certification model, and identify non-timber forest products to promote for export. These included wintergreen oil and lokta, a bark used in local paper-making for which there is strong international demand.

### Senegal

While non-timber forest products—such as nuts, fruit, and charcoal—have traditionally been viewed as subsistence goods, communities in Africa are beginning to recognize the high commercial potential of several of these products. USAID is developing innovative public-private partnerships to link local producers of forest products to commercial firms. In Senegal, the Mission's agriculture and natural resources management program promotes ventures between rural communities and private enterprises to market high-value natural products. One venture is with Baobab Fruit Company, an Italian pharmaceutical firm that makes beauty products based on the baobab fruit, and the village of Sintiou Diokhe Baobab

Producer Group. The producer's group negotiated a contract to provide 350 metric tons of baobab fruit to the firm and some members are getting a price 75% higher than previously obtained at the local market.

## III. AGRICULTURAL POLICIES AND INSTITUTIONS

### A. PARTNERSHIPS WITH U.S. UNIVERSITIES

#### Global Livestock (GL) CRSP

The GL-CRSP Livestock Early Warning System (LEWS) project in **East Africa** has put together and implemented an integrated technology suite to estimate livestock forage availability coupled with a 90-day forecasting system for a large portion of Ethiopia, Kenya, Tanzania, and Uganda. Since the human element may impede deployment of complex technology, LEWS has devised methods by which data is automatically acquired, analysis is conducted by computer programs scheduled to run unattended, and output is disseminated to outreach partners in the region. The information is updated every 10 days, with situation reports and maps distributed via World Space radios, e-mail, Internet, CDs and newsletters, reaching over 400 organizations and 300 decision makers in the region.

### Broadening Access and Strengthening Input Market Systems (BASIS) CRSP

In 2003, the **Kyrgyz** Ministry of Agriculture invited a BASIS researcher to join a new working group because of his involvement in BASIS's recent farm management survey. This researcher participates in the "farm development" subgroup, which is helping formulate the government's new taxation policies so that there is greater equity between rural and urban residents. The Ministry of Labor and Social Protection also intends to use BASIS research results and analysis in developing a new law on social benefits for the poor.

BASIS collaborated with **Peru's** Ministry of Agriculture to design a risk module for the ministry's annual producer survey. The ministry is seeking to identify and analyze the frequency of production shocks affecting different crops and regions. Information gathered will be used in the government's plan to design new crop insurance products.

In the **Russian Federation**, the head of the Department of Agrarian Policy stated that BASIS's work will result in political recommendations to strengthen the organizational, economic, and legal foundations of the agri-food sector.

BASIS has organized several major conferences in Russia that deliver information and analysis directly to participants from ministries, farm groups, agribusiness and academies.

## **B. PARTNERSHIPS WITH INTERNATIONAL AGRICULTURAL RESEARCH CENTERS**

### **International Fertilizer Development Corporation (IFDC)**

IFDC has been supporting ongoing policy reform initiatives in Nigeria to reduce government interventions in the market. In FY 2003, market transparency improved through publication/dissemination of 24,000 information brochures; producers' organizations reduced input costs by 10–15% by adopting more efficient procurement methods; and farmers gained better access to inputs and dealer advisory services through training and direct technical assistance.

## **C. OTHER AGENCY ACTIVITIES**

### **Biotechnology Partnerships in Africa**

Responding to a request from the Conseil Ouest et Centre Africain pour la Recherche et le Développement (CORAF), USAID launched a new effort to help **West African** countries to develop a regional

strategy for biotechnology development. The basic approach to the strategy was outlined at the USAID-African Partners in Biotechnology meeting in Nairobi in October 2002. USAID is working with several governments, research institutions, and non-governmental organizations in this effort, which embraces research, capacity building and policymaking assistance for biosafety laws and regulations.

### **Cocoa SUCCESS Alliance**

A recent survey shows that this partnership has trained more than 23,000 farmers and more than 700 agricultural extension agents in improved crop husbandry techniques. Farmers in Indonesia have realized an average 30% rise in crop yields and a doubling in their incomes to approximately \$540 per year. The partnership has also been successful in recruiting private sector partners, including Masterfoods (formerly Mars Candies), Cadbury, and Archer Daniels Midland. Marketing the increased supply of cocoa from the region has been aided by the increasing demand for cocoa, which now surpasses the supply, with the fastest-growing demand in the Asia region.

### **The John Ogonowski Farmer-to-Farmer (FTF) Program**

During FY 2003, Farmer-to-

Farmer funded a total of 832 international volunteer trips to work on 1,068 volunteer assignments. The volunteers gave technical assistance, worth an estimated \$5,662,812, to 1,162 host organizations in **32 developing countries**. Host groups included 527 farmer associations and technical support agencies; 492 private agricultural enterprises; 42 rural financial service providers; and 101 NGOs. Volunteers gave direct formal training to 17,668 beneficiaries, 5,088 of whom were women (29%).

As a result of this technical assistance, 66 new farmers' organizations have been formed and are operating with democratic principles; all either hold or are seeking formal recognition from government. In addition, 96% of host organizations are using improved planning and management systems; 77% of them have increased revenues or resources through new grants and/or increased fees; 96% have expanded their membership; 82% have successfully intervened with government or businesses on the behalf of members; 98% have developed new training courses for members; and 98% have improved their training skills and materials.

In addition, 83% of targeted host institutions provided

new or improved services or products; 70% have increased production; 89% are operating their businesses more efficiently or have improved their resource conservation; 80% have increased sales; and 79% have increased profits.<sup>1</sup> Volunteers helped host organizations mobilize a total of \$5,551,294 in grants and loans from various sources to further the host organizations' programs.

#### Sub-Regional Research Organizations in Africa

For the first time in the history of the region's national agricultural research systems, Association for Strengthening Agricultural Research in East and Central Africa (ASARECA) and Conseil Ouest et Centre Africain pour la Recherche et le Développement/West and Central African Council for Agricultural Research and Development (CORAF/WECARD) have established a competitive funding mechanism. This has leveraged substantial resources for **Africa's** agricultural research and development programs.

## IV. RURAL DEVELOPMENT, INCLUDING NATURAL RESOURCE MANAGEMENT

<sup>1</sup> Note: Percentage estimates are based on the samples of host organizations surveyed as to impacts of the FTF assignments.

### A. PARTNERSHIPS WITH U.S. UNIVERSITIES

#### Pond Dynamics/Aquaculture (PD/A) CRSP

In 2003 Aquaculture CRSP researchers at Michigan State University and the Asian Institute of Technology in **Thailand** completed development of an affordable and easy-to-use test kit that assays pond algae to evaluate overall pond fertilization requirements and reduce fertilization. Researchers and farmers are adopting this pond fertilization evaluation strategy and using this test kit because it is a simple, practical, and economically efficient approach that improves management water.

The ability to manipulate artificially the sex of fish enables farmers to maximize yields because one sex often grows faster and larger than the other, resulting in higher yields. Joint studies by Aquaculture CRSP researchers at Oregon State University and the Universidad Juárez Autónoma de Tabasco in **Mexico** have shown that hormones incorporated into live brine shrimp successfully inverted the sex of fry of Nile tilapia and two local carnivorous fish. This process broadens the options for farmers, reduces their dependence on feed suppliers since they can produce their own brine shrimp, and improves management of hor-

mone-treated water.

#### Peanut CRSP

U.S. Peanut CRSP scientists have been working with scientists from **Bolivia** to make peanut farming more profitable in both countries. Testing revealed a number of Bolivian peanut lines resistant to diseases that strike in both locations, including tomato spotted wilt virus, leaf spot and white mold. These resistant peanut lines were crossed with U.S. peanut lines to combine the best attributes of both plant materials. Tests carried out during FY 2003 in Florida and Georgia show that resistance to leaf diseases in the best progenies can reduce U.S. farmers' use of fungicides, with no loss of yield. In developing countries where fungicides are seldom used, these lines boost yield up to 50%. The selected lines are now in uniform tests before possible release.

#### Soil Management (SM) CRSP

**Thailand** has adapted nutrient management software developed by the SM CRSP into its own decision-support system to increase overall food security. Farm leaders and extension workers have performed site-specific nutrient management with the software, increasing maize productivity on 0.5 million hectares. This nutrient

management software, which can reduce the over-application of fertilizers, is also being applied in **Brazil** and throughout South and Central America.

### **Sustainable Agriculture and Natural Resources Management (SANREM) CRSP**

The SANREM CRSP completed a land-use study in **Ecuador** documenting profound changes over the last 40 years. The study revealed that, despite land reform, inequities in land distribution remain and competition for land has sharpened due to migrants' land purchases. University of Georgia scientists used soil erosion and crop growth modeling to identify ways to improve sustainability of local farming systems. Researchers completed a comprehensive spatial atlas depicting biophysical, demographic, socioeconomic and cultural aspects of the area as a resource for local planning, policymaking for territorial administration, and managing conflict over natural resources.

In the Bukidnon province of Mindanao, **Philippines**, SANREM has been working to support sustainable watershed management. Its research and training activities provided information, tools, and skills to improve natural resource

management decision-making. At the request of the governor of Bukidnon, two workshops were conducted in 21 municipalities in 2003 to help local planners use geographic information systems to integrate agribusiness expansion with environmental conservation. The Philippine government recognized the province with the prestigious "Clean and Green" Award. In addition, the Pangi River in Sarangani province (where SANREM conducts water monitoring activities) won a "Cleanest Lakes and Rivers" Award.

### **Integrated Pest Management (IPM) CRSP**

In **Albania**, many methods for growing olives organically have been developed, introduced and/or studied by the IPM CRSP. With IPM CRSP guidance, and in collaboration with the Albanian Organic Agriculture Association (AOAA), three organic olive farms with a total of 5,400 olive trees were established for the first time in the Vlora region in 2003. Also during 2003, organic olive oil was produced for the first time from 8,000 olive trees in Tirana District; the product has been certified by an international certification agency (BioSuisse). It is anticipated that about 3 tons of organic extra-virgin olive oil will be exported to Switzerland.

In **Guatemala**, the IPM CRSP has been working with producers of non-traditional agricultural exports (NTAEs) to increase profits and safety through environmentally sound pest control. The CRSP's research activities in FY 2003 included measuring the socio-economic benefits that farmers receive from producing NTAEs. Over two-thirds of the NTAE households report that their lives have improved since 1980, with better housing, health care, education, and nutrition paid for by NTAE earnings. Nearly a fifth reported using NTAE earnings for land purchase, contributing to a modest deconcentration in land distribution over the last 20 years. These findings encouraged the Guatemalan government to help pay for the development of the first grower-based supply consolidation and pre-inspection center in the NTAE sector.

In **Mali**, IPM research results have been obtained and diffused in a collaboration involving four host country institutions and five U.S. universities, led by Virginia Tech. A synthetic, pesticide-free IPM package for green beans was field-tested, economically evaluated, and then disseminated through farmer field schools to 174 men and 151 women in 21 villages in 2003. In addition,

two geminiviruses decimating tomato harvests were identified through DNA sequencing and three new tomato varieties were identified as resistant to the virus (this biotechnology research was partially mission-funded). The Pesticide Residue Laboratory became fully operational and extension agents trained in pesticide safety, assuring quality control for food exports and local consumption. Training modules were prepared and materials will soon be released (another mission-funded activity).

#### **Soil Management (SM) CRSP**

The Soil Management CRSP has developed a new carbon accounting procedure that can make carbon contracts and projects feasible for farming communities. This procedure is being applied in West Africa, where partners from **Mali, Ghana, and Senegal** are comparing carbon levels in fields whose owners have adopted a ridge-till farming system with fields of non-adopting households. In 2003, the researchers found that the ridge-till system captured about 40% of the rainfall that would normally have run off the land. The retained water increased farm yields, lessened downstream flooding—and captured 0.7–1.5 metric tons of carbon dioxide per hectare from the atmo-

sphere as soil organic carbon each year. As an unanticipated added benefit, the retained rainwater recharged local water tables, sustaining more village wells as sources of safe drinking water, especially during droughts.

#### **Coastal Resources Management II (CRM II) Project**

Projects in two sub-districts of North Sulawesi Province in **Indonesia** led to the formal establishment of 26 small-scale marine protected areas in 24 villages encompassing 702 hectares of no-take reserves. Management committees for coastal and marine protected areas were established in all 24 villages, and several also completed integrated plans for development and management of village coastal resources.

**Mexico's** national government has mandated the decentralization of responsibility for coastal management to provincial and local levels. Progress made in managing Bahía Santa María, on the Gulf of California, is seen by state and national governments as a promising example of how municipal coastal stewardship—outside the boundaries of a designated protected area—can advance. CRM II Mexico also developed good practices for marinas and tourism, which provided critical

input to the national guidelines for development.

The **Tanzania** Coastal Management Program (TCMP) has assembled a Seaweed Investors Forum that for the first time draws together investors in a form of mariculture that offers a new source of income to impoverished families along that country's coast. The Mariculture Development Guidelines developed by the TCMP are providing a framework for planning and decision making in mariculture activities, and the program is working to identify other forms of community-based mariculture. The TCMP helped establish the Tourism Investment Forum to promote tourism that will benefit local communities while conserving natural assets.

### **B. PARTNERSHIPS WITH INTERNATIONAL AGRICULTURAL RESEARCH CENTERS**

#### **Rice-Wheat Consortium (RWC) for Indo-Gangetic Plains**

Zero tillage was introduced in **South Asia** nearly 20 years ago, among other reasons, as a way to plant wheat directly after the rice harvest, avoiding summer heat stress. Active efforts by RWC researchers, farmers, and manufacturers, together with the dramatic ben-

efits of zero tillage for wheat, have accelerated its adoption, particularly in the irrigated Indo-Gangetic Plains.

Recent informal surveys (based on machinery sales) suggest that the area under zero tillage exceeded 500,000 hectares during the 2002-03 wheat season and is expanding quickly. Net benefits in India and Pakistan from higher yields and lower land preparation costs came to more than \$150 million in winter 2003 alone. Besides saving farmers fuel and labor, zero tillage helps to forestall the release of huge amounts of carbon dioxide (an important greenhouse gas), even at current levels of adoption.

### C. USAID MISSION ACTIVITIES

#### Bolivia

A USAID/Bolivia partner received a \$100,000 grant through the Global Development Alliance (GDA) mechanism in FY 2003 that leveraged an additional \$100,000 each from the recipient (the National Chamber of Forestry) and the Swedish International Development Agency. Funds will support the institutionalization of sustainable forestry as industry practice and national policy.

#### Colombia

The Mission's Alternative Development (AD) Program provides income and employment opportunities to existing and potential small producers of illicit crops, as well as needed social and productive infrastructure to improve access to markets and services. Overall, the AD program exceeded its targets for FY 2003. Hectares of licit crops supported by the program and the number of social and productive infrastructure projects completed significantly exceeded expectations. A majority of the projects funded under the initiative will leverage USAID resources 8 to 10 times over with funds from the private sector.

Communities in Putumayo Department participated in training on forest management plans, forest management techniques, and wood-processing technologies. In FY 2003, over 700 hectares of agroforestry and plantation forests were established and over 4,000 hectares of forest were placed under improved management. Communities benefited from learning new agroforestry techniques that complement traditional crops with higher-value forest products. USAID also established three forestry centers for processing timber and wood products, allowing forest proprietors and communities to benefit from the sale

of value-added products.

#### Haiti

The conservation of Haiti's forest cover is supported through agroforestry activities focusing on coffee, mango, and cocoa trees for export production on strategic watersheds under the Hillside Agriculture Program. In FY 2003, 460,000 trees were planted and 10,000 grafted, benefiting an estimated 30,000 farmers. Farmers received training on how to cultivate these high-value fruit tree species with appropriate mixes of food crops, as well as on fruit-tree production. The higher income from these tree crops encourages farmers to manage them properly for sustainable production, lessening erosion and increasing soil fertility.

#### Madagascar

In recent years, USAID Madagascar has supported campaigns to encourage agricultural alternatives to slash-and-burn practices. Because few government extension services existed to ensure sustainability for new practices, USAID introduced a peer-to-peer, voluntary extension agent system for farmer associations. Over 700 local extension agents have been officially certified. The average adoption rate of new techniques among 23,092 households in FY 2003 was 63%,

increasing farmers' incomes by 52%. The techniques adopted most often included off-season market crop production, cash crop production, natural soil fertility improvements, and farming small animals for food and fertilizer.

### Malawi

USAID's community-based natural resource management programs have supported a wide range of forestry activities in Malawi, including reforestation, rehabilitation of catchment areas, tree nurseries, and co-management of forest reserves. In addition, the mission has provided grants to community-based organizations and supported non-governmental organizations' activities—as diverse as fruit-tree

nurseries, reforestation, wildlife management, beekeeping, and herbal production. Up to 46% of the sub-grant beneficiaries have been women. In FY 2003, net benefits to communities reached \$156,930, based on the value of goods and resources produced by grantees.

## D. OTHER AGENCY ACTIVITIES

### Integrated Water and Coastal Resource Management Indefinite Quantity Contract (Water IQC)

In **Morocco**, the Water IQC provided evaluation, planning and support to identify critical coastal resource issues in the Souss-Massa Basin, with the aim of integrating better coastal management with

inland water concerns and overall river basin management. Building on this work, a pilot project demonstrated the social and economic impact of improved coastal zone management, promoting stakeholder support for coastal zone protection.

This activity also provided technical, management, and program assistance to USAID/**Romania** to help improve the practices and operations of the country's water user associations. These are private, non-profit, self-governing groups of farmers who have received irrigated land under the current policy of restoring collectivized public lands to private owners. The work is intended to facilitate a market-driven rehabilitation of Romania's irrigation system.

E.A. "SHORT" HEINRICH, PROGRAM DIRECTOR, IPM CRSP



The IPM CRSP develops sustainable pest management technology for production of high-quality vegetables, such as these gourds sold at a Coimbatore, India farmers' market.

## ANNEX SIX

# EDUCATION, TRAINING, AND OUTREACH

Capacity building is a central component of most of USAID's agriculture programs. USAID builds on the knowledge already present within a country or region by engaging developing-country experts in education, training, and outreach activities to increase their agricultural knowledge. In addition to long-term training, USAID sponsored regional

and in-country training events and seminars that brought together experts to exchange information and ideas on topics as diverse as integrated pest management, bio-engineered crop varieties, and product marketing and trade. In FY 2003, over 119,000 individuals participated in USAID-sponsored training programs and/or activities, ranging from in-field demonstration of farming

practices to formalized education programs at universities and technical colleges. It is through these types of exchanges that local knowledge is brought to the attention of experts from around the world, providing a two-way flow of knowledge dissemination.

## EDUCATION AND TRAINING HIGHLIGHTS

### ALO Higher Education

#### Partnerships

The Association Liaison Office for University Cooperation in Development (ALO), established in 1992, administers a cooperative agreement between EGAT's Office of Education and six major U.S. higher education associations. The agreement supports campus-led international development programs through partnerships and strategic alliances among higher-education institutions for development cooperation.

Agricultural activities in FY 2003 included:

- In Ethiopia, partnerships between Langston University, Alemaya University, the Awassa College of Agriculture, and Debub University have helped

Senayit Yetneberk (left) and Nomusa Dlamini (right) are collaborators in INTSORMIL's sorghum and millet food and nutritional quality project.



**TABLE I:  
CAPACITY-BUILDING ACTIVITIES:  
NUMBER OF BENEFICIARIES FY 2001–2003\***

	FY 2001	FY 2002	FY 2003
Degree training completed	88	183	81
Degree training in progress	218	235	341
Non-degree training **	4,787		
Professional training	na	5,290	2,581
Workshops and in-field training ***	na	33,267	114,715
Conferences	na	1,996	1,491
<b>TOTAL</b>	5,093	40,961	119,209

\* Figures are approximate; actual numbers are probably somewhat higher.

\*\* FY 2001 figures do not distinguish among different types of non-degree training.

\*\*\* These figures include technical and ongoing assistance programs to agricultural producers.

train more than 40 women in goat handling and production, as well as training Ethiopian high school teachers and visiting scholars in basic goat production. Ethiopian faculty members also learned teaching techniques in adult and continuing education to enable them to reach local farmers more effectively.

- The University of Wisconsin–Madison and the Universidad de San Carlos de Guatemala established a partnership to improve the quality and productivity of tomatoes in Guatemala. The collaboration will develop and distribute new, disease-resistant varieties of tomato, as well as providing for training of junior researchers and students and for research

exchanges between the University of Wisconsin and the Universidad de San Carlos.

- Mexican graduate students are being trained in agriculture, food quality, nutrition and health through a partnership of the University of Illinois at Urbana-Champaign and the Universidad Autónoma de Querétaro. The program integrates plant and animal science, food engineering, nutritional and consumer science, and technology transfer to help Mexican researchers develop and disseminate new varieties of fruits and vegetables.

#### **Collaborative Research Support Programs (CRSPs)**

USAID's core program for long-

term agricultural training is the Collaborative Research Support Programs. In FY 2003, 81 students were awarded degrees (23 Ph.D., 51 M.S. and 7 B.S.) of whom 75 were in CRSP programs; and 341 students were in long-term training programs (122 Ph.D., 143 M.S., and 76 B.S.), 319 of whom were in CRSP programs. The INTSORMIL CRSP, for instance, had 55 students from 19 countries enrolled in advanced-degree programs and advised by an INTSORMIL principal investigator. INTSORMIL provided nine students 100% funding in 2002–2003 and aided an additional 46 students with partial funding. Other highlights include:

#### **Pond Dynamics/Aquaculture CRSP (PD/A):**

- For ten months, Narayan P. Pandit was supported by the PD/A CRSP in advanced studies under the tutelage of Madhav Shrestha, a PD/A CRSP host-country principal investigator in Nepal. Pandit's M.S. project aimed at increasing the involvement of Nepalese women in aquaculture. The project trained women how to raise fish for extra food and income while engaging in their regular household activities. In all, 82 small ponds (100 to 200 m<sup>2</sup>) were built adjacent to family houses, where women took responsibility for the pond.

– Bernardita Campos Campos, a PD/A CRSP-funded graduate student in environmental engineering, is studying the fate of methyltestosterone and its metabolites in tilapia and comparing the results with the use of phytochemicals as an alternative. The hormones are often used on fry to ensure that the adult fish will be the same sex, reducing overcrowding and stunting of fish in ponds, but often are incompletely metabolized. Campos' research contributes to the little that is known on the effects of these excess hormones in water effluent and fish meat.

#### **Global Livestock CRSP (GL):**

– Hussein A. Mahmoud was awarded the 2003-2004 Margaret Lantis Award by the University of Kentucky for excellence in original research by a graduate student in anthropology. Dr. Mahmoud was recognized for his research on livestock traders and trade in Northern Kenya and Southern Ethiopia.

A number of other programs such as **Food Security III (FS III)**, the successor to the Food Security II program managed by Michigan State University, continue their emphasis on in-service and longer-term training. FS III had 115 Africans partici-

pating in in-country training sessions and 19 receiving some support in graduate programs.

## **INFORMATION DISSEMINATION AND IN-FIELD TRAINING HIGHLIGHTS**

**ALO:** ALO conducted a number of workshops, outreach and local training activities in 2003. These included training over 250 Malawian farmers in goat husbandry, soy flour preparation, and agroforestry management.

**Brazil:** In FY 2003, the USAID/Brazil environment program dramatically exceeded training and information dissemination targets. Practically all of the more than 2,000 individuals

**TABLE 2:  
DEGREES AWARDED FY 2003**

U.S. UNIVERSITY- LED ACTIVITY	DEGREES AWARDED			
	Total	Ph.D.	M.S.	B.S.
BASIS CRSP	2	1	1	0
Bean/Cowpea CRSP	12	5	3	4
FS III	6	1	5	0
Global Livestock CRSP	8	2	6	0
INTSORMIL CRSP	16	7	8	1
IPM CRSP	16	3	13	0
PD/A CRSP	7	1	4	2
Peanut CRSP	8	1	7	0
SANREM CRSP	5	1	4	0
Soil CRSP	1	1	0	0
<b>TOTAL</b>	81	23	51	7

**TABLE 3:  
STUDENTS IN LONG-TERM TRAINING FY 2003**

U.S. UNIVERSITY- LED ACTIVITY	NUMBER IN TRAINING			
	Total	Ph.D.	M.S.	B.S.
BASIS CRSP	17	16	1	0
Bean/Cowpea CRSP	49	16	29	4
FS III	21	12	9	0
Global Livestock CRSP	82	26	31	25
INTSORMIL CRSP	51	22	28	1
IPM CRSP	9	5	4	0
PD/A CRSP	75	5	24	46
Peanut CRSP	9	4	5	0
PFID-F&V	1	0	1	0
SANREM CRSP	6	4	2	0
Soil CRSP	21	12	9	0
<b>TOTAL</b>	341	122	143	76

trained in natural forest management in the Amazon to date received hands-on instruction from USAID partners.

### **Certification and Sustainable Marketing of Non-Timber Forest Products Alliance:**

Under a Title II program established to meet Ghana's food-security needs, USAID encouraged community agroforestry and forestation efforts. With program support, approximately 14,000 farmer households were trained in agroforestry techniques, including improved seedling management, sustainable tree nursery systems, proper spacing and alignment of tree crops, and correct use of fertilizer. Farmers primarily planted citrus, cashew, mango, and other woody species, intercropped with maize, soybeans, beans, peanuts, cassava, yams, and plantain.

### **Coastal Resource Management (CRM) II:**

In Latin America, South-east Asia and East Africa, CRM II has pioneered the integration of gender and population issues into integrated coastal management practice. This is carried out in field programs that combine training with a network of pilot projects documenting the impacts of various approaches to these important issues. At the World Parks Congress in South Africa, CRM II representatives shared CRM II's experience in mainstreaming gender into coastal projects.

**Croatia:** In June 2003, USAID's Croatian Enterprise Promotion Activ-

ity launched a 20-week consulting practicum program with a group of 12 Croatian consultants working in four teams, each at a different food and beverages processing (F&B) enterprise in neighboring Slovenia. The practicum program trained the consultants in world-standard consulting methodologies while providing benefits well in excess of expectations to the participating enterprises, thus strengthening the F&B sector.

**Eritrea:** The ongoing technical assistance program in agriculture provided training and targeted technical assistance in poultry production, horticulture production and marketing, and banana production and marketing, as well as generalized agricultural marketing assistance. Four hundred individuals (including 68 women) received training.

**Farmer to Farmer:** Three hundred eleven U.S. volunteers performed public-outreach activities (public presentations, media interviews, reports and news articles, visits to Congressional representatives, etc.) after completing their assignments working with farmers in developing countries. Implementing agencies and volunteers participated in 219 media events and 527 public group presentations.

**Ghana:** USAID partner Adventist Relief and Development Agency (ADRA) organized training-of-trainers for 2,798 community Health and Agriculture Team (HAT) mem-

bers in agricultural extension. The participants then transferred their knowledge of crop production and post-harvest techniques to residents of 520 Ghanaian communities.

**Guatemala:** The Broadening Access and Strengthening Input Market Systems (BASIS) CRSP is helping to design and conduct a training program for clients of Genesis Empresarial, a leading microfinance institution with a client base of over 40,000.

**Guinea:** In FY 2003, over 25,000 farmers received technical assistance and support to improve their agricultural production.

**Honduras:** USAID supported several artisan groups and enterprises with training in product design and development, business skills, organizational development, and marketing. These entrepreneurs constitute a new cadre of specialized artisans working in a sustainable industry. Over 2,000 persons (71% women) have been trained, and artisan groups have developed 76 new product lines. Productivity, income and sales have risen, creating or helping to maintain an estimated 802 jobs (68% held by women). About \$460,000 in export sales to the United States and Europe have been generated from 11 artisan groups working in clay, cornhusks, metal, wood, natural fibers, candles, and leather.

**International Fertilizer Development Center (IFDC):** IFDC gave agricul-

ture-related training to 13,482 participants in a total of 374 programs. International and specialized training by IFDC headquarters in the United States accounted for 11 programs serving a total of 214 participants, with the balance conducted by IFDC overseas projects.

**Kenya:** Agricultural Cooperative Development International/Volunteers in Overseas Cooperative Assistance (ACDI/VOCA), the lead implementer in the USAID-supported Kenya Maize Development Program (KMDP), trained 1,618 farmers and traders in post-harvest handling activities, including harvest timing, crop cleaning, drying, and bagging, and pest management. The program organized the first-ever farm business fair during the year, with some 5,000 maize farmers and traders attending to learn about services and products from some 23 private companies. Through USAID's Kenya Dairy Development Program (KDDP), the Land O' Lakes consortium trained 21,020 smallholder dairy farmers (33% women) in artificial insemination (AI), animal husbandry, and dairy business management.

**Kosovo:** The Kosovo Business Support (KBS) project is working with private-sector small and medium enterprises to improve their performance and increase their sales and profitability through provision of business services, technical assistance, trade linkages, and training in financial accounting, business planning, management, and market-

ing. KBS provided training for 569 people in a certification program in accounting and auditing.

**Rwanda:** Under the Agribusiness Development Assistance in Rwanda (ADAR) Project, USAID gave technical assistance to 61 private sector operators, up from 24 in 2002.

**Sustainable Treecrops Project:** One hundred sixty farmer field schools in Cameroon, Nigeria, Ghana, and Côte d'Ivoire recently graduated their first classes. The field schools improve cocoa farmers' knowledge and decision-making capacity through discovery-based learning, focusing on integrated pest management, cocoa agronomy, post-harvest management, regeneration, agro-ecosystem analysis, economic analysis, child labor, and non-formal education. Schools in the four countries have trained approximately 4,260 cocoa farmers since May 2003.

**Tanzania:** The Private Enterprise Support Activity is giving training in effective production, processing, and marketing techniques to over 17,000 small producers of high-potential agricultural commodity sectors. Some 2,370 farmers participated in Farmer Fields Schools, which emphasize learning by doing. Farmers also received training in "farming as a business" that strengthens farmers' decision-making skills, which can increase their profitability.

**Ukraine and Moldova:** The Partnership for Food Industry Development (PFID) sponsored a visit by the

U.S. Food and Drug Administration (FDA) to explain FDA compliance agreements for imports and exports to Ukrainian and Moldovan regulatory officials, who learned how cooperation with FDA could help increase trade. In Ukraine, PFID also provided the first Russian-language Basic Seafood Hazard Analysis and Critical Control Point (HACCP) Certification training in any Commonwealth of Independent States (CIS) country, and sponsored Train-the-Trainer seminars for seafood, meat, and poultry producers.

## WORKSHOP AND CONFERENCE HIGHLIGHTS

**Biotechnology Partnerships in Africa:** USAID supported a second pan-African annual conference in Nairobi, Kenya, in November 2002, which brought together African, U.S., and other international partners to discuss a common strategy for biotechnology and review results already being achieved by African countries in the development of technologies, policies, and public outreach. In addition, the Forum on Agricultural Research in Africa (FARA) obtained USAID support to convene a biotechnology symposium for its members during their annual meeting held in Senegal in May 2003. The meeting declaration reaffirmed FARA's vision of modern biotechnology as an important tool for realizing their goal of agricultural growth in Africa.

**Broadening Access and Strengthening Input Market Systems (BASIS)**

**CRSP:** In Kenya, a workshop on economic growth and poverty reduction presented key issues in agriculture and rural development for consideration in the government-led economic recovery strategy. In Madagascar, a national-level stakeholder meeting drew praise from the Minister of Agriculture and President Ravalomanana. They requested the full proceedings and background maps and sent BASIS a message of thanks.

**INTSORMIL CRSP:** During FY 2003, INTSORMIL supported several conferences and workshops. At the 2002 INTSORMIL Principal Investigators' Conference held in Ethiopia in November 2002, 141 participants from more than 23 countries learned about the most recent research on sorghum and pearl millet. Over 200 individuals participated in the First Ethiopia National Workshop on sorghum and millet research, extension and production held with INTSORMIL support in Ethiopia in November 2002. INTSORMIL also sponsored five collaborating scientists' participation in the conference "From the Green Revolution to the Gene Revolution" in Italy in May 2003. Finally, INTSORMIL offered a number of scientific writing workshops in Malaysia, South Korea, and Nigeria.

**Lebanon:** Awareness trainings for olive markets and quality standards were held in the field, targeting 179 participants from individual growers, cooperatives, extension service centers, and Ministry of Agriculture staff.

**Food Security III:** On June 6, 2003, Michigan State University (MSU) hosted a workshop in Washington, D.C., on helping smallholder farmers in Africa gain access to agricultural inputs such as fertilizer and seeds. Held under the Food Security III program, "What Works for African Smallholders: Input Use and Market Development in the Context of Limited Credit Markets" had presentations by researchers from MSU, the International Fertilizer Development Center, the International Food Policy Research Institute, Cooperative League of the USA, USAID, and the World Bank.

Several workshops on the relationship between HIV/AIDS and agriculture were held in FY 2003 under the Food Security III program. These meetings contributed significantly to the groundwork being laid in this important cross-cutting area. The first meeting, held in Nairobi, Kenya, was attended by about 50 participants; the second, in Johannesburg, South Africa, by about 100; and the third, in Maputo, Mozambique, by about 40.

**Nicaragua:** During FY 2003, USAID outreach efforts helped to support

negotiations for the U.S.-Central American Free Trade Agreement (CAFTA), a U.S. presidential initiative. Approximately 4,500 people attended USAID-funded training and seminars to learn about the accord and experiences in other countries with free trade agreements (e.g., Chile and Mexico).

**PFID:** A workshop on food quality and standards was held in Ghana in June 2003, with 80 participants from the government of Ghana and the private sector. The information provided on quality, safety and standards for fresh fruits and vegetables will enable stakeholders gain a bigger share of the international market. Other workshops, such as the Global Food Marketing workshop (110 participants) introducing stakeholders to U.S. fresh produce standards, were attended by members of the horticultural industry.

**Regional Network on AIDS, Rural Livelihoods and Food Security (RENEWAL):** Two regional workshops, "Methods and Indicators" and "HIV/AIDS and the Southern African Food Crises," brought together concept note authors and resource persons to develop consensus within the networks on good research practice, on what constitutes "progress" within a specific action, and on how it can be assessed.

## ANNEX SEVEN

# FIELD SUPPORT

**T**he Economic Growth, Agriculture, and Trade (EGAT) Bureau provides technical assistance to USAID country and regional missions. Drawing upon its staff's extensive field experience in agriculture productivity, agribusiness and markets, agriculture and rural policy, governance, capacity building, and natural resource management, the Bureau assists missions in identifying, designing, implementing, and evaluating their programs and strategic objectives. Support in FY 2003 included:

### **Agribusiness, Competitiveness, and Trade**

EGAT technical assistance helped missions across the globe craft activities to enhance agricultural trade and foster locally based agribusinesses that improve markets for farmers and consumers.

Technical assistance helped missions in Croatia and Central America to implement activities on expanding supermarkets. The latter effort helped to support the Central American Free Trade Agreement. EGAT also worked in Serbia/Montenegro, Moldova, and Morocco on projects to expand and strengthen local agribusinesses.

### **Agriculture and Rural Development**

EGAT staff worked with missions to design and implement projects that improve farmers' productivity and profitability, help fuel rural development, and reduce poverty. Activities that EGAT worked on include evaluation of projects to support private farming expansion and improved rural finance in Moldova.

### **Biotechnology**

Biotechnology promises to help farmers increase their productivity and improve nutrition, helping to alleviate rural poverty and ensuring better food security for developing countries. EGAT has worked with missions in Asia and Africa to develop activities bringing biotechnology to farmers and ensuring its safe and effective integration into the agricultural sector. This includes work in India on developing bio-fortified foods, alleviating safety concerns, and helping government officials design biosafety systems. EGAT has also given technical assistance to a number of countries in Africa—Nigeria, Mali, Kenya, Botswana and Southern Africa—to implement biotechnology trans-

fer, introduce new crops, and develop biosafety plans to improve productivity.

### **Land Policy**

One important foundation of rural prosperity and economic development is securing land tenure and property rights for farmers, smallholders, and rural businesses. Without security of landholding, farmers will have little incentive to produce for and participate in markets, thereby affecting the entire range of rural development activities. Technical assistance from EGAT's Office of Agriculture has, for example, advised East Timor's Ministry of Justice on land policy and property rights issues and helped USAID's mission in Rwanda collaborate with the Ministry of Land and other international donors on national land policy.

### **Natural Resource Management and Agriculture**

Preserving land, forest, and water resources will help farmers build sustainable agricultural systems and pass on a viable ecosystem to the next generation of rural producers. EGAT worked with missions in Ecuador, Eritrea, Bo-

tswana, Ghana, Mali, Niger, Senegal, Honduras, Jamaica, Kenya, and Mexico on mission strategies and activities to help them design projects to provide and preserve water resources. In addition, missions in the Caribbean region received technical and policy support on coral reef fisheries management.

### Strategy Development

To deliver the best programs, USAID missions must also develop strategies and approaches that maximize the effect of limited Agency resources. EGAT, the regional bureaus, and local missions work to coordinate their strategies, focusing on complementing each other's efforts. EGAT worked with African missions and the Africa Bureau to design strategies for implementing and managing the Initiative to End Hunger in Africa. The Regional Center for Southern Africa felt that it "would not have been able to carry out the myriad tasks required to design new rural livelihood activities without the stellar support from the EGAT Office." Other EGAT staff helped missions in Zambia, Mali, Tanzania, Mozambique, Benin, Ethiopia, and Angola design strategies to

Alamonga Valley, Guatemala, is a rich vegetable-growing area. The IPM CRSP is assisting Guatemalan farmers in the production of export-quality vegetables through the development and transfer of vegetable IPM technology.

maximize the use of resources and manage them properly.

### Sector Assessments

An important factor in designing effective mission activities is understanding the challenges and problems facing agriculture and rural development. EGAT provided technical assistance to missions in Bosnia and Central Asia to assess conditions in the agricultural sector, enabling missions to target activities and resources for effective results in farming, agribusiness, and management of the environment.

### Program/Activity Evaluation

Missions need to know how effective their activities are after they have been implemented—how much impact the activity has had on agriculture and rural development, whether the activities had unexpected or unintended consequences, whether their results and benefits are equitable and sustainable, and where to target future

resources. EGAT staff helped the USAID mission in Mali develop a program monitoring plan for its Accelerated Economic Growth project. They also assisted the Nepal mission in preparing documentation for the extension of their Market Access for Rural Development activities by meeting with stakeholder groups to determine new directions and activities.

### Program Design

Translating strategic visions into successful projects is another area where EGAT provides technical assistance to USAID missions. Mission officers need to anticipate and identify potential resources, partners, and stakeholders, as well as the critical elements of each activity. Among other efforts, EGAT staff helped the Regional Center for Southern Africa design program activities for the Rural Livelihoods program for 2004-2010, as well as assisting them with the development of an IEHA regional management plan.

E.A. "SHORT" HEINRICH, PROGRAM DIRECTOR, IPM CRSP



## ANNEX EIGHT

# ACRONYMS

<b>AATF</b>	African Agricultural Technology Foundation
<b>ABSP</b>	Agricultural Biotechnology for Sustainable Productivity Project
<b>ACDI/VOCA</b>	Agriculture Cooperative Development International/Volunteers in Overseas Cooperative Assistance
<b>ACMAD</b>	African Center of Meteorological Application Development
<b>AD</b>	Alternative Development
<b>AFR</b>	Sub-Saharan Africa Bureau
<b>AG</b>	Office of Agriculture
<b>ALO</b>	Association Liaison Office for International Development
<b>ANE</b>	Asia and the Near East Bureau
<b>ANRI</b>	Agricultural and Natural Resource Management
<b>APHIS</b>	Animal and Plant Health Inspection Service
<b>ASARECA</b>	Association for Strengthening Agricultural Research in Eastern and Central Africa
<b>ASBA</b>	Azov Sea Basin Association
<b>BASIS</b>	Broadening Access and Strengthening Input Marketing Systems CRSP
<b>B/C</b>	Bean/Cowpea CRSP
<b>BIFAD</b>	Board for International Food and Agricultural Development
<b>CABIO</b>	Collaborative Agricultural Biotechnology Initiative
<b>CAFTA</b>	Central American Free Trade Agreement
<b>CAR</b>	Central Asian Republics
<b>CBO</b>	Community-based organizations
<b>CDA</b>	Agribusiness Development Center (Honduras)
<b>CEE</b>	Central and Eastern Europe
<b>CGIAR</b>	Consultative Group on International Agricultural Research
<b>CIMMYT</b>	International Maize and Wheat Improvement Center
<b>CIP</b>	International Potato Center
<b>CIS</b>	Commonwealth of Independent States
<b>CRSP</b>	Collaborative Research Support Program
<b>DA</b>	Development Assistance
<b>DART</b>	Disaster Assistance Response Team
<b>DCHA</b>	Bureau of Democracy, Conflict, and Humanitarian Assistance
<b>DFID</b>	Department for International Development (United Kingdom)
<b>E&amp;E</b>	Europe and Eurasia Bureau
<b>EGAT</b>	Bureau of Economic Growth, Agriculture, and Trade

<b>EPIQ II</b>	Office of Environment and Science Policy
<b>ESP</b>	Environmental Policy Indefinite Quantity Contract II
<b>ESF</b>	Economic Support Fund
<b>EU</b>	European Union
<b>FACN</b>	Federation of National Coffee Producers
<b>FAO</b>	Food and Agriculture Organization of the United Nations
<b>FARA</b>	Forum for Agricultural Research in Africa
<b>FFAg</b>	Food for Agriculture
<b>FFP</b>	Office of Food for Peace
<b>FFT</b>	Food for Training
<b>FFW</b>	Food for Work
<b>FTAA</b>	Free Trade Area of the Americas
<b>FTF</b>	Farmer-to-Farmer
<b>FY</b>	Fiscal Year
<b>G</b>	Global Bureau
<b>GDA</b>	Global Development Alliance
<b>GDP</b>	Gross Domestic Product
<b>GH</b>	Global Health Bureau
<b>GIS</b>	Geographical Information System
<b>GL</b>	Global Livestock CRSP
<b>HACCP</b>	Hazard Analysis and Critical Control Point
<b>IAASTD</b>	International Assessment of Agricultural Science and Technology for Development
<b>IAC</b>	Inter-Academy Council
<b>IARC</b>	International Agricultural Research Center
<b>ICARDA</b>	International Center for Agricultural Research in the Dry Areas
<b>ICRAF</b>	International Center for Research on Agroforestry
<b>ICM</b>	Integrated coastal management
<b>ICRISAT</b>	International Crops Research Institute for the Semi-Arid Tropics
<b>IEHA</b>	Initiative to End Hunger in Africa
<b>IFAD</b>	International Fund for Agricultural Development
<b>IFDC</b>	International Fertilizer Development Center
<b>IFPRI</b>	International Food Policy Research Institute
<b>IICA</b>	International Institute for Cooperation in Agriculture
<b>IITA</b>	International Institute for Tropical Agriculture
<b>INRM</b>	Integrated Natural Resources Management
<b>INTSORMIL</b>	Sorghum/Millet CRSP
<b>IPGRI</b>	International Plant Genetic Resources Institute
<b>IPM</b>	Integrated Pest Management
<b>IRRI</b>	International Rice Research Institute
<b>IQC</b>	Indefinite Quantity Contract

<b>ISFM</b>	Integrated Soil Fertility Management
<b>ISRA</b>	Senegalese Institute of Agricultural Research
<b>KARI</b>	Kenya Agricultural Research Institute
<b>KBS</b>	Kosovo Business Support
<b>KDDP</b>	Kenya Dairy Development Program
<b>KMDP</b>	Kenya Maize Development Program
<b>LAC</b>	Latin America and the Caribbean Bureau
<b>LEWS</b>	Livestock Early Warning System
<b>LSU</b>	Louisiana State University
<b>LWA</b>	Leader with Associate
<b>MDGs</b>	Millennium Development Goals
<b>ME</b>	Management entity
<b>MSU</b>	Michigan State University
<b>NAFTA</b>	North American Free Trade Agreement
<b>NARES</b>	National Agricultural Research and Extension System
<b>NARS</b>	National Agricultural Research System
<b>NRM</b>	Natural resource management
<b>NEPAD</b>	New Partnership for African Development
<b>NGO</b>	Non-governmental organization
<b>NOAA</b>	National Oceanic and Atmospheric Administration
<b>NTAE</b>	Non-traditional agricultural exports
<b>OFDA</b>	Office of Foreign Disaster Assistance
<b>OHVN</b>	Office of the High Valley of Niger
<b>PBS</b>	Program for Biosafety Systems
<b>PD/A</b>	Pond Dynamics/Aquaculture CRSP
<b>PFID</b>	Partnership for Food Industry Development
<b>PPC</b>	Policy and Program Coordination Bureau
<b>PVC</b>	Office of Private and Voluntary Cooperation
<b>PVO</b>	Private Voluntary Organization
<b>R&amp;D</b>	Research and development
<b>RAISE</b>	Rural and Agricultural Incomes with a Sustainable Environment
<b>REDSO</b>	Regional Economic Development Services Office
<b>RWC</b>	Rice-Wheat Consortium
<b>S&amp;T</b>	Science and technology
<b>SACCAR</b>	Southern Africa Center for Cooperation in Agriculture and Natural Resource Management
<b>SANREM</b>	Sustainable Agriculture and Natural Resource Management CRSP
<b>SARI</b>	Savannah Agricultural Research Institute
<b>SECID</b>	South East Consortium for International Development
<b>SM</b>	Soil Management CRSP
<b>SPARE</b>	Strategic Partnership for Agricultural Research and Education

<b>STCP</b>	Sustainable Tree Crops Program
<b>TCMP</b>	Tanzanian Coastal Management Program
<b>TIGR</b>	The Institute for Genomics Research
<b>TRADE</b>	Trade for African Development and Enterprise
<b>UNDP</b>	United Nations Development Program
<b>UNEP</b>	United Nations Environment Program
<b>UNESCO</b>	United Nations Educational, Scientific, and Cultural Program
<b>USAID</b>	U.S. Agency for International Development
<b>USDA</b>	U.S. Department of Agriculture
<b>WECARD</b>	West and Central African Council for Research and Development
<b>WHO</b>	World Health Organization
<b>WTO</b>	World Trade Organization

The 2003 Title XII Report was written under the general direction of USAID Assistant Administrator Emmy B. Simmons, Bureau for Economic Growth, Agriculture, and Trade (EGAT) and Senior Policy Advisor Susan J. Thompson, Office of Agriculture, EGAT.

Ben Swartley and Randy Chester compiled the agriculture accomplishments. Peg Hausman, Jeff Reed and Chris Blanchard of The Miller Group (TMG) drafted the annexes. The analytical section, “Mobilizing Science and Technology for Smallholders”, was drafted by Dana Dalrymple with

contributions from Meredith Soule and Rob Bertram.

Leslie Hunter and Peg Hausman edited the 2003 Title XII Report with assistance from Holly Zimmerman. Anne Green, of Greenways Graphic Design, did the design and layout.

## COVER STORY

Tissue culture plays a vital role in helping smallholder farmers in sub-Saharan Africa. One of the best examples has been in the fight against a virulent plant disease caused by the *Cassava mosaic virus*. The disease has devastated cassava harvests in many parts of eastern and central Africa. Cassava is a root crop that originated in the Americas. Today it is the major staple food of more than 100 million Africans, and scientists like Dr. Ada Mbanaso (cover) are key to developing technologies to ensure future food supplies.

The Africa-based International Institute of Tropical Agriculture (IITA) has been able to breed cassava that resists the virus, but because farmers grow cassava from cuttings rather than seeds, getting the new varieties to hundreds of thousands of farmers in desperate need of this new plant technology has not been easy. Tissue culture provides a solution. The process starts by growing disease-free and disease-resistant cassava plants from just a few pure cells in the lab. The tiny plantlets that result from these cells can be multiplied in the lab and are then shipped by air to areas affected by the disease. After growing the plantlets to maturity in local fields, cuttings for cassava can be distributed to farmers. Each cassava plant grown this way can provide hundreds of clean, disease-resistant cuttings. This crop transplant is as important to the smallholder farmers of sub-Saharan Africa as a heart transplant is to an individual. USAID assistance has been crucial in making this work a success. To help ensure productive cassava production in the future, the Danforth Plant Science Center, in collaboration with IITA and African research organizations, is expanding the arsenal for combating cassava disease through the development of new varieties using modern biotechnology.





**U.S. Agency for International Development**

1300 Pennsylvania Avenue, NW

Washington, DC 20523

Tel: (202) 712-0000

Fax: (202) 216-3524

[www.usaid.gov](http://www.usaid.gov)