

Programs Supporting Research and Technology Generation

U.S. universities have participated in research related to development assistance in several ways. The Collaborative Research Support program (CRSP) and the International Agricultural Research Centers (IARCs) provide forums for scientists, researchers, and graduate students from U.S. institutions to work in conjunction with other experts on global issues affecting development. AID also has generated a special collaborative program with Historically Black Colleges and Universities. U.S. university faculty also work on AID Mission project research, which usually entails supporting a national agricultural research organization in the host country.

Collaborative Research Support Program (CRSP) and Other Research and Technical Services Projects

AID's Bureau for Science and Technology manages the majority of the AID-supported research activities conducted by universities. AID and universities carry out the majority of their agricultural research through grant-funded CRSPs or other research and technical services projects funded through cooperative agreements or grants. The CRSPs use matching grants as a mechanism and most other research and technical services projects use cooperative agreements.

CRSPs were formed for the conduct of long-term, collaborative research in areas of mutual interest to U.S. and LDC institutions and were designed to create strong linkages between the two along with mutual benefits. Each CRSP uses a multidisciplinary approach to analyze and solve specific problems in the fields of food, nutrition, or rural development [57]. The nine CRSPs focus on the following topics: small ruminants, sorghum and millet, beans and cowpeas, soil management, nutrition, peanuts, pond dynamics, fisheries, and sustainable agriculture (see table B-1).

U.S. and LDC institutions and the host country AID Mission participate in planning and continued development of the CRSP. Based on recommendations from BEAD, AID selects one institution as the core planning entity for the CRSP. Later, AID and BEAD select the institutions to be involved and designate one as the management entity. The planning entity develops a 5-year plan of action; the managing entity receives the grant and is in charge of running the CRSP. Through a series of subgrants allocated by the management institution, other institutions also participate in the CRSP. Three separate committees are important in the governance of CRSPs—a board of directors to direct CRSP policy, a technical committee to provide scientific guidance to the CRSP,

and an external evaluation committee to provide evaluation and recommendations to the management entity and AID [81].

CRSPs focus on more than research: institution building and training are two other major CRSP activities. CRSPs sponsor educational programs to provide agricultural graduate and technical training to LDC students, scientists, and researchers and thereby build research capabilities in the LDCs.

Approximately 900 scientists from LDC institutions and 30 U.S. universities presently participate in the CRSPs. About 30 nations work with the United States through CRSPs [77]. Because of the mutuality of interest in CRSP subject matter, U.S. universities are required to match at least 25 percent of AID funding for CRSPs. Host countries are also required to contribute financial support for the program. Of the \$152.3 million spent on CRSPs as of fiscal year 1985, the U.S. Government contributed \$104.2 million, U.S. universities contributed \$31.2 million, and host countries contributed \$16.9 million. U.S. universities' contributions totaled about 30 percent of government expenditures, exceeding the 25 percent in matching funds required [77].

An outside review of the four oldest CRSPs in 1986 provided a positive overall assessment of the CRSPs. Achievements listed by reviewers included: excellent research results, focus on high priority issues, successful collaboration among U.S. universities and between U.S. and LDC institutions, and overall cost-effectiveness (having about 20 percent of the overhead costs that IARCs require). The evaluators found that CRSPs needed to improve their linkages with other CRSPs and LDC Missions [34].

Funding for CRSPs has dropped significantly in recent years. Prior to 1986, CRSP annual funding averaged about \$20 million. After implementation of the Gramm-Rudman-Hollings balanced budget law in 1987, the CRSP budget dropped to \$15.75 million [77]. BIFAD commissioned a study in 1987, to examine the effect of budget cuts on the viability of the CRSPs. The report deemed all of the CRSPs "viable" at that time, but warned that additional cuts would render some CRSPs dysfunctional [28]. The evaluators showed particular Concern that recent budget cuts have eroded the training and social science components of CRSPs, and that future cutbacks might prove fatal for these programs.

A central area of debate in the development community revolves around the possibility of enlarging the scope of CRSP work in the areas of extension and institution building. One criticism of the CRSPs has been that they

Table B-I—Universities Participating in AID's Collaborative Research Support Programs

<p>Small Ruminant CRSP</p> <p>Purpose: To improve production of meat, milk, and fiber from sheep, goats, and alpacas owned by smallholders in LDCs. Program began in 1978.</p> <p>U.S. institutions: University of California at Davis,* University of Missouri, Utah State University, Texas Tech University, Texas A&M University, Colorado State University, Montana State University, Washington State University, North Carolina State University, and Winrock International.</p> <p>Developing countries and regions: Worldwide (inc. projects in Indonesia Kenya, Morocco, Peru, and Bolivia)</p> <p>Program components and activities: Research-75 percent, Training-24 percent, Technical Assistance-tl percent, Other-1 percent</p> <p>Funding: (in \$ millions 1978-90); AID contributions: \$38.314; University match: \$14.395; Host country contributions: \$21.42; Total: \$74.129</p>	<p>U.S. institutions: North Carolina State University,* Cornell University, Texas A&M University, and University of Hawaii.</p> <p>Developing countries and regions: Tropics Worldwide (includes projects in Indonesia Mali, Niger, and Peru)</p> <p>Program components and activities: Research-100 percent</p> <p>Funding: (in \$ millions 1982-90); AID contribution: \$21.552; University match: \$5.148; Host country contribution: \$3.087; Total: \$29.787 --</p>
<p>Sorghum and Millet CRSP</p> <p>Purpose: To improve the overall quality of life, both economically and nutritionally, in LDCs where sorghum and millet are principal food crops, through increasing sustainable production of these crops. Program began in 1979.</p> <p>U.S. institutions: University of Nebraska at Lincoln,* Kansas State University, Mississippi State University, Purdue University, and Texas A&M University.</p> <p>Developing countries and regions: Worldwide (including projects in Mali, Niger, Botswana, Honduras, Colombia, and Sudan)</p> <p>Program components/activities: Research-70 percent, Training-20 percent, Technical Assistance-10 percent, Other--0 percent</p> <p>Funding: (in \$ millions 1981-90); AID contribution: \$30.182; University match: \$7.426; Host country contribution: \$4.51; Total: \$42.118</p>	<p>Peanut CRSP</p> <p>Purpose: To improve the availability and consumption of food, increase incomes, and maintain and enhance the natural resource base through the development of a peanut research base in both the U.S. and host countries that can bring relief to constraints to peanut production and utilization. Program began in 1982.</p> <p>U.S. institutions: University of Georgia: Texas A&M University, North Carolina State University, and Alabama A&M University.</p> <p>Developing countries and regions: Worldwide (inc. projects in semiarid tropical Africa, Southeast Asia and Caribbean regions)</p> <p>Program components and activities: Research-60 percent, Training-35 percent, Technical Assistant percent</p> <p>Funding: (in \$ millions 1982-90); AID contribution: \$12.558; University match: \$2.940; Host country contribution: \$1.227; Total: \$16.725</p>
<p>Bean/Cowpea CRSP</p> <p>Purpose: To help organize and mobilize the financial and human resources available to: mount a multi-institutional US/LDC collaborative effort of research and training related to beans and cowpeas; improve the living conditions of small farm producers in developing countries; and increase the availability of low-cost, nutritious food for the rural and urban poor. Program began in 1980.</p> <p>U.S. institutions: Michigan State University,* Purdue University, University of Georgia, Cornell University, University of Wisconsin, Boyce Thompson Institute, University of California at Davis, University of California at Riverside, University of Minnesota University of Nebraska at Lincoln, University of Puerto Rico, and Washington State University.</p> <p>Developing countries and regions: Africa and Latin America/ Caribbean</p> <p>Program components/activities: Research-60 percent, Training-35 percent, Technical Assistant percent, Other--0 percent</p> <p>Funding: (in \$ millions 1981-90); AID contribution: \$28.769; University match: \$6.325; Host country contribution: \$4.180; Total: \$39.274</p>	<p>Pond Dynamics/Aquiculture CRSP</p> <p>Purpose: To define the principles underlying sound aquaculture management so as to provide increased employment and a dependable, inexpensive source of animal protein. Program began in 1982.</p> <p>U.S. institutions: Oregon State University,* Auburn University, University of Hawaii, University of Michigan, Michigan State University, University of Arkansas at Pine Bluff, and the Consortium for International Fisheries and Aquiculture Development.</p> <p>Developing countries and regions: Honduras, Rwanda and Thailand.</p> <p>Program components and activities: Research-100 percent</p> <p>Funding: (in \$ millions 1982-90); AID contribution: \$7.449; University match: \$1.668; Host country contribution: \$2.218; Total: \$11.335</p>
<p>soil Management CRSP</p> <p>Purpose: To develop soil management technologies that are agronomically, economically, and environmentally sustainable in developing countries in the tropics. Program began in 1981 (planning grants during 1979-81).</p>	<p>Fisheries Stock Assessment CRSP</p> <p>Purpose: To improve analytical and sampling methodology for assessment and management of the size and sustainable yields of small-scale multispecies tropical marine capture fishery populations. Program began in 1986 (planning grant in 1982).</p> <p>U.S. institutions: University of Maryland, *University of Delaware, University of Rhode Island, University of Miami, and University of Washington.</p> <p>Developing countries and regions: Costa Rica and Philippines</p> <p>Program components and activities: Research-100 percent</p> <p>Funding: (in \$ millions 1985-90); AID contribution: \$3.919; University match: \$1.005; Host country contribution: \$0.066; Total: \$5.190</p>

Table B-I-Support programs-Continued

<p>Functional Implications of Marginal Malnutrition, Nutrition CRSP</p> <p>Purpose: To provide new information on the effect of marginal food intake on human performance, and to contribute to food policy reform. Project began in 1981 (planning grant in 1978).</p> <p>U.S. institutions: Purdue University (*1989-91), University of California at Berkeley (*1981-88), University of Connecticut, University of Arizona, University of California at Los Angeles, and University of Kansas Medical Center.</p> <p>Developing countries and regions: Egypt, Kenya, Mexico</p> <p>Program components and activities: Research-100 percent</p> <p>Funding: (in \$ millions 1981-90); AID contribution: \$12.891;</p>	<p>University match: \$2.917; Host country contribution: NA; Total: \$15.808</p> <p>Sustainable Agricultural Systems CRSP-planning grant</p> <p>Purpose: To identify constraints to development of sustainable agricultural systems and to prepare a research plan for a program that will bring about sustainable agriculture in developing countries. Planning began in 1990.</p> <p>U.S. institutions: Not yet identified; planning currently conducted by the National Academy of Sciences.</p> <p>Developing countries and regions: Worldwide</p> <p>Program components and activities: Research-100 percent</p> <p>Funding: (in \$ millions); To be determined</p>
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*Indicates management entity.

SOURCE: Loren Schulze, U.S. Agency for International Development, Bureau for Science and Technology, Office of Agriculture, personal communication, Apr. 23, 1991; Board for International Food and Agricultural Development, "The Collaborative Research Support Program (CRSP)," Apr. 12, 1989; U.S. Agency for International Development, Office of Agriculture, "Program Guide to the Office of Agriculture," 1990; U.S. Agency for International Development, Office of Nutrition, "Program Directory," June 1990.

are research organizations that do not disseminate their information successfully. Evaluators stated in the 1986 review that CRSPs were prolific generators of papers and articles but funneling information through academic channels generally does not disseminate the information to those who most need it. However, the reviewers cautioned: "The CRSP cannot be all things to all people" [34]. In the face of declining budgets, the reviewers suggested that broadening CRSP activities too much in the field of institution building and extension would "only lead to a diminution in the quality of CRSP research" [34].

While CRSPs generally cover a large but specific topic, other university research and technical services projects can be used for funding research on smaller topics and generally are supported through cooperative agreements. For example, Kansas State University's grain storage program does not require a CRSP-size program; a cooperative agreement program is more suitable. These smaller non-CRSP research programs are generally viewed as more efficient and responsive than CRSPs due to lower overhead and management costs and because they are generally entered into with a single university, making decision processes simpler. AID also has a relatively simple procedure for facilitating buy-ins of technical services from these programs by Missions. CRSP resources are more difficult to access. Research programs supported through cooperative agreements, however, may require more AID management time than CRSPs. An AID manager evaluating a CRSP with 10 projects need only write 1 evaluation. Evaluating 10 cooperative agreements requires 10 sets of paperwork [42].

International Agricultural Research Centers (IARCs)

As multidisciplinary centers for adaptive research, IARCs draw together scientists, policymakers, and other experts for research on problems related to LDC agriculture. The IARC system consists of 13 individual centers, each sharing the common goal of increasing LDC agricultural productivity as a means to increase farm incomes, lower food costs, and improve human health.

The IARCs received strong support from AID throughout the 1980s, reaching a peak of \$46 million before leveling off at about \$40 million at the end of the decade [59]. Previously, AID's Science and Technology Bureau (AID/S&T) funded the IARCs, but recently funding responsibilities were shifted to the Bureau for Program and Policy Coordination (AID/PPC), although AID/S&T retains management responsibilities.

The United States currently contributes about 18 percent of the IARCs' annual budget, the remainder coming from approximately 40 other international donors. International donors pledged \$228 million for the IARCs for fiscal year 1989 [23]. Because IARCs are international in nature and receive the majority of their funding from non-U.S. Government sources, they are more autonomous and subject to less U.S. control than the CRSPs, the latter being overseen by the U.S. Government and funded almost entirely by U.S. sources.

Like the CRSPs, the IARCs focus only partly on research. They also try to help build the research capabilities of developing countries by offering training to LDC researchers, scientists, and graduate students. Graduate students and visiting scientists from various

institutions around the world also come to contribute to and learn from the IARCs. The IARCs have trained at least 20,000 agricultural scientists from LDCs to date [23].

IARCs also create linkages with the National Agricultural Research Systems (NARS) in LDCs. Their goal is to complement LDC national research systems, not to substitute for them [15]. Training has traditionally been one way for IARCs and NARSs to form bonds, because many scientists trained at IARCs go on to work for national research centers [23].

Although some IARC-NARS linkages have met with success, problems may arise from attempts to connect the two entities. Collaboration between IARCs and NARS can result in diminished funding for the national systems as more money is allocated to the collaborative effort. Because participants in IARC programs tend to receive higher visibility and more professional opportunities than those in NARS, IARCs can draw commitment away from national programs. In the least developed countries, where the NARS may have the most problems surviving, IARCs sometimes are perceived as replacements for the national systems. These factors can undermine attempts to develop national research capabilities in LDCs. Some critics also claim that, although IARCs effectively pursue specific project objectives in collaboration with the NARS, they do not concentrate on strengthening the capabilities of the national systems in a sustainable manner [37].

The IARCs receive their direction from the Consultative Group for International Agricultural Research (CGIAR), a body created in 1971 made up of representatives from international organizations, governments, and foundations to fundraise for the IARCs and coordinate their activities. CGIAR also works to ensure that the IARCs are accountable for their funding. CGIAR created the Technical Advisory Committee composed of 12 members, half from LDCs and half from developing countries, to carry out systemwide reviews of Center programs [57].

IARCs were not formed on the basis of university participation. In the early years of the IARCs' existence the centers seemed to avoid a close relationship with universities from industrialized countries. This attitude seems to have changed, and IARC activities today involve U.S. universities in several ways. Most university participation is arranged on an ad hoc, scientist-to-scientist basis. A program for Collaborative Research on Special Constraints represents the only formal AID-supported linkage between U.S. universities and IARCs, providing grants to scientists at U.S. universities to research specific bottleneck issues restricting progress in IARC research.

Linkages between IARCs and CRSPs also promote U.S. university participation in the IARCs. The linking of

IARCs with CRSPs increasingly is seen as a way of sharing research information as well as complementing the various strengths of each program. CRSPs fill an important gap between work covered by the IARCs and research carried out by U.S. scientists. However, a certain amount of overlap between the two may promote competition for researchers and funding. Concern exists that a fully noncompetitive, collaborative relationship between CRSPs and IARCs would be hard to achieve.

The CGIAR commissioned a major review of the IARC system in 1985, and the IARCs received an overall positive assessment. The evaluators emphasized the vitality of the IARCs in international research and the successes of their training and research, particularly in the areas of wheat and rice production. Among the areas of weakness, however, were:

- absence of research results for IARCs working on particularly confounding issues,
- failure to realize the full potential of working with LDC officials on policies affecting food production issues,
- failure to investigate the problems of female farmers in male-dominated societies and the limited presence of women in research organizations, and
- a tendency to underemphasize certain crops that might improve food production in the developing world [19].

The reviewers predicted that the IARCs will continue to play a crucial role in LDC-related research given the perceptions of the weakness of most national research systems.

A 1986 audit of IARCs by AID's Inspector General applauded the IARCs' contributions to wheat and rice production, but questioned the overall contributions of IARCs to LDCs.

AID's investment in the Centers since 1967 ^{now totals} \$350 million. This huge investment should have resulted in measurable benefits to the small farmers—however, our audit as well as the Centers own [19] impact study found that this has not occurred [102].

The Inspector General's report listed several barriers to implementation of IARC technologies by small farmers:

- National agricultural research organizations were not capable of adapting IARC technologies to local conditions.
- The means to extend technology to the farmer often did not exist.
- Countries lacked adequate seed production capability, fertilizer, and storage facilities.
- Policies on crop prices and other inputs were unfavorable to the farmer.

Some of these conclusions are viewed by many as being overly critical. Other evaluations of the LARCs have tended to be more positive, although they acknowledge a deficiency on the part of the IARC's in disseminating research knowledge. A number of technical papers on the IARCs have praised the level of their contributions to international development. One internationally recognized scholar on research productivity wrote:

A donor agency interested in getting the maximum increment of food supply in the developing world from a given aid grant will obtain it by investing more in an IARC. . . . Furthermore, investments in IARCs stimulate more national system investment than will a comparable amount of direct aid [22].

Research Grants Program for Historically Black Colleges and Universities (HBCUs)

AID created the Research Grants for HBCUs in 1984 as a mechanism for accessing the research skills of scientists in the HBCUs in international development. To date, 30 HBCUs have been awarded a total of 127 grants at a total cost of \$11.4 million. The research has been conducted in 28 developing countries and the United States [10]. Of the 116 HBCUs belonging to the National

Association for Equal Opportunity in Higher Education, 90 have signed Memoranda of Agreement with AID, thereby increasing the pool of talent available to do AID development work. To date, AID has allocated approximately \$2 million per year for the HBCU grants program 50 percent for agriculture and 50 percent for health proposals. An average grant is about \$90,000; the upper limit for any one grant is \$100,000. Approximately 20 new grants are awarded annually in agricultural and health related areas after review by special panels at the National Research Council [49].

A National Research Council panel conducting a 1989 evaluation of the HBCU Research Grants program found it too soon after the creation of the program to assess the impact of grants on the production of relevant research, but concluded that "there are a sufficient number of demonstrated successes in the program's brief history to indicate that the program is achieving its goal" [116]. Since that evaluation, approximately half of the 127 funded proposals have been completed. From these completed projects more than 100 scientific articles have been published in refereed journals; providing one measure of successful productivity [10].