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BOARD ON SCIENCE AND TECHNOLOGY FOR INTERNATIONAL DEVELOPMENT

Anniversary Report, Contract No. AID/csd-2584

1 April 1970 - 31 March 1971 (-1975)

uring this reporting period, a major change occurred in the Board's relationship with AID/Washington. This was in response to AID's suggestion that the Board assume new responsibilities in connection with AID's plans for an expanded technical assistance effort. A Basic Ordering Agreement (AID/csd-2584) which spells out the general provisions of the relationship between the Agency and the Academy was signed for a five-year period.

In addition, under Task Order No. 1 of the new Basic Ordering Agreement signed between the OST/TAB and BOSTID, an increase in the level of support enabled the Board to expand its efforts particularly in the area of advisory panels and special studies bearing on the application of U.S. scientific and technological resources to development problems.

Reports describing each program were either completed and forwarded to the appropriate AID office or mission or are currently in the final stages of preparation. A list of the reports, completed and in preparation, is appended.

The following report briefly summarizes all activities performed under this contract and its seven task orders for the one-year period ending March 31, 1971 and the remaining task order under the former contract, csd-1122.

Task Order No. 1 was extended on a no-cost basis to 31 May 1971. A proposal to initiate the second cycle of the program for the period 1 June 1971 to 31 December 1972 was submitted to the Agency for International Development in April.

The following task orders were issued during this reporting period:

Task Order No. 1 provided for bilateral workshops (and study groups) with scientific institutions in developing countries and for the creation of advisory panels and special studies dealing with science and technology as related to problems of developing countries. The major study completed was concerned with the proposed new International Development Institute -- its character, purposes and functions.

(Effective dates: April 1, 1970 - May 31, 1971)

Task Order No. 2 provided for an Ad Hoc Panel to study East Pakistan Land and Water Development as Related to Agriculture.

(Effective dates: August 7, 1970 - January 31, 1971)

Task Order No. 3 provided for the continuation of the Cooperative Science Program with the Argentine Council for Scientific and Technical Research which was initiated under a previous contract. (Effective dates: August 15, 1970 - June 30, 1971)

Task Order No. 4 provided for Academy assistance in the organization of a Seminar on Protein Food Promotion in Bangkok, Thailand in November, 1970. (Effective dates: October 15, 1970 - February 1, 1971)

Task Order No. 5 provided for the continuation of the NAS-Colciencias Cooperative Science Program with Colombia, involving study

group assessments of the potential for graduate education and research in Colombian universities. (Effective dates: November 15, 1970 - September 30, 1971)

Task Order No. 6 provided for a workshop with the Indonesia Institute of Science on the topic of industrial research as it relates to Indonesian economic development; workshop dates were January 18-30, 1971. (Effective dates: November 23, 1970 - May 31, 1971)

Task Order No. 7 provided for a study concerned with the assessment and evaluation of African Agricultural Research Capabilities. (Effective dates: February 10, 1971 to February 9, 1972)

The Brazil and India science cooperation programs were continued under amended contract csd/1122 which provides for study group activities and bilateral workshops. Activities under these programs are reported under "Bilateral Programs" in this report.

Three meetings of the Board on Science and Technology for International Development were held during this reporting period in June and December of 1970 and in March of 1971. Summary minutes of these meetings were transmitted to AID.

BILATERAL PROGRAMSLATIN AMERICAArgentina

As part of the continuing U.S.-Argentine Cooperative Science program, a task order was issued effective August 15, 1970 to support implementation of recommendations adopted by the bilateral workshop held at Mar del Plata in 1969. Specifically, Panels were formed to look into problems and opportunities in the areas of scientific information, ground-water hydrology, and food technology.

The U.S. Panel on Scientific Information held its first meeting in Washington, August 24-25, 1970. It agreed to undertake two projects:

(a) To assist the Argentines in establishing a Telex network for scientific libraries and documentation centers in Argentina. The purpose of this network will be to expedite processing of loans, photocopies, and other inter-library cooperative services within the country, and to extend the capability for utilizing scientific and technical information resources in the U.S. and other countries, including those in Latin America. By the end of the year, agreements for installation and coordination of the network in Argentina were reached between the Argentine National Council for Scientific and Technological Research (CONICET) and the Empresa Nacional de Telecommunication de Argentina (ENTel), and between CONICET and the participating Argentine universities. Miss Monica Allmand, named by

CONICET as the Manager of the network, completed a three-week training program in the U.S. in late February 1971. The John Creerar Library in Chicago has agreed to provide photocopy and microcopy services to the network for a six-month experimental period. The network will become operational during April, 1971.

(b) To assist the Argentines in setting up a computer-based information service, initially in the field of chemistry, in order to provide selective dissemination of current information and retrospective searches to research scientists in academic, governmental and industrial posts in Argentina. A detailed proposal, outlining the financial and organizational requirements for the service is being prepared for presentation to CONICET by the Argentine members of the panel, and a director of the proposed service will be selected. A training program in the U.S. for the director is planned; alternatives presently being considered include a one-year internship at Chemical Abstracts Service, and a six-month program at Illinois Institute of Technology Research Institute.

In August 1970 the U.S. Panel on Groundwater Hydrology visited the Dry Pampas region of Buenos Aires Province to review with Argentine authorities a serious hydrological problem in that region. The U.S. Panel, together with its Argentine counterpart, visited the site and agreed upon a procedure for data collection and analysis. In September the U.S. Panel submitted its recommendations which were still being considered by the CONICET at the close of this reporting period.

Food Technology - Dr. C. O. Chichester, Department of Food and Resource Chemistry at the University of Rhode Island, and Dr. James Zavistoski, of the OFS, made a brief visit to Buenos Aires in January for a meeting with food technologists and representatives of the CONICET. It was agreed that a joint NAS-CONICET meeting be held to analyze research problems identified by the workshop as well as other factors of critical importance to Argentine food production. Dr. Chichester proposed the development of joint research programs between Argentine institutions and a consortium of five U.S. universities.

The Argentine Panel proposed that representatives of the U.S. consortium and interested Argentines meet after April 30th, 1971. In the meantime, a feasibility study for creating a department of food technology at the University of Buenos Aires will be completed.

Because of the delays in implementing the science information projects and continuing activities of the food technology panel, the task order has been extended to December 31, 1971.

Brazil

Study group activities during this reporting period have been as follows:

Agricultural Research - The Second Brazilian Seminar on Administration of Agricultural Research was held in Campinas during the month of July. Ten members of the Agricultural Research Study Group and two members of the Agricultural Economics Study Group presented papers at the Seminar which was attended by 150 representatives of the leading Brazilian state, federal and private teaching and research institutions. Thirty-four papers were presented on a variety of subjects

concerned with the administration of agricultural research. The Seminar provided an opportunity for fruitful exchange of information and discussion between agricultural research administrators and educators in Brazil. The NAS-CNPq joint study group will recommend to the fourth Brazil-U. S. workshop that seminars on this subject occur at regular 12-18 month intervals in Brazil in order to foster greater research cooperation among the many agricultural research centers in Brazil.

Agricultural Economics - At its May and July 1970 meetings, the joint study group drafted a proposal for strengthening agricultural research in Brazil by incorporating agricultural economists on the research teams of major Federal research stations. The proposal also aims to strengthen graduate training of agricultural economists in Brazil in a program similar to the NAS-CNPq chemistry program already under way. Initially, some of the economists could include U. S. pre-doctoral candidates who would spend two years in Brazil at an experiment station working on Brazilian agricultural problems; these studies might contribute to Ph.D. dissertations to be submitted to home universities. The agricultural economists would be supervised by a group of senior Brazilian and U. S. professors.

If adopted, the proposed program would provide a core of well-trained agricultural economists working on problems in Brazil and establish better linkages between research stations and training institutions. Both the CNPq and the AID Mission have expressed interest in the agricultural economics plan; it remains for the Workshop itself to consider it in the light of other proposed projects.

Computer Sciences - A joint study group met in Brazil in August 1970 to examine the role of computers in relation to Brazilian development planning. Of particular concern to the study group are the manpower requirements and resultant training needs for medium and high level computer specialists. The Brazilian group, with strong initiatives by the CNPq itself, is preparing a proposed development plan based upon the joint study group activities. The proposal will be reviewed in the 4th Brazil-U.S. Workshop.

Earth Sciences - In June 1970 a three member U.S. panel on earth sciences met in Brazil to review with leading university and government specialists the potential for graduate level training in geology, geochemistry and geophysics. Because of the increasing importance to Brazil of mineral products and because of the untapped mineral potential in the country, there is a need for manpower resources highly trained in modern techniques of exploratory, extractive and physical metallurgy. The joint group informally suggested to Brazilian authorities a procedure to develop a sound long range plan for strengthening graduate research and training in the earth sciences. The Brazilians, in turn, will present to the fourth Workshop their suggestions for further activities in this important area.

General Activities - In the fall of 1970, Dr. Antonio Couceiro resigned as Chairman of the Brazilian National Research Council and was succeeded by former Director of the Military Engineering Institute, General Arthur Mascarenhas Façanha. The change in the chairmanship of the Council contributed to the postponement of the Fourth Workshop, now scheduled for Washington during the week of November 1-6, 1971.

Central America

The AID Regional Office for Central America and Panama (ROCAP), located in Guatemala City, responding to the AID/Washington airgram on environmental problems related to development, expressed interest in discussing a regional workshop with Academy representatives. Dr. Harrison Brown, Foreign Secretary (NAS), visited the ROCAP Mission in July 1970 to assess local interest in a joint workshop. The Central American Research Institute for Industry (ICAITI) was enthusiastic about the Workshop approach and took upon itself the regional responsibility for planning and organization. A joint NAS-ICAITI workshop planning group was appointed in early October to work out the agenda and administrative details. The focus is on environmental constraints affecting development in the geographical area of the Central American Common Market (Guatemala, El Salvador, Honduras, Nicaragua and Costa Rica). Environmental problems facing the industrial, agricultural and service industry sectors will be examined. Attention will also be devoted to the needs for research and training in environmental problems, the inclusion of environmental considerations in regional economic planning and, very importantly, population pressures upon the environment.

The workshop was originally scheduled for late February 1971 but due to financial and other problems it had to be postponed to late July.

Antigua, Guatemala, was chosen as the site. The Central American Bank for Economic Integration joined with ICAITI and ROCAP in providing local funding; NAS participation is funded by AID/Washington.

Chile

In mid-1970 the Chilean National Commission for Scientific and Technological Research (CONICYT) expressed a desire to undertake a bilateral workshop with the Academy to consider research priorities in several fields of concern to Chilean planners.

The Assistant Executive Secretary of CONICYT met with OFS staff members for a week in August to formulate an agenda for a workshop on the Contribution of Science and Technology to Chilean Development. Agreement was reached to focus on the development of mechanisms for determining priorities in the broad areas of science policy, nutrition and food technology, mathematics and computer science, marine science and copper technology.

The workshop was held in Santiago the week of January 11th. Joint working groups met for four days to discuss the workshop objectives; conclusions and recommendations were presented by each Chilean panel chairman to the plenary session on the final day of the meeting. Among the numerous recommendations adopted were (a) the creation of a National Office of Nutrition charged with the implementation and coordination of a national nutrition policy including standards, food quality regulations, education and research; and (b) an in-depth study of the food industry in terms of technological, public health, educational and nutritional problems for the purpose of establishing national policies for the development of food production. Consideration of many topics including upwelling, krill, ocean atmosphere interaction, marine geology, etc. led to a recommendation for the development of an institutional infrastructure to coordinate activities as well as to promote communication

among Chilean and international institutions active in these areas. The CONICYT is drawing upon these recommendations in its development of new working policies.

Colombia

In November a task order was executed with the Colombian Mission to enable the NAS, the Colombian Fund for Scientific Research (COLCIENCIAS) and the Colombian Institute for the Development of Higher Education (ICFES) to continue with the study of graduate education and research potential in Colombian universities.

The long academic vacation in most Colombian universities began in early December; at its conclusion in mid-February the first of the six proposed U.S. panels, in chemistry, traveled to Bogotá to meet with its Colombian counterpart group. The joint group visited three universities to assess the institutional capabilities of developing graduate teaching and research programs in chemistry at the Master's degree level. Acquisition of specific equipment and funding of selected research proposals were recommended for each institution as well as a more general plan for overall graduate program development.

A joint Colombia-U.S. panel on Graduate Education and Research in Mathematics convened in March in Bogotá and visited four universities. Recommendations were made to strengthen and further develop an on-going Master's program and to initiate additional graduate programs in applied mathematics and mathematics education.

Joint panels for engineering, earth sciences, physics and biology were originally scheduled to complete their work by September

1971. Due to the closing of Colombian universities in late March and early April, all visits are now being rescheduled for later in the year.

AFRICACongo/Kinshasa

A Congo scientific delegation visited the Academy in late 1968 on a mission to study U.S. science policy organization, and to invite cooperative relations with NAS. It was not possible to follow suit until January 1970 when an OFS staff officer visited Kinshasa. Several staff visits followed in the course of 1970, leading to agreement in January of this year with the Office National de la Recherche et du Developpement (ONRD) for a joint workshop.

The purpose of this workshop, convened during the next reporting period, was to review various aspects of national science policy and organization and to assist in the formulation of priorities in a number of areas important to the economic development of the country, e.g. food and nutrition, agriculture, scientific manpower development and natural resources. The workshop offered the first opportunity for U.S. and Congolese scientists, technologists, and government planners to discuss together how science and technology might contribute to Congolese development. These discussions led to concrete recommendations for further joint activity to be developed in the next reporting period.

Ghana

Communication between the Academy and Ghanaian officials concerning the possibility of establishing a bilateral program has been underway for a number of years. However, due to protracted political difficulties in Ghana and the reorganization of the science establishment

following the fall of President Nkrumah, initiation of a program was postponed until 1970 when the Ghanaians asked to resume an active relationship with the NAS. This was undertaken with the newly-created Council of Scientific and Industrial Research and the universities.

A joint workshop on "Research Priorities and Problems in the Execution of Research in Ghana" was held in Accra, Ghana, in January 1971. Convened under the auspices of the NAS, the Ghanaian Council for Scientific and Industrial Research (CSIR), and the universities of Ghana, the workshop brought together for the first time twelve U.S. scientists and over sixty Ghanaian scientists, cabinet ministers, university and research institute administrators to consider problems and opportunities in relating science and technology to Ghanaian development planning. This workshop identified two areas of critical importance requiring further joint study: (a) agricultural research and extension and (b) research priorities in relation to Ghanaian development.

Each joint study group will consist of five members from each side and will spend approximately two weeks in Ghana for discussions and the preparation of a report. The first group, on agricultural research and extension, will meet in Ghana 27 September through 8 October 1971; the second study, now in the planning stage, will be initiated shortly thereafter.

Ghanaian scientists and government officials have asserted that the first joint workshop was of decisive importance insofar as it brought together for the first time many disparate elements of the science-related establishment. The catalytic effect of this event is to be seen in the subsequent developments it inspired, i.e. an all-Ghanaian

conference on the role of Agricultural Research and its Relationship to the Development of Agriculture, to be convened in July 1971, the dissemination of a crops research handbook to agricultural ministry and extension personnel, and the initiation of concrete planning for the joint studies noted above.

ASIAIndia

Preparations have been under way for a second workshop, under the joint U.S.-India science cooperation program, scheduled for the week of September 13th in New Delhi. The workshop will consider the interrelationships of water resources and environmental factors under the theme "Water in Man's Life in India." Arrangements for this workshop were made in separate visits by Deputy U.S. Ambassador Thomas Malone and Roger Revelle. The latter will chair the NAS panel of twelve specialists in water resources engineering, hydrology, and ecology. The topics to be discussed include the following: quality of water resources in urban and rural settlements; economic aspects of clean water supply; sewage disposal problems; disposal of industrial effluents; use of fertilizers and pesticides and their bearing on water pollution; air pollution and its effect on marine life; and problems of siltation.

It is anticipated the workshop will lead to the establishment of a number of joint study groups to analyze in greater depth problems identified by the workshop. There is great interest in these proceedings and participation in the forthcoming UN Conference on the Human Environment (Stockholm, 1972).

Indonesia

Preparations were begun in 1970 for a second Indonesia-U.S. workshop to be held in Djakarta in January 1971. The workshop focused on industrial research and development and U.S. expertise in the fields

of research organization and management, technology transfer, graduate education in science and engineering, standardization, small industries and extension services, chemicals, agriculture, textiles, pulp and paper, metal working and machinery. In addition to the ten U.S. panelists, the meeting was attended by forty-eight Indonesians and representatives from Australia, Japan, Great Britain, and the Netherlands. Observers from Malaysia, Singapore and the Philippines were invited by the Indonesians to draw attention to their desire to foster regional scientific cooperation.

This workshop was the first major Indonesian national meeting which brought together scientists and engineers with planners and economists for a discussion of the problems relating to the development of industrial research. Specific recommendations were adopted for improving and strengthening the existing industrial research and development infrastructure in such areas as training research management, utilizing existing research activities effectively, training scientific and technical personnel, improving and upgrading technical information services, developing an effective system of industrial standards and establishing an effective industrial extension service.

The Indonesians are already implementing some of the recommendations. Dr. John Katili, Deputy Chairman of the Indonesian Institute of Sciences, has proposed a third joint workshop to consider the application of science and technology to the development of natural resources.

Korea

The AID Mission in Seoul and the Korean Ministry of Science and Technology asked the Academy to send a panel of three U.S. scientists for a two-week visit to Korea for the purpose of consulting with the Minister and his senior staff on the Ministry's role, structure and function, its plans for long-range policy and program development, its responsibilities with respect to the determination of research priorities, and Korea's needs for scientific and technical manpower. The Third Five-Year Plan for Korea's Scientific and Technological Development would also be reviewed by the NAS team.

Arrangements are underway to compose a panel to carry out this mission. No definite dates have been set as yet for the visit of such a panel to Korea.

Pakistan

Members of the Pakistani scientific community have encouraged the Academy to undertake a bilateral scientific cooperation program with their country. In response to this expression of interest, Dr. Roger Revelle, chairman of the Board on Science and Technology for International Development, traveled to Karachi, Islamabad and Dacca in mid-January 1971 to meet with members of the Planning Commission and senior government officials. He found there was unanimous support among Pakistani officials and AID for the development of cooperative activities between the Academy and the National Science Council of Pakistan.

The Council represents the six major research councils of Pakistan and is the recognized institution supporting and reflecting

the interests of the scientific community. Dr. I.H. Usmani, chairman of the Council, proposed that the new relationship with the Academy be initiated with a joint workshop to be held in Karachi. This meeting would address itself to the problem of how Pakistan's natural resources could be assessed and utilized rationally in accelerating economic development. A tentative agenda included the following: cyclonic storm surges, monsoon forecasting, forestry research, fisheries resources, new technologies for mineral exploration and utilization, groundwater hydrology, manpower requirements and the more effective utilization of wastes from processing natural products.

Internal political difficulties between the Eastern and Western sectors of the country necessitated the postponement of the proposed workshop indefinitely. However, Dr. J. Wheeler, AID Mission Director for Pakistan, and Dr. Usmani have urged NAS to move forward with the cooperative science program despite the problems in East Pakistan.

Thailand

At the request of AID/Thailand, the Academy assisted in the organization of a Seminar on Protein Food Promotion in Bangkok. The seminar, held in November 1970, was organized in cooperation with the Food Research and Product Development Institute at Kasetsart University, the Department of Health and the National Research Council of Thailand. The purpose of the meeting was to stimulate greater interest in the development and marketing of new high protein foods on the part of indigenous and foreign firms in Thailand and to strengthen Thai government support of these programs. U. S. participation consisted

of seven specialists in the fields of nutrition and food technology.

The Cabinet of the Thai Government officially accepted the resolutions of the Seminar and forwarded them to appropriate government agencies for action. The Cabinet also promulgated a new National Nutrition Policy and established a National Nutrition Institute. Some progress has been made toward involvement of commercial firms in high protein foods.

SPECIAL STUDIES AND ADVISORY PANELS

East Pakistan Land and Water Development as Related to Agriculture

At the request of AID Near East and South East Asia Bureau, an ad hoc committee composed of nine experts in agriculture and water management familiar with East Pakistan was established upon consultation with the NRC Agricultural Board and the Committee for the International Hydrological Decade.

AID was interested in obtaining NAS evaluation of and advice concerning an \$800 million multi-year program proposed by the World Bank for water and agricultural development in East Pakistan, a scheme to be supported by the multi-national Aid-to-Pakistan consortium of which the U.S. is a member.

The panel met in Washington in August, October and November 1970 to review and assess the draft Plan of Action proposals of the World Bank, bearing in mind that this examination was to be undertaken within the context of a broader review of factors inhibiting the economic and social development of East Pakistan. During its deliberations, the panel heard experts associated with the World Bank, AID, and the Harvard Development Advisory Service.

The study furnished advice to AID on the ordering of priorities relative to water and agriculture problems in East Pakistan as well as an assessment of the World Bank's program proposal.

International Development Institute

In his September 15, 1970 message to Congress, the President of the United States proposed the establishment of an International Development Institute. At the request of AID, an ad hoc committee was convened to consider the character, purposes and functions of the IDI as a key element in a reorganized foreign aid program. The committee was operational during the months of October through January and drew on the experience of a distinguished group from the world of universities, foundations, scientific research institutions and industry. The committee's report, to be published in the next reporting period, advocates concentration of IDI resources on systematic research-development-diffusion efforts on select, critical problems hindering development, and the establishment of new field instrumentalities for technical assistance - namely, bi-national development foundations largely oriented to the strengthening of indigenous educational and scientific capabilities.

The projects listed below were initiated toward the end of the reporting period; for this reason only brief descriptions of purpose and objectives are given. Progress on these studies will be reported in the subsequent anniversary report.

African Agricultural Research Capabilities

The development of agriculture is of increasing concern to African nations as well as to the United States, other donor countries and international agencies. Promising results obtained through research in Africa as well as other parts of the world suggest the potential that exists for improving animal and crop production in Africa.

In order to explore this potential in depth, the Office of Technical Assistance Coordination in AID's Africa Bureau asked the Academy to undertake a twelve-month study which will address itself to the following objectives: (a) to review, analyze, and establish, if necessary, the priorities in research and education that will enable agriculture to make its maximum contribution to the development goals for Africa; (b) to specify the institutions and systems of agricultural research and research-related education - international, regional, and national - needed to achieve the goals identified in (a); (c) to determine the most appropriate roles and modes of operation and subject areas and locations for non-African agencies in providing coordinated support for agricultural research and education in Africa; (d) to suggest appropriate channels of communication and cooperation among nations, agencies and institutions; (3) to outline the means by which research and education can be applied most effectively to agricultural development; and

(f) to make a broad assessment of the scientific manpower needs related to the proposed research system(s) and institutions recommended by the Academy committee.

To carry out this study, an international committee was created which consists of eighteen agricultural experts drawn from the United States, Africa and Western Europe. Several members are affiliated with the leading institutions and agencies concerned with the development of African agriculture, such as the World Bank, FAO, the UN Economic Commission for Africa, the French and British aid programs, etc. The first meeting of this Committee was scheduled for April 1971 in Washington for the purpose of working out detailed plans for the execution of this study. Additional specialists will be invited to serve as consultants; they will assist in the preparation of background papers and in the compilation of data in support of the study. Two further meetings (one in Addis Ababa, Ethiopia in the fall of 1971, and one in Washington in the winter of 1971) are planned.

The project is being carried out under the joint auspices of the Agricultural Board (NAS) and the Board on Science and Technology for International Development.

Scientific and Technical Information for Developing Countries

An ad hoc panel was established in March 1971 at AID's request to formulate a rationale and to suggest projects for an AID program addressed to the problem of the acquisition and dissemination of scientific and technical information in developing countries. The members of this panel were drawn from universities, technical societies, and various public and private organizations; all of them are concerned with various

aspects of information handling, transfer, and development problems.

The panel will seek to determine the requirements of developing countries for more effective acquisition and dissemination of scientific and technical information, particularly with reference to information needs for industrialization, natural resource development, and the natural sciences. The group will also attempt to identify various project approaches and mechanisms to be developed by AID as a means of expanding the flow of information to and among the developing countries.

The first meeting of the panel took place in March 1971 and developed an action plan to deal with the above objectives; two additional full panel meetings as well as sub-panel discussions are planned.

The Role of Science and Technology in Development in the 1970's

Plans were made and preparations started for a study designed to take a comprehensive look at the potential of scientific research and technological application in the social and economic progress of developing countries. Broad objectives of the study are: to identify development problems most susceptible to scientific and technological solutions; to recommend ways of assisting developing countries to create or expand their own capability to develop and utilize science and technology; to consider contributions which the scientific and engineering communities of the industrialized countries are particularly qualified to make to the solutions of these problems; to identify new developments in science and technology which show promise for economic

and social development; and to formulate guidelines that will assist administrators of technical assistance organizations to utilize science and technology most effectively to cope with the development problems of the next decade.

As the first step in the study, an ad hoc conference will be convened at Woods Hole, Massachusetts, in August 1971. Included in the conference will be participants from both developing and industrialized countries, from the natural and social sciences, and from private industry, government, and international organizations. The conference will provide for an initial consideration of the study issues and will help outline the parameters of a further, in-depth study.

Solar Energy Utilization for Developing Countries

An ad hoc panel was formed to assess the need for AID to sponsor solar energy research in view of the rising interest, particularly within developing countries, in solar energy. This panel is comprised of twelve persons: seven from the U.S. constituting the panel proper, and one each from Canada, Australia, Niger, Israel and India serving as advisors and resource persons. Its terms of reference are as follows: (a) assess the state-of-the art in solar energy utilization in different areas of potential application for developing countries, including current practical applications; (b) identify promising areas of research and development and indicate requirements for fostering efforts in such areas; and (c) examine the desirability of establishing an International Solar Energy Institute in North Africa.

A meeting to deal with the above questions was scheduled for May 1971.

Labor Intensive Technologies for Developing Countries

This study entered into its first phase--a problem-definition stage--preliminary to the elaboration of a study approach to a complex set of problems, the most critical of which is the rapidly rising level of unemployment in developing countries. Arrangements were made with the Overseas Development Council for the preparation of a paper, "Appropriate Technologies for Developing Countries" summarizing recent literature. The paper provides an annotated bibliography of the literature on the subject.

It is expected that on the basis of this and other papers that the steering committee will define a study approach for this problem in the next reporting period.

U.S. Training Opportunities for Managers and Senior Staff of Industrial Research Institutes in Developing Countries

NAS Workshops on industrial research have repeatedly noted that the absence of properly trained R & D administrators constitute a most significant bottleneck to the growth of industry-oriented applied research in developing countries.

As a result of this observation, the BOSTID is creating an ad hoc panel, to be composed of persons from U.S. government laboratories, industrial firms, contract research organizations to (a) identify elements and characteristics of alternative training programs for research management and senior staff which U.S. organizations might undertake in the host country, and/or in the United

States; (b) assess the interest and potential contributions of U.S. universities, government and industrial laboratories, and research institutes in such programs; and (c) recommend to AID steps for setting up training programs.

Role of the U.S. Engineering Schools in Technical Assistance Overseas

Discussions between AID and NAS/NAE in 1970 revealed a common concern to see U.S. engineering schools play a more active and relevant role in technical assistance effort overseas comparable to that of the agriculture schools and experiment stations of U.S. land-grant universities. As a result of these discussions, plans were developed to create an advisory panel which will be concerned with the following objectives: (a) identify relevant interests and capabilities of U.S. engineering schools related to developing country needs such as curriculum reform, training and orientation of teachers, and development of indigenous institutions; (b) recommend needed changes in U.S. engineering school curricula to orient training of engineers more directly toward developing country problems; (c) examine means of relating research interests of U.S. schools to specific developing country problems and recommend ways in which AID can mobilize U.S. schools for this role; and (d) to assess the interest and capabilities of U.S. engineering schools in acting as intermediate contract organizations in implementing development projects.

A first panel meeting, scheduled for May 1971, will try to identify a number of project areas potentially suitable for U.S. engineering schools.

Role of U.S. Firms in Promoting the Development of Industrial R, D & E Capabilities in Developing Countries

Workshops in industrial research conducted in five developing countries have revealed possibilities for a positive contribution by U.S. firms operating in these and similar countries towards strengthening indigenous research, engineering, and development capabilities. To clarify these possibilities and provide guidance for its own policies, AID requested that a study be undertaken in collaboration with the National Academy of Engineering.

Plans were made for the formation of an advisory panel whose members will be drawn from multinational corporations, universities, and public and private development institutions. Specifically, the panel's terms of reference will be to examine the past role of U.S. private investment in strengthening R, D & E capabilities of LDCs, as well as the potential role of the U.S. corporation to assist in developing local R, D & E capabilities. In addition, the panel will attempt to identify major factors which either strengthen or inhibit the initiation and expansion of these activities. First panel and sub-panel meetings are tentatively scheduled for the fall of 1971.

Technology Innovation and Monitoring Program

The purpose of this project is to monitor new and unique developments in science and technology relevant to the solution of problems in developing countries. It provides for staff scanning of the scientific and technical literature, discussions with staff and members of Academy/NRC boards and committees, and contacts with other

individuals and organizations for identification of existing technologies which show promise of rapid innovative application to present development problems. Items identified will be evaluated by expert Panels, assembled with the assistance of an Advisory Committee currently being established, which will recommend further steps. In addition, an experimental interdisciplinary group will be created to identify promising areas for basic and applied research in an effort to cut short the time between laboratory developments and field applications in developing countries.

Because of the experimental nature of the program a preliminary pilot project was instituted to identify a number of promising examples of developments with rapid application potential. From this preliminary project, construction of ferro-cement boats was selected for in-depth staff study with the results to be widely disseminated within AID. The program is now being organized into a two-phase operation with action on the second phase contingent on mutual AID/Academy evaluation and authorization.

Review and Evaluation of Past Activities with the Developing Countries

The purpose of this project is to evaluate the past activities of the OFS, especially those of the Board on Science and Technology for International Development, to determine their effectiveness both in terms of strengths and weaknesses.

This effort consists of a review of reports and results of previous advisory committees as well as recent studies and bilateral programs. Summaries of recent projects and programs have been prepared which will help in the comparison and evaluation. The final part of this report, currently being drafted, will outline the criteria and philosophy which have guided OFS programs with a view toward future determining direction.

REPORTS SUBMITTED TO AIDDURING PERIOD APRIL 1, 1970 TO JULY 31, 1971

1. Preliminary Assessment of Some Problems of the Hydrogeology of the Dry Pampas in Buenos Aires Province, Argentina; Trip Report, September 1970.
2. A Seminar on Protein Food Promotion, Bangkok, Thailand, November 22-December 1, 1971.
3. East Pakistan Land and Water Development as Related to Agriculture, January 1971.
4. The International Development Institute, July 1971.
5. Report of a Workshop on Research Priorities and Problems in the Execution of Research in Ghana, January 4-9, 1971.
6. Status Report to the USAID Mission in Brazil - U.S.-Brazil Joint Study Group Activities - period July 1970-December 1970.
7. Summary Minutes of Meetings of the Board on Science and Technology for International Development (June and December 1970 and March 1971).

REPORTS IN PREPARATION

1. Workshop on Science and Technology in the National Development of Chile, January 11-15, 1971.
2. Indonesia-U.S. Workshop on Industrial and Technological Research, January 18-30, 1971.
3. Advisory panel on Scientific and Technical Information for Developing Countries, May 1971.