Agriculture in the New Century

Title XII
Report to Congress
Fiscal Year 2000

USAID
United States Agency for
International Development

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I deeply believe in the United States and its profoundly important role in making the world a more peaceful, decent and civilized place. I have seen firsthand the difference America can make in the world in support of freedom and democracy in countries that have only recently known either. ... We are beginning a new chapter in USAID's work in support of American foreign policy. We will now focus more resources and attention on agricultural development to end hunger [and] economic development to end poverty by preparing developing countries to participate more fully in the new global trading system.

—Andrew S. Natsios,
Administrator
SWEARING-IN CEREMONY, DEPARTMENT OF STATE, MAY 22, 2001

USAID

I am pleased to present the FY 2000 Title XII Report entitled Agriculture in the New Century. The report summarizes the accomplishments of USAID and our public and private partners in FY 2000, the final year of implementation under Title XII as originally legislated in 1975. As the report demonstrates, USAID and its partners have made considerable progress with few resources. However, far more challenging work in agriculture confronts us as we enter the new century. In this increasingly global market, the role of government in support of agriculture is changing. So too is USAID's role in support of agricultural development.

Since I began as USAID's Administrator earlier this year, I have frequently emphasized the importance of agricultural development in reducing hunger and malnutrition. For much of the Third World, economic growth and poverty reduction are virtually synonymous with agriculture. As many as 75 percent of the world's poor live and work in rural areas. In addition, for many of our developing and transition country partners, the agriculture sector continues to be a primary engine of economic growth. That is especially the case in Africa. We must do more to help Africa and our other developing and transition country partners confront the scourges of hunger and poverty. Agriculture has to be a major component of such a strategy.

In the context of global and regional economic integration, and building on decades of experience, we are developing a new approach to agriculture. From USAID's perspective, the recent amendment of Title XII legislation (P.L. 106-373) is most timely. Broad and familiar themes, consistent with the new Title XII legislation, are included in the new approach and discussed in the "Future Directions for Agriculture" section of this report. It outlines our plans for expanded collaboration with our public and private partners to accelerate agriculture science-based solutions to reduce poverty and hunger, develop global and domestic trade opportunities for farmers and rural industries, bridge the rural knowledge divide through training, outreach, and adaptive research, and promote sustainable development and sound environmental management.

Agriculture programs are an integral part of USAID's development assistance. The revitalization of this key sector has begun and I look forward to sharing with you the progress of our collaborative efforts over the next year.

Andrew S. Natsios
Administrator

Agriculture in the New Century

FY 2000 Report to Congress on Title XII,
Famine Prevention and Freedom from Hunger,
of the Foreign Assistance Act of 1961

September 2001

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Agriculture in the New Century

Executive Summary

This report summarizes implementation of Title XII of the Foreign Assistance Act by the U.S. Agency for International Development (USAID) for FY 2000 and the Agency's plans for implementing Title XII in the next five years. USAID's agricultural activities are guided by the priorities outlined in three key documents: the Title XII legislation, the *U.S. Action Plan on Food Security,* and the respective bureaus' and USAID missions' strategic plans.

During FY 2000, approximately $310 million in USAID funding was invested in activities that address the objectives of the Title XII legislation. The Global Bureau's agricultural funding was largely devoted to agricultural research and training. Implementing partners included the nine Collaborative Research Support Programs (CRSPs) that mobilize the resources and expertise of more than 40 U.S. universities and their counterparts in developing countries, the 16 international agricultural research centers (IARCs) supported by the Consultative Group on International Agricultural Research (CGIAR), and the Agricultural Biotechnology for Sustainable Productivity Project (ABSP), that provides technical support for biotechnology and genetic resource policies.

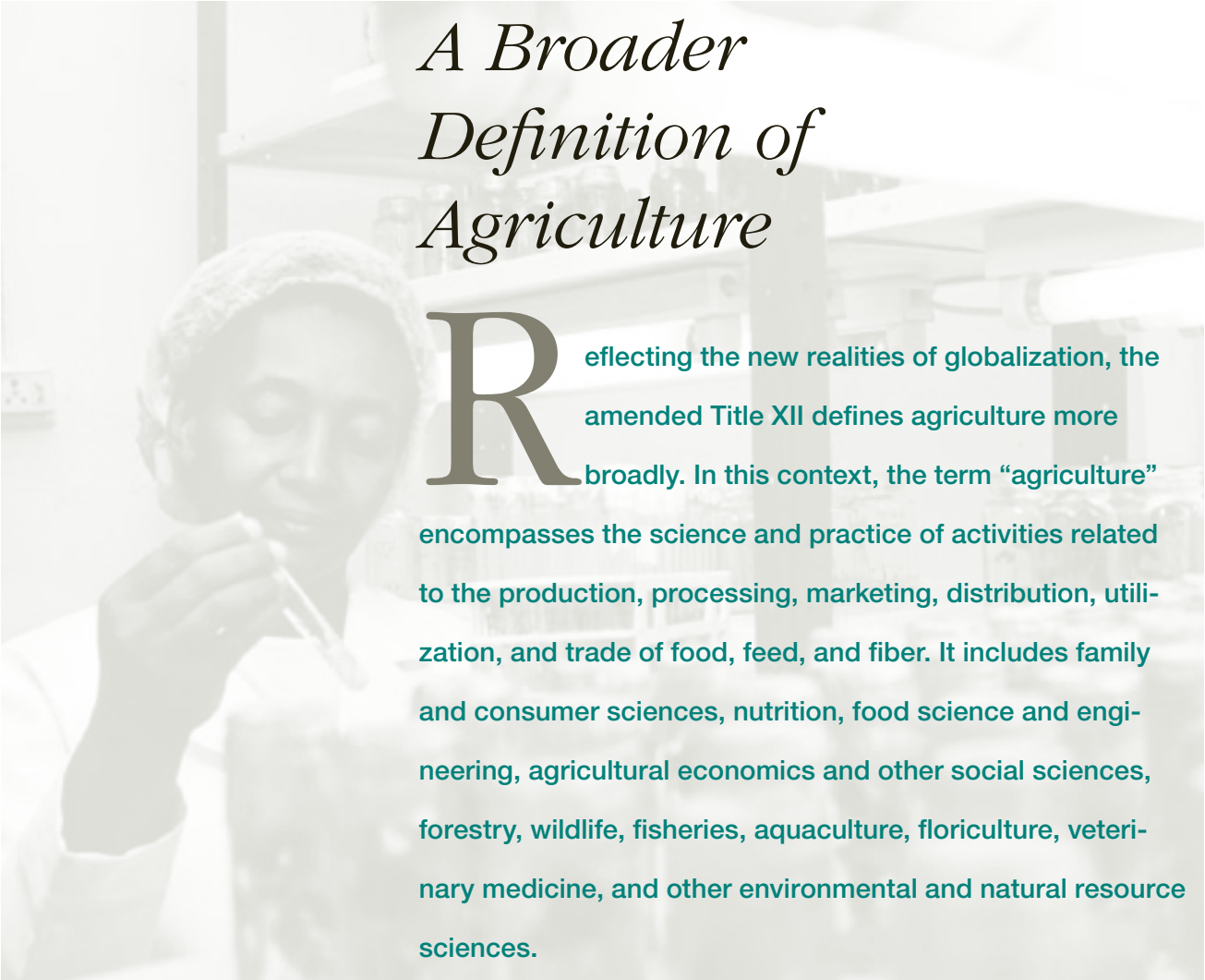
Among the regional bureaus, Africa managed one of the Agency's largest agricultural programs, addressing two of the most pervasive causes of malnutrition in the region: food insecurity and poverty. Bilateral USAID mission activities ranged from developing technology and market systems to strengthening producer organizations and rural enterprises through local partnerships. In Latin America and the Caribbean, bilateral agricultural programs focused on helping small farmers increase their productivity. Nine countries in Asia and the Near East received agricultural and food security assistance ranging from refining agricultural policies to improving the management of aquatic and tropical forest resources. Europe and Eurasia agricultural assistance ranged from support to dairy producers and processors to state land privatization.

The Bureau of Humanitarian Response provided funding for agricultural activities through its Office of Foreign Disaster Assistance (OFDA). It supported a range of agricultural activities through CGIAR. The Office of Food for Peace, which administered the P.L. 480, Title II Food for Peace Non-Emergency Program, also provided funding. Title II development funding is one of the main sources of financing for agricultural and food security activities in the Agency.

The Board for International Food and Agricultural Development (BIFAD) met three times during 2000 to discuss a number of pressing issues, including the coming water crisis, world poverty, USAID's response to the livestock revolution, and the food security crisis in the Horn of Africa. Dr. G. Edward Schuh, at his last meeting as chairman, provided a cogent summary of the current Board's thinking during its tenure.

Over the next five years, USAID will renew its leadership in the provision of agricultural development assistance. This will be framed by a new agricultural strategy that will reflect adaptations to major emerging opportunities including:

- ***Accelerating agriculture science-based solutions, especially using biotechnology, to reduce poverty and hunger;***
- ***Developing global and domestic trade opportunities for farmers and rural industries;***
- ***Bridging the rural knowledge divide through training, outreach, and adaptive research at the local level; and***
- ***Promoting sustainable agriculture and sound environmental management.***



A Broader Definition of Agriculture

Reflecting the new realities of globalization, the amended Title XII defines agriculture more broadly. In this context, the term "agriculture" encompasses the science and practice of activities related to the production, processing, marketing, distribution, utilization, and trade of food, feed, and fiber. It includes family and consumer sciences, nutrition, food science and engineering, agricultural economics and other social sciences, forestry, wildlife, fisheries, aquaculture, floriculture, veterinary medicine, and other environmental and natural resource sciences.

Introduction

In 1975, a time of widespread global food insecurity, the Congress of the United States passed an amendment to the Foreign Assistance Act of 1961 known as "Title XII – Famine Prevention and Freedom from Hunger." This legislation recognized the magnitude of the tasks of reducing famine, hunger and food insecurity globally, and the potential of the U.S. university community to contribute significantly to these efforts. Its mandate was and remains to strengthen the capacities of U.S. land-grant and other eligible universities in agricultural institutional development and research, improve U.S. university participation in the U.S. Government efforts to increase world food production, and provide increased and longer-term support to the application of science to solving food and nutrition problems in developing countries.

Agriculture and its related food and fiber industries play a critical role in securing stable, broad-based economic growth and eliminating hunger and poverty in the world. Thirty years after the "miracle seeds" and mineral fertilizers of the Green Revolution began to spread across Asia, helping to feed all mankind, hunger and poverty persist throughout the world. In some of the neediest countries, particularly in Africa, agricultural productivity is actually declining. Over 800 million people worldwide still suffer from inadequate food supplies and malnutrition.

The Famine Prevention and Freedom from Hunger Improvement Act of 2000 (P.L. 106–373), signed on October 27, 2000, is the first major amendment to Title XII. It introduces the following changes to the original legislation:

- *It broadens the goals of the original legislation to include "ensuring food security, human health, agricultural growth, trade expansion, and the wise and sustainable use of natural resources."*
- *It redefines the U.S. land-grant university community to include its public and private partners, which may include, among others, federal and state government agencies, private voluntary organizations, non-governmental organizations, firms operated for profit and not for profit, multinational banks, and host-country organizations and institutions. It also includes Native American land-grant colleges in its definition of eligible universities.*
- *It calls for increasing world food and fiber production, agricultural trade, and responsible management of natural resources through a global network of U.S. universities, international agricultural research centers, and other international research entities.*
- *It provides for the participation of the U.S. university community in programs of multilateral banks and agencies that receive federal funds.*
- *It seeks to engage the U.S. academic community more extensively in agricultural research, trade, and development initiatives undertaken outside the United States.*
- *It defines "agriculture" and "agriculturists" more broadly.*

USAID's agricultural activities are guided by the priorities outlined in three key documents: the Title XII legislation, the *U.S. Action Plan on Food Security,* and the respective bureaus' and USAID missions' strategic plans on agriculture. The *U.S. Action Plan on Food Security,* a joint effort of the sub-Cabinet-level Interagency Working Group on Food Security and the Food Security Advisory Committee (FSAC), a subcommittee of the Board for International Food and Agricultural Development (BIFAD), summarizes the government's response to the 1996 World Food Summit, at which the United States and 185 other countries pledged to reduce by half the number of hungry and undernourished people by the year 2015.

This report highlights USAID's activities and accomplishments in addressing the objectives of the Title XII legislation during FY 2000. It describes the activities of the BIFAD. Finally, it outlines the future directions for USAID's agriculture programs.

Activities and Accomplishments

Overview

Agricultural activities at USAID are carried out in accordance with the strategic priorities of its regional and functional bureaus. The four regional bureaus are Africa, Latin America and the Caribbean, Asia and the Near East, and Europe and Eurasia. The functional bureaus include the Global Bureau, the Bureau of Humanitarian Response, and the Bureau of Policy and Program Coordination. The relevant activities of the Global Bureau, the Bureau of Humanitarian Response, and the four regional bureaus in FY 2000 are summarized in the following subsections.

During FY 2000, approximately $310 million in USAID funding was invested in activities that address the objectives of the Title XII legislation (table 1). Investments in the Asia and Near East bureau constitute 37 percent of that amount, while those for the Africa Bureau accounted for 32 percent. Latin American and Caribbean bureau investments made up 11 percent and the Europe and Eurasia Bureau constituted 10 percent of the total. The Global Bureau obligated another $27.8 million for sustainable agriculture activities coded as "environment," raising the total funding for agriculture to about $337 million.

Agricultural activities were funded from the Development Assistance (DA), Child Survival and Disease (CSD), Development Fund for Africa (DFA), Economic Support Fund (ESF), Support for East European Democracy (SEED), and Freedom Support Act (FSA) accounts. Recorded obligations for agriculture programs in the last three years remained relatively stable. Development Assistance accounted for about half the total and the Economic Support Fund provided a third, with the balance coming from the special Europe and Eurasia regional accounts. Title II (P.L. 480) obligations were funded separately through the Farm Bill.

TABLE 1: USAID AGRICULTURE OBLIGATIONS BY BUREAU, 1994–2000 (THOUSAND $)*

Bureau[1]	FY94	FY95	FY96	FY97	FY98	FY99	FY00
AFR[2]	124,517	111,734	80,123	80,186	77,912	83,161	97,734
ANE	94,883	114,329	93,569	56,828	131,906	130,420	113,710
E&E	87,090	60,983	32,109	31,525	34,200	40,938	32,432
LAC[3]	43,919	50,182	32,682	28,958	27,478	34,867	34,341
G[4]	56,297	85,016	64,040	42,663	37,738	38,777	29,518
BHR[5]	6,191	12,286	5,302	2,736	4,239	1,941	2,083
PPC	2,361	0	0	1,858	2,300	3,100	406
Total	**415,258**	**434,530**	**307,825**	**244,754**	**315,773**	**333,204**	**310,224**

*Data for FY 1994 thru FY 1999 are from FY 1999 Title XII Report to Congress, data for FY 2000 from Emphasis Area Coding System database. Obligations include new obligating authority from Development Assistance and other appropriations, carry over, and recoveries. The table does not include International Narcotics Control monies or monies for sustainable agriculture activities coded as environmental activities, or monies obligated under Title II (P.L. 480).

[1]AFR–Africa, ANE–Asia and Near East, E&E–Europe and Eurasia, LAC–Latin America and the Caribbean, G–Global, BHR–Bureau for Humanitarian Response, and PPC–Policy and Program Coordination; [2]FY 1999 updated figures; [3]FY 1998 and FY 1999 updated figures; [4]Global Bureau began obligating for sustainable agriculture activities that are coded as environment activities in FY 1992. In FY 1994 the Global Bureau's obligations for sustainable agriculture activities coded "environment" were $11,619,000; FY 1995, $23,563,000; FY 1996, $16,195,000; FY 1997 $11,457,359; FY 1998 $15,478,017; FY 1999 $13,161,056; FY 2000 $27,880,711; [5]BHR obligations under P.L. 480 (see table 8), which was re-authorized in the 1996 Farm Bill, are not included.

Global Bureau

Title XII activities carried out by the Global Bureau are managed mainly by the Office of Agriculture and Food Security of the Bureau's Center for Economic Growth and Agricultural Development. A limited number of agricultural activities are carried out by other centers within the Bureau (e.g., Environment and Human Capacity Development) and by other offices within the Center for Economic Growth and Agricultural Development, such as the Office of Microenterprise Development.

One of the Center's overarching goals is to alleviate hunger and enhance global food security. In support of this goal, the Office of Agriculture and Food Security provides technical leadership to the Agency and field support to missions worldwide on all aspects of agricultural development, including technology development and dissemination, agribusiness development, trade and marketing, and overall food security.

In FY 2000, the Global Bureau's investments in agricultural research and development, including those coded as environment-related sustainable agriculture activities, totaled $57.4 million, an 11-percent increase over the FY 1999 obligation.

TABLE 2: GLOBAL BUREAU'S AGRICULTURE AND FOOD SECURITY OFFICE OBLIGATIONS, FY 1998-2000*

	FY98[1]	FY99[1]	FY00[1]
Consultative Group on International Agricultural Research (CGIAR)[2]	26,370,000	26,450,000	26,600,000
Collaborative Research Support Programs (CRSPs)	18,100,000	18,050,000	20,050,000
International Fertilizer Development Center (IFDC)	2,000,000	2,100,000	2,000,000
Spring Time Winter Wheat (SXWW)	295,000	0	0
Postharvest Collaborative Agribusiness Support Program (CASP)	1,000,000	250,000	0
Agricultural Biotechnology for Sustainable Productivity (ABSP)	868,000	869,000	39,000
Food Security II (FSII)	300,000	527,000	400,000
Agricultural Policy Analysis Project III (APAP III)	252,017	32,708	113,604
Rural and Agricultural Incomes with a Sustainable Environment (RAISE)[3]	0	207,000	252,000
Program Support[4]	443,000	1,340,348	1,772,107
BIFAD Support[5]	[126,500]	[150,000]	[150,000]
Child Survival Initiative	0	1,128,000	872,000
Africa Food Security Initiative	1,888,000	0	0
Dairy Directive	0	0	800,000
Sub-Total	**51,516,017**	**50,954,056**	**52,898,711**
Additional Dairy[6]	1,500,000	984,000	4,500,000
Additional CGIAR A/AID Reserve[7]	200,000	0	0
Total	**53,216,017**	**51,938,056**	**57,398,711**
(Minus sustainable agriculture activities coded as environmental activities)	-15,478,017	-13,161,056	-27,880,711
Total	**37,738,000**	**38,777,000**	**29,518,000**

*This table includes obligations for sustainable agriculture that have been coded as environmental activities. [1]Updated figures; [2]includes $2 million each year from the Africa Bureau for CGIAR research activities; [3]includes Environment Center contribution to joint financing of this activity; [4]increase in FY 1999 due to CRSPs line item exclusion for staff support funding; [5]included in Program Support; [6]monies transferred from Management Bureau's Budget Office; [7]monies transferred from A/AID Reserve.

GLOBAL BUREAU

RESEARCH, CAPACITY BUILDING, AND TECHNOLOGY DISSEMINATION

Partnerships with U.S. Universities—Collaborative Research Support Programs

The bulk of the resources administered by the Global Bureau's Office of Agriculture and Food Security (AFS) support agricultural research and education. AFS channels approximately 35 percent of these resources through the Collaborative Research Support Programs (CRSPs). The CRSPs are long-term, multidisciplinary research and training initiatives that capitalize on the vast U.S. land-grant university system and other U.S. universities that work with agricultural research programs in developing countries.

In FY 2000, the work of the nine CRSPs produced significant benefits for developing countries around the world, as well as for the United States. Following are some of the highlights of those efforts.

The Broadening Access and Strengthening Input Market Systems (BASIS) CRSP identifies policies and strategies to promote economic growth through improved access to and efficient use of land, water, labor, and financial markets. In FY 2000:

- *Russian and U.S. researchers and policymakers participated in two workshops, coordinated by individuals at the University of Maryland and held in October 1999 and July 2000, to discuss Russia's agricultural policy and market reforms and provide guidance to policymakers on implementing market-oriented agricultural policy in Russia.*

- *An International Symposium held in Ethiopia in November 1999 brought together nutrition and social scientists and policymakers from six African countries and a number of U.S. institutions, including the University of Wisconsin-Madison, Clark Atlanta University, and the International Center for Research on Women, to examine the linkages between agriculture, health, and nutrition in agricultural policy.*

- *The President of El Salvador introduced new financing initiatives based on a study conducted by Ohio State University researchers on segmented market niches in rural financial markets.*

- *South Africa's Department of Land Administration launched the Land Reform Credit Facility, developed by researchers from the University of Natal, Ohio State University, and the University of Wisconsin-Madison to help draw private sector financing and human capital into commercially viable land-reform projects. This facility offers loans to reputable banks and venture capitalists that finance equity-sharing projects and land purchases by historically disadvantaged farmers. The loan target of R15 million set for the first year was reached after only 8 months.*

The Broadening Access and Strengthening Input Market Systems Indefinite Quantity Contract (IQC) builds on the BASIS CRSP's work to meet requests for technical assistance on the efficiency and integration of input markets such as

COLLABORATIVE RESEARCH SUPPORT PROGRAM - US MANAGEMENT ENTITIES AND PARTNER COUNTRIES

land, water, labor, and capital. FY 2000 highlights include a contribution to the OECD Development Assistance Committee's Poverty Reduction Dialogue, assistance to the regional land tenure observatories of the Permanent Interstate Committee for Drought Control in the Sahel (CILSS), a study to increase access to Senegal River Basin resources, and assistance to communal resource management in Mali and land registration in Albania.

The Bean/Cowpea CRSP seeks to overcome malnutrition, stimulate economic growth, promote environmental stewardship, and improve the well-being of people, especially women and the poor, by generating technologies and knowledge that enhance the production, commercialization, and utilization of beans and cowpea. Bean/Cowpea CRSP scientists use cutting-edge research technologies, including molecular tools of biotechnology, to address production and utilization constraints in Latin America and Africa. In FY 2000:

- *A Workshop on the Genetic Improvement of Cowpea, held in Senegal and organized by a Bean/Cowpea CRSP scientist from Purdue University, brought together an international group of scientists and stakeholders committed to enhancing cowpea production in Africa. The Dakar group resolved to introduce new, beneficial traits into cowpeas using the tools of modern biotechnology. Other U.S. universities represented were Michigan State University, the University of Wisconsin, the University of California-Riverside, and the University of Georgia.*

- *Tío Canela-75, a bean variety developed by CRSP scientists at the Escuela Agrícola Panamericana (EAP) at Zamorano, Honduras, and the University of Puerto Rico, is being disseminated throughout Central America and the Caribbean. Already the most widely*

planted variety of bean in Honduras, Tío Canela-75 was released in El Salvador and in Nicaragua, the largest bean-producing country in Central America.

- *Research conducted by a Michigan State University scientist and CRSP trainees from Costa Rica and Tanzania showed that consumption of black or navy beans dramatically reduced the incidence of colon cancer. This research substantiates findings of previous epidemiological studies that beans in traditional diets provide anti-carcinogenic benefits in addition to being important sources of protein and micronutrients.*

The Global Livestock (GL) CRSP aims to increase food security and improve the quality of life of people in developing countries while bringing an international focus to the research, teaching, and extension efforts of U.S. institutions through collaboration between U.S. land-grant institutions and national and regional institutions abroad that are active in livestock research and development. In FY 2000:

- *GL CRSP scientists from Texas A&M University collaborated with scientists from eight African universities and research institutes to establish a system to predict and manage drought for pastoralists in East Africa using satellite monitoring and plant and soil models.*

- *In Central Asia, researchers from the University of California-Davis, the USDA, South Dakota State University, Utah State University, Kazakhstan's Barayev Research Institute of Grain Farming, and Turkmenistan's National Institute of Deserts, Flora, and Fauna developed regional capacity to measure carbon flux in the steppe and integrate local measurements into regional projects of carbon balances. This system is a primary source of data to justify steppe rehabilitation and possible participation in future carbon credit market schemes.*

- *Researchers at the University of California-Davis, the University of California-Los Angeles, the University of Hawaii, the University of Nairobi, the Kenya Agricultural Research Institute, and the Kenyan Ministries of Agriculture, Health, and Education completed data collection for their study of the impact of animal-source foods on the micronutrient status of children in rural Kenya.*

- *Scientists at the University of Colorado and Colorado State University, in collaboration with the University of Dar es Salaam, the University of Nairobi, Sokoine University of Agriculture, and the African Wildlife Foundation, developed and put in place the Integrated Management and Assessment System (IMAS) in seven East African institutions. It has been used to assess management issues in Tanzania's Ngorongoro Conservation Area and the effects of fragmentation of land ownership in Kajiado District, Kenya.*

- *GL-CRSP research has identified an approach for East African pastoralists to work their way out of poverty by diversifying livestock assets into new forms of savings and investment. An outreach network, consisting of 70 individuals from 30 institutions in Ethiopia and Kenya, has been established and is working on risk management and conflict resolution.*

The Integrated Pest Management (IPM) CRSP focuses on participatory and collaborative integrated pest management programs to develop and implement economically and environmentally sound crop protection methods. In FY 2000:

- *In Guatemala, nearly 5,000 small-farm snowpea producers participating in IPM CRSP programs developed by Purdue University, the Kroger grocery chain, and Guatemala's Universidad del Valle reduced pesticide applications by 70 percent.*

- *In Jamaica, over 200 farmers and extension officers were trained in IPM techniques as part of an IPM CRSP collaboration between the Pennsylvania State University, Virginia Polytechnic Institute and State University, Ohio State University, the USDA Vegetable Laboratory, and the Caribbean Agricultural Research and Development Institute.*

- *In Uganda, IPM CRSP scientists from Ohio State University, Fort Valley State University, Virginia Polytechnic Institute and State University, and Uganda's Makerere University introduced wasp parasites to control sorghum and maize stem borer insects, eliminating a third of these insects in northern Uganda.*

The Peanut CRSP seeks to increase the global production and use of peanuts. It focuses on food safety, production efficiency, post-harvest technology and marketing, and socio-economic research to enhance economic development. In FY 2000:

- *Peanut CRSP scientists at the Universities of Florida and Georgia confirmed the discovery of a new source of resistance to tomato spotted wilt virus in the Bolivian peanut line Bayo Grande. Tomato spotted wilt is the most serious viral disease of peanuts in both North and South America, resulting in major yield losses. Hybrids of this and other high-yielding lines are now advancing through the segregation process.*

- *CRSP collaborators at Bolivia's Tropical Agricultural Research Center (CIAT) published a manual on peanut production practices for Bolivian farmers. Seed multiplication of improved varieties is underway and steps to improve the local marketing and processing of peanuts in Bolivia are now being planned.*

- *In Uganda, University of Georgia researchers initiated seed multiplication of groundnut rosette virus-resistant lines in collaboration with the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) and the British government's Department for International Development (DFID). Groundnut rosette virus is responsible for yield losses that average 40 percent annually in Uganda.*

- *Research on peanut satiety effects conducted at Purdue University has been used by the U.S. peanut industry to promote the commodity as a healthful food. This has resulted in a 14-percent per capita increase in peanut consumption in the United States since 1996, estimated by the industry to be worth $50 million to farmers and processors.*

- *In the Philippines, an improved method of identifying and sorting to remove aflatoxin-contaminated peanuts was developed by the Philippines Food Development Center and the University of Georgia and commercialized by a local processor of peanut-based sauces. Since implementation, the company has not detected any aflatoxin in its products and has been able to increase production of ethnic foods for export to expatriate communities.*

The Pond Dynamics/ Aquaculture (PD/A) CRSP works to enhance the development and sustainability of aquaculture production systems to improve food supplies and human nutrition. In FY 2000:

- *PD/A CRSP researchers investigated several new aquaculture systems and species. Researchers from the University of Michigan and the Asian Institute of Technology in Thailand found that growing*

tilapia in ponds planted with lotus reduces nutrient levels in pond muds. Researchers from Southern Illinois University at Carbondale and Peru's Instituto de Investigaciones de la Amazonia Peruana, working with two fish species indigenous to the Amazon Basin, demonstrated the species' economic suitability for pond culture.

- *A survey of 146 farmers in Peru conducted by PD/A CRSP researchers at Auburn University found that fish farmers view fish culture in a positive light, plan to build more ponds, and want more visits from extension workers.*

- *Researchers from the University of Michigan and the Asian Institute of Technology in Thailand showed the beneficial environmental effects of adding Nile tilapia to intensive hybrid catfish ponds, with no additional cost associated with the addition of tilapia.*

- *The PD/A CRSP assisted 35 U.S. and 36 international students with funding, training, and research opportunities. International students conducted research at Auburn University, the University of Arkansas at Pine Bluff, Oregon State University, and the University of Hawaii. Research results were disseminated at workshops held in 5 countries, benefiting over 100 host-country agency personnel and 120 farmers. CRSP researchers and students made presentations at scientific conferences in 10 countries.*

- *The PD/A CRSP disseminated research findings quickly and inexpensively through the Internet. The PD/A CRSP website, maintained at Oregon State University, experienced a 50-percent increase in use over the previous year, with over 450 visitors per week from more than 60 countries. The website contains 187 publications and the world's largest inventory of standardized aquaculture data.*

The Sustainable Agriculture and Natural Resource Management (SANREM) CRSP supports the development and adoption of sustainable agricultural production and natural resource management practices. In FY 2000:

- *SANREM-trained community water monitors in the Philippines presented 6 years' worth of data to inform the Watershed Enhancement Committee of the Philippines House of Representatives. The water quality and water quantity citizen research methods, developed by Auburn University, Heifer Project International, and Central Mindanao University, and used in Ecuador and the Philippines, are also widely employed in Alabama and Georgia.*

- *SANREM developed a model for municipally led natural resource management planning and implementation. The model is currently being disseminated to seven municipalities in the Philippines and Vietnam. Using participatory, demand-driven approaches to natural resource management, the model allows the exchange of information among local governments. Partners in this effort include the International Center for Research in Agroforestry, provincial planners, local government units, and the University of Wisconsin.*

- *SANREM researchers from Virginia Polytechnic Institute and State University facilitated the formation of the Natural Resources Management Advisory Council for 10 villages in Madiama, Mali. The council includes Maraka farmers, Peuhl herders, and Bozo fisherfolk, all of whom earn their livelihoods from shared natural resources. Council members were trained in holistic management, a goal-oriented natural resource management approach that takes into account human, biological, and financial resources. Members were also trained in conflict management in order to prevent conflicts over resource use. CARE-Mali disseminated this technique to 12 other communities during the fiscal year.*

The Soil Management CRSP works to improve soil fertility by helping to resolve nitrogen and phosphorus deficiency, soil acidity, water deficiency, and soil erosion and degradation. In FY 2000:

- *Models for predicting landslide hazard developed by Soil Management CRSP scientists at Texas A&M University were validated using pre- and post-Hurricane Mitch data from Honduras.*

- *Collaborators conducted field trials in 16 countries on a new liquid product developed by the University of Hawaii for inoculating legume seeds. The yield and farmer survey results showed that the liquid product outperformed the conventional peat carriers of symbiotic nitrogen-fixing bacteria for legumes.*

- *Version 1.5 of NuMaSS, a decision support system developed by North Carolina State University, Texas A&M University, the University of Hawaii, and Cornell University for diagnosing and correcting major nutrient deficiencies in plants, was distributed to collaborators for testing and improvement of the software.*

The Sorghum-Millet CRSP (INTSORMIL) seeks to overcome the biophysical and socio-economic constraints to sorghum and millet production and consumption. In FY 2000:

- *The number of on-farm trials and partnerships with NGOs increased in 10 African countries. The University of Nebraska and Michigan State University collaborated with World Vision in West Africa, and the University of Nebraska worked with Sasakawa Global 2000 in East Africa. These partnerships have helped evaluate and disseminate promising new varieties.*

- *In Mali, Texas A&M University collaborated with the Institut d'Economie Rurale and Général Alimentaire de Mali on the commercialization of Deli-Ken, a cookie made from a mixture of sorghum and wheat flours. The research demonstrated the potential for sorghum flour in processed foods.*

- *INTSORMIL CRSP scientists from the University of Nebraska contracted with the International Crops Research Institute for the Semi-Arid Tropics' Sorghum and Millet Network research center in Zimbabwe to analyze and monitor ergot management in South Africa.*

- *INTSORMIL CRSP researchers at Purdue University provided technical assistance to Niger to train farmers and new seed producers in the proper management and production of hybrid seed and to establish the Niger Seed Producers Association.*

Benefits to the United States. The impacts of CRSP research are not limited to boosting food security, enhancing economic growth, and reducing poverty in developing countries. The following are just a few examples of the innumerable benefits of CRSP research to the United States:

- *Integrated systems of root rot control in bean, including seed-applied biocontrol treatments, developed by Bean/Cowpea CRSP scientists at the University of Minnesota, are receiving widespread acceptance by farmers in Minnesota and North Dakota. In the 2000 planting season alone, more than 280 tons of bean seed, close to 25 percent of all the*

bean seed planted in Minnesota, were treated with Bacillus subtilis GB03.

- *The Jaguar and Phantom varieties, released by Michigan State University, were the first black bean varieties to combine both Co-1 and Co-2 resistance genes. These two genes provide resistance to all current races of anthracnose, a major disease affecting U.S. bean yields, present in North America.*

- *Akara, a traditional West African cowpea-based food, was prepared on a pilot scale by Bean/Cowpea CRSP food scientists and trainees at the University of Georgia. A California-based company that processes and markets ethnic, natural, and vegetable-based foods in the United States is introducing samples as test products.*

- *The water quality and water quantity citizen research and methods developed by Auburn University's SANREM CRSP team are widely used in Alabama and Georgia, where water monitors collect data on stream flows and water quality in their local communities.*

- *Iowa State University-led SANREM research and advocacy coalitions are active in Iowa, Maryland, and New Mexico. These coalitions bring together local government officials, the private sector, and non-governmental organizations to resolve natural resource management issues related to the protection of community drinking water.*

- *SANREM CRSP's memory banking methodology, developed by the University of Georgia, has been adopted by two regional seed-saving organizations (Native Seed Search and Southern Seed Legacy). This methodology is helping to conserve U.S. germplasm and safeguard the cultural heritage underlying its preservation. The National Seed Laboratory has requested a proposal to collect germplasm and cultural information in Vietnam.*

- *Methods of acquiring and using spatially explicit information and biophysical and environmental models developed by Texas A&M University have been updated through SANREM CRSP efforts in Mali and Kenya. These improved models linking biophysical and environmental parameters can be used immediately in U.S. analyses while providing an important planning and extension tool to extrapolate geographic equivalence.*

- *INTSORMIL CRSP researchers at Texas A&M who have been working on new markets for white sorghum began marketing a new snack food in the United States containing white sorghum.*

- *IPM CRSP scientists at the USDA Vegetable Laboratory have developed several dry-flesh sweet-potato breeding lines that were field tested in both the United States and the Caribbean for resistance to soil insect pests (sweet potato weevil, flea beetles, leaf beetles, and WDS wireworm-Diabrotica-Systena complex). Several lines demonstrated resistance to these pests as well as desirable agronomic and color characteristics.*

GLOBAL BUREAU

RESEARCH, CAPACITY BUILDING, AND TECHNOLOGY DISSEMINATION

Partnerships with International Agricultural Research Centers

USAID, through its Global Bureau, regional bureaus, bilateral missions, and the Bureau of Humanitarian Response, works closely with international agricultural research centers (IARCs) in support of economic growth, food security, and environmental objectives. These include the 16 centers that make up the Consultative Group on International Agricultural Research (CGIAR), as well as the International Fertilizer Development Center (IFDC), the Asian Vegetable Research and Development Center (AVRDC), and the International Center for Insect Physiology and Ecology (ICIPE).

The CGIAR centers conduct research on natural resource management, livestock management, rice farming systems, and commodities important to the poor (i.e., potatoes, cassava, sorghum, millet, maize, and wheat). Other centers focus on policy research and support to developing-country institutions that conduct agricultural and natural resource management research.

American researchers are active in the CGIAR system. More than 80 U.S. universities engage in cooperative research and development programs. Each CGIAR center allocates 8 percent of its annual USAID unrestricted core support for collaboration with the U.S. research community. American trustees make up the largest single group of nationals serving on the centers' governing boards.

USAID's partnership with the IARCs, in collaboration with national program partners, advanced research groups, NGOs, and the private sector, led to important achievements in FY 2000. Some of the highlights of these collaborative efforts are listed below.

Crop Genetic Improvement, Still Going Strong! Robert Evenson of Yale University completed a comprehensive study of the impact of CGIAR breeding programs on the food situation in developing countries. The adoption and spread of high-yielding, pest-resistant modern varieties accelerated during the 1980s and 1990s. While rice and wheat remained the biggest success stories, new data revealed tremendous progress in maize, millet, and root crops. In the 1990s, Africa adopted improved varieties at much higher levels. For example, planting of improved varieties of cassava and sweet potato, two key food security crops of the poor, expanded from roughly zero to almost 20 percent of total acreage for these crops.

Economic and Nutrition Impacts—Low-Income Groups and Children are Key Beneficiaries. The Evenson analysis found that food prices in developing countries today would be between 35 and 66 percent higher had there been no green revolution. Poor people in both rural and urban areas are the main beneficiaries of the productivity gains that have led to lower real prices. In compelling human terms, without the green revolution, between 32 and 42 million more children would be malnourished. With malnutrition implicated in more than half of all early childhood deaths, millions more children would die each year, especially in Africa and South Asia.

Environmental Gains. An analysis of the environmental impacts of CGIAR technologies suggests that over 200 million hectares of forest and grassland have been preserved in their natural state because of CGIAR-related productivity gains on currently farmed lands. High-productivity sustainable systems, such as those introduced in tropical savannas, spare the forests and also sequester huge amounts of carbon as roots and soil organic matter. In economic terms, the value of this fixed carbon reaches into the billions of dollars.

East Africa: Emergency Program to Combat Cassava Mosaic Disease Pandemic. A virulent new strain of cassava mosaic disease (CMD) has devastated cassava production in East Africa. Since October 1998, USAID has sponsored the International Institute of Tropical Agriculture and its national and NGO partners' emergency program to combat this impending disaster. Cassava production in USAID's target areas increased from fewer than 1,000 metric tons (mt) in 1997 to 342,000 mt in 1999, with an estimated market value of $40 million.

Food for Education. The International Food Policy Research Institute and the Ministry of Food of the Government of Bangladesh put in place the country's first Food for Schooling program—an innovative program that provides food to poor families based on children's school attendance. In 2000, the program covered more than 25 percent of all primary schools in Bangladesh. School enrollment has increased 35 percent since the program's inception in the mid-1990s—44 percent for girls and 28 percent for boys. The program has significantly increased calorie and protein availability for the beneficiary households.

Recovering Lost Grain Yields. Cereal growers in North Africa are safeguarding food supplies and the environment while recovering lost yields worth millions of dollars from the ravages of the Hessian fly. Morocco's National Agricultural Research Institute, Kansas State University, and the International Center for Agricultural Research in the Dry Areas pooled resources to develop resistant varieties of both bread wheat and durum wheat. Producing all of Morocco's wheat using new, resistant varieties would lead to a gain of $336 million per year. Germplasm developed from the research has been sent to other North African countries and to the United States for use and further development.

Genomics for the Poor. The Institute of Genomics Research, in Rockville, MD, and the International Livestock Research Institute have completed the genome sequence of *Theileria parva,* a parasite that causes a fatal infection in cattle in East and Southern Africa known as East Coast fever. The breakthrough will facilitate the development of vaccines against this and the related tropical theileriosis, which threatens 500 million livestock across the Mediterranean region and Asia. *T. parva* is closely related to the human malaria parasites, and this research may further the development of malaria vaccines.

Conserving Trees for Health and Wealth. Skyrocketing demand for a natural remedy for prostate cancer found in the bark of an African tree, *Prunus africana*, will likely lead to the tree's extinction in the wild in 5 to 10 years, according to the International Center for Research in Agroforestry. A medicinal extract from its bark is converted into capsules for an over-the-counter trade in Europe and the United States that has been estimated at $220 million a year. When harvested sustainably, each batch of bark returns $10 to $20 to the harvester. Center researchers and partners in Africa and Europe are working to encourage small farmers to increase their incomes by planting these trees on their land and harvesting the bark sustainably. The bark will be marketed to natural remedy producers under a "green" label.

Sustainable Reduction of Vitamin A Deficiency. Michigan State University researchers found that 15 million African women and children could benefit from new, orange-fleshed varieties of sweet potatoes high in beta-carotene. The International Potato Center, the International Institute of Tropical Agriculture and partners in several African countries have developed these varieties. In Mozambique, more than 120,000 families planted them in FY 2000. NGO partners include World Vision, CARE, Helen Keller International, and Save the Children.

Fish Farming in Bangladesh. USAID is working with the International Center for Living Aquatic Resources Management to bring the benefits of low-input fish farming to poor people. This low-cost technology is being extended to farm households throughout Bangladesh in partnership with the Bangladesh Fisheries Research Institute, local NGOs, and Bangladesh Agricultural University. In 2000, the project trained staff at 19 NGOs, who in turn trained 6,400 farmers, half of them women. They will produce 22,000 tons of fish valued at $17 million. Impacts on diet, education, and other key factors are being monitored.

INTERNATIONAL AGRICULTURE RESEARCH CENTER PARTNERS

Soybean Improving Lives in Nigeria. The International Institute of Tropical Agriculture has improved soybean productivity by developing high-yielding, early maturing varieties. In the northern zone of Benue State, 75 percent of male and 62 percent of female farmers adopted the improved varieties. Women earned a substantial proportion of their income from soybean. Efforts to promote soybean use in rural and urban households have involved almost 50,000 people, mostly women. The impact of soybean on the nutritional status of children was assessed. Communities that produced and consumed soybean had a significantly higher percentage of nutritionally normal children.

True Potato Seed Benefits 100,000 Rural Vietnamese Households. Smallholder farmers are planting true potato seed (TPS) on 10 percent of the total potato area in Vietnam, increasing their yields by 75 percent. Net annual household income among TPS adopters increased by $10 to $15. Most of this increase goes to women, who devote a large share of it to childcare and household improvements. Aggregate economic benefits nationwide are estimated at $1.075 million per year.

The International Fertilizer Development Center. USAID also works with the International Fertilizer Development Center to address integrated soil nutrient management needs associated with improving global agricultural productivity. In FY 2000, the center helped over 600,000 smallholder rice farmers in Bangladesh increase their net production returns by 57 percent through the adoption of deep-placed Urea Super Granules. The center's training and study programs in marketing and business analysis reached over 10,000 entrepreneurs, decision makers, and researchers. The center helped 12 countries improve their fertilizer production and distribution systems and conducted fertilizer subsector assessments in Nigeria and Malawi.

GLOBAL BUREAU

RESEARCH, CAPACITY BUILDING, AND TECHNOLOGY DISSEMINATION

Biotechnology Research

Biotechnology encompasses techniques such as molecular markers that enable the molecular characterization of viruses and genetic linkage maps, which allow breeders more effectively to select for desired traits. It is used to develop genetically engineered crops and livestock vaccines.

USAID's approach to agricultural biotechnology is one of balanced consideration of both benefits and risks. It takes into account both the scientific and the policy issues associated with each program. In addition to funding the development of biotechnology tools and applications, the Agency funds the development of science-based biosafety regulatory systems and institutional and human capacity building in biosafety to ensure that adequate safeguards are in place in developing countries. The Agency has funded public outreach efforts in Africa and the Philippines to promote broader dialogue on biotechnology.

In FY 2000, the Office of Agriculture and Food Security's technology research investments informed broader policy dialogues and legislation on biotechnology and biosafety regulation, intellectual property rights, protection, and agricultural biotechnology training. The Agricultural Biotechnology for Sustainable Productivity (ABSP) project was the main vehicle for advancing USAID's efforts in biotechnology research.

Some of the key USAID-supported contributions in biotechnology research in FY 2000 were the following:

- **Developing Regional Approaches to Biotechnology.** *ABSP provided technical support to the Association for Strengthening Agricultural Research in East and Central Africa (ASARECA) to develop a biotechnology and biosafety program. ABSP produced a report demonstrating the potential benefits of agricultural biotechnology to Africa. It is being used to identify priorities for the incorporation of biotechnology into ASARECA's regional programs. More than 560 people have downloaded the report, which is available on the ABSP website.*

- **Biotechnology Legislation in Indonesia.** *In December 2000, the Indonesian Parliament approved the Plant Variety Protection Act, providing a form of intellectual property rights (IPR) protection for crop varieties and meeting the obligations of the World Trade Organization Agreement on Trade Related Aspects of Intellectual Property. ABSP provided technical assistance in drafting the law. The government also approved food safety guidelines for genetically modified organisms (GMOs). Through the annual International Short Course in Food Safety at Michigan State University, the ABSP project trained many Indonesian scientists who were instrumental in the development of these guidelines. The Indonesian Ministry of Agriculture approved the limited sale of transgenic cotton.*

- **The Recombinant Rinderpest Vaccine Project** *supported University of California-Davis scientists in the development of a diagnostic test for rinderpest, a scourge of cattle, buffalo, and some forms of wildlife, and a vaccine. In FY 2000, the USDA's Animal and Plant Health Inspection Service evaluated the vaccine and the protocol for expanded field testing and issued a finding of no significant impact (FONSI), which would enable USDA to purchase the vaccine from commercial sources, if necessary. The project trained African scientists from four regional laboratories, who will train staff to manufacture the diagnostic tool in Africa, thus reducing costs and dependence on non-African commercial firms.*

GLOBAL BUREAU

RESEARCH, CAPACITY BUILDING, AND TECHNOLOGY DISSEMINATION

Human and Institutional Capacity Building

Degree and Non-Degree Programs

USAID supports critical education and technology dissemination through both degree and non-degree programs. In FY 2000, approximately 25,000 participants benefited from USAID's agricultural training programs (table 3), ranging from 1-day workshops for farmers to degree programs. There is a growing trend toward non-degree training and dissemination of technical information through field days and the private sector. Thousands of farmers participated in field days in FY 2000. More than 600,000 smallholder farmers in Bangladesh received help from the International Fertilizer Development Center and its public and private partners in the use of Urea Super Granules.

The Global Bureau's Center for Human Capacity Development worked through the Association Liaison Office (ALO) to administer a competitive grants program for educational institutions in developing countries. In FY 2000, the ALO successfully initiated 25 partnership grants valued at $3.275 million. The grants were for community colleges and workforce skills development and other higher education institution partnerships to support USAID strategic objectives. Over $800,000 in matching resources was leveraged from public and private firms associated with these partnership institutions. Ten existing partnerships received $800,000 to promote sustainability and the use of information technology.

Nine of these partnerships, totaling $1.675 million, focus on agriculture and natural resource and environmental management. Public and private firms associated with these institutions provided these nine partnerships with matching funds of more than $400,000. Eight land-grant universities and Walla Walla Community College are collaborating with institutions of higher education in eight countries. The partnerships will develop a joint degree program in environmental sciences in Botswana, establish an agricultural technician training institute in Egypt, create a regional geographic information system to enhance environmental management in Mexico, improve agroforestry curricula in South Africa, expand agricultural extension and education capacity in Ethiopia, increase protein consumption levels of infants in Malawi, develop environmental courses in Uzbekistan, and provide agricultural capacity building in Rwanda.

Workshops

NTA Food Security Workshop. *The New Trans-Atlantic Agenda (NTA), a bilateral agreement between the United States and the European Community, promotes collaboration on international food security issues. In April 2000, NTA held a workshop on "Country-Level Collaboration Case Studies and Their Global Implications" in Brussels to discuss progress in achieving the 1996 World Food Summit commitment to halve the number of chronically undernourished people worldwide by 2015. Collaborative activities in Bolivia, Haiti,*

TABLE 3. DEGREE AND NON-DEGREE TRAINING PROGRAMS*

	FY98	FY99	FY00
Degree Training (completed Ph.D., M.S., and B.S.)	439	483	372
Non-degree Training (sabbatical, post-doctoral, workshops, etc.)	15,951	18,250	25,070
Total	**16,390**	**18,733**	**25,442**

*Data from CRSPs, IFDC, RAISE, USAID TraiNet/HAC Reports. These figures are rough estimates.

Malawi, Mozambique, Ethiopia, Bangladesh, Kyrgyzstan, and Montenegro were discussed, as were international food security issues associated with trade, the Food Aid Convention, and the new poverty reduction strategies. It also identified partner-country food security strategies and programs to improve performance in reaching this international goal.

- Estimating Impacts of Agricultural Research. *An Impact Assessment Workshop on "New Developments in Estimating Impacts of Agricultural Research" was held in Washington in July 2000 to review and discuss impact assessment and prediction models currently available to appraise the impact of research in agriculture and natural resources. Participants identified three overriding objectives of impact assessment: to achieve higher probability of successful impact, to achieve scientific credibility, and to address accountability issues. The models and approaches discussed at the workshop help researchers, managers of research programs, and policymakers to analyze, ex-ante and ex-post, the impact of research.*

- Carbon Sequestration, Sustainable Agriculture, and Poverty Alleviation. *The International Fund for Agricultural Development, with support from the Food and Agriculture Organization of the United Nations (FAO) and USAID, convened an international workshop on "Carbon Sequestration, Sustainable Agriculture, and Poverty Alleviation" in Geneva from August 30 to September 1, 2000. Scientists and development practitioners explored the importance of carbon in agriculture and land use, and new avenues to reduce poverty and enhance food security among the rural poor in developing countries.*

- WTO Training Workshop. *As part of the Global Bureau's support to field operations, the Office of Agriculture and Food Security held a training workshop on November 1–2, 1999, led by the International Food Policy Research Institute. The workshop focused on the links between trade, food security, and economic development practices with emphasis on the implications of the Seattle (Millennium) Trade Round for poor countries. It covered key concepts utilized in the Uruguay Round and the results of those negotiations, methodological and analytical instruments to study quantitatively trade issues, and topics that may be taken up in the coming agricultural negotiations and the positions of key actors.*

- Agricultural Biotechnology Training for USAID. *In 2000, the Agricultural Biotechnology for Sustainable Productivity project developed and implemented an electronic information resource on biotechnology for use by USAID Washington-based and overseas staff. Covering a wide range of issues, this resource will build USAID's capacity to play an expanding role in biotechnology as it relates to both development and U.S. foreign policy objectives.*

- Food Security Workshop. *A workshop organized by the Office of Agriculture and Food Security in coordination with Michigan State University, USAID's Agricultural Policy Analysis Project, and the Réseau Européen de Sécurité Alimentaire was held on November 3, 1999, to evaluate lessons learned in food security in Africa and the Andes. Participants made recommendations on applying concepts in agriculture, food security and economic growth to USAID activities in partner countries. The workshop helped further the dialogue between USAID, European international development specialists, NGOs, and the private sector.*

Food Security Policy Research

Food security and other policy-related research is an integral part of CRSP and IARC activities. The BASIS CRSP and the International Food Policy Research Institute, a CGIAR center, focus their research on food policy issues. In addition, food security policy research is conducted in the Global Bureau through the following specific projects:

- **The Food Security II Cooperative Agreement (FS II)** *carries out a broad array of applied food and agricultural policy research, outreach, and capacity building activities throughout Africa. In FY 2000, a report on the food and nutrition situation in Mali was presented to over 100 representatives of the Malian government, NGOs, and the donor community. The report strengthened interministerial coordination on nutrition policy. Analyses of smallholder agricultural commercialization and maize trade policy in Kenya were disseminated at a conference in June 2000 and have since been used to develop sector and poverty reduction strategies. In Rwanda, the government, donors, NGOs, and importers are using the FS II publication on crop/zone combinations with potential for profitable fertilizer.*

- **The Agricultural Policy Development Project (APD)** *is an IQC under the Agricultural Policy Analysis Project (APAP) III authority that addresses policies that encourage increased agricultural employment and efficient agricultural markets. Trade reform, market performance, food equity, agricultural sustainability, and poverty reduction receive priority attention. In FY 2000, the project provided a senior agricultural and food security policy advisor to Rwanda, commissioned a white paper on meeting the OECD poverty targets, prepared two reports comparing the food security framework of USAID and the European Community in Ethiopia and Haiti, and participated in the April workshop of the New Trans-Atlantic Agenda in Brussels.*

Agribusiness, Trade, and Marketing Support

In FY 2000, USAID promoted an increasing number of public-private partnerships in support of its food security and poverty alleviation goals. Among them were the following:

- **Rural and Agricultural Incomes with a Sustainable Environment (RAISE)** *is a field support program coordinated jointly by USAID's Environment Center and the Economic Growth and Agricultural Development Center. This partnership of business and environmental groups, consulting firms, and universities assists USAID missions and bureaus in identifying and pursuing investments in natural resource-based industries. A workshop held in October 1999 examined best practices for integrating eco-*

GLOBAL BUREAU, continued

nomic growth and environmental sustainability. The proceedings and case studies were later published and are available at www.raise.org. In FY 2000, RAISE processed some $35 million in task orders, focusing on projects integrating environmental sustainability and economic growth. The program was active in 20 countries and 2 regions (Sahel and East Africa). During FY 2000, RAISE assisted USAID/Haiti in the design of a $40 million Hillside Agriculture Program and helped negotiate a partnership between USAID and the Specialty Coffee Association of America (SCAA).

- The Partnership for Food Industry Development (PFID) *is a 10-year USAID-university partnership designed by the Office of Agriculture and Food Security. PFID builds upon the recently amended Title XII, which calls for improved distribution, storage, and marketing in developing countries, not only to prevent hunger and ensure human and child survival, but also to build the basis for economic growth and trade. It has a financing capacity of $50 million (including a provision of up to $30 million in task orders from interested missions and bureaus). A Cooperative Agreement is being negotiated with two university-led consortia to support research and field operations for food-industry development and trade, in order to promote productivity and broad-based economic growth in USAID partner countries. PFID succeeds the Regional Agribusiness Project and the Collaborative Agribusiness Support Project.*

- The Dairy Enterprise Initiative's partners—*Land O'Lakes, Cooperative Resources International, Heifer Project International, ACDI/VOCA, and Partners of the Americas (POA)—conduct activities in Honduras, Nicaragua, Montenegro, Albania, Bulgaria, Rumania, Zambia, Malawi, Kenya, and the West Bank to assist smallholder dairy producers and processors in developing local dairy industries. In FY 2000, West Bank project extension agents visited more than 385 villages and 1,624 farmers with over 308,155 sheep and goats. The project also included a special women's component, in which project extension agents visited 136 villages and trained Bedouin women. The average mortality rate among newborn sheep and goats decreased from 39 to 24 percent in the year since the project began. Milk yields improved 20 percent during the same period.*

- Two dairy development projects *were implemented in Kenya. One, aimed at creating awareness about the nutritional value of milk and dairy products, resulted in improved nutritional status in the communities near the milk plant. The other created employment and fostered business activities to strengthen the dairy industry. The net price paid to farmers per liter of milk has risen by 20 percent. Activities carried out in Nairobi brought together farmers, cooperative leaders, dairy processors, NGOs, school children and teachers, government officials, equipment suppliers, and the media. In all, 3,085 farmers and youth were trained in dairy husbandry and hygienic milk handling.*

AFRICA

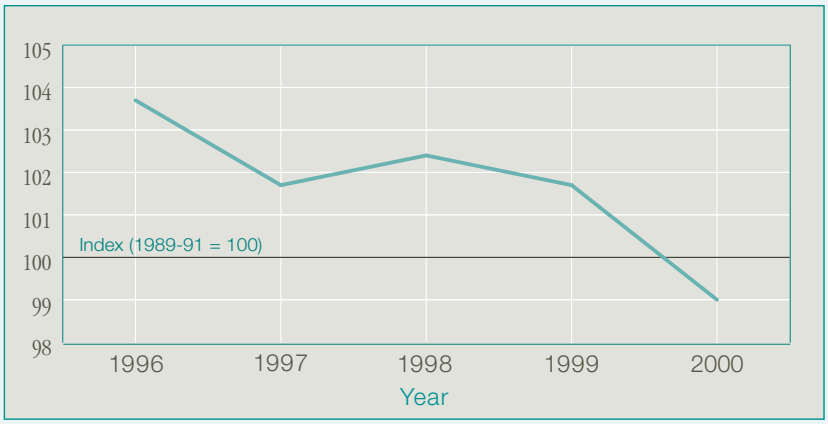
REGIONAL BUREAUS

The Africa Region, particularly Sub-Saharan Africa, continues to be a major focus of USAID's efforts in agricultural development. Agriculture remains the backbone of most African economies. Widespread food insecurity, hunger, and resource degradation still plague much of Sub-Saharan Africa, while population growth and urbanization are outpacing gains in agricultural productivity, as illustrated in the declining performance of per capita agricultural production (figure 1).

Today, the growing impoverishment in many parts of the continent is fueling social conflict, while the rapid spread of HIV/AIDS continues to take a devastating human and economic toll. The result has been a general decline in living standards. Since a majority of Africans are smallholder farmers, investments in agriculture and agro-industries will continue to play an important role as an engine of economic growth, food security, and poverty reduction.

The overall goal of the Africa Bureau's agriculture programs in FY 2000 was to address two of the most pervasive causes of malnutrition in Africa: food insecurity and poverty. The Bureau did so primarily through bilateral USAID missions to help strengthen partnerships with local institutions, NGOs, entrepreneurs, and governments. Programs and activities ranged from developing technology and market systems to strengthening producer organizations and rural enterprises. Eleven out of 27 missions had active agriculture-related strategic objectives of raising rural incomes through expanded rural enterprises or new employment opportunities.

FIGURE 1: TRENDS IN NET* PER CAPITA AGRICULTURE PRODUCTION–SUB-SAHARAN AFRICA (1996–2000)



Source: 2001 FAOSTAT Data

* Net: Seed and livestock feed production removed from total production figures prior to index calculation

PROGRAM HIGHLIGHTS

- *USAID/Uganda's agricultural programs improved the ability of Uganda's poor to meet their basic consumption requirements. Average rural annual income grew by over 8 percent. The mission's ongoing investments in Uganda's horticultural sector helped expand the volume of exports, and international buyers have begun to recognize Uganda as a top competitor.*

- *In Ethiopia, USAID's support to sustainable agricultural development helped restructure 112 farmer cooperatives into business-oriented enterprises that paid over $1 million in dividends to their members.*

TABLE 4: 1998–2000 AGRICULTURE OBLIGATIONS FOR AFRICA (THOUSAND $)*

BILATERAL	FY98	FY99	FY00
Angola	6,600	4,620	0
Congo (DROC)[1]	0	0	500
Eritrea	2,005	1,850	2,500
Ethiopia	3,614	7,764	3,000
Ghana	3,456	4,248	7,000
Kenya	2,703	2,000	6,700
Liberia	6,093	1,589	2,399
Madagascar	1,500	0	349
Malawi	5,175	10,211	7,885
Mali	7,749	7,562	5,391
Mozambique	14,000	9,200	10,715
Nigeria	0	1,000	7,349
Rwanda	2,800	3,000	4,900
Senegal	445	1,263	0
Somalia	875	0	0
Tanzania	0	2,000	2,000
Uganda	7,039	7,500	12,500
Zambia	2,195	2,000	5,500
Zimbabwe	0	1,500	699
REGIONAL			
REDSO/ESA[2]	635	3,147	3300
SA Regional[3]	2675	2,820	3100
Sahel Regional	2,382	1,470	2000
South Africa	0	0	2400
Africa-Wide (AFR/SD & DP)[4]	5,971	6,417	7,546
CGIAR[5]	0	2,000	0
Total	**77,912**	**83,161**	**97,733**

*Data for FY 1998 and FY 1999 from FY 1999 Title XII Report to Congress. Data for FY 2000 from Emphasis Area Coding System database. This table does not include Title II funds which can be significant for some countries (see Table 8). [1]Democratic Republic of the Congo; [2]Regional Economic Development Support Office/East and Southern Africa; [3]Southern Africa Regional; [4]Africa Bureau, Office of Sustainable Development and Office of Development Planning; [5]Consultative Group on International Agricultural Research.

In Malawi, significant progress was made in increasing smallholder farmer participation in producer organizations. In 2000 there were some 80,000 members in nearly 70 such organizations, a 53-percent increase from the previous year. Member farmers received higher prices for their commodities than non-members.

In Zambia, a program designed to provide producer support and financial services and links to markets (the CLUSA model) helped raise rural incomes in target areas. The success of this program helped leverage an additional $18 million from the International Fund for Agricultural Development.

In Guinea, USAID worked with 3,200 farmers to improve conservation and soil fertility, tripling rice yields in some cases. The mission also negotiated a 10-year endowment fund agreement with the government to help sustain its microfinance programs. Through these programs, USAID/Guinea helped 7,000 small enterprises expand their operations by 56 percent with loans worth over $3.6 million. Women accounted for over three-fourths of the borrowers.

Bilateral missions drew on U.S. universities to help monitor and assess the impact of USAID program activities. In FY 2000, for example, USAID/Mozambique and USAID/Kenya received assistance from Michigan State University (MSU) to develop and manage income proxy models that helped generate, at very low cost, estimates of household incomes and income components. The proxies enable the missions to monitor and evaluate the impact of program activities whose strategic objective is to raise rural incomes.

REGIONAL ACTIVITIES

By supporting regional activities coordinated by African commodity research networks, USAID was able to assist many national research programs in multiplying and disseminating new technologies to smallholder farmers. These networks also helped expand market opportunities and encouraged knowledge and information sharing

across member countries. The University of Georgia, the University of Nebraska, Purdue University, Michigan State University, Texas A&M University, and Oregon State University, in partnership with international agricultural research centers, CRSPs, NGOs, local institutions, and the private sector, collaborated with the commodity networks.

These region-wide efforts are beginning to bear fruit. For example, the maize network in West Africa reported that more farmers were cultivating improved maize and that use of improved maize varieties in Ghana had increased from less than 20 percent in 1988 to about 76 percent in 2000. A rapid dissemination of disease-resistant cassava varieties developed by the International Institute of Tropical Agriculture and supported by USAID/Uganda resulted in a tenfold increase in cassava production in Uganda in the last few years. Today, the Africa Bureau is helping six bilateral missions develop programs on biotechnology and biosafety.

USAID targets food aid to some countries in Africa to help achieve greater food security in crisis situations—both man-made and natural. In other countries, targeted food aid is used to help achieve long-term development objectives in the agriculture sector, permanently improving the assisted countries' agricultural self-reliance.

LAC
Latin America and the Caribbean

Twelve USAID bilateral missions and the two regional programs in the Latin American and Caribbean (LAC) region devote a portion of their resources to USAID's strategic goal of achieving broad-based economic growth. Of these, 11 bilateral missions and the LAC regional program focus on expanding access and opportunities for the poor. The LAC regional program and the Central American regional program also direct their assistance toward strengthening markets, with the majority of this assistance targeted to trade capacity building, particularly in the smaller economies.

Although LAC countries had some success in reducing poverty during the 1990s, these gains occurred primarily in countries with relatively high rates of economic growth. However, economic growth rates have not been sufficient in many countries to achieve the Summit of the Americas and the OECD Development Assistance Committee's poverty reduction goal. In Ecuador, Haiti, Jamaica, Nicaragua, Paraguay, and Venezuela, per capita income growth rates were negative during the 1990s. Poverty remains a serious program in rural areas of Latin America and the Caribbean. Although poverty has become more urbanized, the majority of the extremely poor (47 million people) still lived in rural areas at the end of the 1990s.

In FY 2000, USAID's bilateral agricultural programs in Latin America and the Caribbean concentrated on helping small farmers in the poorer countries to increase their productivity and incomes. Most programs focused more on the delivery of production and marketing services to small farmers than on policy reform and institutional development. Most worked with the private sector, particularly NGOs, with fewer interactions with government institutions in the agricultural sector. Bilateral programs also focused on strengthening producers' organizations, developing rural enterprises, promoting land titling, and providing assistance in accessing high-value niche markets.

PROGRAM HIGHLIGHTS

- *In Honduras, 16,041 farmers received land titles under the mass land-titling program supported by USAID. Preliminary findings indicate that farmers have begun using these titles to secure bank financing.*

- *In Honduras, the USAID-financed REACT Program, established to help farmers return to pre-Hurricane Mitch*

levels, has trained thousands of small horticultural and dairy farmers, increased employment, commercial sales and incomes, and leveraged millions of dollars in new private investment in production, post-harvest, and marketing infrastructure. It combines four agribusiness projects and four grantee consortia led by established Honduran institutions (FHIA and Zamorano), the Land O'Lakes cooperative, and Fintrac/CDA, a U.S. woman-owned small business.

- *USAID/Peru, with technical assistance provided by Winrock International, helped a group of 1,400 smallholder shade-coffee producers in the Apurimac River Valley to create a specialty coffee cooperative called Inkafe VRAE. Seattle's Best Coffee, a USAID partner, purchased two containers of the cooperative's specialty coffee at a premium price. Because of the improved competitiveness of this new cooperative, Inkafe VRAE recently came in second in the national cupping competition for specialty coffees in Peru.*

- *Title II food resources were used in Bolivia, Honduras, Guatemala, Nicaragua, and Peru, among the most food-insecure countries in the region, to help some of the poorest farmers in these countries increase their productivity and incomes. In Honduras, the CARE Title II program, which works in the western part of the country, was able to achieve a 106-percent increase in the yields of basic grains over the 5-year life of the project and a 3,000-percent increase in the proportion of households with markets in their communities.*

TABLE 5. LAC BUREAU AGRICULTURAL OBLIGATIONS BY COUNTRY (THOUSAND $)

	FY98	FY99	FY00
Bolivia	688	400	0
Colombia	0	0	0
Ecuador	0	0	550
El Salvador	3,406	3,205	2,533
Guatemala	5,413	8,525	8,175
Haiti	1,400	10,154	6,826
Honduras	559	2,333	978
Jamaica	0	0	2,170
Nicaragua	5,084	5,500	5,929
Peru	3,832	1,535	5,920
Caribbean Regional	0	0	500
LAC Regional	7,096	3,215	760
Total	**27,478**	**34,867**	**34,341**

*Data for FY 1998 and FY 1999 are from FY 1999 Title XII Report to Congress; data for FY 2000 from Emphasis Area Coding System database. This table does not include Title II funds, which can be significant for some countries (see table 8). Adjusted figures, excludes International Narcotics Control (INC) funds currently coded as Economic Support Fund (ESF) in the Emphasis Area Coding System database.

REGIONAL ACTIVITIES

USAID identified cutting-edge lending technologies and approaches and is making them available across the region. USAID has disseminated methods for improving access to international, high-value niche markets (e.g., applications of information technology and specialized certification systems that enhance the ability of smaller producers to compete in markets).

- *In Dominica, the USAID-funded Caribbean Land Information and Environmental Sustainability (CarLISES) program developed a prototype for the verification of environmentally sustainable banana production for the Dominica Banana Marketing Corporation (DBMC). The CarLISES example set the stage for the development of similar projects in coffee and cocoa in Peru.*

USAID missions and local agribusinesses in Central America, Haiti, and the Dominican Republic have requested similar programs for their countries. Activities may be expanded to accommodate larger numbers of small businesses and entrepreneurs as well as small farmers to market their products in high-value niche markets.

ASIA AND THE NEAR EAST

USAID invested in agricultural and food security programs in nine countries in the Asia and the Near East (ANE) region: Bangladesh, Egypt, Indonesia, Lebanon, Mongolia, Jordan, Nepal, the Philippines, and West Bank/Gaza. Egypt and Jordan accounted for 88 percent of this investment.

In Egypt, agricultural programs support policy reform, agribusiness development, and increased export competitiveness for agricultural products. Funding in Jordan supports improved water resource management. Agricultural programs in Asia are typically more limited and focused due to funding constraints. In Indonesia, the emphasis is on improving agricultural policies. Activities in Bangladesh support the growth of agribusiness and improved management of aquatic and tropical forest resources. Finally, agricultural activities promote the adoption of higher value fishing/farming products and techniques in Mindanao, the Philippines, and the development of coffee cooperatives in East Timor.

PROGRAM HIGHLIGHTS

- *In Bangladesh, USAID activities provided information, expertise, and capital to agribusiness enterprises ranging in size from large farms and food processors to household gardens and fish ponds. USAID also worked to improve the policy and institutional environment for agribusiness, integrate food policy and food security planning, and improve the productivity of water resources.*

- *In Indonesia, USAID's Food Policy Initiative contributed critical input into rice pricing and tariff issues through extensive research and dialogue with Indonesian policymakers.*

- *In Egypt, USAID continued to support special efforts to provide employment and income opportunities to the country's poorest-the four million small farmers, landless laborers, and women-who produce and process horticultural and other agricultural commodities. Through the Agricultural Technology Utilization and Transfer (ATUT) Project, new nursery*

TABLE 6. ANE BUREAU AGRICULTURE OBLIGATIONS BY COUNTRY (THOUSAND $)*

	FY98	FY99	FY00
Bangladesh	2,941	2,800	3,303
Egypt	90,500	100,142	72,291
Indonesia	5,600	2,412	4,093
Jordan	31,865	20,000	27,390
Laos	0	1,500	0
Lebanon	0	0	2,250
Mongolia	0	0	1,596
Nepal	1,000	1,000	*
Philippines	0	0	500
Regional Program	0	1,566	0
Sri Lanka	0	1,000	0
West Bank/Gaza	0	0	2,287
Total	**131,906**	**130,420**	**113,710**

*Data for FY 1998 and FY 1999 are from FY 1999 Title XII Report to Congress; data for FY 2000 from Emphasis Area Coding System database. This table does not include Title II funds which can be significant for some countries (see table 8). Funds for agricultural activities in Nepal are coded under Environment.

and production techniques made Egyptian strawberries available in time to coincide with Europe's high-demand and high-priced periods, resulting in an increase in exports of 75 percent, valued at $23 million.

Environmental programs also contribute to food security. USAID/Philippines' Coastal Resource Management Program improved local food security by working with communities to manage their fish and other seafood resources sustainably.

REGIONAL ACTIVITIES

The Fostering Resolution of Water Resources Disputes Project (FORWARD) is a regional project that assists governments and stakeholders in Asia and the Near East with collaborative approaches for resolving water issues. In FY 2000, FORWARD conducted activities in water management and agricultural pricing.

E&E
EUROPE AND EURASIA

Agriculture continues to play a significant role throughout the Europe and Eurasia (E&E) Region. Food and timber production alone account for over half the GDP of Albania, a quarter of that of the Federal Republic of Yugoslavia, and nearly 40 percent of Georgia's and Armenia's. A significant proportion of these populations is poor. Food shortages are frequent where significant refugee populations live, particularly in the Caucasus and the Balkan countries.

Agriculture served as a buffer against macroeconomic crises and declining growth in many E&E countries. Industrial output declined more rapidly than agriculture in nearly every country where GDP growth was negative in the 1990s. In Croatia, where overall output growth was positive, agricultural growth averaged 2 percent per year while industrial output grew by only 1 percent per year on average.

In Central and Eastern Europe, USAID provided agricultural assistance to Albania, Bulgaria, Romania, and the former republics of the Federal Republic of Yugoslavia (FRY), which include Macedonia, Bosnia, Croatia, Kosovo, and Montenegro. The agriculture sector was a significant contributor to GDP in most Central and Eastern European countries and provided an income and employment safety net, especially in the Balkans.

Most of USAID's agricultural assistance in Europe and Eurasia supported dairy producers and processors, agricultural trade associations, land privatization and registration, improvements in the business environment, and access to credit for small and medium-sized businesses. Important progress was made in implementing land reform and registration, developing the dairy industry, privatizing state farms, and assisting rural entrepreneurs.

In the Former Soviet Union, developing private agricultural input and output markets and helping small producers to access those markets continued to be the focus of agricultural assistance. USAID efforts in this subregion were implemented largely by U.S. NGOs.

PROGRAM HIGHLIGHTS

In Albania, two USAID partners were particularly successful. The International Fertilizer Development Center worked to establish and support trade associations, technical assistance, policy reform, and access to credit, resulting in significant growth in production and sales for 700 members of 7 trade associations. Compared with the previous year, the meat processors association increased its revenues by 61 percent, the poultry asso-

ciation increased revenues by 63 percent, and flour millers in the association grew their business by 42 percent.

- *The University of Wisconsin's Land Tenure Center implemented the Albania Land Market Development Project. It established 34 Immovable Property Registration Offices where transactions are being registered, completed 90 percent of the base map for cadastral zones, and registered almost 70 percent of properties for the first time. This initiative is laying the foundation for modern, market-based agricultural and urban land improvement and utilization.*

- *In Ukraine, Moldova, and Georgia, assistance included programs to provide and register land titles. Activities in Azerbaijan focused on the formation of farmer associations, while programs in Moldova, Armenia, Russia, and Georgia focused on establishing farm stores and increasing the availability of seeds, fertilizers, and credit.*

- *USAID provided general agribusiness support in Ukraine, Moldova, and Azerbaijan, with extension support for small farmers provided in Armenia and Ukraine. Agricultural policy work continued in Ukraine, with the involvement of Title XII universities.*

- *In Georgia, a small but ambitious assistance effort will help the Minister of Agriculture design and implement a policy and administrative restructuring program. New programs with policy components are also being planned in Moldova and Georgia.*

Market Linkages Forged in Moldova

The program in the Europe and Eurasia Region that best reflects progress in our efforts to reform and revitalize the agricultural sectors in this region is the USAID-funded Private Farmer Commercialization Program, which is being implemented by Citizens Network for Foreign Affairs (CNFA) in Moldova.

Developing market linkages is the key to reviving the agricultural sectors of E&E countries. Food processors, shippers, and retailers are also key links in the marketing chain.

The Market Linkages program builds upon the 931 state and collective farms privatized and the 792,000 individual land titles distributed over the last 5 years through USAID grants to Soros' East-West Management Institute and Booz-Allen & Hamilton. To support these newly endowed private farmers, CNFA facilitated the creation of 9 farm stores, 4 regional farm service centers, 8 cooperatives, and 45 Savings & Credit Associations (SCAs), and assisted 7 agricultural produce processing enterprises.

Table 7. Agriculture's Contribution to Growth and to GDP in Selected Countries of Eastern Europe & the Former Soviet Union

	Change in Gross Output (% change; average 93-99)		Sector Share of GDP (percent)	
	Industry	**Agriculture***	**Industry**	**Agriculture***
A. Eastern Europe				
Albania	2	7	12	54
Bulgaria	-3	1	28	15
Croatia	1	2	17	6
Fry	-3	-1	35	25
Macedonia	-3	-1	22	10
Romania	0	1	32	17
B. Former Soviet Union				
Armenia	1	0	25	36
Azebaijan	-8	-5	25	24
Georgia	-7	1	14	37
Moldova	-8	-4	25	27
Russia	-4	-4	31	7
Ukraine	-5	-5	29	15

*Agriculture includes farm production only, while food processing and retailing—important elements of agribusiness—are counted as part of industry. Source: Transition Report Update, European Bank for Reconstruction and Development, 2001.

Bureau of Humanitarian Response

Office of Foreign Disaster Assistance

The mandate of the USAID Office of Foreign Disaster Assistance (OFDA) is to save lives and reduce human suffering. While the majority of its International Disaster Assistance funding is directed toward response to natural and human-caused disasters, a portion of its resources is spent on mitigation and preparedness. Funding agricultural activities through IARCs is one way that OFDA seeks to improve food security for vulnerable populations in disaster-prone areas of the world.

Maintaining food security during times of crisis is a critical component of disaster prevention and mitigation. Direct funding to IARCs allows researchers within individual countries to ascertain immediate needs of farmers and to respond appropriately, using suitable technologies and methodologies. In addition, overall disaster preparedness can increase dramatically when suitable strategies are developed in advance to mitigate and prevent loss of food security. In arid regions, for example, programs that provide drought-resistant, locally adapted cultivars of staple crop plants can keep productivity at an acceptable level during times of water stress, reducing the need for foreign food aid. The development of early warning systems and regional strategies for coping with drought can also serve to reduce food insecurity in these arid zones.

In FY 2000, USAID/OFDA supported a range of agricultural activities through the IARCs, focusing primarily on crop and livestock productivity in Africa. As a result, the overall sustainability of many smallholder farms has been significantly enhanced.

Program Highlights

- *In Sierra Leone, farmers have been frequently forced to abandon their fields, seeds, and planting materials. OFDA funding for the International Institute of Tropical Agriculture (IITA) has provided farmers with improved planting materials of cassava and yams; improved seeds of maize, cowpea, and soybean; and basic farm tools including hoes, machetes, wheelbarrows, and shovels. The project has also promoted improved management practices.*

- *In Sub-Saharan Africa, USAID, including OFDA, has supported efforts by IITA to implement an emergency program to tackle a cassava mosaic disease (CMD) pandemic that has devastated cassava production in East Africa. Strong progress has been made in monitoring and forecasting the pandemic's development, multiplying CMD-resistant varieties, and conducting training in CMD management methods.*

- *An OFDA-supported project led by the International Livestock Research Institute recently completed a study on "Traditional Coping Mechanisms to Crisis Situations in Livestock Systems in the Greater Horn of Africa." Information provided by the study to the Global Livestock CRSP's Livestock Early Warning System, led by Texas A&M, facilitated the establishment of a monitoring system in drought-prone areas in the Greater Horn of Africa, using both traditional and modern technologies to provide earlier warning than the anthropometrics-based early warning system.*

- *An OFDA-commissioned study by the International Center for Tropical Agriculture (CIAT) and Mississippi State University reviewed the effectiveness of seed aid in Kenya, drawing on a history of almost 10 years of repeated seed aid. While farmers assessed the crops and varieties given as appropriate, they expressed concern that*

the timing was generally late, targeting was not transparent, and too little seed was provided. The study found no concrete evidence that seed aid, per se, is strengthening farmer systems, and determined that seed aid is often given without understanding the constraints to the system.

- *In Honduras and Nicaragua, CIAT launched the Seeds of Hope for Central America project to reestablish food-production capabilities after Hurricane Mitch. The project aims to restore critical seed stocks that were lost in the hurricane and teach environmentally appropriate farming techniques that hold promise both for feeding the two countries over the long term and for reducing their vulnerability to natural disasters in the future. To date, about 22,000 farmers and their families have benefited from the project's outputs, including the planting and harvesting of two bean crops.*

Office of Food for Peace

P.L. 480: Title II Food for Peace Non-Emergency Program

In FY 1999, food assistance programs (including Title II) accounted for over 23 percent of U.S. Foreign Assistance.[1] In FY 2000, $928.2 million was channeled through Title II programs, of which $437.4 million was for development activities and $490.8 million was for emergency activities. The development activity budget was divided as follows: $163.2 million for Africa (37.3 percent), $150.2 million for Asia/Near East (34.3 percent), and $124 million for Latin America (28.3 percent). More than half of the 57 countries receiving Title II funding in FY 2000 were in Africa.

P.L. 480, Title II development funding is one of the main sources of funding for agricultural and food security activities in the Agency. Priority is given to activities that improve household nutrition and agricultural productivity. Development assistance programs are designed with specific food security objectives, targets, and indicators. Title II activities promote more productive and diversified farming systems, improve postharvest management and marketing, provide microfinance credit, and improve natural resource management. Title II programs are integrated and involve activities to address access, availability, and utilization of food, in accordance with the Agency's 1995 Food Aid and Food Security Policy Paper.

To provide greater sustainability to the programs, Title II grantees implement their programs in partnership with local communities, governments, national NGOs, and research institutions. Partners also include the IARCs and universities. Michigan State University, Tufts University, and the Academy for Educational Development provide ongoing assistance in targeting and measuring the impact of food aid programs.

Some notable successes in Title II programs include the following:

- **Improved Agricultural Production and Food Security/ Nutrition Linkages in Mozambique.** *Farmers participating in CARE's Viable Initiatives in the Development of Agriculture (VIDA) project who planted sunflowers, sesame, improved maize varieties, and disease-resistant peanuts have seen average income received from these crops increase by 50 percent over the past 2 years. The price received for white sesame increased by 150 percent, thanks to strong export markets. In FY 2000, CARE initiated a nutritional component in the VIDA project. Its main focus is to improve the nutritional value of the maize porridge that is typically fed to small children by adding vegetable oil, pounded sesame seeds, or ground peanuts. A survey conducted at the end of the program year showed that 70 percent of women had adopted this practice after witnessing a demonstration by VIDA extensionists.*

- **Increased Availability of Food in Cape Verde.** *ACDI/ VOCA Cape Verde collabo-*

[1] The U.S. International Food Assistance Report 1999 (USAID, January 2000)

Bureau of Humanitarian Response
continued

rated with the FAO's Horticulture Sector Development Project in drip irrigation training and promotion and developed financial service providers that disburse loans to farmers for drip irrigation systems and to local importers of drip irrigation equipment. The percentage of irrigated horticulture cropland in Cape Verde under drip irrigation is approaching 30 percent, according to the FAO. Total production of vegetables has increased by 300 percent since 1991, resulting in a greater availability of horticultural crops in the market at a more modest price.

Impressive Yield Increases of Basic Crops in Honduras. *CARE reports that under its recently completed 5-year Title II activity, crop yields in the project area increased by 26 percent for corn, by 39 percent for sorghum, and by 105 percent for beans. Increased availability of basic grains in the project area has affected nutritional status at the household level, increasing the percentage of children with adequate growth trends from 33 percent in 1997 to 65 percent by 2000.*

TABLE 8. P.L. 480 TITLE II EMERGENCY AND NON-EMERGENCY FUNDING: 20 LARGEST RECIPIENT COUNTRIES IN FY 2000 (THOUSAND $)*

	Emergency	Non-Emergency	Total
Ethiopia	106,096	34,859	140,955
India	1,868	117,295	119,163
Korea (DPRK)[1]	60,970	0	60,970
Angola	50,651	9,177	59,828
Serbia	54,746	0	54,746
Peru	0	39,573	39,573
Sudan	36,461	0	36,461
Kenya	22,804	7,114	29,918
Haiti	0	25,076	25,076
Mozambique	5726	19,233	24,959
Sierra Leone	23811	0	23,811
Bangladesh		23,798	23,798
Bolivia	0	22,830	22,830
Ghana	0	21,451	21,451
Guatemala	0	19,745	19,745
Uganda	8909	10,744	19,653
Indonesia	13688	4,422	18,110
Burkina Faso	0	14,017	14,017
Afghanistan	13,978	0	13,978
Rwanda	6002	4,966	10,968
Others	85,134	63,100	175,310
Total	490,844	437,400	955,320

*Food for Peace Information System (FFPIS Report). FY 2000 P.L. 480 Approved Budget Summary Report—Revised Final Report, March 28, 2001. [1]Democratic People's Republic of Korea.

Activities and Recommendations of the BIFAD

The Board for International Food and Agricultural Development (BIFAD) participates in the planning, development, and implementation of the activities described in Section 297 of Title XII. It also makes recommendations for and monitors these activities. The Board constitutes the core group of this nation's Food Security Advisory Committee, which advises the Interagency Working Group on follow-up to the World Food Summit. The current chair of the Board is Dr. G. Edward Schuh, Regents Professor and Director of the Freeman Center for International Economic Policy at the University of Minnesota. Four other serving members of the Board are drawn from the university community, and two are from the private sector. During FY 2000, BIFAD awarded its third annual Chair's Award for Scientific Excellence to Dr. Anthony Hall.

Themes from BIFAD meetings held in 2000 were:

March (131st Meeting)

- *World poverty: the proposed World Development Framework; poverty reduction guidelines; regional agribusiness promotion; university-NGO partnerships.*

June (132nd Meeting)

- *The food security crisis in the Horn of Africa: drought, conflict, food aid, technology transfers; the coming water crisis: dimensions, programs, new technologies; management issues; building a new coalition for foreign aid.*

September (133rd Meeting)

- *Policy coherence: OECD background and USAID initiatives; agriculture and the environment; trade and food security; constituency-building: raising support, roles for universities; USAID's response to the livestock revolution: roles for the CGIAR, donors, and universities; crafting a common message regarding agriculture: USAID and universities.*

Looking toward the Future

A cogent summary of BIFAD thinking during the tenure of the current Board is in the valedictory remarks of Chairman G. Edward Schuh. At his last meeting as chairman of the BIFAD, Dr. Schuh discussed some of the institutional changes over the last 6 years, the changing environment in which economic development takes place, and his thoughts on future directions for the Agency and the BIFAD. His remarks are summarized starting on page 38.

Scientific Excellence

In 1998, BIFAD instituted an annual Chair's Award for Scientific Excellence to recognize an individual researcher or team of researchers for a significant achievement from within the U.S. university community. The award highlights the success of USAID and university collaboration. It also recognizes work toward sustainable increases in food security and economic growth without environmental degradation. The 2000 award went to Dr. Anthony Hall, of the University of California-Riverside and a member of the Bean/Cowpea CRSP for 20 years, for his research in cowpea varietal responses to environmental stress, particularly the severe drought conditions in the Sahelian zone of Africa. Dr. Hall's research led to new varieties of cowpea that produced substantial increases in grain yields in shorter time periods without using pesticides. The collaboration between Dr. Hall, scientists at the Senegalese Institute for Agricultural Research (ISRA), the International Institute of Tropical Agriculture in Nairobi, other African and U.S. universities, and PVOs such as World Vision International, has been instrumental in famine relief and in laying the groundwork for a "doubly green revolution" in Africa. Dr. Hall's presentation to the BIFAD, "Cowpea Varieties Provide a Partial Solution to Sahelian Droughts," is included as Annex 2 of this Report.

The picture shows Dr. Hall (on left), recipient of the Award, with Dr. G. Edward Schuh, Chairman of BIFAD.

New Visions for Universities, The BIFAD, and Foreign Aid in Agricultural Development: Bifad in the 21st Century*

*G. Edward Schuh.***

In the last 6 years, BIFAD updated, reformed, and revised each of the major institutional arrangements that constitute the Title XII program. In collaboration with Agency staff and representatives from the universities, it revised the CRSP Guidelines, the basic document for the Collaborative Research Support Programs. With leadership from Ed Price of Texas A&M University and colleagues within the Agency, important revisions were made in the original Title XII legislation, aimed at broadening its mission and adapting it to the current environment. One of the first initiatives of the reestablished BIFAD was to consider how the declining support for foreign aid could be rebuilt. A related issue was the deterioration in support for agriculture within the Agency. The Board made the revitalization of support for agriculture (and implicitly, economic development) one of its key objectives. New agricultural staff are being appointed and budget support for agriculture is increasing. The Board also undertook a number of confidence-building activities to help heal relations between the Agency and the university community and rebuild what historically was a very valuable relationship.

Institutional Changes

The BIFAD was re-created about 6 years ago, after a period in which it was in abeyance. The previous members of the Board had resigned en masse because they felt that the Agency was not taking it seriously. I was appointed chair of what I often describe as the reincarnation of the Board, and some of my colleagues were appointed at that same time.

When the BIFAD was reactivated in 1996, some of the main elements of the past were not reestablished. One of these was the Joint Committee on Agricultural Research and Development (JCARD). The JCARD had been an important means by which criteria for programs were established and program decisions were made, with input from both the university community and the Agency.

There seemed to be little chance that the JCARD itself was going to be re-created. In its place, the Board worked with both the university community and Agency staff to create the Strategic Partnership for Agricultural Research and Education (SPARE). An important feature of the new arrangement is that it brings the National Association of State Universities and Land Grant Colleges' (NASULGC) Board on Agriculture into formal collaboration with the Board and the Agency.

Following the World Food Security Forum in Rome, the BIFAD was made an integral part of this nation's Food Security Advisory Committee, with the chair of the Board being the co-chair of the larger Committee. This reflected the need for a mechanism through which to advise the Interagency Working Group that had prepared the original papers for that Forum and the Action Plan that followed it. Being an integral part of this Advisory Committee gives the Board a much larger range of responsibilities and increases its potential for influencing food security policy.

In 1998, the BIFAD created the Chair's Award for Scientific Excellence. This award, made annually, is designed to recognize the significant contributions of the CRSPs to science, poverty alleviation, and food security.

One of the continuing significant breaks with the past, however, has been the lack of staff support for the activities of the Board. In earlier days the BIFAD had a full-time Executive Director in an office in Washington, DC, backed by a number of full-time staff and a significant operating budget. When the Board was reestablished, none of those support arrangements were re-created. Some part-time staff in the Agency were assigned to work with the Board, but they had other responsibilities as well. In effect, the Chair of the Board had to provide the leadership for developing programs and the agendas by working with these part-time people, mostly on the telephone. Eventually, the Board was able to negotiate funding for a part-time person and a research assistant at the University of Minnesota to support the Chair and the Board. This was helpful, but it still

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* Chair, BIFAD, and Regents Professor of International Economic Policy, University of Minnesota, Minneapolis.

** Summary of concluding comments, meeting of the Board for International Food and Agricultural Development (BIFAD), Washington, DC, March 30, 2001.

does not provide the support that a full-time person in Washington would provide.

Another change in BIFAD arrangements was in the composition of the Board. Previously, the Board was made up mostly of presidents of major universities. When the Board was reestablished, there were no university presidents among its membership. New appointments to the Board should be university presidents. University presidents can speak with much more authority on the national scene than regular academics or representatives from the private sector.

Changes in the International Economy

In recent decades, the international economy has been undergoing dramatic changes. Many of these changes have very important implications for the Agency, for the BIFAD, and for the university community.

The first significant change, and perhaps the one with the most pervasive implications, is globalization. In the 1950s and 1960s, when foreign aid became an important part of this nation's foreign policy, individual countries were thought of as autonomous and relatively independent. Collaborative programs of foreign aid could be developed for individual countries on that basis.

That single-country perspective is no longer possible. The growth in international trade has changed the way one has to think about foreign aid. Moreover, the emergence of huge international financial markets, combined with the shift to a system of flexible exchange rates, has significantly changed the fundamentals in the international economy. Economic integration brings with it an enormous increase in the interdependence of national policies. For example, U.S. monetary policy has a significant impact on the economies of other countries, in large part through its influence on interest rates in international financial markets. At the same time, events such as the Asian crisis have ramifications all around the world, including in the United States.

Ironically, very little attention has been given to the forces that are driving the process of globalization. Some believe that it is caused by the U.S. drive for global hegemony, combined with the growing power of the multinational firms. Less seldom is it recognized that globalization is driven by three basic technological revolutions: one in the transportation sector, one in the communication sector, and one in information technology. These technological breakthroughs have enormously increased the scope for markets. They have also greatly increased the benefits from international trade.

These technological revolutions have been limited primarily to the developed countries. They have hardly touched the developing countries, where 80 percent of the world's population live, or the previously centrally planned economies. The implication is that globalization is going to become increasingly profound and complex. That has enormous implications for the Agency, and for the BIFAD.

The second change in the international economy is the lack of Malthusian scares in recent decades. Such scares used to occur about once a decade, but it has been 25 years since the last one. The lack of a Malthusian crisis has significantly changed the economic development environment and weakened support for agricultural development programs.

While we still have periodic crises of hunger and famine in individual countries, these crises are for the most part politically motivated. The world has done an excellent job of avoiding major famines in the post-World War II period. We are not credible when we raise the famine or starvation issue as the means to make the case for agricultural development.

Instead, we must articulate the importance of agricultural development as an engine of economic growth and development. Agricultural modernization—the introduction of new production technology into the agricultural sector—distributes the benefits of economic development widely in society. Reducing the price of food increases real income. The poor and disadvantaged benefit more, since they spend a larger share of their budget on food. The further challenge is to articulate economic development as the key to addressing the world's poverty and food security problem.

There is political support for poverty alleviation. We must explain the connection between agricultural modernization, economic growth and development, poverty alleviation, and food security. The links are well established and documented by sound research. We need to take up the clarion call in favor of agricultural modernization, with its corollary call for the public goods that make agricultural modernization possible. Our government periodically makes commitments to these ends. It is time we get our programs back on track and consistent with our policy statements.

The third significant issue in the international economy is the importance of international trade. International trade parallels agricultural modernization as an engine of economic growth and development. It enables countries to specialize and engage in a division of labor in the international economy. More importantly, it eliminates the cap on per capita incomes that small countries experience because of the limited scope of their domestic markets. Many of the world's poor live in small countries. If these countries are willing to engage in specialization and division of labor and to trade internationally, they can alleviate the constraints on their economic growth and development.

Globalization has received a bad name in part because people concentrate on the relative distribution of income when they examine its effects. What they fail to recognize is that even though the relative distribution of income may become more unequal, low-income groups tend to experience increases in their absolute incomes as this process proceeds. Researchers who have searched for the cause of the widening income gap find that much of it lies in deficient educational systems. The expansion of international trade and economic integration shifts the demand for skills. Income distribution becomes more unequal in large part because of the failure of the educational system to deliver the necessary skills. This also has important implications for the Agency and for international development policy.

Pointing to the Future

There are three issues we need to keep in mind as we think about the future and the continued revitalization of the Agency. The first is the supply of public goods for the international economy. The critical public goods are in the form of institutional arrangements. Some of the pertinent ones now exist—the International Monetary Fund, the World Bank, the World Trade Organization, and environmental organizations such as the UNEP.

Most of these international organizations and institutions need to be redesigned and made more effective for the modern international economy. The United States should be taking the lead in this redesign work. The issues that surface are new international institutions to address the problem of food security, a stronger capability for agricultural research, and a system of taxes to provide the resources to support these organizations and institutions. Most of these issues fall within the purview of USAID and the BIFAD.

An example is the Consultative Group for International Agricultural Research, and the hundreds of millions of people who have been fed because of it. The political will to support that system is on the wane. If the system should become unsustainable, some years from now we will be holding conferences to redesign or re-create it. How much more sensible it would be to redesign the system at this point so it would be sustainable!

The second critical issue is the institutional infrastructure that supports international trade and specialization. This needs to be high on the Agency's agenda, and on the BIFAD's as well. The Agency and BIFAD should be assisting developing countries to strengthen their institutional arrangements for dealing with international trade issues. A special challenge is to link the new institutional arrangements for economic integration with agricultural research institutions and other international public goods.

Third, and perhaps most important, is the need for a science and technology policy capability to serve the global economy. The Agency becomes involved repeatedly in decisions about global science and technology policy. It needs such an in-house capability. The BIFAD provides such a science and technology policy capability. However, its resources are far too limited to enable it to do anything more than pool judgments.

The BIFAD and the other institutional arrangements that came out of the original Title XII legislation were designed for a different era. The challenge in today's world is to redesign the institutional arrangements that govern our relations among nations, especially those that promote broad-based economic growth and development. USAID has a major role to play in making this a reality. The BIFAD has a great deal to contribute in helping the Agency promote economic development and alleviate poverty.

Future Directions for Agriculture

In the developing world, more than 800 million people go to bed hungry each night. Most of these individuals live in Sub-Saharan Africa and South Asia, although there are groups in all regions vulnerable to undernutrition, either continuously or during specific seasons. Many of the hungry are farmers, but they are unable to produce adequate food and income to ensure their families' well-being. Even for the urban poor, safety nets are crisis-oriented, although a limited amount of donor-financed assistance is sometimes available to address the needs of the most vulnerable.

More than two billion children will be born over the next 20 years, and more than 95 percent of them will live in the developing world. To provide diets adequate for a healthy and active population, agricultural producers in developing countries must be able to more than double the current productivity of their land, labor, and water resources.

But agricultural[1] producers cannot do this on their own. Science, training, credit, infrastructure, and external investments must all come together to achieve the needed agricultural transformation at the production level and the sector level. Also, increased integration into global markets is critical for developing and transition countries. Not only will such integration contribute to making available new production and processing technologies, but it will also expand the opportunities for developing country agricultural producers and rural industries to market higher value crops and products competitively and profitably to a broader range of consumers.

Knowledge—and the capacity to harness its opportunities—is now recognized as a major driver of the development process in the global economy. Those without knowledge or skills to participate and compete in this economy are excluded from the potential benefits associated with greater information, commodity, and resource exchange. It is no surprise, then, that the capacity to innovate—to develop new knowledge and apply it productively—defines the countries that are most competitive in global markets.

Fortunately, there is currently a convergence of many elements that could enable agricultural producers and rural industries in USAID-assisted developing and transition countries to better meet the dual challenges of food production (for reducing hunger) and globalization (for promoting long-term income growth):

- *The development of agricultural science and technology, especially in the United States, has fostered extraordinary advances in biotechnology, bioinformatics, and expanded applications of geospatial and modeling tools.*

- *Recent analyses of economic development confirm the importance of agricultural productivity as a critical stimulus to broad-based, rural-led economic growth. These analyses have led to new appreciation of the power of those multipliers to translate agricultural growth into rural development.*

[1] As used in Title XII, amended, "agriculturists" includes farmers, herders, and livestock producers, individuals who fish and others employed in cultivating and harvesting food resources from salt and fresh waters, individuals who cultivate trees and shrubs and harvest nontimber forest products, as well as the processors, managers, teachers, extension specialists, researchers, policymakers, and others who are engaged in the food, feed, and fiber systems and its relationships with natural resources.

- *Non-governmental organizations (NGOs) have collaborated with farmers and farmer organizations in developing new approaches to transferring technologies, accessing markets, and tapping new sources of finance.*

- *Embracing the call for improved democratic governance and responding to the potential of the growing global marketplace, many developing and transition country governments have begun to put in place the economic, legal, and regulatory systems that facilitate greater engagement of agricultural producers in local and regional as well as global markets.*

- *Finally, USAID has been provided with a new and more positive legislative framework that supports the emergence of a "new agriculture" in developing and transition countries. Revised Title XII legislation passed in FY 2000 restates the United States' commitment to the goal of preventing famine and freeing the world from hunger.*

Over the next five years, USAID will renew its leadership in the provision of agricultural development assistance. This will be framed by a new agricultural strategy that will reflect adaptations to major emerging opportunities including:

- ***Accelerating agriculture science-based solutions, especially using biotechnology, to reduce poverty and hunger;***

- ***Developing global and domestic trade opportunities for farmers and rural industries;***

- ***Bridging the rural knowledge divide through training, outreach, and adaptive research at the local level; and***

- ***Promoting sustainable agriculture and sound environmental management.***

Providing leadership in promoting a "new agriculture" implies significantly increased investments in agriculture but also renewed, increased commitments from other donors. However, this will not happen automatically. USAID will build on its comparative advantages to provide the needed leadership in restoring a commitment to agriculture and hunger reduction. These comparative advantages include our potential to mobilize significant grant financing resources; our ability to engage multilateral and bilateral partners in common agendas; our capacity to mobilize the U.S.-based, high-quality network of scientific and technological expertise and to partner with the interests and experience of the most competitive entrepreneurial and corporate system in the world; our organizational knowledge, accumulated over 50 years of implementing development programs; and our strong field presence.

Many of USAID's programs already respond to these challenges individually.

However, in order to improve the Agency's effectiveness as a key foreign policy instrument, the Administration has begun to coordinate and focus Agency resources and capabilities to address hunger and poverty. The new central bureau of Economic Growth, Agriculture, and Trade will provide a new emphasis on the Agency's total portfolio of agriculture programs and activities with the ultimate goal of creating and cultivating viable market-oriented economies. This central bureau will highlight environmental sustainability, the development of human capital and the interdependence of economic growth and agricultural development.

No development effort is sustainable without economic growth and food security. The Agency will seek to increase support for economic growth and agriculture programs that reduce poverty and hunger, while finding better ways to mobilize and to partner with the private sector. One mechanism the Agency would like to pursue is Global Development Alliances (GDAs). GDAs could become a fundamental reorientation of USAID's role in providing international development assistance. Using the GDA approach, the Agency could serve as a catalyst to mobilize the ideas, efforts, and resources of the public sector, corporate America, the higher education community, and non-governmental organizations in support of shared objectives. USAID's exten-

sive field presence and technical expertise give the Agency the ability to integrate, coordinate, and facilitate a public-private alliance among different U.S. actors.

Under each "new agriculture" theme, the Agency also proposes to launch a set of activities that broadly signal a shift in USAID leadership in this sector and may leverage new commitments and funding from others. Selecting the activity most appropriate for a given region, set of households, or group of producers will involve participatory approaches to both research and technology transfer. Even within individual regions and countries, rural populations are highly heterogeneous. To be cost-effective, the activities identified must be capable of being scaled up, either by private or public sector organizations. Risk is also important, but as the microfinance experience has shown us, it cannot serve as an excuse to avoid reaching down to the poorest. Equally important, agricultural development is now seen as part, not the whole, of the solution. Investments in infrastructure, health, and education both reinforce and are made more viable by investments in agricultural growth.

Over the next year, we intend to lay a stronger intellectual foundation for USAID agriculture sector programming by developing a new strategy. We assume that the formation of specific Global Development Alliances, the public-private partnership modality that has characterized part of our current agricultural portfolio, will be significantly expanded. Highlights of this new strategy will be included in next year's Title XII Report to Congress.

Annex One
List of USAID Operating Units Reporting an Agriculture and Food Security Strategic Objective (SO)[1] in FY 2000

Unit SO Number or ID Number	Objective
Center for Economic Growth and Agricultural Development	
933-007-01	Increased science and technology cooperation among Middle Eastern and developing countries
933-002-01	Improved food availability, economic growth, and conservation of natural resources through agricultural development
LAC Regional Program	
SO 1	Progress toward resolving key market issues impeding environmentally sound and equitable free trade in the Hemisphere
USAID Albania	
182-001-13	Accelerated development and growth of private enterprises
USAID Armenia	
111-003-13	Accelerated development and growth of private enterprises
USAID Bangladesh	
388-002-01	Improved food security for the poor in targeted areas
USAID Bolivia	
SO 2	Increased income and employment for Bolivia's poor with emphasis on targeted communities
511-005-01	Illicit coca eliminated from the Chapare
USAID Bulgaria	
183-001-13	Accelerated development and growth of private enterprises in a competitive environment
USAID Egypt	
263-001-01	Accelerated private sector-led, export-oriented economic growth
USAID El Salvador	
519-001-01	Expanded access and economic opportunity for rural families in poverty
USAID Eritrea	
661-002-01	Increased income of enterprises, primarily rural, with emphasis on exports
USAID Ethiopia	
663-001-01	Increased availability of selected domestically produced food grains
USAID Georgia	
114-001-13	Accelerated development and growth of private enterprise
USAID Ghana	
641-001-01	Private sector growth
USAID Guatemala	
SO 2	Poverty reduced in selected geographic areas
520-006-01	Support to the implementation of the peace accords
USAID Guinea	
SO 1	Sustainable growth in agricultural markets
SpO 2	Protection of the environment
USAID Guinea-Bissau	
657-001-00	Increased private sector trade and investment
USAID Guyana	
504-001-01	Expanded economic opportunities for the urban and rural poor
USAID Haiti	
521-001-01	Broad-based, environmentally sound and sustainable increases in agricultural and urban incomes and employment

[1] Source: CDIE R4 Database as of 7/25/01. List of missions reporting activities linked to the Agency's Strategic Objective in Agriculture and Food Security (AGFS).

USAID Honduras	
522-001-01	Expanded and equitable access to productive resources and markets
USAID India	
386-008-01	Increased investment in agribusiness by firms
USAID Jamaica	
532-001-01	Increased participation for economic growth
USAID Kenya	
615-002-01	Increased commercialization of smallholder agriculture and natural resources management
USAID Lebanon	
268-001-01	Reconstruction and expanded opportunity
USAID Macedonia	
165-001-13	Accelerated development and growth of the private sector
USAID Malawi	
612-001-01	Increased agricultural incomes on per capita basis
USAID Mali	
688-002-01	Increased value-added of specific economic subsectors of national income
USAID Moldova	
117-001-11	Increased transfer of state-owned assets to the private sector
117-003-13	Accelerated development and growth of private enterprises
USAID Morocco	
608-003-01	Expanded base of stakeholders in the economy, targeting people of below-median income
USAID Mozambique	
656-001-01	Increased rural household income in focus area
USAID Nepal	
367-001-01	Increased sustainable production and sales of forest and high-value agricultural products
USAID Nicaragua	
524-002-01	Sustainable growth of small producers' income and employment
USAID Office of Sustainable Development	
698-014-01	Adoption of improved strategies, policies, and activities for accelerated, sustainable, and equitable economic growth
698-015-01	Adoption of improved agricultural policies, programs, and strategies
USAID Peru	
527-002-01	Increased incomes of the poor
527-005-01	Reduced illicit coca production in target areas in Peru
USAID Philippines	
492-001-01	Accelerated economic transformation of Mindanao
USAID RCSA	
690-003-01	Accelerated regional adoption of sustainable agriculture and natural resource management approaches
USAID REDSO/ESA	
623-002-01	Increased utilization of critical information by USAID and other decisionmakers in the region
USAID Romania	
186-002-13	Development and growth of private enterprises
USAID Russia	
118-002-13	Accelerated development and growth of private enterprises
118-003-14	A robust and market-supportive financial sector
USAID Sahel Regional Program	
625-003-01	Decision makers have ready access to relevant information on food security, population, and the environment

USAID Senegal	
SO 2	Increased crop productivity through improved natural resource management (NRM) in zones of reliable rainfall
SO 3	Increased liberalization of the market for agricultural and natural resources-based products
USAID Slovakia	
193-001-12	Increased soundness of fiscal policies and fiscal management practices
USAID South Africa	
SO 4	Improved capacity of key government and non-government entities to formulate, evaluate, and implement economic policies
USAID Tajikistan	
119-002-13	Accelerated development and growth of private enterprises
USAID Uganda	
617-001-01	Increased rural household income
SpO	(NEW) reintegration of Northern Uganda
USAID Ukraine	
121-001-11	Increased transfer of state-owned assets to the private sector
121-003-13	Accelerated development and growth of private enterprises
USAID West Bank and Gaza	
294-005-01	Selected development needs met
USAID Zambia	
SO 1	Reduced role of the state in the provision of goods and services
SO 2	Increased participation of rural enterprises and communities in the national economy

Annex Two
Cowpea Varieties Provide a Partial Solution to Sahelian Droughts

Presentation to the Board for International Food and Agricultural Development, Washington, DC

by Professor Anthony E. Hall,

Botany and Plant Sciences Department, University of California, Riverside, CA 92521, March 29, 2001

I will describe an agricultural development project that has been conducted since the 1970s in one of the most challenging environments for crop production on earth. This cowpea project is seeking ways for farmers in the Sahelian zone of Africa to partially overcome problems due to drought and heat. The Sahel is a large area stretching across Africa from Senegal in the west to Sudan in the east and is next to the Sahara Desert. I will show that, even in this extremely harsh environment, some progress can be made in agricultural development, but that it took many years and a collaborative effort involving many people. This is their story as well as mine; I will closely follow the text of my talk to ensure that I do not forget to give credit to at least some of the people who have contributed to this project.

Extreme droughts began occurring in the Sahel in 1968 in places such as Louga, Senegal, where our project has conducted some important field studies. For the 50-year period prior to 1968, average rainfall in Louga was 442 millimeters (mm) per year, and in many years it was sufficient to enable local varieties of pearl millet to produce adequate food. But, for the 30-year period from 1968 through 1998 the rainfall was 38 percent less, and only 276 mm per year. During these 30 years much of the Sahel has experienced some of the most severe droughts with respect to their effects on agriculture that have been recorded since biblical times. Traditional cropping systems that had evolved over thousands of years failed to produce much food in many of the dry years. When we started the project, the main crops near Louga were cultivars of pearl millet and peanut grown as sole crops in rotation. These crops had considerable drought resistance but it was not strong enough to withstand the droughts that occurred.

I began studying Sahelian droughts in 1974 as part of a United States Agency for International Development (USAID)-funded institutional development program at the University of California-Riverside (UCR). I decided to work on cowpea because relatively little was known about this crop and it was being grown to a small extent by Sahelian farmers and by some family farms in California. You may know this crop by the name southern peas or blackeye peas. I began my research program by conducting field experiments in California. I discovered that cowpea during the vegetative stage could survive droughts so severe that they would kill most other crop species; in addition, the droughted cowpea were able to recover when re-watered and produce excellent grain yields.

In 1976 I went to West Africa. I wanted to determine whether cowpea could offer at least a partial solution to the droughts occurring in the Sahelian zone. I took a small computer and used it to analyze data on rainfall, evaporative demand, crop water use, and soil conditions. I applied a hydrologic balance model and developed the concept that in a dry year with only 200 mm of rain, a variety of cowpea that could begin flowering in about 30 days could produce a crop within 60 days from sowing that might yield 1,000 kilograms per hectare (kg/ha) of grain. This predicted yield is about 10 times more than available cowpea landraces produce in these droughty conditions. I also predicted that it might be more effective to grow cowpea in the Sahelian zone than in the Savanna zones to the south that are wetter. This was because of differences I observed in the extent of insect pests. There appeared to be relatively few insect pests of cowpea in the Sahelian zone such that it might be possible to achieve substantial grain yield without using pesticides. In contrast, in the areas of the Savanna zones where much cowpea is produced, there are many serious insect pests, and pesticides usually have to be applied if a reasonable yield of cowpea grain is to be achieved. Unfortunately, in many parts of Africa, pesticides are applied in improper ways which can be dangerous to people and damaging to the environment. In testing the 60-day cowpea concept I faced a major problem. I knew of no cowpea varieties anywhere in the world in 1976 that could

flower early enough and produce a reasonable grain yield within 60 days from sowing in Sahelian conditions. Also, no other agronomic solutions to Sahelian droughts were apparent to me in that there were no other crop species that could produce useful amounts of food with only 200 mm of rain falling in a short growing season and with very hot conditions similar to those of the Sahara Desert in the summer.

After developing the 60-day cowpea concept, I proposed to the administrators of the Senegalese Institute for Agricultural Research (ISRA) that we initiate a collaborative project to develop short-cycle cowpea varieties and improved management methods for the Sahelian zone. They agreed with this proposal but pointed out that they had no trained cowpea scientists and no funds available for this type of project. I then left Senegal and went to work on a project in northern Burkina Faso where a graduate student of geography from UCR was studying current farming methods. We felt that if you wish to improve a system, you need to know something about it to ensure that any innovations do not cause damage. I then visited the International Institute of Tropical Agriculture (IITA) at Ibadan in Nigeria. The IITA had done considerable research on cowpea breeding, but I found they had mainly worked in the Savanna zones. At this date in 1976, IITA had not developed any cowpea varieties with very short cycles and they had not done much research on cowpea in Sahelian conditions. But they had some useful cowpea germplasm and I obtained seed of many accessions and lines. In future years, as a consequence of seed collection in various parts of Africa and various seed multiplication projects funded by the United States Department of Agriculture (USDA), I contributed to a threefold increase in the U.S. cowpea germplasm collection, which has benefited my own and several other research programs, and has important long-term value.

I returned to UCR late in the fall of 1976 and began breeding short-cycle, heat-tolerant cowpea varieties. I did this by growing the cowpeas I had collected in the field and evaluating them. I chose an early flowering cowpea from Senegal that had good agronomic traits and crossed it with an early California variety. Among the progeny, I selected lines that flowered even earlier than the parents and had high grain yields in hot dry field conditions. I also began looking for funds to support a collaborative program of training and research between UCR and ISRA. Five years later, I obtained funding from the Bean/Cowpea Collaborative Research Support Program (CRSP) of USAID that was initiated at Michigan State University (MSU) late in 1980. The design of this CRSP provided a nearly perfect fit to my goals and those of ISRA and has supported our collaborative research and training project for the last 20 years. There have been two key factors contributing to this project: support by the CRSP at MSU which was ably led for many years by Pat Barnes McConnell and Russ Freed, and excellent support by USAID-Washington staff such as Harvey Hortik.

In 1981, I provided the cowpea lines I had bred to ISRA technician Samba Thiaw, who began to evaluate them in the Sahelian zone of Senegal. Also in the early 1980s, training of ISRA scientists was initiated at the Riverside and Davis campuses of the University of California using USAID CRSP and Senegal Mission funding. In 1982, project research at Louga, Senegal, demonstrated that the best of the lines I had bred could indeed mature within 60 days and they produced 1,000 kg/ha of grain with only 215 mm of rain and very hot conditions. At this time I also was supervising several Sudanese graduate students, and the USAID-funded Western Sudan Agricultural Research Project asked for my 60-day cowpea lines. They began testing my lines in 1983 and they performed well under very dry conditions. In 1984 I was invited to work in Sudan with this project for several weeks. During this period I developed a plan for enhancing cowpea production. It was similar to the one I had developed for Senegal in that it emphasized the Sahelian zone and required similar types of cowpea varieties and management methods. One of the Sudanese scientists who had studied with me, Dr. Hassan Elowad, implemented my plan for enhancing cowpea production in the Sudan in the late 1980s. In the 1990s he reported that one of my 60-day cowpea lines had been released as the new variety “Ein El Gazal” for use in the Sahelian zone of Sudan. Agronomic studies had shown that “Ein El Gazal” could produce 600 to 1,000 kg/ha of grain with no sprays of insecticides and an average rainfall of only 300 mm. In these harsh conditions, local landraces of cowpea only produced 0 to 100 kg/ha of grain because they began flowering too late in the season. Dr. Elowad told me that “Ein El Gazal” had been extended to many farmers in the area around El Obeid in the Sudan by various NGOs, including CARE International.

The 60-day cowpeas I had bred were not, how-

ever, released as varieties in Senegal, due to a special set of circumstances. From 1982 through 1984 there were 3 years of extreme drought in the Sahelian zone of Senegal, and harvests of pearl millet and peanut were very poor. Typically, 3 years of poor harvests are enough to completely deplete stores of pearl millet in village granaries. In the fall of 1984, I advised ISRA and the USAID Mission that there could be severe shortages of food in 1985. A few weeks later, the European Economic Community (EEC) offered to provide Senegal with $1 million for famine relief. The Government of Senegal requested that instead of importing food, the money be used to help Senegalese farmers to increase production of pearl millet and cowpea in the Savanna and Sahelian zones. The Government was aware that our project had achieved high yields with the 60-day cowpeas and wanted seed of these lines, but they estimated that they needed 1,000 tons of cowpea seed. Unfortunately, we did not have such large amounts of seed of my breeding lines. I advised the EEC that the best substitute for which substantial seed was available was the California parent of these lines, "Calfornia Blackeye No. 5" (CB5). The EEC decided to import 450 tons of seed of CB5 into Senegal from California. After a visit by President Abdou Diouf with President Ronald Reagan in Washington, the USAID Mission in Senegal decided to fund the importation of an additional 200 tons of CB5 seed. After much effort by many people, the 650 tons of cowpea seed were shipped from California to Senegal and distributed to farmers in late June 1985, which was just before the start of the rainy season. The seeds were sown and even though rainfall was low in northern Senegal in 1985, with only 208 mm at Louga, it was well distributed, and CB5 was very productive. I saw some of the best fields of cowpea I had ever seen in Africa. National cowpea production in Senegal in 1985 was about 300 percent greater than the average of the previous 25 years. In 1986, national cowpea production was also high, being about 200 percent greater than the base-line level. Unfortunately, after 1986, national cowpea production steadily decreased, reaching base-line levels during the years 1988 through 1992. One reason for the decline in national cowpea production after 1986 was that the California variety, CB5, was too sensitive to several diseases occurring in the Sahelian zone. In addition, no more CB5 seed was imported or produced, and the quality of CB5 seed and extent of the CB5 crop decreased. However, the CB5 project was very successful as a famine-relief effort in that it fed many people and was much more effective than shipping in food. But, the technology was not suitable for long-term development because it was not sustainable. For cowpea and many other crop species, much better varieties can be developed if they are bred and selected in the zone where they are going to be grown by farmers.

By now the CRSP project had trained some scientists including a plant breeder. During the late 1980s, Ndiaga Cisse led the ISRA team that bred two very effective cowpea varieties that were released in Senegal in the 1990s. "Mouride" and "Melakh" were developed by crossing a Senegal variety with an early flowering breeding line from IITA. Ndiaga Cisse then selected progeny that have resistance to multiple stresses in collaboration with ISRA staff member Mbaye Ndiaye, who was advised in virology by Dr. R. O. Hampton of USDA and in bacterial pathogens by Dr. P. N. Patel, who was working with me at UCR. ISRA staff member Samba Thiaw subjected the lines to extensive field tests on experiment stations and in farmers' fields in the Sahelian zone of Senegal and the best two lines were selected. These varieties have different complementary types of drought adaptation. "Melakh" is an early 60-day cowpea that escapes late-season droughts, whereas "Mouride" flowers a little later and has stronger resistance to mid-season droughts. Together these two varieties also have tolerance to heat, and resistance to two major seed-borne diseases, two insect pests, and a parasitic weed that occur in the Sahelian zone. If farmers grow both of these varieties there is a good chance that at least one of them will produce a good yield irrespective of the pattern of rainfall or the type of pests and diseases that are present. The value of these varieties is indicated by the fact that in 1999, a prestigious Senegalese Presidential Award for Science was given to Dr. Ndiaga Cisse for breeding "Mouride" and "Melakh." During the 1980s the ISRA team also developed improved animal-traction methods for growing cowpea as a sole crop in rotation with pearl millet and peanut, and a very effective sealed-drum storage method for cowpea that does not require pesticides.

In 1992, another bad drought occurred. The annual rainfall at Louga was only 202 mm and poorly distributed. It was the worst year for crop and food production in the Sahelian zone of Senegal that I had seen in working visits during the previous 17

years. Also, rainfall and food production had been low in the previous 2 years. I advised ISRA and the USAID Mission that most of the pearl millet granaries probably were empty and there could be severe food shortages in 1993. But what could be done? Importing CB5 seed as had been done in 1985 was not an option because it had been replaced in California by a new variety that is less effective than CB5 in Senegal. In addition, farmers could benefit more from sowing seed of "Mouride" and "Melakh" but how could the seed be multiplied in time for the 1993 cropping season? Government agencies involved in cowpea seed multiplication and extension were not very effective at that time. But our CRSP project had begun collaborating with World Vision International (WVI), which had installed 400 boreholes in the Sahelian zone of Senegal and had established good relations with many farmers. WVI staff members Al Johnson and Mansour Fall agreed with my estimate that there could be a food shortage in 1993 and we planned a collaborative project. Samba Thiaw of ISRA multiplied seed of "Mouride" and "Melakh" during the dry season using irrigation and funds from the CRSP. ISRA then sold the seed to WVI, which had obtained funds for this project from its headquarters in Monrovia, California. Then WVI extended the seed to farmers on a credit basis. For the main growing season in 1993, WVI provided about 1,400 farmers in 380 villages with cowpea seed and information on improved management and storage methods developed by ISRA. The new cowpea varieties and management methods were very successful and grain yields were high, estimated by WVI as averaging 1,280 kg/ha in their project villages, which was three times the national average for the Sahelian zone of Senegal in that year. WVI continued to extend cowpea technologies during the next year.

Since 1993, a sustainable increase in national cowpea production may have been achieved in Senegal. The average national production for the 7 years from 1993 through 1999 was about 100 percent higher than the 25-year average prior to 1985 and most of the increase was in the Sahelian zone. The technology also is slowly spreading to other countries. "Mouride" has been released for use by farmers in Guinea-Bissau. I have provided seed of "Mouride" and "Melakh" for testing in the Sudan. WVI has evaluated "Mouride" and "Melakh" in several other West African countries through an Inter-CRSP project. These studies indicate "Mouride" and "Melakh" can be effective and potentially useful in the Sahelian zones of Niger and Chad. In this way farmers in other parts of the Sahelian zone are slowly gaining access to seed of "Mouride" and "Melakh."

But what opportunities are present for the future? Even better cowpea varieties could be developed for the Sahelian zone by on-site breeding in every country to combine resistance to multiple stresses with local adaptation, and the technology and germplasm are available to do this. In contrast, in the Savanna zones of Africa, cowpea production still is severely constrained by several insect pests and truly effective technology and germplasm are not yet available. We have collaborated with CRSP cowpea breeding and entomology projects in the Savanna zone in northern Ghana and Cameroon. These collaborations have resulted in the development of two new cowpea varieties by the late Dr. K. O. Marfo of Ghana. He began breeding them while studying heat tolerance in cowpea with me at UCR. Also, Dr. A. B. Salifu of Ghana and Dr. J. D. Ehlers, who works with me at UCR, have discovered that some cowpea landraces have useful resistance to insect pests and we are breeding to incorporate this resistance. The CRSP project in Cameroon working with Purdue University has bred two cowpea varieties with pod and seed resistance to weevils. Also CRSP food science projects in Ghana and Georgia are evaluating the new cowpea varieties to ensure they have adequate food quality. However, progress in breeding cowpeas that have multiple resistances to several insect pests and other essential traits has been slow because it is difficult to combine many genes and because strong resistance has not yet been discovered for several of the major insect pests of cowpea. But a CRSP team of collaborating African and U.S. cowpea breeders and other scientists, including those at IITA, could achieve this goal if given long-term funding support. To use a current phrase, there could be a "Doubly Green Revolution" in Africa. What it would take is to breed some special cowpea varieties. They would need to have sufficient resistance to insect pests that they can be grown without using pesticides. They also would need sufficient resistance to other pests and diseases and adaptation to the climatic and soil conditions that they can provide reasonably high yields of good quality grain. The new technology would be sustainable in that the new varieties would require fewer inputs than current varieties and thus could be adopted by even the poorest farmers. The

new technology would be environmentally safer than present practices because no pesticides would be needed. Also, since cowpea fixes substantial atmospheric nitrogen, in this and other ways it improves soil conditions for subsequent crops of pearl millet and sorghum grown in rotation making the whole cropping system more sustainable.

However, for agricultural development to proceed well, many other conditions must be improved, including some elements that are not primary responsibilities of the CRSPs. More effective national seed and extension organizations should be developed, because NGOs cannot be expected to do this work on a long-term basis. Family planning and the emancipation of women must be promoted, because this is critical for societal development. The extent and effects of AIDS and wars must be reduced, because they are destroying Africa.

Annex Three
CRSPs and their Partners FY 2000

CRSP Management Entity	E-mail Contact
BASIS CRSP-University of Wisconsin, Madison (Broadening Access and Strengthening Input Marketing Systems)	basis-me@facstaff.wisc.edu
Bean/Cowpea CRSP-Michigan State University	widders@pilot.msu.edu
GL CRSP-University of California, Davis (Global Livestock)	glcrsp@ucdavis.edu
INTSORMIL CRSP-University of Nebraska, Lincoln (Sorghum/Millet)	jyohe1@unl.edu
IPM CRSP-Virginia Polytechnic Institute & State University (Integrated Pest Management)	brhane@vt.edu
Peanut CRSP-University of Georgia	crspgrf@gaes.griffin.peachnet.edu
PD/A CRSP-Oregon State University (Pond Dynamics/Aquaculture)	egnah@ucs.orst.edu
SANREM CRSP-University of Georgia (Sustainable Agriculture and Natural Resource Management)	sanrem@arches.uga.edu
Soil CRSP-University of Hawaii (Soil Management)	goro@hawaii.edu

Partners	CRSP
I. U.S. Public Sector	
Alabama A&M University	PEANUT
American University, DC	BASIS
Auburn University, AL	PD/A, SOIL, PEANUT, SANREM
Clark Atlanta University, GA	BASIS
Clemson University, SC	BEAN/COWPEA
Colorado State University	GL, SOIL
Cornell University, NY	BASIS, SOIL, GL
Florida A&M University	IPM
Florida International University	PD/A
Fort Valley State University, PA	IPM
George Washington University, DC	SANREM
Harvard University, MA	BASIS
Hofstra University, NY	PD/A
Institute for Development Anthropology (IDA)	BASIS
International Center for Research on Women (ICRW)	BASIS
International Consortium for Agricultural Systems Applications (ICASA)	BASIS
Iowa State University	SANREM
Kansas State University	INTSORMIL
Michigan State University	BEAN/COWPEA, PD/A, SOIL, BASIS
Mississippi State University	INTSORMIL
Montana State University	IPM, SOIL

Partners	CRSP
U.S. Public Sector, *continued*	
National Aeronautics and Space Administration (NASA)	SANREM
National Oceanic and Atmospheric Administration (NOAA)	SANREM
North Carolina A&T University	IPM, PEANUT
North Carolina State University	SOIL, PEANUT
Ohio State University	IPM, PD/A, BASIS
Oregon State University	BEAN/COWPEA, PD/A
Pennsylvania State University	IPM
Purdue University, IN	BEAN/COWPEA, IPM, INTSORMIL, PEANUT, SANREM
Rural Development Institute (RDI)	BASIS
Rutgers University, NJ	BASIS
South Dakota State University	GL
Southern Illinois University at Carbondale	PD/A
Texas A&M University	GL, SOIL, BASIS, INTSORMIL, SANREM, PEANUT
Texas Tech University	INTSORMIL
The Allan Savory Center for Holistic Management, NM	SANREM
Understanding Systems, Inc., NC	SOIL
University of Alabama, Birmingham	PD/A
University of Arizona	PD/A
University of Arkansas, Pine Bluff	PD/A
University of California, Davis	GL, PD/A, BEAN/COWPEA, IPM
University of California, Los Angeles	GL
University of California, Riverside	BEAN/COWPEA
University of Colorado	SANREM, GL
University of Connecticut	PEANUT
University of Delaware	PD/A
University of Florida	SOIL, PEANUT
University of Georgia	BEAN/COWPEA, IPM, PD/A, PEANUT, SANREM
University of Hawaii	PD/A, SOIL
University of Illinois, Urbana-Champaign	INTSORMIL, SANREM
University of Kentucky	GL
University of Maryland, College Park	BASIS
University of Maryland, Eastern Shore	IPM
University of Michigan	PD/A
University of Minnesota	BEAN/COWPEA
University of Nebraska, Lincoln	BEAN/COWPEA, INTSORMIL
University of Oklahoma	PD/A
University of Pittsburgh, PA	PD/A
University of Puerto Rico	BEAN/COWPEA
University of Texas, Austin	PD/A
University of the South, TN	SOIL
University of Virginia	INTSORMIL
University of Wisconsin, Madison	BEAN/COWPEA, SANREM, GL, BASIS
U.S. Department of Agriculture (USDA)	INTSORMIL, SANREM, BASIS, GL, SOIL
USDA Plant Soil Nutrition Lab, NY	SOIL
USDA Vegetable Laboratory, SC	IPM
Utah State University	GL, SOIL
Virginia Polytechnic Institute and State University	PEANUT, SANREM, IPM, SOIL
Washington State University	BEAN/COWPEA, SANREM
Williams College, MA	BASIS
Wisconsin Division of Safety and Buildings	GL
Yale University, CT	GL

II. International Public Sector

Partner	CRSP
AB-DLO, The Netherlands	SOIL
Academy of Sciences of the Czech Republic	INTSORMIL
Academy of Sciences, Turkmenistan	GL
Adami Tulu Agricultural Research Center, Ethiopia	GL
Addis Ababa University, Ethiopia	BASIS
African Centre for Technology	BASIS
African Wildlife Foundation	GL
Agricultural Biotechnology Center, Hungary	INTSORMIL
Agricultural Research Center, Egypt	INTSORMIL
Agricultural Research Council, South Africa	INTSORMIL
Agricultural Research Council, Sudan	INTSORMIL
Agricultural Research Institute of Panama (IDIAP)	INTSORMIL
Agricultural Research Station, Botswana	INTSORMIL
Agricultural University of Tirana (AUT), Albania	IPM
Agri-lab, Guatemala	IPM
All Russia Research Institute for Sorghum, Russia	INTSORMIL
Allahabad Agricultural Institute, India	SOIL
Almesa, Nicaragua	SOIL
Amazonia National Research Institute, Brazil	SOIL
ARD-GOLD (Governance for Local Democracy), Philippines	SANREM
Arid Lands Resource Management Project (ALRMP), Kenya	GL
Asian Institute of Technology, Thailand	PD/A
Asian Vegetable Research Development Center (AVRDC), Taiwan	IPM
Asociación Civil para la Investigación y Desarrollo Forestal (ADEFOR), Peru	SOIL
Asociación de Productores de Oleaginosas y Trigo (ANAPO), Bolivia	PEANUT
Asociación para el Desarrollo Rural de Cajamarca (ASPADERUC), Peru	SOIL
Association for Strengthening Agricultural Research in East and Central Africa (ASARECA)	INTSORMIL, GL
Awassa Research Station, Ethiopia	SOIL
BAIF, India	SOIL
Bangladesh Agricultural Research Council (BARC)	IPM
Bangladesh Agricultural Research Institute (BARI)	IPM, SOIL
Bangladesh Institute for Nuclear Agriculture (BINA)	SOIL
Bangladesh Rice Research Institute (BRRI)	SOIL
Barayev Research Institute of Grain Farming, Kazakhstan	GL
BIDANI (Barangay Integrated Development Approach for Nutrition Improvement), Philippines	SANREM
Bishkek Humanities Institute, Kyrgyzstan	GL
Botswana College of Agriculture, Botswana	INTSORMIL
Bunda College of Agriculture, Malawi	BEAN/COWPEA
Bunda College, Malawi	PEANUT, PD/A
C. Adhikari, Nepal	SOIL
CABI Bioscience, United Kingdom	SOIL
Canning Research Institute, Bulgaria	PEANUT
Caribbean Agricultural Research and Development Institute (CARDI), Trinidad, Jamaica, and Belize	IPM, PEANUT
CENTA, El Salvador	INTSORMIL
Center for Agricultural Research and Documentation (CRDA), Haiti	PEANUT

Partner	CRSP
International Public Sector, *continued*	
Center for Sheep Selection and Genetics (CSSG), Kazakhstan	GL
Central Luzon State University, Philippines	PD/A, IPM
Central Mindanao University, Philippines	SANREM
Central Queensland University, Australia	SANREM
Centre de Coopération Internationale en Recherche Agronomique pour le Développement (CIRAD), France	PEANUT
Centre de Recherche et de Documentation Agricoles (CRDA), Haiti	SOIL
Centre National de Recherches Agronomiques (CNRA), Senegal	BEAN/COWPEA
Centre National de Recherches Appliquées (CNRA), Burkina Faso	PEANUT
Centre Régional de Formation et d'Application en Agrométérologie et Hydrologie (AGRYHYMET), Niger	SANREM
Centre International en Recherches Agronomiques pour le Développement (CIRAD), Mali	INTSORMIL
Centro de Conservación de Datos, Ecuador	SANREM
Centro de Datos para la Conservación (CDC), Ecuador	GL
Centro de Estudios Regionales para el Desarrollo de Tarija (CER-DET), Bolivia	GL
Centro de Investigaciones Agrícolas del Surocate (CIAS), Dominican Republic	BEAN/COWPEA
Centro Interdisciplinario de Estudios Comunitarios (CIEC), Bolivia	GL
Centro Internacional de Agricultura Tropical (CIAT), Colombia	IPM, PD/A
Centro Internacional de Agricultura Tropical (CIAT), Bolivia	PEANUT
Centro Internacional de Agricultura Tropical (CIAT), Peru	SANREM
Centro Internacional de la Papa, Peru	SANREM, IPM, SOIL
Centro Internacional de Tecnología de Semillas y Granos (CITESGRAN), Honduras	INTSORMIL
Centro Panamericano de Estudios e Investigaciones Geográficas, Ecuador	SANREM
Chiang Mai University, Thailand	SANREM
Chitedze Research Station, Malawi	PEANUT
Cinzana Agricultural Experiment Station, Mali	INTSORMIL
Communities of Nanegal, Ecuador	SANREM
Comunidad de Estudios JAINA, Bolivia	GL
Consortium for the Sustainable Development of the Andean Region (CONDESAN), Peru	SANREM
Council for Scientific and Industrial Research (CSIR), Ghana	PEANUT
Crops Research Institute (CRI), Ghana	BEAN/COWPEA, PEANUT
Danish International Development Agency	BASIS
Department of Agricultural Research (DAR), Botswana	INTSORMIL
Department of Agriculture, Malawi	PEANUT
Department of Environment and Natural Resources (DENR), Philippines	SANREM
Department of Fisheries (DOF), Kenya	PD/A
Department of Fisheries, Thailand	
Department of Land Affairs, South Africa	BASIS
Department of Research & Specialist Services (DRSS), Zimbabwe	INTSORMIL
Department of Research and Training, Tanzania	INTSORMIL
Deutsche Gesellschaft fur Technische Zusammenarbeit, Germany	BASIS
Dirección de Ciencia y Tecnología Agrícola, Mexico	INTSORMIL
Division of Agricultural Research and Extension Services (DARES), Eritrea	INTSORMIL

Partner	CRSP
International Public Sector, *continued*	
Division of Research, Zambia	SOIL
EARO (IAR), Ethiopia	INTSORMIL
EcoCiencia, Ecuador	SOIL, SANREM
Ecole Nationale d'Economie Appliquée (ENEA), Senegal	PEANUT
Eduardo Mondlane University, Mozambique	BASIS
Egerton University, Kenya	BASIS, GL
Empresa Brasileira de Pesquisa Agropecuaria (EMBRAPA), Brazil	SOIL, INTSORMIL
Escuela Agrícola Panamericana El Zamorano, Honduras	SOIL, INTSORMIL, BEAN/COWPEA, PD/A, IPM
Ethiopian Agricultural Research Organization (EARO)	GL
Food and Agricultural Organization of the United Nations (FAO)	BASIS, GL, SANREM
Food Development Center, Philippines	PEANUT
Food Research Institute, Ghana	PEANUT
Fruit Tree Research Institute (FTRI), Albania	IPM
Fundación Antisana (FUNAN), Ecuador	GL
Fundación Maquipucuña, Ecuador	SANREM
Fundación Pastaza Ambato, Ecuador	SOIL
Fundación Peru, Peru	PEANUT
G.B. Pantnagar University, India	SOIL
Gezira Research Station, Sudan	INTSORMIL
Golden Valley Research Station, Zambia	INTSORMIL
Grasslands Research Institute, Zimbabwe	SOIL
Grupo Yanapi, Peru	SANREM
GSFC Ltd., India	SOIL
Higher Agricultural Institute, Bulgaria	PEANUT
Holetta Research Center, Ethiopia	GL
ICAR, Modipuram, India	SOIL
ICRAF, Kenya	SOIL
Ilagan Research Station, Philippines	SOIL
INERA, Burkina Faso	INTSORMIL
INIA, Peru	SOIL
INIA, Mozambique	INTSORMIL
INRAN, Niger	INTSORMIL
Institut d'Economie Rurale (IER), Mali	PEANUT, SANREM, IPM, INTSORMIL, SOIL
Institut de l'Environnement et des Recherches Agricoles (INERA), Burkina Faso	PEANUT
Institut de la Recherche Agronomique pour le Développement (IRAD), Cameroon	BEAN/COWPEA
Institut de Recherche en Sciences Appliquées et Technologiques, (IRSAT), Burkina Faso	INTSORMIL
Institut du Sahel (INSAH), Mali	SANREM, SOIL, INTSORMIL
Institut National de Recherches Agronomiques du Niger (INRAN), Niger	PEANUT
Institut National de Recherches Agricoles (INRAB), Benin	PEANUT
Institut Sénégalais de Recherches Agricoles (ISRA), Senegal	INTSORMIL, PEANUT, BEAN/COWPEA, SOIL
Institut Sénégalais de Technologie Alimentaire (ITA), Senegal	INTSORMIL
Institute for Ethnography and Anthropology, Russia	GL
Institute for Introduction and Plant Genetic Resources, Bulgaria	PEANUT
Institute of Agriculture and Animal Science, Nepal	SOIL
Institute of Agricultural Research, Senegal/Ethiopia	INTSORMIL
Institute of Agronomic Sciences (ISAR), Rwanda	SOIL
Institute of Animal Breeding and Veterinary Husbandry, Turkmenistan	GL

Partner	CRSP
International Public Sector, *continued*	
Institute of Animal Management, Turkmenistan	GL
Institute of Ecology and Sustainable Development, Kazakhstan	GL
Institute of Economics, Kazakhstan	GL
Institute of Feed and Pasture, Kazakhstan	GL
Institute of Fundamental Studies, Sri Lanka	SOIL
Institute of Geography, Russia	GL
Institute of Microbiology, CAS, Czech Republic	INTSORMIL
Institute of Oriental Studies, Russia	GL
Instituto de Estudios Ecuatorianos, Ecuador	SANREM
Instituto de Investigaciones de la Amazonia Peruana	PD/A
Instituto Económico de Seguro Social, Ecuador	SOIL
Instituto Nacional Autónomo de Investigaciones Agropecuarias (INIAP), Ecuador	IPM, BEAN/COWPEA, SOIL
Instituto Nacional de Investigaciones Forestales y Agropecuarias (INIFAP), Mexico	BEAN/COWPEA, INTSORMIL
Instituto Nicaraguense de Tecnología Agropecuaria (INTA/CNIA)	INTSORMIL
Instituto Tecnológico y de Estudios Superiores de Monterrey, Mexico	INTSORMIL
International Agriculture Center, Netherlands	SANREM
International Center for Agricultural Research in Dry Areas (ICARDA)	GL
International Center for Research in Agroforestry (ICRAF), Indonesia	SANREM
International Center for Living Aquatic Resources Management (ICLARM), Malaysia	PD/A
International Centre of Insect Physiology and Ecology (ICIPE), Kenya	IPM
International Crops Research Institute for the Semi-Arid Tropics (ICRISAT), India	INTSORMIL, SOIL
International Food Policy Research Institute (IFPRI)	BASIS, IPM, SOIL
International Institute for Land Reclamation and Improvement	BASIS
International Institute for Tropical Agriculture (IITA)	SOIL
International Livestock Research Institute (ILRI)	GL, INTSORMIL
International Maize and Wheat Improvement Center (CIMMYT)	SOIL, INTSORMIL
International Rice Research Institute (IRRI), Philippines	IPM, SOIL
INTARNA Research Station, Niger	INTSORMIL
Interstate Committee for Drought Control in the Sahel (CILSS), Mali	SANREM
Jatun Sacha, Ecuador	SANREM
Kahublagan Sang Panimalay (NGO Watershed coalition), Philippines	SANREM
Kazakh Institute of Oriental Studies, Kazakhstan	GL
Kazakh Research Technological Institute of Sheep Breeding, Kazakhstan	GL
Kazakhstan State University	GL
Kenya Agricultural Research Institute (KARI), Kenya	GL, INTSORMIL
Kenya Department of Resource, Surveys & Remote Sensing	GL
Kenya Rural Enterprise Project/Financial Services Association	GL
Kenya Wildlife Service (KWS)	GL
Kenyan Plant Health Inspection Station	INTSORMIL
Khon Kaen University, Thailand	PEANUT
Kitanglad Integrated NGOs, Philippines	SANREM
Krishak Bharati Cooperative Ltd., India	SOIL
Kyrgyz Republic Center for Land and Agrarian Reform (CLAR), Kyrgyzstan	BASIS
Kyrgyzstan Institute of History, Kyrgyzstan	GL
La Lujosa Water Quality Laboratory, Honduras	PD/A

Partner	CRSP
International Public Sector, *continued*	
La Trobe University, Australia	SANREM
Laboratoire Central Vétérinaire / Laboratoire de Qualité Environnementale (LCV/LQE), Mali	IPM
Laboratorio de Microbiología, Uruguay	SOIL
Laboratorio Tecnológico del Uruguay (LATU)	INTSORMIL
Livestock Policy Analysis Program (LPAP), Ethiopia	GL
Livestock Production Research Institute (LPRI), Tanzania	GL
MacCaulay Land Use Research Institute, United Kingdom	GL
Makere University, Uganda	GL, IPM
Mariano Marcos State University, Philippines	SOIL
McMaster University, Canada	SOIL
Medical Research Institute, South Africa	INTSORMIL
Mekelle University, Ethiopia	GL
Michael Nyika, Zimbabwe	SOIL
Ministère de l'Agriculture et des Resources Animales, Burkina Faso	INTSORMIL
Ministère de l'Agriculture, des Resources Naturelles et du Développement Rural, Haiti	SOIL
Ministry of Agriculture and Cooperatives, Tanzania	BASIS
Ministry of Agriculture and Livestock, Honduras	PD/A
Ministry of Agriculture and Rural Development, Kenya	GL, PD/A
Ministry of Agriculture, Jamaica	IPM
Ministry of Agriculture, Tanzania	GL
Ministry of Agriculture, The Netherlands	BASIS
Ministry of Agriculture, Water and Rural Development, Namibia	INTSORMIL
Ministry of Education, Kenya	GL
Ministry of Environment, Honduras	SOIL
Ministry of Health, Kenya	GL
Ministry of Natural Resources, Honduras	SOIL
Ministry of Science-Academy of Science, Kazakhstan	GL
Moi University, Kenya	PD/A
Mpala Research Centre, Kenya	GL
Mpawapwa Livestock Research Institute, Tanzania	GL
Municipality of Lantapan, Philippines	SANREM
Mt. Makulu Research Station, Zambia	INTSORMIL
Namulonge Agricultural and Animal Research Institute, Uganda	GL
National Agricultural Research Organization (NARO), Uganda	GL, INTSORMIL, IPM
National Crop Protection Center (NCPC), Philippines	IPM
National Dryland Farming Research Center, Kenya	GL, INTSORMIL
National Economic Commission, Malawi	SOIL
National Federation of Private Farmers of Kazakhstan	GL
National Institute of Deserts, Flora, and Fauna, Turkmenistan	GL
National Range Research Center, Kenya	GL
National Research Centre for Soybean, India	SOIL
National University of Lao PDR	SANREM
Natural Resource Management Advisory Committee of Madiama, Mali	SANREM
Nepal Agricultural Research Council	SOIL
Ngorongoro Conservation Area Authority, Tanzania	GL
Norwegian Church Aid (NCA)	GL
Norwegian Ministry of Foreign Affairs	BASIS
Office of Rural Land Titling (OTR), Nicaragua	BASIS
Oil Crops Research Institute, People's Republic of China	SOIL

International Public Sector, *continued*

Partner	CRSP
Oil Plant Institute (OPI), Vietnam	SOIL
Ololepo Hills Grazing Association, Tanzania	GL
Opération Haute Vallée du Niger (OHVN), Mali	IPM, SANREM
Organization of Tropical Studies, Costa Rica	SOIL
Oromia Agricultural Development Bureau, Ethiopia	GL
Oromia Cooperative Promotion Bureau, Ethiopia	GL
Oshkii State University, Kyrgyzstan	GL
Pakistan Agricultural Research Council (PARC), Pakistan	SOIL
Pan American Development Foundation (PADF)	SOIL
Pearl Millet Network for West and Central Africa (ROCAFREMI)	INTSORMIL
Philippine Agricultural and Resources Research Foundation (PARRFI)	SANREM
Philippine Atmospheric, Geophysical and Astronomical Services Administration (PAGASA)	SANREM
Philippine Rice Research Institute (PhilRice)	IPM, SOIL
Philippines Bureau of Agricultural Research	SANREM
Philippines Council for Agriculture, Forestry, and Natural Resources Research and Development	SANREM, PEANUT, SOIL
Plant Protection Institute (PPI), Albania	INTSORMIL, IPM
Pontifica Universidad Cátolica, Ecuador	SOIL, SANREM
PROMEC, South African Medical Research Council	INTSORMIL
PROMESA, Nicaragua	INTSORMIL
PRONOMACHCS, Peru	SOIL
Province of Bukidnon, Philippines	SANREM
Proyecto de Desarrollo de los Pueblos Indígenas y Negros de Ecuador (PRODEPINE)	SANREM
Proyecto Zonificación Agro-ecológica y Establecimiento de una Base de Datos y Red de Terranueva, Ecuador	GL
Punjab Agricultural University, India	SOIL
Research Institute, Uzbekistan	GL
Rothamsted Experiment Station, United Kingdom	SOIL
Russian Center for Strategic Research and International Studies	GL
SADC/ICRISAT/SMIP	INTSORMIL
Sagana Fish Farm, Sagana, Kenya	PD/A
Samarkand State University, Uzbekistan	GL
SARI, Ghana	INTSORMIL
Sasakawa Global 2000	INTSORMIL
Savanna Agricultural Research Institute (SARI), Ghana	BEAN/COWPEA, PEANUT
Selian Agricultural Research Institute, Tanzania	GL, SOIL
Serengeti Wildlife Research Institute, Tanzania	GL
Serere Animal and Agricultural Research Institute, Uganda	GL
Servicios Agro-Informáticos de Apoyo a la Planificación para el Uso y Manejo de los Recursos Naturales (AGROSIG), Bolivia	GL
Sokoine University of Agriculture, Tanzania	BEAN/COWPEA, GL
Sorghum and Millet Improvement Network (SMINET), Zimbabwe	INTSORMIL
Sorghum and Millet Improvement Program (SMIP), Zimbabwe	INTSORMIL
Sorghum Network for West and Central Africa, WCASNR/ROCARS	INTSORMIL
Southeast Asian Center for Graduate Studies (SEARCA) South-East Consortium for International Development (SECID)	SANREM SOIL
Southern Consortium for International Development (SECID)	PEANUT
Southern Rangelands Development Unit (SORDU), Ethiopia	GL
Soygro LTD, Potcherstroom, Republic of South Africa	SOIL

Partner	CRSP
International Public Sector, *continued*	
Suranaree University, Thailand	SOIL
Swedish International Development Cooperation Agency	BASIS
Tamil Nadu Agriculture University, India	SOIL
Tashkent Institute of Irrigation and Agricultural Mechanization Engineers (TIIAME), Uzbekistan	BASIS
Tecnología Alternativa (ALTERTEC), Universidad de Valle de Guatemala (UVG)	IPM
TerraNueva, Ecuador	SANREM
Tigbantay Wahig, Inc., Philippines	SANREM
Uganda Agriculture and Forestry Research Organization	INTSORMIL
U.P. Seeds of Tarai, India	SOIL
Universidad Nacional Agraria, Nicaragua	INTSORMIL, SOIL
Universidad Nacional Autónoma de Nicaragua (UNAN)	INTSORMIL
United Kingdom Department for International Development	BASIS
Universidad Central, Ecuador	SANREM, SOIL
Universidad Centroamericana (UCA), El Salvador	BASIS
Universidad de Costa Rica	BEAN/COWPEA, SOIL
Universidad de Guadalajara, Mexico	GL
Universidad de Sonora, Mexico	INTSORMIL
Universidad Juarez Autónoma de Tabasco, Mexico	PD/A
Universidad Mayor San Simon, Bolivia	GL
Universidad Nacional, Cajamarca, Peru	SOIL
Universidad Nacional de la Amazonia Peruana, Peru	PD/A
Universidad San Francisco de Quito, Ecuador	SANREM
University of Agricultural Sciences, India	SOIL
University of Agricultural Sciences, Hungary	INTSORMIL
University of Agriculture and Forestry, Vietnam	SANREM
University of Dar es Salaam, Tanzania	GL
University of Ghana	PEANUT
University of Ghana-Legon, Accra, Ghana	BEAN/COWPEA
University of Hohenheim, Germany	INTSORMIL
University of Malawi	BASIS
University of Nairobi, Kenya	INTSORMIL, SOIL, GL, PD/A
University of Namibia	BASIS
University of Natal, South Africa	BASIS
University of New England, Australia	SOIL
University of Ouagadougou, Burkina Faso	INTSORMIL, PEANUT
University of Pretoria, South Africa	INTSORMIL
University of Science and Technology, Ghana	PEANUT
University of the Philippines at Los Baños	SANREM, PEANUT, IPM
University of Visayas, Philippines	PEANUT
University of Zimbabwe	BASIS, INTSORMIL
UNORCAC, Ecuador	SANREM
Uralsk University, Kazakhstan	GL
Uzbek Livestock Research Institute, Uzbekistan	GL
Uzbek Research Institute of Market Reforms, Uzbekistan	GL
Uzbek Sericulture Research Institute, Uzbekistan	GL
Vietnam Agricultural Science Institute, Vietnam	SOIL
Vietnam National University, Vietnam	SOIL
Visayas State College of Agriculture, the Philippines	PEANUT
Wageningen Agricultural University, The Netherlands	SOIL

Partner	CRSP
International Public Sector, *continued*	
World Bank	BASIS, INTSORMIL
Zimbabwe National Water Authority	BASIS

III. Private Sector

Academy for Educational Development	BASIS
African Centre for Technology Studies (ACTS)	BASIS
Africare, Washington, DC	INTSORMIL
Agritech Seeds	INTSORMIL
Alabama Catfish Producers Association	PD/A
American Tilapia Association, VA	PD/A
Appropriate Technology International (ATI)	SOIL
Asgrow of Central America, Honduras	INTSORMIL
Asociación Nacional de Acuicultores de Honduras (ANDAH), Honduras	PD/A, SOIL
ASSET Project Bangladesh Rural Advancement Committee (BRAC)	SOIL
Banco de Fomento Agropecuario, El Salvador	BASIS
Caito Foods, USA	IPM
CARE	SANREM, IPM, PD/A
Cargill of Central America, Honduras	INTSORMIL
Cáritas del Perú	PD/A
Centro de Apoyo a la Microempresa, El Salvador	BASIS
Comité para la Defensa y Desarrollo de la Flora y Fauna del Golfo de Fonseca (CODDEFFAGOLF), Honduras	PD/A
Counter-Narcotics Consolidation of Alternative Development Efforts (CONCADE)	SOIL
Crosbyton Seed Company	INTSORMIL
Development Alternatives	BASIS
DeKalb of Central America, Costa Rica	INTSORMIL
Economic and Social Research Foundation (ESRF), Tanzania	BASIS
Facultad Latinoamericana de Ciencias Sociales (FLACSO), El Salvador	BASIS
Fe y Alegría, Peru	PD/A
Federación de Agroexportadores de Honduras (FPX), Honduras	PD/A
Financiera Calpiá, El Salvador	BASIS
Fisheries Society of Africa (FISA), Kenya	PD/A
Fomento a las Microfinanzas Rurales, El Salvador	BASIS
Fundación Dr. Guillermo Manuel Ungo (FUNDAUNGO), El Salvador	BASIS
Fundación Internacional para el Desafío Económico Global (FIDEG), Nicaragua	BASIS
Fundación para el Desarrollo Económico (FUNDE), El Salvador	BASIS
Fundación Salvadoreña para el Desarrollo Económico y Social (FUSADES), El Salvador	BASIS
Georgia Peanut Commission	PEANUT
Global Village, Honduras	PD/A
Gold Crist Cooperative	INTSORMIL
Gremial de Exportadores de Productos No Tradicionales (GEXPRONT), Guatemala	IPM
Grupo Granjas Marinas, S.A., Honduras	PD/A
Gujarat State Fertilizer and Chemical Ltd. (GSFC), India	SOIL
Heifer Project International	GL, SANREM
Institut des Sciences Humaines (ISH), Mali	BASIS

Partner	CRSP
Private Sector, *continued*	
Institute for the Economy in Transition Analytical Centre (IET), Russia	BASIS
International Institute for Rural Reconstruction (IIRR), Philippines	SANREM
Lake Victoria Environmental Management Programme, Kenya	PD/A
Latin America Consortium on Agroecology and Sustainable Development (CLADES), Chile	IPM
Mahrashtra Hybred Seed Company (MAHYCO), India	SOIL
Mennonite Central Committee (MCC)	SOIL
Ministry of Research, Technical Training, and Technology, Kenya	BASIS
Mount Kenya Fish Farmers Association, Central Province, Kenya	PD/A
National Grain Sorghum Producers Association	INTSORMIL
National Onion Growers Cooperative and Marketing Association (NOGROCOMA), Philippines	IPM
Nebraska Grain Sorghum Producers Association	INTSORMIL
Nuestros Pequeños Hermanos (NPH), Honduras	PD/A
Organization for Social Science Research in Eastern and Southern Africa (OSSREA), Ethiopia	BASIS
Peanut Foundation, VA	PEANUT
Peanut Institute, GA	PEANUT
Pioneer of Central America, Honduras	INTSORMIL
Policy and Praxis	BASIS
Production Seed Company	INTSORMIL
Program for Appropriate Technology in Health (PATH)	SOIL
Red de Desarrollo Sostenible Honduras (RDS-HN), Honduras	PD/A
River Valley Farms	INTSORMIL
Southeast Asian Outreach (SAO), Cambodia Aquaculture at Low Expenditure (SCALE) Project, Cambodia	PD/A
Sustainable Agricultural Centre for Research and Development in Africa (SACRED-Africa), Kenya	PD/A
Terra Nueva, Peru	PD/A
The Kroger Company, USA	IPM
Uganda Wetlands and Resource Conservation Association (UNWRCA), Uganda	PD/A
Volunteers in Overseas Cooperative Action (VOCA)	GL
Winrock International	SOIL, PD/A
World Neighbors, Honduras	PD/A

Annex Four

ACRONYMS

ABSP	Agricultural Biotechnology for Sustainable Productivity Project
ACIEP	Advisory Committee on International Economic Policy
ACDI/VOCA	Agriculture Cooperative Development International/Volunteers in Overseas Cooperative Assistance
ACRI	American Cocoa Research Institute
ADRA	Adventist Development and Relief Agency
AFR	Africa
AFSI	Africa Food Security Initiative
AGERI	Agricultural Genetic Engineering Research Institute
AGHRYMET	Agronomy, Hydrology and Meteorology
ALO	Association Liaison Office
ANE	Asia and the Near East
APAP	Agricultural Policy Analysis Project
APD	Agricultural Policy Development Project
AMIS	Agribusiness and Marketing Improvement Strategies Project
ARS	Agriculture Research Service,USDA
ASARECA	Association for Strengthening A0gricultural Research in Eastern and Central Africa
ATRIP	Africa Trade and Investment Initiative
AVRDC	Asian Vegetable Research and Development Center
BASIS	Broadening Access and Strengthening Input Marketing Systems CRSP
B/C	Bean/Cowpea CRSP
BHR	Bureau of Humanitarian Response
BIFAD	Board for International Food and Agricultural Development
BOA	Board of Agriculture, NASULGC
CarLISES	Caribbean Land Information and Environmental Sustainability Program
CASP	Postharvest Collaborative Agribusiness Support Program
CGIAR	Consultative Group on International Agricultural Research
CIAT	International Center for Tropical Agriculture
CIFOR	Center for International Forestry Research
CILSS	Interstate Committee for Drought Control in the Sahel
CIMMYT	International Maize and Wheat Improvement Center
CLUSA	Cooperative League of the USA
CMD	Cassava Mosaic Disease
CRSP	Collaborative Research Support Program
CSD-8	Commission on Sustainable Development, Eighth Session
CY	Calendar Year
DAC	Development Assistance Committee
DBMC	Dominica Banana Marketing Corporation
DEI	Dairy Enterprise Initiative
DFID	Department for International Development (United Kingdom)
DPRK	Democratic People's Republic of Korea
E&E	Europe and Eurasia
EXTENSA	Agricultural Extension for Food Security (Spanish acronym used by CARE in Honduras)
FAO	Food and Agriculture Organization of the United Nations
FEWS	Famine Early Warning System
FHIA	Honduran Agricultural Research Foundation
Fintrac/CDA	Fintrac Inc. Agribusiness Development Project

FORWARD	Fostering Resolution of Water Resources Disputes Project
FRY	Federal Republic of Yugoslavia
FTAA	Free Trade Area of the Americas
FY	Fiscal Year
G	Global
GATT	General Agreement on Tariffs and Trade
GDP	Gross Domestic Product
G/EGAD/AFS	Global Bureau/Center for Economic Growth and Agricultural Development/
	Office of Agriculture and Food Security, USAID
GHG	Greenhouse Gases
GIS	Geographical Information System
GL	Global Livestock CRSP
GPRA	Government Performance and Results Act
HACCP	Hazard Analysis of Critical Control Points
IARC	International Agricultural Research Center
ICRAF	International Center for Research on Agroforestry
ICLARM	International Center for Living Aquatic Resources Management
ICRISAT	International Crops Research Institute for the Semi-Arid Tropics
IFDC	International Fertilizer Development Center
IGM	Integrated Gene Management
IITA	International Institute for Tropical Agriculture
ILRI	International Livestock Research Institute
IMAS	Integrated Management and Assessment System
IMF	International Monetary Fund
IMP	Integrated Pest Management
IMPACT	Impact Methods to Predict and Assess Contribution of Technology
Inkafe VRAE	Apurimac River Valley Coffee Cooperative
INRM	Integrated Natural Resources Management
INTSORMIL	Sorghum/Millet CRSP
IPR	Intellectual Property Rights
IPM	Integrated Pest Management CRSP
IRRI	International Rice Research Institute
IWMI	International Water Management Institute
JCARD	Joint Committee on Agricultural Research and Development
KARI	Kenya Agricultural Research Institute
KIMS	Knowledge Information Systems
LAC	Latin America and the Caribbean
LEWS	Livestock Early Warning System
LDC	Less Developed Countries
LTC	Land Tenure Center, University of Wisconsin
LOL	Land O'Lakes
LUPE	Land Use and Productivity Enhancement Project
MAMA	Macedonian Agribusiness Marketing Activity
MIS	Market Information System
MOU	Memorandum of Understanding
NARS	National Agricultural Research Systems
NASULGC	National Association of State Universities and Land Grant Colleges
NGO	Non-Governmental Organization
NuMaSS	Nutrient Management Support System
OECD	Organization for Economic Cooperation and Development
OES	Bureau for Oceans and Environmental and Scientific Affairs, State Dept.
OFDA	Office of Foreign Disaster Assistance
PADF	Pan-American Development Foundation

PD/A	Pond Dynamics/Aquaculture CRSP
PFID	Partnership for Food Industry Development
PPC	Policy and Program Coordination
POA	Partners of the Americas
PPMP	Pest and Pesticide Management Project
PRARI	Program to Revitalize Agriculture through Regional Investment
PRN	Poverty Reduction Network
PRSP	Poverty Reduction Strategy Paper
PVO	Private Voluntary Organization
REACT	Program to Reactivate the Agriculture Sector through Technology
RFA	Request for Application
SANREM	Sustainable Agriculture and Natural Resource Management CRSP
SCAA	Specialty Coffee Association of America
SECID	Southeast Consortium for International Development
SG	Sasakawa Global (2000)
Soils	Soil Management CRSP
SPARE	Strategic Partnership for Agricultural Research and Education
SPS	Sanitary Phyto-Sanitary
SXWW	Spring Time Winter Wheat Program
UNICEF	United Nations Children's Fund
USAID	U.S. Agency for International Development
USDA	U.S. Department of Agriculture
USG	U.S. Government
WAICENT	Worldwide Agricultural Information Center, FAO
WARDA	West African Rice Development Association
WHO	World Health Organization
WTO	World Trade Organization

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