Chapter II

The Role of the Agency for International Development

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INTRODUCTION

During the second day of the workshop, AID staff reviewed their agency's agricultural development activities and the various constraints under which AID operates when carrying out its agricultural mandates. Their discussions were candid and are summarized in the following text. An organizational chart in effect for AID in November 1980 appears at the end of this chapter.

BUDGET AND G0ALS

In 1980, AID carried out about $600 million in agricultural projects and research related to solving agricultural problems and developing agricultural opportunities in LDCs. Further, AID spent an additional $43 million to transfer fertilizer, much of it going to Sri Lanka, Zambia, and Bangladesh.[1] During the first quarter of FY '81, fertilizer transfers to India, Kenya, Zambia, and Bangladesh were $105 million. AID's main thrust in agriculture is to help LDCs increase agricultural productivity, especially of the locally accepted basic food crops. By doing so, AID's goal is to help LDCs improve their economy, nutrition, and the general well-being of their people,

But for AID to step beyond traditional approaches and promote innovative technologies to solve LDC food and agricultural problems is risky. AID is not a research agency; its goal is development. Therefore, AID commonly supports research that holds promise of high immediate payoff and tends to avoid research that may have long-run payoffs. Similarly, AID feels that its development projects should focus on the short term, have high visibility, and show positive results quickly. It is not surprising that some AID agriculturalists believe that "when you only have $2 to bet you don't go for long shots. " To compound the problem, AID's small budget for innovative activities is often one of the first targets during budget cuts.

The United States, on the basis of its gross national product (GNP), in 1980 ranked 14th of those countries that provide development assistance to LDCs. For example, Sweden contributes 1.0 percent of its GNP whereas the U.S. contributes 0.19 percent.

AID's budget dilemma is complicated further by a growing list of competing development needs such as forestry, women-in-development, and environmental concerns. AID has been many things to many people, but it has not been perceived by Congress as a technical transfer agency. AID stressed that there remains a lack of understanding among the public and Congress about how science and technology relate to economic development.

[1] AID financed fertilizer purchases for FY '80 were at the lowest level since 1965.

CURRENT INNOVATIVE BIOLOGICAL ACTIVITIES AT AID

During the workshop, AID participants presented a brief overview of some of their current activities involving various innovative biological technologies. Examples included biological nitrogen fixation, tissue culture, and applied soybean research. In addition, through a collaborative effort, AID, the Joint Research Committee (JRC), the Board on International Food and Agricultural Development (BIFAD), and 30 land-grant colleges and universities have developed three Collaborative Research Support Programs (CRSP) to study small ruminants, sorghum and millet, and bean/cow pea production systems. The activities involve 30 U.S. universities, six international agricultural research centers, and one foundation. Work is carried out at 28 LDC sites with collaboration of the local LDC institution. Two new CRSPs are being developed in nutrition and soils. These activities will expand the number of participating U.S. universities by eight and LDC sites by ten.

CRSPs are viewed as long-term research endeavors, at least five years in duration. AID funds up to 75 percent of the CRSP and the collaborating U.S. colleges and universities contribute from 25 to 50 percent. At least 50 percent of AID's CRSP budget is spent in participating countries. AID's minimum budget for FY '82 CRSP activities is $11 million. AID plans to invest a minimum of $88.3 million in CRSP activities from FY '82 through FY '87.

Biological nitrogen fixation (BNF) is not a new technology; it was recognized in Biblical times that when certain legumes were grown in alternate years, the yield of the following year's crop was improved. After five years of research, AID recognizes that BNF technology still could be improved. Because it can provide nitrogen to plants in a usable form without the expense of commercial nitrogen fertilizers, it has important potentials for LDCs and developed countries alike.

Rhizobia, nitrogen-fixing bacteria that live in nodules associated with the roots of certain plants, can be used in some instances to inoculate the roots of plants to enhance nitrogen production. No infallible technique to inoculate seeds is known, but this is an area of research AID is addressing. (The information of BNF summarized elsewhere in this report is based on research at the University of Hawaii sponsored in part by AID). BNF in tropical grasses also is being studied. AID is working on in-country testing of BNF technology, building inoculation production and distribution systems, developing profitable BNF cropping systems, and providing continued help in improving BNF technology for LDC use.

AID believes that commercial fertilizers play an important role in LDC agriculture but also believes that BNF technology can help these countries reduce their need for commercial nitrogen fertilizers. Considering that commercial nitrogen fertilizer may cost as much as $1 a pound by the year 2000, BNF, which ultimately may reduce the need for commercial nitrogen fertilizers in LDCs by 25 percent, could help tremendously.

AID is supporting some research on tissue culture to supplement its traditional research on standard crop-breeding practices. AID believes tissue culture to be an inexpensive technology and one that has good potential for use in LDC agriculture.

In the past, agriculturalists selected superior plants for reproduction by handpicking those few individual plants having certain desirable characteristics out of many thousands of the less desirable specimens. Space and time severely limit the number of plants screened this way. With tissue culture, desirable plants can be selected and propagated quickly and easily. For example, an agriculturally desirable plant can be used as a cell source for a desired special characteristic such as salt tolerance needed for growth in irrigated areas. A tiny slice of the plant can be used to grow large clusters of cells that can be separated in the laboratory and screened to find the cells having the required characteristics. These cells in turn can be grown to full plants that themselves

can be used for seed sources. Research has demonstrated that the new plants will survive the particular soil stresses for which they were screened. This technique enhances our ability to design plants for the especially harsh environments in LDCs and holds real promise for improving LDC agriculture.

AID provides support for the International Soybean Program (INTSOY) as part of its effort to support innovative biological technologies. INTSOY works to improve and adapt soybeans for tropical developing countries through germplasm selection. Some of their applied research deals with finding improved ways to store seed for extended times in LDCs and improving soybean processing using simple technologies. INTSOY also is studying the role of soybeans in the LDC farming economies and in the national economy as well.

TWO APPROACHES TO APPLY INNOVATIVE BIOLOGICAL TECHNOLOGIES TO LDC AGRICULTURAL PROBLEMS

Two sharply different approaches to applying innovative biological technologies to LDC agricultural problems, particularly the problem of rising fertilizer costs, surfaced during the workshop's discussions. The first might be called an "agroecosystem approach" and was stressed by most non-AID participants. The second reflected a "conventional production approach" and was mainly an AID viewpoint.

The "agroecosystem approach" focuses on applying biological technologies that are tailored to fit the biological, physical, and social limitations of the local environment so that sustainable agriculture can exist within the constraints of the natural resource base. This approach includes a concern for energy conservation and a desire for interdisciplinary research and development.

The "agroecosystem approach" to LDC requirements for food, fodder, and fuel also focuses on developing new agricultural systems and on accepting rediscovered, and perhaps improved, agricultural systems. A wide spectrum of agricultural crops is considered including a number that might be viewed as nontraditional. This approach emphasizes restoring, maintaining, and improving the natural resource base while offering the farmers a reasonable chance for economic betterment.

In comparison, the "conventional production approach" stresses production and increased yields. It tends to focus on a more limited number of crops for which a market already exists. The ecosystem is adjusted to provide high production of these crops by using intensive inputs of commercial fertilizers, pesticides, pumped water, and petroleum-powered farm equipment. Some such systems commonly are categorized as "green revolution" technologies. Major efforts have been devoted to mainstay crops such as rice, corn, sorghum, and soybeans, and production increases generally have been outstanding.

The variety of crops dealt with in this approach is more limited than in the "agroecosystem approach" and monoculture often are economically advantageous. Production efforts typically attempt to foster crop growth by overcoming local environmental constraints such as infertile soils or water scarcity. In many cases the technologies promoted are adaptations of technologies that have been used successfully in developed countries and temperate climates.

There are, of course, instances where the two approaches overlap, but these are exceptions. Proponents of both approaches are trying to help LDCs improve the well-being of the populace—their methods, however, include quite different agricultural styles and practices. The workshop focused on the opportunities shown by each of the approaches for helping LDCs reduce their need for expensive commercial fertilizers while enhancing soil productivity.

The Need for Cooperative Ventures

Participants agreed that agricultural research and its appropriate implementation in lesser developed countries is an AID/LDC cooperative venture and that good communication is essential for success. They discussed the inherent difficulties involved in using U.S. expertise in LDC projects because many U.S. experts lack the special training that is appropriate to the physical and biological environment. Many U.S. technical experts used by AID are drawn from U.S. land-grant universities and consulting firms where there is little familiarity and experience with LDCs. And because the United States historically has little experience in LDC—i.e., tropical—agriculture, AID has difficulty finding contractors who are able to grasp LDC agricultural problems quickly and recognize the appropriateness or inappropriateness of temperate region agricultural solutions.

AID has provided grants and other support to numerous U.S. universities to help them develop their teaching/research expertise so that it can be tapped to help solve LDC agricultural problems. Many of these universities have set aside land for use in agricultural research and teaching, but again agricultural research results commonly are not readily transferable from region to region. Further, because pilot studies often are cumbersome to conduct, take considerable time, and lack significant recognition, few university scientists are eager to devote effort to projects relevant to LDC agriculture, even though certain aspects may also hold indirect promise for improving U.S. agriculture.

The Need for Field Demons-rations

Pilot projects, demonstrations, and field experiments carried out in LDCs by U.S. and host-country interdisciplinary teams on innovative biological technologies are essential first steps before new technologies can be used widely. Section 103A of the Foreign Assistance Act directs AID to carry out pilot studies. Further, workshop participants agreed that the private sector, whether U.S. or LDC, should be encouraged to participate in biological technology development and its transfer to potential users. Only where new technologies can be shown to be economically profitable is there the likelihood of their being pursued and adopted by the private sector. For example, Thailand established several innovative programs in alcohol production from cassava through direct links between the private sector and Thai research institutions. It was also pointed out that in many places, farmers learn new agricultural techniques from salesmen.

AID believes that during the 1980s it will emphasize technology transfer but hopes to sponsor increased adaptive field research and do cooperative research with LDC scientists. The Agency sees the need for multitiered development efforts but recognized the difficulty in coordinating them. There is an acute need for LDCs to establish their own national research priorities rather than having the donor community do so.

pilot-scale activities that receive partial support from AID do exist at the international agricultural centers. But whether or not all such institutions strongly emphasize the “agroecosystem approach,” especially agricultural techniques that are aimed at enhancing soil fertility and reducing reliance on expensive commercial fertilizers, was debated. AID believes that much of the work carried out at the international centers is innovative, but many of the non-AID participants felt that these centers pay little attention to low fertilizer, low-energy agricultural systems,

The Need for Innovative Research

Further, AID was criticized for spending $43 million of its $650 million agricultural efforts on the transfer of expensive commercial fertilizers to LDCs without providing incentives to try new agricultural methods that minimize fertilizer use. LDCs must develop the resources to continue appropriate fertilizer use, but along with this should go development of efficient new agriculture systems that rely on biological processes to complement soil nutrient availability. The use of mycorrhizal technologies,

for instance, seems to hold great promise for reducing fertilizer needs, but AID is not working with this technology, Although AID agricultural professionals in the Development Support Bureau have tried to initiate mycorrhizal research, it has failed to place high enough on their priority list to warrant funding in each of the last two years. AID interest in biological technologies has expanded, but the Agency staff feels funds remain the limiting factor. They feel their involvement in biotechnology research might help speed transfer and implementation of its results.

Workshop participants encouraged AID to place agricultural scientists from nonconventional fields of study on AID peer review panels ,of field projects and research activities. Because AID seemed committed to conventional agriculture, some workshop participants believed that AID needs fresh ideas to help their agricultural professionals move away from conventional paths and into new areas having potential for high payoff for LDCs. AID's peer review was likened to "an old boy system, " one in which acceptance of new ideas was slow, Non-AID members also viewed the U.S. Department of Agriculture (USDA) dimly in the field of innovative biological research because they felt that USDA, too, primarily is committed to conventionality. Some participants thought USDA was not helping AID with the question of how to maintain productive soils in LDCs while reducing the input of expensive commercial fertilizers.

In the view of "agroecosystem" proponents, AID and some international agricultural centers place the greater part of their efforts on a few traditional food crops but do little to develop underexploited, nutritionally important new food crops, AID was viewed as having no interest in these "odd-ball" crops even though such foods contribute significantly to LDC diets. Proponents of the "agroecosystem approach" proposed looking into any food crops that fit into the local ecological system, Therefore, the resulting mix of crops might be radically different from the crop mix recommended by the "production approach, " but one that could be sustained with lower fertilizer inputs,

An agroforestry system might be instituted that would integrate, for example, tree crops for food, fodder, firewood, and erosion control; native food crops; microbiological systems such as mycorrhiza and rhizobium; and local mineral resources such as zeolites into a low-energy consuming system. Participants encouraged AID to set aside a certain percentage of its appropriations each year to look for new, low-energy agricultural systems. The Agency could continue to back its efforts in "bread and butter" crops—corn, rice, etc.– but should be willing to commit some of its resources to nonconventional approaches. All participants agreed that AID should be encouraged to take some risks and not merely to back "winner" crops,

The Need for Flexibility

Most non-AID participants, as well as some AID staff, believed that the Agency needs a more flexible mechanism to provide funding for small-scale innovative activities. Currently, AID seems unable to transfer small amounts of money quickly or easily for such projects or experimental activities. The Agency claims that processing a small amount of money is as time-consuming as processing large grants or projects. Pressure within AID to obligate program dollars rapidly makes dealing with small projects bothersome. AID's agricultural professionals in the Development Support Bureau, for example, may wish to support certain inexpensive innovative activities, but they are discouraged by internal AID procedures and the program office's strong control, Consequently, scientists outside of AID who have special useful knowledge and who wish to participate in solving LDC agricultural problems feel that AID is neither open nor interested in outside assistance, Yet most participants felt that many aspects of both the "conventional production approach" and "agroecosystem approach" could be integrated with positive results.

The non-AID scientists elaborated on how it is generally difficult for them to obtain needed support for innovative approaches to low-energy agricultural systems. The picture was similar for the varied researchers. First, there seems to be little support for funding the broad range of innovative biological technologies that may help improve LDC agricultural systems, This is particularly true at most U.S. universities because the universities find it difficult to support international activities that seem remote. Then, too, researchers who rely on the university for their salary commonly do not want to jeopardize their security by conducting nonmainline research.

Some of the non-AID researchers admitted that to carry out their chosen areas of LDC-related research they sometimes resort to using small amounts of money from other projects that are not LDC-related ("bootlegging"). Other common small funding sources for LDC-related research include a variety of Federal agencies other than AID, although AID does provide significant support for the biological nitrogen fixation work at the University of Hawaii. An AID grant provides partial support for azolla/algae research. Because Federal support for LDC-related research has the habit of vanishing suddenly, non-AID researchers face constant doubt about the continuity of their funding. The National Science Foundation, some United Nations institutions, small university grants, and private industry and institutions sometimes are funding sources as well. Private industry support seemed lacking for applied research in these fields.

The Need for Trained Aid Staff

Underlying all of the above problems was the strong need for a significant increase in the number of technically trained professionals in agriculture and natural resource areas in AID and its Missions overseas. Existing technical professionals need to spend increased time on the substance of their projects and less dealing with bureaucratic constraints. Without such an environment, AID may find it increasingly difficult to maintain or expand technical competence within its Washington offices or Missions in LDCs. A need for improved communication between scientists and the Congress was restated several times during the workshop, and activities similar to this workshop were cited as a step in the right direction.

PERCEIVED CONSTRAINTS

AID's major efforts in innovative agricultural research are directed primarily to the *13* international agricultural research centers to which AID contributes financial support. Much of the AID activity, however, depends on the work of the AID Missions and the ability of the professional staff to relate to the scientific community at large and to the Missions and regional or geographic bureaus. A number of problems in these areas were identified by the workshop participants.

Mission Agricultural Activities

AID Missions largely are removed from current science and technology developments in the academic and private sectors. Consequently, AID faces a difficult task in channeling new science and technology to field activities in most LDCs. In addition, AID staff at the workshop explained that many Missions feel that adequate technology already exists and that new science and technology are not needed. The Missions want AID technical people to solve the problems that the Missions identify using established technologies. This approach frustrates AID professional staff, including staff in the Agriculture Office.

CGIAR

AID considers its contribution to the Consultative Group on International Agricultural Research (CGIAR) valuable and feels that the

nonbureaucratic institution functions very well in addressing agricultural development problems and in implementing research results. AID sees Korea as a model of successful development where effective technology transfer has occurred, and feels that the Korea example should be used as a model for development activities by other LDCs.

Agrcultural Staff

AID agricultural professionals attempt to maintain close contact with agricultural experts in the scientific community both within and outside of USDA. But the number of agricultural scientists in AID is so small that maintaining regular contact with their scientific colleagues can be difficult. AID employs about *4,000* people yet its Development Support Bureau (DSB), the bureau that provides technical support to all of AID's regional or geographic bureaus, has only *25* agricultural professionals. These *25* people managed about *$70* million in agricultural projects in FY *'80*. Further, only about *10* percent of AID Mission personnel worldwide are agricultural officers even though some *50* percent of AID's development programs are agriculturally oriented. Because AID commonly reassigns its agricultural professionals to new Missions or back to the U.S. about every three to four years, many agricultural programs suffer from the lack of continuity. AID's workshop participants felt personnel rotations occur too frequently.

AID workshop participants felt that the Agency's emphasis on natural resource management should be increased but that this area is not receiving much Agency attention. Natural resource management requires an interdisciplinary approach, but because AID is segmented into numerous administrative compartments it is extremely difficult to conduct interdisciplinary activities. For example, agroforestry activities were to be transferred recently to DSB's Office of Forestry, Environment, and Natural Resources, the successor to the Office of Science and Technology (OST). Agroforestry, by definition, combines aspects both of agriculture and forestry, yet in the new arrangement, agroforestry is separated from agriculture.

The mandate to identify and test innovative and/or emerging science and technology and to transfer promising ideas to AID's Missions and Regional Bureaus belonged to the disbanded Office of Science and Technology. This office served as AID's "window" to the science and technology community and gave AID the opportunity to tap a broad array of innovative science and technology to help solve LDC problems.[2]

A problem that AID workshop participants highlighted repeatedly was that of the expanded role of AID program officers in decisionmaking and priority-setting for agriculture projects and research. Program officers commonly are generalists having little or no technical agricultural training. Organizationally, they sit between top bureau administrators and agriculturalists and other professionals and exert a strong influence on AID's agricultural efforts. AID agricultural professionals feel that they are continually second-guessed by program office generalists and that the technical content of proposed agricultural projects and research many times is adversely affected by the actions of the program office.

Program officers commonly evaluate project or research activities. But AID's evaluation process seems to foster a strong desire to have evaluations that show positive results. Without positive evaluations, the difficulty of moving subsequent projects through the AID system and, therefore, through the program office may increase. This perception, whether true or not, discourages some technical professionals from pursuing innovative opportunities because the element of risk in innovative activities generally is higher than in traditional approaches. The overall effect of having an inordinately strong program office is that agricultural professionals introduce fewer innovative technologies into AID agricultural programs.

[2] As of May 1981, a new Bureau for Science and Technology was formed. (See section on AID organization changes.)

Fall 1984 **Addendum**

Demand for the original House Foreign Affairs Committee publication on innovative biological technologies was high in the United States as well as many other countries and by *1984* copies were no longer available. Continuing requests for the publication have prompted OTA to reprint the document in its workshop series. Described below are some relevant policy changes that have occurred at AID since the 1980 workshop.

The atmosphere at AID today is more favorable toward new biological technologies. The current administration has expanded work on tissue culture and sees potential in other related areas. The attitude toward innovative crops, however, remains essentially unchanged and few resources are directed toward new crop development.

In its overseas Missions and within AID-Washington, there is still a scarcity of professional agriculturalists. Those that are on staff have many, diverse responsibilities so that innovative biological technologies do not receive much attention. Nevertheless, the National Academy of Sciences Board on Science and Technology for International Development (BOSTID) receives AID funds to seek new biological opportunities for developing countries. Since the *1980* workshop, research received increased attention in AID, however, the substantial budget cuts recently proposed in *1985* may adversely affect this trend.

One problem identified at the *1980* workshop concerned AID's inability to support small scale activities. AID appears to have improved some in this area. A new small grants program—the Program in Science and Technology Cooperation (PSTC)—has been established in the Office of the Science Advisor. The program is designed to stimulate new outside research on problems that confront developing nations. Priority funding is directed to five areas: Biotechnology/Immunology, Plant Biotechnology, Chemistry for World Food Needs, Biomass Resources and Conversion Technology, and Biological Control of Disease. This type of competitive, small grants program is an important step toward providing a more flexible mechanism to support innovative and small-scale research and technology development.

SUMMARY OF WORKSHOP SUGGESTIONS

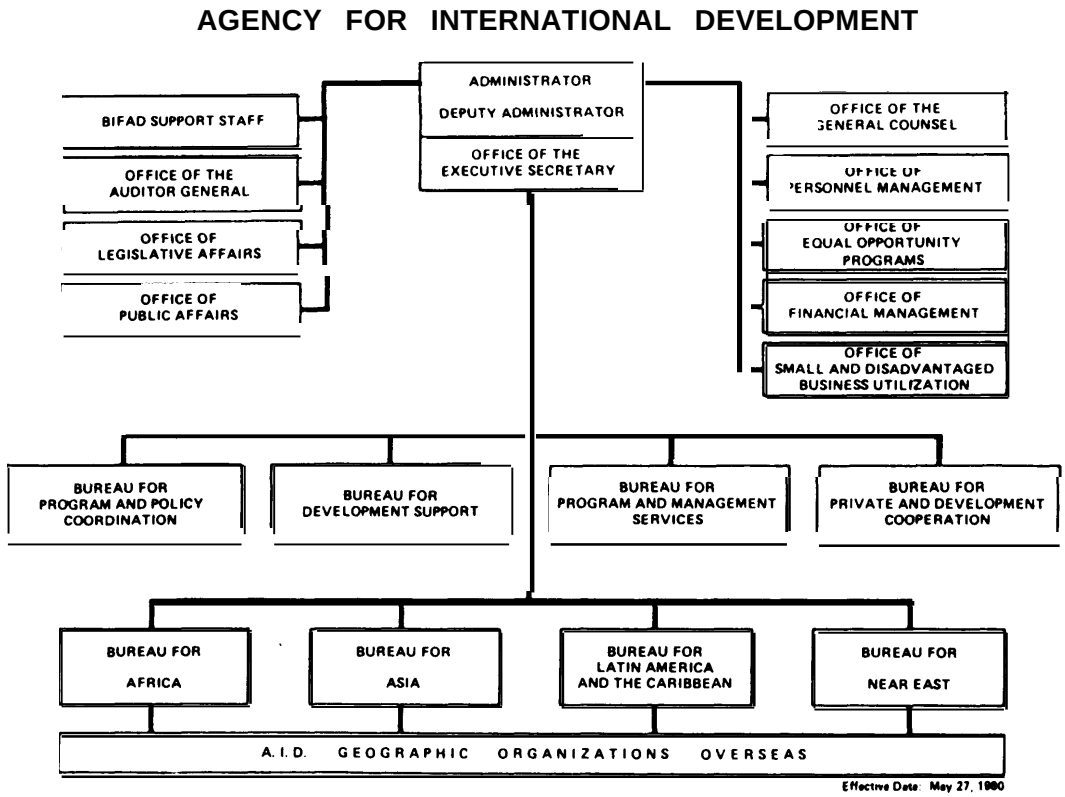
Summarized below are a variety of suggestions generated by the 40 participants during the course of the workshop discussions. Some of these topics received considerable attention and others much less. The participants were encouraged to express their points of view freely on any issues they felt were relevant. By doing so, the participants touched upon a variety of topics, many of which deserved more detailed examination than could be accomplished in two days. The issues that surfaced, however, should help the House Committee on Foreign Affairs in their oversight responsibilities of the Agency for International Development and in determining the role that innovative biological technologies could play in enhancing soil fertility, improving food production, and reducing the need for expensive commercial fertilizers throughout the world.

* AID should greatly increase the number of in-house agricultural professionals in Washington and in the missions, especially in decisionmaking positions.
* AID should increase the number of Mission directors who are agricultural professionals. Similarly, effort should be made to encourage the selection of an increased number of people with professional agricultural training as ambassadors for LDCs.
* AID should encourage the U.S. and LDC private sector to participate in pilot-scale projects testing and developing innovative biological technologies.

* AID should appoint some outside experts in nonconventional agricultural technologies to its advisory committees and to its peer review panels.
* AID should broaden its inventory of scientists who might help AID expand its efforts into nonconventional agricultural practices.
* AID should streamline its procedures to encourage increased outside participation by U.S. scientists and technologies in small-scale innovative agricultural activities.
* AID should set aside a certain percentage of each agricultural project to integrate some new, innovative biological technology into the project.
* AID should fund some small-scale, pilot-type projects on the kinds of innovative biological technologies presented at this workshop and encourage the participation of outside scientists to work on the project as members of interdisciplinary teams. The need for pilot testing of a wide variety of innovative biological technologies by AID was stressed heavily and the need for risk-taking was encouraged.
* AID should increase its activities in agroforestry systems. These activities should be expanded to include both humid tropical regions and arid/semiarid regions. Pilot testing of the arid/semiarid systems could be carried out in the Southwest United States and LDCs,
* An expanded inventory of innovative biological technologies that could help LDCs reduce their need for expensive commercial fertilizers should be prepared, and institutions and individuals who have the skills for these technologies could be identified.
* OTA could conduct a full assessment of a broad range of innovative biological technologies that could help LDCs reduce the need for their use of expensive commercial fertilizers.
* AID should emphasize the transfer of technical information to LDCs and to AID mission agriculturalists, particularly on innovative biological technologies that might help LDCs reduce their need for expensive commercial fertilizers.

AID ORGANIZATION CHANGES

The Administrator for the Agency for International Development (AID) on May *21, 1981,* announced a reorganization for the structure of AID (see following chart). One major change was the formation of a new Bureau for Technology and Science to replace the old Bureau for Development Support. Structurally, this change gives greater prominence to the role of science and technology in AID than has existed previously. Unlike the other AID bureaus for Science and Technology. Unlike the other AID bureaus which are headed by Assistant Administrators, the Bureau for Science and Technology is headed by a Senior Assistant Administrator, thus giving added strength to science and technology in AID.



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