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EVALUATION

"ENHANCING S&T CAPABILITIES IN LDCs"

DSB/ST - NATIONAL ACADEMY OF SCIENCE

Members of the Evaluation Team

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BEST AVAILABLE DOCUMENT

Project No.: 931-1223
Contract No.: AID/ta-C-1433

EVALUATION
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I. Introduction

The Project Paper (PP) for the "Enchancing S&T Capabilities in LDCs" project called for a major AID evaluation at the end of two years, or approximately October 1979. That deadline was not met (although both NAS and AID made preparations at the time) and the evaluation was initiated only in late June 1980. With only nine months of project activity remaining, the Evaluation Team was less concerned with modifications and adjustments to the current project and, instead, concentrated on accomplishments to date and assessing the overall AID/NAS relationship.

Stated in the broadest terms, the function of this evaluation is to measure progress toward achievement of the Project Purpose, which is described in the logical framework of the PP as follows:

> PURPOSE: 1) Strengthen the capability of LDC institutions to apply science and technology resources to solve economi development problems; 2) to assist AID and LDCs in utilizing imoroved techniques to adopt scientific and technological advancements in the U.S. and other industrialized countries to the solution of specific development problems. (The AID/NAC contract objective, Article I.A., has virtually the same wording.

The Evaluation Team was specifically charged to measure the degree to which targets for inputs and project purposes have been achieved to date, as per the logical framework, to review the quality of the workshops and ACTI studies and to provide expert opinion on the adequacy of processes used by NAS to plan, carry out and evaluate workshops and publications. In addition, the team was to evaluate the relevance of NAS services to AID and to recommend changes which might foster a continued or expanded relationship between AID/IDCA and NAS. Such a new relationship was under active discussion with the President of NAS.

Members of the Evaluation Team are:

1. Ralph Smuckler: Ph.D., Professor and Dean at Michigan State University, Chairman of AID's Research Advisory Committee, and former head of the ISTC Planning Office (Team leader).

2. Joseph Toner, Consultant, former AID Mission Director in Bangladesh, Turkey, Nepal and Cyprus.

3. Elizabeth Keys MacManus, J.D., Deputy Director, AID/NE/TECH.

4. Francis Campbell, Evaluation Officer, DS/PO.

5. John Daly, Ph.D., Chief, Science Policy and Technology Division, DS/ST.

No field visits were undertaken as part of the evaluation. NAS' follow-up evaluations of workshops and other trip reports were available, as were all of NAS and DS/ST project documents and reports on project activities. Many of these were reviewed. The team did not have the time to go deeply into other NAS projects which are funded by AID regional bureaus or USAIDs but did go over reviews or evaluations where they were available. A 1975 evaluation of the predecessor project to this one was referred to frequently. A summary review of the previous Evaluation Team recommendations is appended (Appendix J). Members of the team interviewed NAS, AID and related personnel, including Mission Directors who were present in Washington during the evaluation.

The Board on Science and Technology for International Development (BOSTID) of the National Academy of Sciences is the vehicle for operating this project. (See Appendix A for NAS organizational relations.) The evaluation is targeted on that portion of BOSTID activity -- about 55% of the total -- which was funded and defined through one specific contract (AID/ta-C-1433). BOSTID activities include AID regional bureau and country contracts plus other program components which are not directly under review. Since this contract supported the central staff which enabled NAS/BOSTID to take on some of these other activities, it provides the core support which underpins the others. It establishes the "response capability" which enables NAS/BOSTID to relate to and deal affirmatively with program needs suggested by others in AID and in developing countries.

Some of the review team's interviews with AID staff revealed some confusion about the overall NAS operation and the

limits of the NAS/BOSTID role in support of AID programs. Strengths and shortcomings were attributed to NAS performance which were not directly tied to the project under review. To the extent possible, we have tried to limit our evaluation to the work of BOSTID, and specifically that portion which is supported by this contract.

II. NAS/BOSTID Activities and Measures of Achievement

NAS/BOSTID activities include workshops on scientific and technological issues in development. These are held in a developing country and are planned and executed in close cooperation with local national organizations or agencies. In addition, BOSTID brings together study and advisory panels on S&T at the request of AID and related to specific issues or events. The work of the Advisory Committee on Technology Innovation is a third important component of this project. It operates through a study process, issuing materials which describe or suggest new technologies which may be important in certain developing countries. These three "mechanisms":

1) workshops,

2) studies, including those of ACTI, and

3) advisory and consultative panels

are the means the NAS/BOSTID employs to fulfill project purposes. A summary of NAS activities is listed in Appendix B.

The separation of inputs and outputs as listed in the Appendix does not agree with the logical framework in the Project Paper which lists all of those items as inputs. The Evaluation Team believes this is an error in the design of the logical framework which - although having no effect on project activities as such - tended to make it more difficult to come up with measures of achievement for "outputs" and "End of Project Status" and resulted in those sections being overstated. This will be discussed further along in the report.

The description of activities to be undertaken by NAS varies - often considerably - between the Project Paper (PP) and the AID/NAS contract, and yet again in NAS reports and billings of the activities undertaken; feasibility studies, for example, are a significant activity in the PP but are not mentioned in the contract; advisory missions and special studies are not in the PP but are called for under the contract in somewhat vague terms, but NAS either did not carry any out or labeled them differently when reporting and billing for them. For these reasons, a precise, across-the-board measurement of achievement and compliance is not possible. Nevertheless, there are enough

indicators to demonstrate that compliance and achievement are (or are planned to be) substantially in accordance with the PP and the contract.

The most significant inputs required of NAS in the PP were NAS/BOSTID staffing levels and contributed time by scientist and engineer members of the Academy. (Contributed time means that NAS participants in workshops, seminars, publication reviews, etc., receive only travel and per diem; there is no payment of salaries or fees from project funds.) The PP calls for 12 professional staff. Currently, NAS/BOSTID has a 17 person professional staff. It has billed the contract for 80% of the 12 person/years per year complying with in the Project Paper. The level of contributed time is running well in advanced PP levels to be carried out through completion of 300 persons contributing approximately 1,750 days. It is estimated that 925 persons will contribute 4,433 person days over the life of this contract. The PP does not specify counterpart participation in the project. However, this is an important contribution to the project and should be noted. It is estimated that counterparts in LDC's have contributed 5,568 person days of effort to oversea activities sponsored under this project. Appendices B and C list the specific activities which comprise NAS outputs.

According to the PP, the principal instrument of the NAS overseas program for assisting LDCs in the development of science and technology policies, institutions and manpower for use in resolving development problems is the bilateral workshop. Four workshops were projected for each year and a total of 12 through the project lifetime. Although workshops completed and those scheduled through the remaining months of the contract will reach 12, the first year of operation saw only two workshops due to the diversion of NAS/BOSTID efforts into preparations for UNCSTD. As of 7/1/80, two workshops remain to be undertaken -- Nepal and Morocco -- and both are on schedule. Another matter is that AID'S participation in the selection of workshop themes and locations appears to be more passive than suggested in the PP. Nevertheless, the quality of the workshops completed so far seems to be good and there is reasonable expectations that the remaining will be also.

Another major component of the project was to the studies carried out by NAS' Advisory Committee on Technology Innovation (ACTI). What constitutes a study is not well defined in the PP or the contract. Thus, NAS figures show that ACTI studies meet projected targets but the number of new or revised publications resulting from the studies does not. In the absence of a good definition, the Evaluation Team accepted NAS' claim.

Rather than go into detail here on the two principal mechanisms employed by NAS/BOSTID, a more complete treatment of the workshop technique and the product of ACTI studies appears in Appendixes D and E.

III. Relevance of NAS to LDCs and AID

The relevance of NAS/BOSTID activities to S&T and AID for development in the LDCs can be assessed by a number of indicators. Among these are the eagerness or willingness of a developing country to host an AID/NAS sponsored workshop or seminar in their country. Another index is the nature of LDC attendance in such meetings and their participation following the meeting in subsequent related activities. In the same vein, the distribution of NAS/ACTI monographs and the continuing request from institutions and individuals from LDCs for more copies and more information provides a useful measure of the extent to which the topic under study is seen as central to LDC interests. Using these indicators as yardsticks, the BOSTID programs appear to have sparked the interest of the LDCs.

The next question of whether this interest has promoted change and advanced the S&T capability of the developing countries is more difficult to measure. This is because many of the developing countries will seek to conserve U.S. assistance for things other than S&T and use their own funds or other donor resources for such purposes. The result is that there are few "footprints" for AID use in tracing the impact of a BOSTID intervention. In some selected subjects like the winged bean, there is sufficient evaluative data to indicate a wide acceptance and utilization of the new variety. However, this data is not available for the bulk of such activities.

In discussing BOSTID activities with AID field personnel, the responses are almost always positive in terms of LDC reactions. However, even though a new technology may appear very attractive to the LDC representatives, it is explained that it is difficult for them to attract sufficient support in their own countries to garner the resources necessary for trial applications. Thus, measurable benefits from workshops and seminars may not become apparent for some years after the event.

In looking at the question of NAS relevance to AID, consideration has to be given to the varying interests of the differing AID organizational units. The Development Support Bureau has been a principal point of contact with the scientific community and reflects a broad institutional interest in both developing and encapsuling new technologies. In addition to the Office of Science and Technology, the Office of Engineering, the Office of Agriculture, the Office of Population, the Office of Health, and the Office of Nutrition have also had substantial relations with NAS and its affiliates on their individual programs. In a subject matter such as remote sensing, USAIDs can choose between utilizing DSB/NAS or

move to the Private Development Cooperation Bureau and through its Office of Foreign Disaster Assistance utilize NASA as its preferred instrumentality.

Apart from these central bureau programs, there are a variety of individual contractual relationships between NAS and the regional bureaus of AID. Some of these like the multi-year program in Egypt where NAS has stationed permanent representatives involve a substantial commitment by both the Near East Bureau and NAS.

NAS has also played a substantial role in programs for Korea, Brazil, Indonesia, and the Sahel. As NAS undertakings move from central AID bureaus to regional bureaus and USAIDS there are some indications that these operating elements of the AID program attempt to fit NAS into the classical role of a conventional AID contractor working as an extension of the USAID mission. Given its mandate, NAS cannot and should not compete with other AID contractors. NAS/NRC is fundamentally an independent, quasi-governmental agency providing disinterested scientific and technical advice to the government. It must retain independence from AID to be credible in its primary function. It must also be able to continue to attract the outstanding S&T talent in the U.S. on the basis of their professional responsibility to provide disinterested advice on public policy.

Since NAS is present in the field in these relationships at the concurrence of the host government there is no question but that there is a common perception of the relevance of NAS services. Some strains, however, are apparent as USAID and NAS develop a working relationship in the field that attempts to maximize NAS input within the format of AID operating procedures.

IV. Quality

The team reviewed the quantity and relevance of the NAS/BOSTID effort, and also the quality of NAS performance in pursuit of project objectives. These three guages of NAS/BOSTID performance are not easily sorted out. Quantity of output and its relevance to AID and LDC needs has much to do with quality measures. But regarding quality, a review of documents and evaluation materials, published volumes and interviews reveals that NAS maintained a standard fully commensurate with AID and developing country needs. AID turned to the NAS as an organization perhaps uniquely capable of marshalling high level U.S. scientific and technological talent to aid developing countries and to advise the Agency on policies and programs. The NAS drew on such talent and maintained a high standard of performance in overseas activities, ACTI studies and special activities under this project.

Overseas workshops, perhaps the central NAS "mechanism" for accomplishing BOSTID project goals, can be judged in terms of their quality of conception and design, in terms of their smoothness of execution, and on criteria of participation and follow-through. Although there are exceptions, in all of these criteria, the workshops get reasonably high marks. (See Appendix D.) BOSTID has installed an evaluation system which provides feedback to maintain and improve quality. The review team had access to evaluations of workshops and other activities.

Within the limits imposed by short-term rather than resident NAS staff abroad, workshop planning has been thorough and carefully worked out with local national agencies and scientific community members. Much care has gone into selection of the U.S. resource persons who participate, without compensation, in the workshops. From October 1977 through July 1980, 302 U.S. scientists participated mainly in panels and workshops overseas, ranging over 46 defined specialties. NAS drew on 145 persons from academia, 66 from government, 51 from private industry and 51 from other sectors of the society (the total exceeds 302 since some participants had multiple affiliations). These included well qualified and experienced members of the U.S. science community and persons in important policy positions.

Evaluation questionnaires and interviews showed that, while some workshop participants felt the need for improving pre-workshop preparation, expanding time for discussion, and deepening the knowledge of local problems on the part of U.S. experts, the general tone was strongly positive. In numerous instances, the workshop became one step in expanded contact and desirable follow-up activity. Because of the quality of participation, workshops were cited as providing legitimacy to the local science community which was concerned with the scientific subject or problem under consideration.

Turning to the work of the NAS Advisory Committee on Technology Innovation (ACTI), the studies produced by the special multi-disciplinary panels have been of good quality, carefully screened and reviewed before publication and made widely available. Each report is a product of careful investigation. Each reflects the judgment of specialists who can write to stimulate ideas and encourage investigations which offer genuine promise. They read well, and are in wide demand. The impact of the ideas presented varies, but there exist notable successes in terms of follow-up and momentum toward building a self-sustaining network to inform potential users. These include ACTI publications on ferrocement, the winged bean, the leucaena tree, guayula, jojoba, etc.

The other activities of NAS/BOSTID include advisory panels and studies not under ACTI auspices. Some of these activities are difficult to sort into discrete categories. (A complete list is found in Appendix B.) Questions of quality revolve around the thoroughness of planning and the level of staff participation underpinning these activities, as is the case for the workshops and ACTI. The same positive evaluative judgments prevail. NAS/BOSTID has delivered the level of talent needed in well conceived and executed, wide ranging and productive activities geared to use of science and technology in developing countries. (See Appendix F regarding range of participants and Appendix G for special evaluation of BOSTID organized discussion seminars.)

The Board on Science and Technology for International Development which is at the core of the NAS contract program is itself made up of leaders of scientific endeavor in the U.S. It is the vehicle for overseeing quality, and its members are active in the workshops, evaluative processes and studies., along with many others who are recruited for limited assignments on the same uncompensated basis.

The BOSTID includes persons of recognized reputation in academia and industry -- a scientist who is the President of a major pharmaceutical company; the scientist/administrator who is foreign secretary of the NAS; the President emeritus of the NAS and of Rockefeller University; the Executive Vice President of the General Foods Corporation; and a number of active researchers. The prestige of this group working under the aegis of the NAS helps to account for the ability to attract acknowledged experts to the work of the project both in the U.S. and abroad. A special BOSTID committee is charged with the evaluation task, but the entire group is concerned with and in the end responsible for maintenance of good quality.

V. Administrative Processes

A more detailed discussion of the administrative processes is contained in Annex H. The key conclusions are summarized below:

Governance: We are impressed by the quality of the Board and its staff directors. The NAS/NRC is highly respected for overall control of the advisory services. However, we perceive the need for serious adaptation of governance procedures if a major program expansion is to occur.

AID Management should be strengthened at current program levels and regional bureau officials involved. Appropriate AID management will be a major concern for an expanded program.

Resource Management Systems are generally acceptable. Financial management procedures should be modified to allow better planning and control of total expenditures per project output. A separate and very effective system would be required to manage an overseas S&T grants program. Personnel management procedures seem effective for current program levels, although it is recommended that a study be made of ways to improve selection of participants. We doubt, however, that they would serve a much larger program without significant changes. Information management is acceptable, but would benefit from stronger contacts with AID.

Evaluation and Reporting Systems are adequate. Continued evaluation studies are urged as are modest improvements in reporting.

Management Services: We are concerned about NAS/NRC central management services especially since they tend not to have been designed for support of overseas activities. NAS Purchasing Services have not been a problem for the current contract, but overseas purchasing would probably have to be decentralized to the BOSTID staff to obtain timely, efficient acquisition of materials for overseas programs. We see no likelihood that NAS' Contracts Office could manage a large program of small overseas grants as might be contemplated for a new program. Travel arrangements do appear to be well handled. There is no current NAS/NRC field support capacity for overseas programs.

NAS Facilities: These seem adequate for current and future needs.

Program Management:

1) ACTI appears to provide very high quality work. Management changes should not interfere with either the originality or quality of this work. We recommend alternative management approaches to networking after the publication of an ACTI study.

2) Overseas programs. Generally, these are well and flexibly managed. We recommend more training for workshop managers in workshop methodology and small group processes, and more effective coordination with AID Mission and Regional Bureau personnel in workshop planning.

3) Special studies. These are very well handled by NAS staff, but management of AID inputs should be improved.

VI. Analysis of Costs of NAS Subprograms

The efficiency of the NAS program is difficult to measure in large part because the pecise functions of the program have not been clearly specified. The materials in Appendix I were prepared by NAS to the specifications and at the request of the evaluation team. The following discussion will refer primarily to the budget table in Appendix I.

There are three main subprograms financed under the Strengthening S&T Capabilities project:

1) The overseas program.

2) The special studies/advisory panel programs.

3) The ACTI studies program.

Additionally, the contract funds central support functions -- program development, follow-up and implementation, evaluation, administration and Board support -- which serve the centrally funded programs, but which also serve NAS projects funded through other mechanisms. Under the practices established in the contract, these central support functions have been separately reported. The appended memo allocates these central support costs according to the best judgment of NAS to allow analysis of total activity cost under the NAS project.

Leverage: NAS has also revised and improved estimates of overall project financing. The revised estimate of donated professional time by (U.S.) scientists to the program is 4,433 person days over the 3-1/2 year life of project (of which 1230 person days were for overseas activities). If per day rates are estimated at $195 -- appears realistic in view of the consultant-like services and high level professional talent they seek -- this results in a valuation of $864,435 for these donated inputs. Compared with the $2,736,371 total estimated costs for centrally funded programs, we may conclude that donated services of the U.S. scientific community are approximately 30% of AID financial inputs to the program.

BOSTID staff also reviewed all of the overseas activities to estimate host country inputs, resulting in an estimate of 5,568 person days of host country national participation in centrally funded activities. We see no realistic way to evaluate this input in financial terms commensurate with the AID inputs. The actual average salaries in the LDCs in question are not available to us, these do not usually represent full-time salaries in any case, nor do they represent the average honoraria for the participants when they take part

in international consultancies. We note merely that host country counterpart person days of participation in NAS' overseas activities are approximately four times that of U.S. participants in those overseas activities.

Overseas Program Costs: It is suggested that the overseas programs can be regarded from two different perspectives. On one hand, the workshops provide disinterested scientific advice on S&T policy issues which is valuable in itself. Twelve workshops are to be financed under this project. On the other hand, NAS/BOSTID staff maintain ongoing S&T communications channels with a number of LDCs, through workshops, visits and other means, which has many useful results. Staff can catalyze useful S&T exchanges, provide advice on U.S. science policy with these countries (as they have done, for example, in developing S&T agreements with Mexico and the Andean Pact nations, or in preparation for the trip to Africa by Dr. Frank Press, Director of the Office of Science and Technology Policy in the Executive Office of the President). Using the 20 additional countries visited by BOSTID staff, it can be estimated that NAS has actively maintained S&T contacts with 32 countries over the course of this project. (This is probably a conservative estimate.)

In fact, the workshop and country relations functions are complementary and each is performed more efficiently by managing them in concert. However, from the point of view of cost effectiveness analysis, it is informative to allocate costs among these functions. (Appendix I presents illustrative material.) If for example, it appears reasonable to allocate 50% of overseas program expenditures to workshops as products per se, and 50% to maintenance of S&T relationships, then the estimated average cost per workshop would be $47,675 and the estimated average cost per country would be $16,500 per 3-1/2 years or $4,700 per country per year. If all costs are attributed to workshops, the average per workshop cost would be $95,350.

The average cost per activity should be distinguished from the marginal cost, that is the additional cost of the program to add one additional activity. Since management, evaluation and other overhead costs are relatively fixed, the marginal cost for an additional workshop would be approximately the average direct cost -- $65,850.

Special Studies: The relatively simple discussion seminars held in the U.S. have an estimated average total expenditure of approximately $32,000. The estimated range was $19,327 to $38,744. The average direct (or marginal) cost for these activities was $13,711.

ACTI Studies: There is a conceptual problem with cost-effectiveness ratios for the ACTI program analogous to that of the overseas program. On the one hand, the ACTI program produces monographs which are useful products in and for themselves. There will be nine produced under this current contract. On the other hand, the ACTI program is involved in stimulating research in new and productive areas. A large part of staff time and effort is taken up promoting technologies discovered in earlier studies through speaking engagements, correspondence, distribution of publications, personal contacts and other means. There are a total of 26 ACTI studies completed or underway. Ideally, we would allocate expenditures partially to the monograph production per se, and partially to efforts to coordinate and expedite the (informal) cooperative programs those monographs catalyze. (Estimates of donated professional time are only for monograph production.) Unfortunately, we do not have an adequate measure, and none may be possible, of the relative importance of these two aspects of the ACTI program.

The material in Appendix I shows average per unit total cost according to alternative allocations. For example, if expenditures are allocated 50% to production of new monographs and 50% to coordination and expediting programs, then the average expenditure per published monograph would be $67,025 and the average cost of follow-up would be $22,750 per 3-1/2 years or approximately $6,800 per substantive area per year. If expenditures are wholely allocated to monograph production, the average per unit cost would be $134,050.

The direct costs per ACTI study averaged $84,381 (see Table). They ranged in direct cost from 35,000 to 109,200 (these figures are slightly understated due to split funding of one ACTI study). The direct costs of these seven monographs are 48% of the total costs of the ACTI program, suggesting that the majority of efforts is indeed directed to the publications themselves.

VII. Broader Context and new Directions for NAS/BOSTID

Attention to various segments of S&T is on the increase both in developing countries and, logically, in development assistance programs. Preparations for the UN Conference on Science and Technology for Development in August 1979 and activities planned as follow-up to the conference highlight this trend. In view of the BOSTID experience, it is reasonable to turn to the NAS as an important asset in expanded U.S. attention to Science and Technology in developing countries.

The underlying philosophy of BOSTID and its careful definition of appropriate role and operating style, characteristics which give strength and quality to the NAS effort, are also factors in suggesting and delimiting an expanded NAS/BOSTID role in development efforts. The NAS/BOSTID program has performed an essential function within an array of tasks which are important if one is to bring the science and technology community to focus on development issues. As an intermediary agency operating between government and the private sector it has brought quality and independent judgment to bear in the service of strengthening developing country scientific communities and institutions. Its central mechanisms are workshops, studies, publications, panels, and short-term advisory visits -- all shaped within the style of operation befitting the NAS. What does this style and philosophy suggest as an expanded role? And what are its limits?

BOSTID operations stress jointly planned ventures with developing country scientists and scientific institutions, designed and executed in a collaborative mode. BOSTID identifies and makes good use of short-term, high quality, usually unpaid authorities, augmented by professional management staff based essentially in Washington. It makes good use of a standing board of experts which meets twice each year as a group to assure quality within the program which continues throughout the year.

NAS/BOSTID operates within the Commission on International Relations (CIR) of the National Research Council which is the operating arm of the NAS, NAE, and IOM. (See Annex A.) It is one of five offices of the CIR, the one concerned with developing countries. It must reject activities which are not approved in broad terms by the National Research Council, i.e., are not considered appropriate for a private, distinguished scientific organization such as the Academy, or which would distort its independent status and image. Although the Council is broadening the boundaries and has permitted experimentation in the NAS/BOSTID role -- such as that now established under another AID contract in Egypt -- there are limits.

The record suggests significant advantages to expanding the NAS role to include functions compatable with the present activity and the philosophy of Academy programs. In broad terms, this would encompass building additional links between foreign S&T communities - policy making bodies and other institutions - and those in the U.S. Specific examples are:

1) additional follow-up activity to workshops on a systematic basis;

2) fellowship programs involving selection panels but probably not actual placement and management of trainees;

3) in-depth, specialized seminars at foreign locations which would supplement present advisory panels and workshops;

4) management of a competitive small grants fund mainly for LDC researchers in support of creative S&T experimentation and research on development problems in developing countries; and

5) an expanded information service geared to developing country needs in selected S&T fields.

These types of functions would draw on and strengthen the quality and reputation which NAS brings to its tasks. Each would use short-term, high quality staff, occasionally on a repetitive basis, blended with Washington based professional staff. The BOSTID staff would continue to play a key role planning and preparing the way for overseas activity and seminars, training and advisory panels in the U.S.

Each of these new or expanded activities would reinforce the other, and improve focus and follow-up present efforts. Combined, they would lead the BOSTID in the hub of the strategy for S&T developments, a role for which it is well suited and experienced. In serving as the central component of a broad program consisting of linkage building, institutional strengthening and research on promising segments of S&T, BOSTID would draw regularly on its official and unoffical ties with developing country S&T communities to which it relates well as a result of the unique status of the NAS and the very nature of the scientific fields themselves.

The NAS should also be encouraged to expand its program of studies tied to major development concerns. AID should turn to the NAS for studies similar to the World Food and Nutrition Study, the IOM's Strengthening U.S. Programs to Improve Health in Developing Countries, and the volume on Science and Technology for Development prepared by BOSTID for UNCSTD. The scope and depth of such studies would vary. Some major topics might include:

1) Energy -- Research and Technology Transfer Priorities.

2) Urbanization in Developing Countries -- Research and Development Priorities.

3) Natural Resoruces and the Environment -- S&T priorities to improve Environmental Mangement and Natural Resources Exploitation Systems in LDCs.

4) Employment -- S&T Implications of the Employment Crisis in the Developing World.

5) International Development Implication of Developments in Communications and Information Processing Technology.

6) International Development Implications of New Methodological Developments in Microbiology, Molecular Genetics and Tissue Culture.

There is need and room for expansion of the NAS contribution to strengthen S&T policy instruments abroad. It is uniquely qualified in many countries to offer assistance which would:

1) Strengthen National Science Councils, National Science Academies, and Offices of Technology Assessment.

2) Expand into more analytic modes of work in LDCs including performing S&T Assessments (with counterpart organizations), stimulating development of S&T policy analysis staff in counterpart organizations, and stimulating improvement of S&T data systems.

3) Develop and diffuse improved methodologies for S&T planning.

AID should encourage NAS to provide training sessions of value directly to Missions and to central units of regional bureaus. One possibility would be to attach an advisory panel to the Office of a Regional Assistant Administrator. Other possibilities might be:

1) Informal advisory panels to meet with staff from several Missions in a regional bureau to discuss common problems -- environmental management in the Middle East, tropical disease programs and priorities in Africa, agriculture research priorities in Africa.

2) A science advisory group to the Mission Director (Indonesia, ROCAP, Kenya) to advise on new developments in S&T with host country implication, research implication of development assistance policy, etc.

Some expanded activities might call for actually stationing of a BOSTID staff person abroad, but AID can also turn in other directions for residential talent and for staffing S&T projects calling for operations of a continuing and more intensive nature. Some continuing activities would grow naturally out of NAS diagnostic efforts, evaluative panels, small grants program and workshops.

The NAS as one of the intermediaries needed by AID in its assistance program abroad would be at the center of the S&T program but contracts with research organizations, specialized private contractors and universitites, and PASA's with government agencies would still be essential. The expanded NAS/BOSTID program would be a necessary and central part of the mix, but it would not by itself be sufficient to serve all elements of AID or developing country needs.

VIII. Summary of Findings and Recommendations

The central finding in this evaluation is that the NAS/BOSTID project (AID/ta-C-1433) has provided relevant and high quality services toward fulfilling the central purposes of the project:

1) strengthening LDC capability to apply S&T to meet development needs and

2) assisting AID and LDCs to use and adapt S&T for specific problem-solving.

The following board recommendations flow from this central, positive finding:

1. NAS/BOSTID programs should address broader purposes in promoting effective growth in use of S&T for development. However, such deepening and broadening of program should be within the limits set by NAS/BOSTID philosophy and operating style which account for the unique, central and strategic role of NAS in this field. AID should look to others for S&T support involving more intensive efforts which would call for personnel use beyond the BOSTID pattern. Suggestions for an expanded program appear in section VII of the text.

2. Within AID, steps should be taken to coordinate use of an expanded NAS effort by regional bureaus and country Missions. Present use of BOSTID is spread widely in the Agency with DSB/OST providing only a segment of central coordination and planning support. An agency-wide mechanism -- perhaps a committee -- is needed to assure efficient use of the unique quality which NAS may provide.

There are a number of specific recommendations related to the above or referred to in the text or appendixes. The more important of these follow:

1. Under an expanded program, there would have to be a larger BOSTID staff and of critical importance to assure quality and credibility, more frequent meetings of the Board itself, coupled with a suitable executive committee or standing committee structure.

2. In a new project, there should be an improved financial management system so that personnel costs and indirect costs can be more easily tied to project functions and outputs.

3. In view of what may be increased difficulty in locating and attracting the uncompensated S&T experts who would be needed in an expanded program, NAS/BOSTID should consider a more formal system to identify and attract participants.

4. NAS/BOSTID should intensify use of its newly designed evaluation system, including increased follow-up visits to workshops and a survey of NRC reviews of ACTI monographs in order to identify measures which would improve quality.

5. We believe the NAS overseas grant and contracts management procedures are likely to require careful scrutiny if an expanded program involves subgrants or subcontracting.

6. The system of producing and reviewing ACTI reports requires attention so that there is a more rapid completion of reports.

7. To broaden awareness throughout AID of NAS resources and capabilities, we suggest a series of presentations to the Administrator's senior staff, the regional bureaus and a joint presentation to concerned central staff bureaus on the status of NAS present and prospective activities that relate to foreign assistance priorities. Similarly, a video tape should be prepared by NAS that USAIDs could use for their own staffs and relevant host country officials that reflects the breadth of NAS/BOSTID.

8. Any new project should be structured with more realistic "purpose" and "end-of-project-status" statements, as well as clearer definitions of basic project elements (e.g. studies, advisory panels, feasibility studies, etc). There should be more compatability and comparability between AID's basic project document and the project agreement between AID and NAS.

9. Without compromising the essential independence of the scientific judgement of NAS, AID should work more actively with NAS in planning and carrying out project activities. One measure necessary to accomplish this is to be sure the AID Project Officer does not have too many other projects in his portfolio.

10. In order to promote more rapid introduction of technological improvements identified by the ACTI program, we suggest a new program element in which, after a study has been completed:

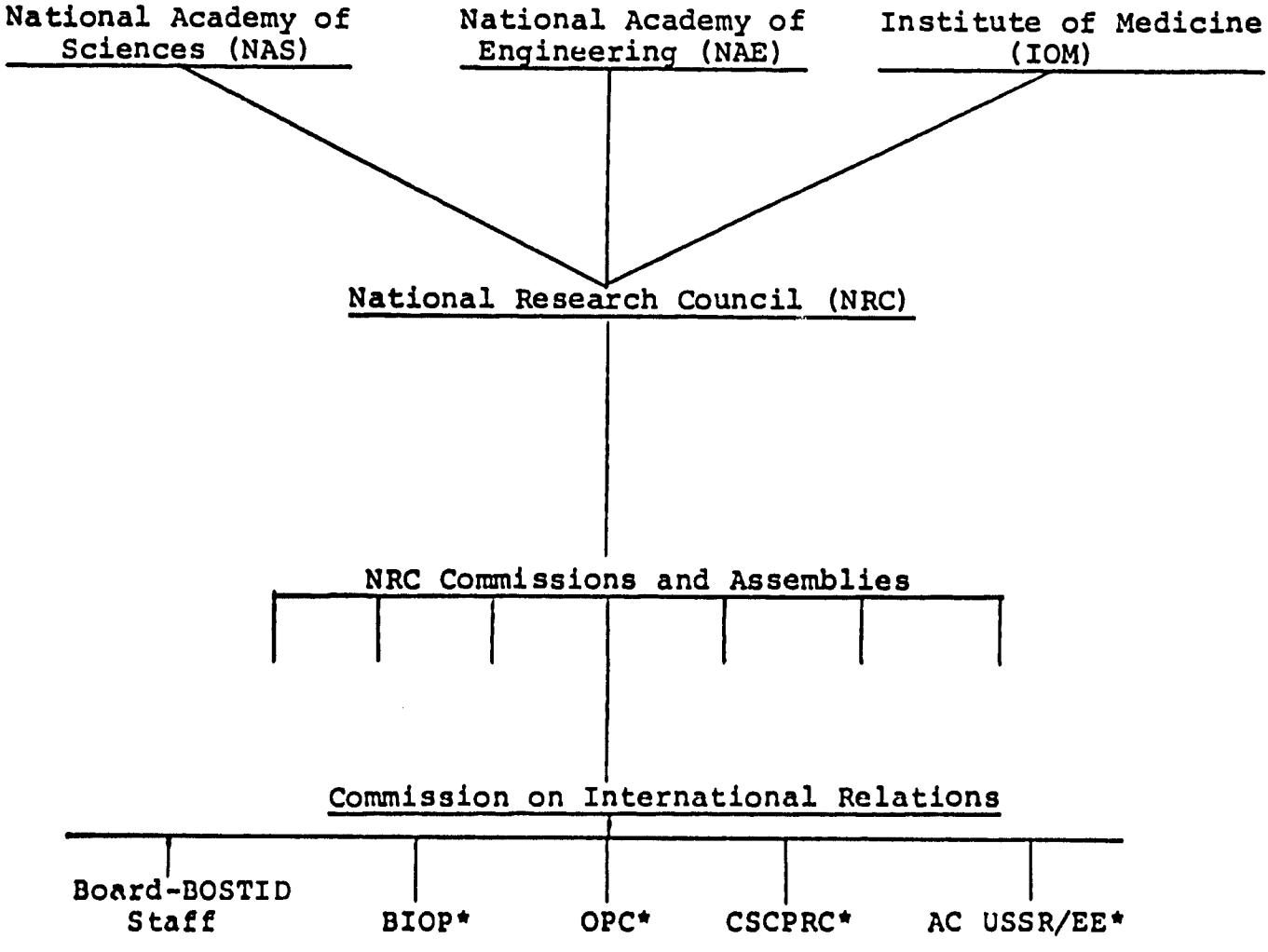
a) AID missions and regional bureaus, with the technical advice of NAS/ACTI, when needed, provide complementary grants in AID countries.

b) NAS provides seed grants to individuals and institutions in non-AID countries to promote improvement of the technology for the poor.

c) NAS provides subgrants to an appropriate institution for selected technologies to help develop communications among research and demonstration centers.

APPENDIX A

ORGANIZATIONAL RELATIONS OF THE BOARD ON SCIENCE AND TECHNOLOGY FOR INTERNATIONAL DEVELOPMENT (BOSTID)



* Board on International Organization and Programs (BIOP)
* Ocean Policy Committee (OPC)
* Committee on Scholarly Communication with the PRC (CSCPRC)
* Advisory Committee on the USSR and Eastern Europe (ACUSSR/EE)

Appendix B

NAS MAJOR PROJECT ACTIVITIES

Activity Agreement No.	Time	Description
Workshops		
2	June 1978	CAMEROON - Management of Ag. Research
3	Sept. 1978	PHILIPPINES - Technology for Rural Dev.
6	Dec. 1978	SUDAN - Acuatic Weed Mgmt; Gezira Canals
13	April 1979	CARIBBEAN - Regional Meeting on Natural Products
19	July 1979	JORDAN - Science & Technology in Jordanian Dev.
27	Sept. 1979	MAURITANIA - Mauritanian Environmental Panel
16	Nov. 1979	COSTA RICA - Energy Development
23	Dec. 1979	INDIA - Postharvest Food Conservation
24	Feb. 1980	SRI LANKA - Postharvest Food Losses
N/A	Mar. 1980	GHANA - Research Mgmt for Dev. Planning
Planned	(Dec. 1980)	MOROCCO - Workshop Science & Tech. Policies
Planned	(Oct. 1980)	NEPAL - Workshop on Research Mgmt Environment
DISCUSSION SEMINARS		
11	Apr. 1978	Washington - Urban Problems in Devel. Countries.
5	Oct. 1978	Washington - Regional Service & Technology Devel. in the Middle East
14	Mar. 1979	Washington - New mechanisms for applying U.S. Science & Technology to LDC problems.

File 7/23/80

Activity Agreement No.	Time	Description
18	June 1979	Washington - Techniques for Large-Scale Revegetation.
25	Feb. 1980	Washington - Research Priorities within Foreign Assistance program
28	Oct. 1979	Washington - Appropriate Technologiers for Health Care Delivery
30	Mar. 1980	Washington - Review of Future Directions of AID's DS/ST
33	June 1980	Washington - 2-way communications for Rural Health Service
36	May 1980	Washington - Conventional Energy Training
ACTI STUDIES		
7	July 1979	Panel on Water Buffalow; Gainsville, Fla.
8	N/A	New Edition of ACTI Report - The Winged Bean
10(Ref 17)	Jan. 1979	Advisory Study of need for supplement to ACTI Report Energy for Rural Development
12	Apr. & Aug. 1979	Panel for Report, The Productive Utilization of Wastes in Developing Countries
15	June & Dec. 1979	Panel for Report, The Potential for Alcohol Fuels in Developing Countries
17(Ref 10)	N/A	Revision & Editing of Energy For Rural Devel.
21	Sept. 1979	Panel for possible publication of Land Imprinting, A Promising New Technology For Arid Lands; Tucson, Ariz.
22	Nov. 1979	Study or Aerial Seeding of Forests. Alabama & Louisana
26	Apr. 1980	Study of Producer Gas For Motor Transport Gainsville, Fla.
31	Mar. 1980	Feasibility meeting for Study of Catalytic Oxidation. Washington
32	May 1980	Feasibility meeting for Study of Vegetable oils as diesel fuels

File 7/23/80

APPENDIX C

EVALUATION: "Enhancing S&T Capabilities in LDCs"

Project Inputs and Outputs

Item	Proposed		Actual
	Proj. Paper	Contract	
INPUTS			
I. AID			
Professional Mgmt	8 mm	--	
Sec'tarial Support	N/S	--	
Funding: TAB/OST (DS/ST)	$3.375 Million N/S	--	$3.375 million
Regional Bureaus			1,244 milli
USAIDs			2,111 milli
Evaluation: at end year 2	(Oct. 1979)		July 1980
II. NAS			
Professional Mgmt	12 full time	N/S	17
Administrative & Clerical	8	# N/S	10
Contributed Advisory Services of Scientists & Engineers	300 persons @5-10 days ea (1,500-3,000 days)	# N/S	4433 person days (est. thru Proj. completion)
III. Counterpart Inputs	Not mentioned	Not mentioned	5568 person days
OUTPUTS			
Workshops	4 yr; 12 tot	4 yr; 12 tot	10 completed 2 planned
Discussion Seminars	4 yr; 12 tot	# N/S	9
Feasibility Studies	4 yr; 12 tot	No mention	
ACTI Studies	3 yr	7 ex. given 3-4 studies 1st year	11 *
Advisory Missions	--	2 mentioned	Not able to be distinguished
Special Studies	--	1-2 ea yr.	from other studies
Advisory Panels for AID	--	# N/S	seminars

* As mentioned in text, Section II, the PP & contract are unclear as to what constitutes a "study". This figure is the number of panels, reviews, or discussions on subjects for possible publication - not the number of new publications.

DS/PO:FRC:7/23/80

APPENDIX D

Workshops in Developing Countries: A Mechanism for International Technical Cooperation

(Prepared by BOSTID Staff)

I. The Workshop Mechanism: Rationale

From its inception, the members and staff of BOSTID recognized that the knowledge and techniques that created U.S. agricultural production miracles, sustained phenomenal industrial growth and diversity, contributed to better health and longer lives for Americans, and provided transportation and communications systems of wide accessibility are not easily adapted or applied in other places where natural resource endowments are different and human populations reflect different traditions. Thus BOSTID approached its work cautiously and implicitly established guidelines for its activities. Among the principal guidelines are the following:

1. The concept of partnership. Fully recognizing the limitations as well as the utility of U.S. scientific and technological experiences, all BOSTID relationships with developing countries stress joint endeavors with counterpart institutions in planning, analysis, execution, and evaluation.

2. A concept of multidisciplinary analysis. In all areas of joint activity, recognition is given to the need for expertise from a wide variety of specialties -- basic sciences, engineering sciences and technology, social sciences, and humanistic policy-oriented disciplines.

3. A concept of options. In almost no area of problem analysis and decision making is there a "solution" that presents itself as an obvious choice. It is possible, however, to analyze various routes to problem resolution and assess, qualitatively or quantitatively, what options are available.

4. A concept of local choice. To engage in development is to make choices and to change customs and habits. This requires conscious selection and, in the tradition of most societies, occurs best when there is broad participation in the decision making process. BOSTID always insists that choices be local ones, not decisions by foreign specialists, however relevant may be their experience. To catalyze the process of local choice, BOSTID panels and committees often help to bring together for discussion and continuing work widely scattered groups and diverse organizations within a particular country.

5. A concept of mutual reinforcement. Usually the solution of a particular development problem requires many individual steps over a long period of time. BOSTID, from its earliest days, has recognized that the development process is evolutionary

rather than revolutionary and that mutual reinforcement among local and outside groups, including participation from the U.S.A., is an essential element in adapting a technique or technology to a given problem.

6. A concept of continuity. Cooperative activities aimed at the solution of development problems are most effective when built upon relationships of mutual trust and professional respect. In addition, U.S. participants can share their expertise most effectively when they possess more than a cursory understanding of the problems and constraints at hand. For these reasons, BOSTID tries to establish cooperative relationships that are long-range and permit the continuing involvement of a core group of participants on each side.

7. A concept of strengthening local capacities. Ultimately economic and social development involve local aspirations, abilities, and accomplishments. BOSTID attempts to select and plan activities that will provide opportunties for the scientific and technological personnel and institutions of the cooperating countries to be strengthened.

To achieve the working relationships over time which BOSTID desires, a mechanism was created that is usually referred to as a "workshop." The workshop is the keystone of the Board's operational method and has evolved into a process, a series of activities, which enables scientists, engineers, economists and other decision makers to coordinate their talents and experiences on a wide spectrum of development problems. This short paper seeks to describe the workshop process and illustrate its utility in applying science and technology to development issues.

II. The Workshop Mechanism: Operational Characteristics

A. Introduction

Initially a "workshop" was considered an event, a carefully-planned opportunity to share experiences and ideas on a topic of development priorities in a particular developing country. The activity always implied that action-oriented conclusions and recommendations to the sponsoring organizations would be made by the participants. Often workshops were bilateral in their organization, but they have also been successfully conducted on a regional basis. Increasingly, the general characteristic of BOSTID workshops has been that they constitute a part of a continuing process for joint cooperation. (As one example, the 1965 workshop in Brazil led to the identification of agricultural research management, agricultural economics education, application of computer science and technology, creation of an industrial

research and development capability, and creation of institutional strength in chemistry as joint BOSTID-Brazilian National Research Council study and action projects. Many of these follow-up activities continued as joint program elements into the 1970s.)

The workshop viewed as a process is defined to include such techniques as joint consultative committees, advisory missions, study groups, and discussion seminars.

B. Choice of a Country

The choice of a country or region for cooperative activities with BOSTID occurs in several ways. Often scientirts from a particular country have research, educational, or other professional ties with colleagues in the U.S.A. These scientists often have access to their government through a research council, academy, or service in an advisory capacity. They initiate exchanges of ideas with BOSTID which lead to more extensive planning discussions with appropriate local officials for a workshop on a subject such as the role of science and technology in agricultural planning and management, or the effect of environmental degradation on development, or the linking of applied research to economic development goals.

Another avenue for inviting BOSTID cooperation is the Agency for International Development. A mission director or a technical office in Washington will seek assistance from a BOSTID panel on a development issue in agriculture, health, manpower development and use, utilization of natural resources, analysis of energy problems, or the application of technologies related to water management, solar energy, marine resources development, integrated control of pesticides, or management of industrial research.

Familiarity with BOSTID activities in one country quite often stimulates scientists or development specialists in another country to seek discussions with BOSTID which may lead to a joint workshop.

C. Choice of Counterpart Organization

In holding a workshop and conducting ongoing projects, a local organizational base is essential. The U.S. National Academy of Sciences is a nongovernmental organization with a history of cooperation with the United States Government on sciences and technology-related issues. In most LDCs, however, scientific academies, if they exist at all, are primarily professional societies for the diffusion and encouragement of research. Generally BOSTID has found it preferable to be associated with national scientific research councils, a scientific group within a ministry of planning, a national research center, or a group of scientists from universities having applied R&D roles. Science and technology applications and their potential for stimulating economic growth require persons with both a knowledge of the subject matter and the capacity to influence government decision making.

In different countries, or for different problems within a country, the choice of counterpart organization may change over time. Often the first workshop is held with several cooperating institutions (ministries, universities, research councils, and research institutes) and specific recommendations are then implemented through one or more of those groups.

D. Planning a Workshop

Although planning a workshop is a joint activity, BOSTID always seeks to be responsive to the host country and counterpart organization in arriving at the specific topic, or topics, to be covered. Generally, only a few themes are included in any one activity. Usually, there is a common element running throughout the themes. For example, in the Central American Workshop on Environment and Development, major sub-elements were the environment and agriculture, the environment and industry, the environment and service industries, and the environment as a factor in economic planning.

Once a theme and the sub-elements to develop the theme have been agreed upon, joint preparation of the agenda is relatively easy. A workshop is most successful if there is ample time for discussion among the participants both in formal sessions and in informal settings. Experience has shown that workshops often are most effective away from the capital city or large metropolitan centers. A typical arrangement may be a conference center on the fringe of a city where all participants are housed, fed, and where large and small groups may meet in an uninterrupted atmosphere. Further, the optimum number of participants seems to be 6-12 from the U.S.A. and 20-25 from the host country. This limitation of numbers and the isolation of the meetings from daily routines greatly strengthens an atmosphere of informality and promotes pragmatic analysis of difficult issues.

E. Selecting Participants

In selecting participants the principal applied is that the host country is responsible for selecting its participants; BOSTID is then responsible for selection of those from the U.S.A. Within the NAS/NRC, procedures have been established to provide broad representation in terms of physical, biological, and social sciences, reasonable geographic distribution and participation from both the public and private sectors, as well as assuring opportunities for women, minorities, and younger scientists. All NAS/NRC participants are confirmed and appointed by the President of the National Academy of Sciences (who is Chairman of the NRC). In this way care is exercised in making the selections representative of the experience, diversity and high competence of American science and technology. Moreover, U.S. participants serve without pay or honoraria and are chosen as individuals, not as representatives

of any organization. Wherever possible, a U.S. team includes members having experience in the particular country in which the workshop is to be held. Increasingly, language competence plays a role where English is not a working language. Search and selection of a U.S. workshop team is a complex, time-consuming task which BOSTID members and staff recognize to be crucial to the success of any undertaking.

F. Logistics

Preparations prior to a workshop and arrangements during a workshop activity are important aspects for a smooth-running, productive encounter. BOSTID staff are responsible for the collection and presentation of background information to U.S. panelists. Occasionally, commissioned papers are prepared jointly with the host country. A briefing meeting is organized by BOSTID staff to provide panelists with the views of A.I.D. and State Department officials, and other persons with relevant experience and knowledge.

BOSTID staff must ensure good meeting facilities at the conference site. Notes may need to be taken and transcribed for the participants. A smooth-running conference office, equipped for local and international telephone service, a message center, a transportation unit and modern reproduction machinery (electric typewriters plus duplicators) greatly enhance the productivity of a workshop. In general, if services function routinely but are "unnoticed" by the participants, the logistic preparations have been well planned and can be considered successful. When such services are absent or poorly staffed, delays occur which inconvenience individuals and the progress of group sessions.

G. Products

What "results" or "products" are generated from a workshop? First, there is an interaction among knowledgeable people focussing on a set of questions or problems related to social and economic development. Even when the workshop process does not result in follow-on activities of a cooperative nature, the recommendations and conclusions stimulate projects, educational efforts, and other responses. For example, a 1976 workshop on agro-industrial development in the Dominican Republic was not followed by a specific BOSTID-Dominican Republic cooperative program. However, in 1978 when the A.I.D. mission in Santo Domingo was queried as to the results of the workshop, the reporting officer estimated that 50 percent of the recommendations had been implemented by one or more agencies of that government.

Often, however, a workshop leads to a series of joint projects. A 1975 workshop on research and development management and planning

in the Arab Republic of Egypt resulted in an ongoing, mission-funded activity with NSF and NAS/NRC. A 1971 workshop in Central America on the environment and development led to a two-year United Nations study project on economic and environmental consequences of pesticide use in cotton production and an enhanced capability within the host institution, the Central American Research Institute for Industry, to use technology assessment techniques on environmental-developmental issues. That Institute is now engaged with U.S. and German funding in a series of urban environmental studies in five rapidly growing cities of Central America. Noteworthy programs of BOSTID with Taiwan, Korea, Brazil and now with Indonesia are other examples of workshops catalyzing major cooperative projects.

Workshops also produce reports, generally in the language of the host country, that may have far-reaching implications in policy planning for development. A nutrition workshop in Indonesia lead to action programs on nutrition in that country's development plan. A workshop in Brazil resulted in a joint study group on applied research; from this evolved a plan to strengthen industrial research institutes and, eventually, a major loan program for industrial research in food technology, metallurgy, and building materials. New institutional arrangements have come from workshops and follow-on activities in Korea, Colombia, Peru, and Ghana. BOSTID staff members also prepare summary workshop reports that are aimed primarily at an A.I.D. audience.

Workshops at times have contributed to changing the emphasis of science-related programs of A.I.D. missions. Although one could not claim that BOSTID's input was the only, or even the major factor, in the recognition that science and technology are powerful development tools, there is well-documented evidence that workshops have resulted in the strengthening of U.S. A.I.D. endeavors in a number of countries.

APPENDIX E

NOTE ON THE NATIONAL ADVISORY COMMITTEE ON TECHNOLOGY INNOVATION (ACTI)

The NAS Advisory Committee on Technology Innovation was established in 1971. Its function has been described as offering practical technological solutions to development problems in a readable style aimed for an audience of decision makers in the governments of developing countries. In these reports ACTI tries to uncover innovations in scientific consciousness and literature and play a middle-man role in helping build the confidence of decision makers in taking action.

The range of ACTI interests and their application to problems of development can be seen in the listing of the reports it has published that are currently available as well as by the listing of reports now in preparation. Currently available reports include:

8. Ferrocement: Applications in Developing Countries. 1973. 80 pp. Assesses state of the art and cities applications of particular interest to developing countries-boat-building, construction, food and water storage facilities, ect. NTIS Accession No. PB 220-825. $9.00.

14. More Water for Arid Lands: Promising Technologies and Research Opportunities. 1974. 153 pp. Outlines little-known but promising technologies to supply and conserve water in arid areas. NTIS Accession No. PB 239-472. $8.00 (French-language edition is available from Office of Science and Technology, Development Support Bureau, Agency for International Development, Washington, D.C. 20523 or through NTIS, Accession No. 274-612. $8.00.)

16. Underexploited Tropical Plants with Promising Economic Value. 1975. 187 pp. Describes 36 little-known tropical plants that, with research, could become important cash and food crops in the future. Includes cereals, roots and tubers, vegetables, fruits, oilseeds, forage plants, and others. NTIS Accession No. PB 251-656. $12.00.

17. The Winged Bean: A High Protein Crop for the Tropics. 1975. 43 pp. Describes a neglected tropical legume from Southeast Asia and Papua New Guinea that appears to have promise for combatting malnutrition worldwide. NTIS Accession No. PB 243-442. $6.00.

18. Energy for Rural Development: Renewable Resources and Alternative Technologies for Developing Countries. 1976. 305 pp. Examines energy technologies with power capabilities of 10-100 kilowatts at village or rural level in terms of short-and intermediate-term availability. Identifies specific research and development efforts needed to make intermediate-term applications feasible in areas offering realistic promise. NTIS Accession No. PB 260-606. $17.00. (French-language edition is available from Office of Energy, Development Support Bureau, Agency for International Development, Washington, D.C. 20523.)

19. Methane Generation from Human, Animal, and Agricultural Wastes. 1977. 131 pp. Discusses means by which natural process of anerobic fermentation can be controlled by man for his benefits, and how the methane generated can be used as a fuel. NTIS Accession No. PB 276-469. $10.00.

21. Making Aquatic Weeds Useful. Some Perspectives for Developing Countries. 1976. 175 pp. Describes ways to exploit aquatic weeds for grazing, and by harvesting and processing for use as compost, animal feed, pulp, paper, and fuel. Also describes utilization for sewage and industrial wastewater treatment. Examines certain plants with potential for aquaculture. NTIS Accession No. PB 265-161. $12.00.

22. Guayule: An Alternative Source of Natural Rubber. 1977. 80 pp. Describes a little-known bush that grows wild in deserts of North America and produces a rubber virtually identical with that from the rubber tree. Recommends funding for guayule development. NTIS Accession No. PB 264-170. $8.00.

25. Tropical Legumes: Resources for the Future. 1979. 331 pp. Describes plants of the family Leguminosae, including root crops, pulses, fruits, forages, timber and wood products, ornamentals, and others. NTIS Accession No. PB 298-423. $18.00

26. Leucaena: Promising Forage and Tree Crop for the Tropics. 1977. 118 pp. Describes Leucaena leucocephala, a little-known Mexican plant with vigorously growing, bushy types that produce nutritious forage and organic fertilizer as well as tree types that produce timber, firewood, and pulp and paper. The plant is also useful for revegetating hillslopes and providing firebreaks, shade, and city beautification. NTIS Accession No. PB 268-124. $10.00.

28. Microbial Processes: Promising Technologies for Developing Countries. 1979. 198 pp. Discusses the potential importance of microbiology in developing countries in food and feed, plant nutrition, pest control, fuel and energy, waste treatment and utilization, and health. NTIS Accession No. 80-144-686. $13.00.

Reports now in preparation include: (working titles)

Firewood Crops: Shrubs and Tree Species for Energy Production.

Food, Fuel and Fertilizer from Organic Wastes.

The Water Buffalo: An Underexploited Resource.

The Potential for Alcohol Fuels in Developing Countries.

Revegetating the Range: Selected Research and Development Opportunities.

Sowing Forests from the Air.

Energy for Rural Development: A supplement.

Wood Gas: A little-known fuel for Motor Transport.

The Winged Bean: A high protein crop for the Tropics. (Second edition)

Out of Print Reports:

Mosquito Control: Some Perspectives for Developing Countries.

Food Science in Developing Countries.

Roofing in Developing Countries: Research for new Technologies.

Related Publications Produced with ACTI assistance:

Products from Jojoba: A Promising New Crop for Arid Lands (out of print)

Jojoba: Feasibility for Cultivation on Indian Reservations in the Sonoran Desert Region (out of print)

An International Centre for Manatee Research

APPENDIX F

Committee Members/Panelists* Involved in BOSTID Activities (October 1977 - July 1980)

*Does not include peripheral participants such as research contacts, contributors, or report reviewers.

Total Participants in Contract Projects 302

Time Contributed by Participants approximately 3,091 days

		No. of Participants	Total Days
	BOSTID Members	23	690
	ACTI Members	7	140
1.	Discussion Seminar--Fast-Growing Trees for LDCs	1	2
2.	Cameroon-Workshop on Management of Agricultural Research	5	90
3.	Philippines--Workshop on Technology for Rural Development	8	96
4.	French Translation of Resource Sensing from Space	--	--
5.	Discussion Seminar--Regional Science & Technology in the Middle East	14	28
6.	Sudan--Workshop on Aquatic Weed Management in Gezira Canals	7	126
7.	ACTI Study--The Water Buffalo: Its Potential for LDCs	26	156
8.	ACTI Study--The Winged Bean (second edition)	--	--
9.	Assessment of Brazil Chemistry Program	6	48
10.	Feasibility of Supplement to ACTI Report, Energy for Rural Development	8	16
11.	Discussion Seminar--Urban Problems in LDCs: The Role of S&T	9	36
12.	ACTI Report--The Productive Utilization of Wastes in LDCs	24	168
13.	Caribbean--Regional Meeting on Natural Products	7	63
14.	Discussion Seminar--New Mechanisms for Applying U.S. S&T to LDC Problems	15	30
15.	ACTI Report--The Potential for Alcohol Fuels in LDCs	16	144
16.	Costa Rica--Workshop on Energy Development	10	120
17.	ACTI Report--Supplement to Energy for Rural Development	--	--

		No. of Participants	Total Days
18.	Discussion Seminar--Techniques for Large-Scale Revegetation	13	26
19.	Jordan--Panel on S&T in Jordanian Development	5	50
20.	Feasibility Study--Internatl. Workshop on Energy Survey Methodologies	7	14
21.	ACTI Study--Land Imprinting	9	72
22.	ACTI Study--Aerial Seeding of Forests	6	48
23.	India--Workshop on Post-Harvest Food Conservation	9	126
24.	Sri Lanka--Workshop on Post-Harvest Food Losses	8	144
25.	Discussion Seminar--Review of Research Priorities Within Foreign Assistance Programs	15	45
26.	ACTI Report--Producer Gas for Motor Transport	16	128
27.	Mauritania--Panel for Mauritania National Environmental Conference	5	100
28.	Discussion Seminar--Appropriate Technologies for Health Care Delivery	16	64
29.	Follow-Up to ACTI Projects on Traditional Village Resources	--	--
30.	Discussion Seminar--Review of Future Directions of A.I.D.'s DS/ST	10	30
31.	Feasibility Meeting--Study on Catalytic Oxidation	21	63
32.	Feasibility Meeting--Study on Vegetable Oils as Diesel Fuels	26	52
33.	Discussion Seminar--Two-Way Communications for Rural Health Services in LDCs	13	65
34.	Nepal Workshop (Planned)	8	120
35.	Morocco Workshop (planned)	8	120
36.	Discussion Seminar--Conventional Energy Training	12	36
No Number	Ghana--Workshop on Research Management for Development Planning	5	75
	TOTALS, 10/01/77 - 3/31/81	403*	3,331
	Less Planned Activities, 7/24/80 - 3/31/81	<16>	<240>
		387*	3,091

Total Value of Contributed Time: 3,091 days @ $195/day (Applicable A.I.D. Consulting Fee) = $602,745

3,091 days = 11.9 manyears

* Total exceeds 302 since 85 participants, or 28% have served on more than one project.

Areas of Specialization of Participants

Aeronautics	2
Agricultural Economics	5
Agriculture	5
Agronomy	9
Animal Sciences	18
Anthropology	2
Biology	2
Botany	6
Chemistry	
Biochemistry	3
Chemistry	7
Geochemistry	1
Inorganic Chemistry	1
Organic Chemistry	8
Physical Chemistry	6
Total Chemistry	26
Crop Ecology	2
Economics	15
Education	15
Energy	10
Engineering	
Agricultural Eng.	10
Chemical Eng.	4
Civil Eng.	4
Electrical Eng.	7
Engineering	19
Fuels Eng.	1
Industrial Eng.	1
Mechanical Eng.	12
Sanitary Eng.	4
Total Engineering	62
Entomology	2
Environmental Science	9
Fisheries	7
Food Science & Technology	12
Forestry	15
Horticulture	3
Hydrology & Water Mgt.	3
Land Reclamation	1
Medicine	16
Meteorology	1
Microbiology	4
Nutrition	5
Oceanography	1
Physics	
Physics	8
Nuclear Physics	2
Total Physics	10
Pharmacy	1
Plant Pathology	1
Plant Physiology	2
Political Science	1
Public Administration	4
Public Health	17
Rancher	1
Range Science	5
R & D Management	7
Science Policy	7
Small Industry	2
Sociology	8

Areas of Specialization of Participants (Contd.)

Soil Science	6
Transportation	1
Tropical Agriculture	1
Urban & Regional Planning	8
Veterinary Medicine	7
Waste Water Technology	3

APPENDIX G

Evaluation of NAS Discussion Seminars

To date there have been ten informal discussion seminars convened at A.I.D. request to discuss matters of specific interest to various offices. In order to judge the utility of this effort a questionnaire was completed by a senior A.I.D. official responsible for the request for seven different seminars. The questionnaire and tabulated responses are attached.

In general the responses were quite positive. Specifically:

1) Five of the seven seminars accomplished the original purpose, and a sixth did so in part.

2) All seven seminars were judged timely.

3) NAS staff work was judged outstanding for two seminars, more satisfactory for four, and satisfactory for the seventh.

4) All seven responses were positive in terms of use of the seminar mechanism in the future.

5) The panel was judged to be more than satisfactory in four cases, satisfactory in one case, and marginal in one case, and in one case there was no response.

(An eighth interview was held with a program officer who had attended one of the seminars. The purpose of the interview was to see if there may be a difference in perspective between technical and financial officers vis-a-vis the discussion seminar. This interview was not tabulated, but it was supportive of the mechanism in terms of accomplishing its purpose, timeliness, NAS staff work, future use of seminars and panel quality.)

Review of the purposes for the seminars indicated most sought outside S&T community opinions about programs, projects, or technology status. On the other hand, two responses dealt with attempts to raise A.I.D. consciousness about an issue and one response involved stimulating inter-office cooperation. The one seminar that was characterized as organized to validate a pre-conceived office plan was (probably not coincidentally) the one that was judged by the respondant not to have served its purpose.

A.I.D. staff participation was judged only marginal in two of the five substantive responses. In other cases respondants mentioned lack of participation of regional bureau officials, and in one case a respondant criticized lack of full-time participation by the requesting office personnel.

In contrast to expectations, participation of other donors was not judged to be important in five of seven cases -- but was judged to have been more than satisfactory in the two relevant seminars.

There was only one respondant who identified an important unanticipated result of a seminar, and few programmatic changes were identified as linked to the seminars (three identified no changes, three identified one each, and one respondant identified three).

Finally, eight specific recommendations were made by respondants for improving the discussion seminar process. Three of these involved A.I.D. primarily (better planning in sponsoring office, multi-office cooperation in seminar planning, and longer time frame for planning). Three suggestions apply mainly to NAS (increase structure, issue written minutes, seek more new faces with active research interests). The suggestions to limit meetings to substantive technology policy issues and improve liaison in panel selection involve both A.I.D. and NAS.

Conclusions: It would appear that NAS staff work preparing for these seminars is highly regarded. However, A.I.D. staff work and A.I.D. participation appeared less highly regarded. There appears to be evidence of lack of regional bureau interest in these discussion seminars (only one was requested by a regional bureau).

Offices requesting these seminars do so to get general advice. Specific program changes are not a primary attribute of the seminars. The seminars generally achieve their purpose, and do not have unintended side effects. This general advice, and consciousness raising is sufficiently valued that all eight respondants would use seminars again.

In general it would appear that the discussion seminars should continue to be a significant part of the NAS project, and that the process should not be seriously changed. The eight specific suggestions merit serious consideration.

Questionnaire
Evaluation of NAS Discussion Seminars

Title of Seminar:

Interviewee:

Office:

1.) What was the function of the seminar in the Office viewpoint when it was requested? See attached page

2.) Did it serve the purpose?
yes 5 in part 1 no 1

3.) What other important impacts did the seminar have, if any?
none 6 one 1

4.) How would you rate the panel, in terms of expertise, authority and overall relevance to your needs? No response 1

unsatisfactory	marginal	satisfactory	more than satisfactory	outstanding
	1	1	4	

5.) How would you rate the participation of AID staff, in terms of numbers of participants, appropriateness, and contribution?
no response 2

unsatisfactory	marginal	satisfactory	more than satisfactory	outstanding
	2	1	2	

6.) How would you rate the participation of persons from other donor agencies? Not applicable 5

unsatisfactory	marginal	satisfactory	more than satisfactory	outstanding
			2	

7.) Was the seminar timely in terms of your needs?

Yes 7 No____

8.) Were there any specific programmatic changes or improvements that you can trace to this seminar?

Yes 4 No 3

What were the two most important

a)	number mentioned	0	1	2	3
b)	frequency	3	3	-	1

9.) How would you rate the staff work of NAS in arranging the seminar?

unsatisfactory	marginal	satisfactory	more than satisfactory	outstanding
		1	4	2

10.) Will you use the NAS seminar process in the future to obtain S&T advice?

Yes 7 No ____

11.) How would you improve the process?

Identify the principal step that occurs to you.

See attached page

Responses to Question 1

Reason given	Number of responses*
1) Obtain judgement of S&T expert panel on a portfolio of projects or programs	3
2) Stimulate A.I.D. consciousness of problems in the substantive area	2
3) Obtain judgement of S&T experts panel on project direction	1
4) Obtain judgement of S&T expert panel on current state of technology in a defined area	1
5) Stimulate inter-office cooperation in DSB	1
6) Validate office implementation plan for a project	1

*There were multiple responses

Responses to Question I1

1) Better planning in A.I.D.'s sponsoring office

2) Stronger liaison in selection of participants

3) Limit seminars' purpose to discussion of substantive technical policy questions and avoid seminars on project implimentation details

4) Increase structure in the seminar

5) Issue a written summary of the discussions in the seminar

6) Longer time frame to plan workshop and coordinate within A.I.D.

7) Seek multi-office cooperation in A.I.D. in preparing for seminars

8) Consciously seek to broaden participation to include fresh viewpoints, especially individuals who combine current research activities in relevant technical areas with LDC experience

APPENDIX H

Administrative Processes

Governance: The overall governance of NAS/NRC will not be discussed. The Board on Science and Technology for International Development (BOSTID) is distinguished and appears to take its duties seriously. Members meet twice a year to review programs, consult individually with BOSTID staff throughout the intervening intervals and serve on specific committees.

One subcommittee of the Board is responsible for evaluation, and has prepared a useful report creating an improved internal evaluation system which is now being followed. The Advisory Committee on Technological Innovation, consisting of five experts charged with governance of the ACTI studies, is also distinguished in composition and serious in carrying out responsibilities.

Day-to-day management of BOSTID activities appears to be the responsibility of the Staff Director and what may be viewed as a management committee of his two deputies and assistant. Members of the professional staff appear to be given a relatively free hand in managing field activities and ACTI studies. In all, the governance system appears to be functioning well.

There is a question as to the degree of coordination between BOSTID activities and those of other elements within NAS/NRC. For example, A.I.D. has contracted with other NAS/NRC organizations for special studies (Institute of Medicine, Transportation Research Board), and there seems to be some interchange between the staff involved in these studies and the BOSTID staff, although there should be more. It is particularly unfortunate that mechanisms have not been developed to tap the larger S&T policy advisory capacity of NAS/NRC to provide advice to A.I.D. on "the state of Science and Technology in development."

There is serious question whether this current governance system can handle a significantly larger program or different programmatic responsibilities. For example, it would appear that subject-specific advisory committees would provide an appropriate peer review mechanism for grants programs. Similarly for a larger program, a permanent executive committee or subcommittee; structure for BOSTID might be appropriate (Executive Committee; evaluation, finance, personnel, planning subcommittees). More frequent plenary meetings of BOSTID, perhaps four per year, would be needed.

A.I.D. Management of Contract: Currently A.I.D. management responsibility for this contract is a part-time responsibility of one officer in the Office of Science and Technology. The responsibility is to be transferred to a Science Advisory in DSB in the near future. Project management functions performed in DS/ST include:

1. Management of financial and budgeting systems within A.I.D. for project.

2. Developing project documentation (data sheets, project papers, etc.).

3. Coordinating NAS actvities with relevant mission, regional bureau and technical office personnel (approving cable traffic, obtaining geographic and technical inputs and clearances, distributing studies and reports, etc.).

4. Working with NAS board and staff personnel to assure program direction and sound management.

5. Management of evaluations of the project.

6. Stimulating awareness and proper use of the project in A.I.D.

It is estimated that no more than 20% of the project manager's time has been available for this work. There has been one change in project managers during the course of the project.

The evaluation has elicited several suggestions for additional functions, or improvement in these functions, including:

1. Increasing effort to make senior mission and regional bureau personnel aware of the program.

2. Assisting A.I.D. offices and missions to plan and prepare more fully for NAS activities.

3. Organizing and making available complementary technical resources to A.I.D. missions for follow-up on S&T policy advice (especially IQCs, cooperative agreements or other contractual mechanisms to provide TDYs, and developing individual and institutional capabilities rosters in this area).

4. Providing more substantive guidance to NAS in substantive content of activities, geographical priorities and other aid.

No formal inter-office or inter-bureau committees exist within A.I.D. to coordinate the diverse approaches of differing A.I.D. entities to NAS. Within the Development Support Bureau for example, the Offices of Health, Nutrition, Engineering and Agriculture have all had formal or informal relations with components.

of NAS. At the same time, A.I.D. regional bureaus of Asia, Africa and the Near East have had either dialogues or major contractual relations with NAS. Currently, the PDC Bureau is considering the use of NAS for another long term operation. In light of this total A.I.D. activity with NAS it would appear desirable to have one coordinating body within A.I.D. charged with bringing together concerned offices to discuss their experience and see if there is consensus of the strengths and weaknesses of NAS in terms of future work with A.I.D.

In general, it is suggested that:

1. A grant agreement be seriously considered for follow-on activities, recognizing the relative autonomy of NAS's program, NAS's non-profit nature, and the organizational strength of the BOSTID Board and Staff.

2. That additional A.I.D. staff time be devoted to NAS project management activities, and that coordinator and assistance efforts be expanded.

3. Efforts be made to create an inter-bureau committee, which meets regularly, to assist in management of the AID/NAS program.

If there is to be an expanded NAS program (in numbers of activities, countries involved, types of activities) and new efforts are more closely related to A.I.D.'s other program responsibilities (S&T assessments, institutional grants, research grants, country project implementation activities), then more vigorous A.I.D. management will be required. It is recommended that A.I.D. consider these requirements in planning for any new project.

Resource Management Systems/Financial: Within A.I.D., funding for the central project has been solely the responsibility of DS/ST. It has been suggested that regional bureau contributions to the funding of this project would have been useful in stimulating them to be more active in project management. On the other hand, management of a project funded by five bureaus is complex and burdensome. No resolution of this concern was sought due to the special financial planning that will be required for the follow-on project.

Financial management within NAS appears relatively effective. BOSTID staff maintain detailed financial plans and status information complementary to that provided by the formal financial management system of NAS/NRC. Financial statements to A.I.D. are relatively timely and appear accurate.

On the other hand, the aggregation of financial data in reports and planning documents is inadequate for efficient A.I.D.

management. The major problem is that in financial reporting, personnel costs and indirect costs have not been related to project outputs or functions. The attached analysis of financial data illustrates a more useful approach. It is suggested that in developing the new project, a careful delineation of project outputs be attempted and a regular planning and reporting scheme be institutionalized relating staff and indirect costs to project outputs. The intent of the recommendation is not to create a detailed and burdensome accounting system but, rather, to provide approximate data on total economic and financial costs for planning and control purposes. Similarly it is noted that the existing system was agreed upon by A.I.D. and NAS and implements the findings of the last evaluation team.

It should be noted that the financial management system necessary to manage a significant overseas grant program is different in kind than the current system. Clearly a proposal for a new project including overseas grants should discuss not only improvements of the existing system, but also development of a complimentary grants oriented sub-system.

Personnel/Staff: The attached table identifies the qualifications of the fifteen professional staff who provide programmatic leadership. They combine extensive international experience with strong training in the sciences. The staff has been very stable, with no departures from the 17-person professional staff in the past 12 months, and one or two departures in the previous 12 months. Consequently, we must conclude that the personnel system functions admirably, allowing the recruitment of qualified individuals and providing sufficient incentives to keep them.

Personnel management is separated according to non-professional junior professional and senior professional. Personnel do not have tenure at NAS and can be dismissed when financial support for their salaries is withdrawn.

Recruitment is done by local advertisement for non-professional and junior professional personnel and by national advertisement for senior professional personnel. NAS has an EEO office and EEO concerns are carefully considered.

Staff remuneration is negotiated within pre-established limits for each of six grades of professional employees. Annual raises include cost-of-living adjustments and merit increases (allocated from a small NAS pool by the staff directors). Distribution of professional staff by pay level is attached.

While this system works well at current program size, it is questionable if it would accommodate to a major program expansion. The small size of the total C.I.R. staff and lack of tenure and

Revised 7/24/80

BOSTID Staff Qualification Summary

Position	Specialties	Degrees	Geographic Specialty	Years Experience Living Overseas	Yrs. Experience With International Progra...
Director	Zoology & International Relations	PhD			14
Deputy Director	Biochemistry	PhD	Africa	11	23
Deputy Director	Biological Science Urban Affairs	BS MS	Asia	~~6~~ 6½	15
Prof. Assoc.	Chemical Engineer Public Admin.	BS MA	Latin America Egypt	2	17
Prof. Assoc.	Geography	PhD	Middle East Islamic Africa	6	18
Prof. Assoc.	Law and Diplomacy International Relations	MALD MA		-	11
Prof. Assoc.	Industrial Chemistry	MS		-	11
Prof. Assoc.	Organ. Chemistry	PhD		resided in New Zealand	7 12
Prof. Assoc.	Photo Chemistry Biology	PhD BS	Asia North Africa	8	12

BOSTID Staff Qualifications Summary

Position	Specialties	Degrees	Geographic Specialty	Years Experience Living Overseas	Years Experience with International Programs
Asst to Director	Business Administration Asian Studies		Asia, Middle East	10	29
Staff Assoc	Political Science, Accounting	B.A.	Asia	2	12
Editor	English Literature	B.A.			5
Librarian	French, History Library Science	B.A. M.L.S.		2	1
Staff Assistant	Radio, Television,+ Film	B.A.		0	6
Staff Assistant	History Library Science	B.A.		0	9

July 1980

DISTRIBUTION BY GRADE OF
BOSTID PROFESSIONAL STAFF

Grade	Salary Range	No. of BOSTID Staff
PG I	$13,000 - $21,000	2
PG II	$16,000 - $28,500	2
PG III	$22,000 - $39,000	3
PG IV	$28,500 - $47,500	7
PG V	$35,000 - $55,000	1
PG VI	$42,000 - $60,000	0
		15

career mobility mechanisms may seriously complicate hiring of overseas staff or relatively large numbers of professionals. It may be necessary for BOSTID to organize personnel loan agreements from universities or other large S&T institutions for an expanded program.

Personnel/Participants: BOSTID Board and staff rely largely on informal networks to identify participants. Once identified however, NAS institutional procedures are used to assure balance in advice and lack of bias in committee recommendations. Experiments with more formal rostering have not been highly regarded.

The system appears to function well, in that large numbers of qualified persons have in fact donated time and services to the program. There is a reasonable balance between academic, governmental, industrial and other participants, and there appears to be reasonable success in combining scientific stature with relevant field experience and language capability. Similarly we applaud the wide number of disciplinary backgrounds that NAS has tapped for advice. However, continued priority to participant selection is a keystone to effective management of the NAS/BOSTID program. We particularly recommend that attention be given to identification of "new faces", drawing more extensively on the total S&T capacity of the US; that consideration be given to increasing the participation of scientists actively carrying out research on development problems (as compared with scientist primarily engaged in science administration or teaching); that continued attention be directed to involving women and minority group scientists in this program in numbers commensurate with their participation in the US S&T labor force. It is therefore recommended that BOSTID carry out a study of participant selection processes to propose improvements.

If the program is to be expanded significantly, we believe additional formal mechanisms will be needed to identify and attract participants. There is some question as to how much expansion can occur in a system dependent on short term, voluntary expert talent.

Information: BOSTID maintains a small but useful library of its own and has access to NAS's library. It has access to specialized information services of A.I.D. (DS/DIU's library and on-line information systems, map library, training reference materials, etc.) but makes only occasional use of these facilities.

It is strongly suggested that DS/DIU coordinate with BOSTID to improve systems for selective dissemination of NAS publications and reports within A.I.D. and to coordinate overseas distribution

efforts for NAS reports.

Evaluation/Reporting System: There has been a serious effort to improve the evaluation system under the current contract. It appears to have been reasonable successful, and NAS is to be complimented on the completeness of materials presented for this evalution and the conscientious and open manner in which they have responded.

It is important that evaluation efforts be continued, and we strongly recommend that:

1) at least two follow-up visits be made to countries where recent workshops have been held prior to the end of this contract, and

2) a survey of existing NAS/NRC reviews of ACTI monographs should be undertaken to study on a comparative basis the quality of the series and identify any general measures that would improve their quality and utility.

A complex reporting system is in use, involving periodic reports on the overall program, specific activity documentation (letters of agreement, trip reports, minutes of meetings, reports, evaluation reports), publications of reports of substantive efforts, and occasional published reports of BOSTID progress, and monthly financial reports. In general, the reporting is timely and reports are of high quality.

One significant criticism has been of discussion seminars. It would appear that a timely written minute of the discussion would improve A.I.D. utilization of these meetings. It is not intended that such minutes represent formal recommendations of the advisory panel but, rather, that they serve to document the discussions for future reference and inform persons not present of the substance of the meeting. The internal NAS clearance and review process is such that there is no likelyhood that they can produce timely minutes for such meetings. It is therefore recommended that the AID project manager arrange independently for minutes to be taken.

A second concern is that reporting use a uniform categorization of activities. It is important in preparing for a new project that outputs of that project be clearly specified and categorized, that reporting formats be organized accordingly, and that reporting be consistent in terms of the formats.

NAS Central Management Services: There are a number of basic administrative services, not previously discussed, which are

necessary to the efficient functioning of this project, and of any contemplated follow-on project. These are discussed in the following paragraphs.

In consideration of NAS's central management practices it is important to recognize that they are specific to the organization's Congressionally mandated, normal functions--provision of independent professional scientific advice on questions of policy to the US government. Specifically NAS does not normally finance research and development projects, do in-house R&D, nor manage regular overseas development assistance projects.

The NAS/BOSTID overseas programs place a relatively small burden on these management systems, as do other overseas programs managed by NAS's Council on International Development. For example, in 1976 State and AID were respectively the 10th and 11th important federal agencies in terms of funding NAS activities, accounting together for approximately five percent of NAS's total budget. Similarly only three percent of participants on NAS committees are from foreign or international institutions. Thus effective central management of current overseas activities may be related its perception as exceptional situations in NAS, and the experience might not generalize to a much larger and broader development assistance program.

Purchasing: The current project does not involve NAS's purchasing department in a critical way. In managing the earlier Brazil Chemistry program, however, it was felt desirable for BOSTID staff to manage the acquisition of research equipment and materials in order to have efficient, timely services. Such special arrangements may be required in an expanded program if it involves overseas materials.

Contracting: The current contract was negociated under tight time constraints at the end of the fiscal year. In large part the inadequacies in clarity and precision alluded to in other sections of this report stem from that pressure. On the other hand an unfortunate misunderstanding about the utility of Basic Ordering Agreements (and their use in facilitating complementary use of NAS services by other AID units) created some discord between AID and NAS's contract office. In general there have been occasional delays in contracting for complimentary NAS/BOSTID activities, but it is not clear to what degree these are attributable to NAS contracts as AID internal procedures.

Under the current contract, there is relatively little sub-contracting. That sub-contracting has been done expeditiously. It is n noted that fixed price contracts for over 25,000 and all cost reimbursable sub-contracts must be approved by the A.I.D. contracts office, doubling the required execution time. If substantial numbers of such sub-contracts are contemplated for a follow-on project, this double review should possibly be eliminated.

1/Philip Handler, "The Work of the National Research Council," NAS, Washington, D.C., 1979, p. 19.

We note that NAS's capacity to manage formal contractual or grant agreements with LDC institutions may prove to be of critical importance if NAS should propose expanding from its advisory role to undertake R&D or R&D financing. However, this evaluation can not speak to the required capacity for lack of relevant examples of its application.

Travel: Professional members of the BOSTID staff take personal responsibility for drafting their own travel routes and schedule. One administrator reviews these plans and maintains current records of travel status and expenditures. Actual ticketing is done by a contracted travel agent and billed to NAS. NAS financial management office is responsible for the formal accounts. The system appears to work well.

Field Support: NAS has no overseas offices. Consequently, NAS staff fend for themselves overseas. In some instances BOSTID has depended on A.I.D. missions for logistic support in overseas activities (e.g., country clearance, hotel reservations, vehicles and local transportation, government contracts, etc.). This system appears adequate, but places some management burden on A.I.D. missions. It is to the advantage of both NAS and A.I.D. to minimize the burden on A.I.D. missions logistically. The field and logistics support requirements are especially important in research and institution building grants, such as might be contemplated in an expanded NAS program.

NAS Facilities: NAS is a large S&T policy advisory agency. It has currently 800 or more committees with 8,000 or more participants and a staff (serving these committees) of 1,200 people. Physical facilities appear more than adequate. There are the standard common facilities--library, computer, health services, etc. NAS/NRC publish about one report per day and have unusually competent printing, publications, editing, art and book storage and distribution facilities. In short, NAS has excellent general facilities for this and expanded programs.

Program Management: Within NAS, special management procedures exist for the ACTI program, for overseas activities, and for other functions. These are discussed in the following paragraphs.

ACTI: Oversight of the ACTI program is vested directly in the Advisory Committee on Technology Innovation. The staff appears to be specific to this program. Selection of ACTI study topics involves: 1) an ad hoc procedure for idea generation which appears admirable, 2) topic selection by ACTI with staff advice, and 3) approval by the A.I.D. project manager. Technical officers in relevant DSB technical offices are asked to clear on topics selected, and in practice they and regional bureau counterparts

are extensively consulted in developing study proposals.

Study-specific committees are created to supervise the conduct of various ACTI studies. The professional staff of the Board usually manage the development, mailing and tabulation of questionnaires and the drafting of the monographs. In some cases, writing has been subcontracted.

Draft monographs are extensively reviewed by individuals and committee members. When a finished draft has been produced, it is subject to the formal review process of the NAS.

Our principal concern with this system is its ability to produce reports in a timely fashion. No study financed under the current project (started in FY 77) has yet been published and one study funded under the previous project is still in process. It is recommended that ACTI take additional measures to assure rapid production of these studies.

Distribution of published studies is done primarily by NAS, using established distribution lists and responding to mail requests. Multiple copies are sent to all US embassies, and A.I.D. missions. The A.I.D. project manager makes an additional distribution within A.I.D., and the monograph is put in DS/DIU's system and publicized in "Resources Reports." While more than 200,000 copies of ACTI reports have been distributed, it still appears probable that distribution could be further improved. It is recommended that DS/DIU and ACTI staff work together to develop:

1) improved distribution lists and processes for ACTI studies, and

2) a selective distribution of information procedure for distribution of these studies in A.I.D.

In an internal evaluation, it was recommended that a specific organization be identified and assisted to take responsibility for promoting awareness and technology transfer in each major under-exploited technological area opened by ACTI.1/ It would appear appropriate where possible to institutionalize such functions in LDC institutions rather than in the U.S. Careful planning would be required to involve the specific institution in the ACTI study and to transfer responsibility to the organization. Subcontracting for substantive work in the monograph preparation might be desirable.

1/This might include publishing a newsletter, responding to questions, arranging conferences, creating gene banks or sources of specialized experimental materials or equipment, etc.

Most improtant would be establishing mechanisms to assure eventual financial independence of such centers. It would appear that resolution of these management problems would be a basic concern of any adequate proposal for a new and expanded ACTI program.

Overseas Workshops: The overseas workshops are managed by NAS in cooperation with host country institutions and A.I.D. missions. While A.I.D. missions are intended and encouraged to be very strongly involved, the experience differs from country to country, and in some cases, mission involvement is marginal at best. Authority and responsibility for managing NAS inputs to each workshop are delegated to a single professional associate, who has independent authority to make decisions in the field. Clearly the timely completion of high quality workshops depends fundamentally on many elements beyond NAS's control. In general, the elements within NAS's domain (timely completion of arrangements, selection of U.S. participants) are adequate. There have, however, been criticisms of lack of pre-prepared scientific papers and similar technical inputs from US participants. (We applaud NAS emphasis on such pre-preparation by counterparts).

The process by which workshops are organized responds to a series of excellent and important criteria--host country selection of substantive issues, cooperative management by NAS and counterpart officials, multi-disciplinary panels, strengthening of host country capacity, development of options, etc. These guidelines should be maintained and reinforced.

On the other hand, the staff appears to have little professional understanding of conferencing methodology. Clearly different procedures are appropriate for conferences in accordance with the balance among differing objectives such as:

1) raise visibility for a problem
2) identify a wide variety of alternative options for attacking a problem
3) develop an accurate prediction for a future course of events
4) utilize consensus around some option for a specific problem
5) communicate technical judgement about a problem to non-technical authoritarian decision maker, etc.

It is recommended that a consultant be hired to train NAS's professional associates in conferencing methodologies, famiar izing them with procedures and criteria for use for such methods as Delphi, computer conferencing, role playing, etc.

In terms of the overall program management, BOSTID staff organize regular program development and follow-up trips to discuss

overseas programs with host country and mission officials in the field. They are regularly briefed by A.I.D. officials on overall program and substantive priorities, and so develop proposed plans of work balancing overall program concerns, specific concerns of the LDCs, and capabilities of NAS. Yearly program plans are reviewed and approved by BOSTID and A.I.D. It is suggested that the process be improved through participation of an A.I.D. inter-bureau project advisory committee.

Special Activities: These activities have been ad hoc, and there has deliberately been no attempt to organize a subprogram around feasibility meetings and discussion seminars. It is recommended, however, that more sericus efforts be made to inform A.I.D. officials of this capacity, and to assist them to use it.

Evaluation of NAS management of these informal meetings was highly laudatory (see Appendix G).

APPENDIX I

Analysis of Costs

Contract AID/ta-C-1433 was designed to allow support for up to 80 percent of BOSTID core staff plus certain numbers of mutually-agreed activities. While BOSTID can provide actual costs figures for program costs for each project, and for total staff costs, any attempt to associate specific staff costs with program costs, must be regarded as an estimate. Thus, in developing the supplementary material requested, certain assumptions have been made; for example, the use of an average cost per person month of $10,000 (professional plus secretary, including fringe benefits and obligatory overhead and general and administrative costs). The portions of costs for program development, follow-up and implementation, evaluation, Board support, and administration allocated to the categories of overseas programs, special studies/advisory panels, and ACTI studies are likewise at best an educated guess and are figured on a pro-rata basis.

BOSTID and OST staff have agreed that Contract AID/ta-C-1433 support will be used to develop and manage the overall BOSTID program, including projects which are separately funded. During the Contract period (9/30/77 - 3/31/81) approximately 62 percent of BOSTID's total program funding (excluding staff support) has been derived from sources other than Contract AID/ta-C-1433. Thus, in estimating costs per activity, 62 percent of Board support and administration and 31 percent of evaluation costs have been allocated to projects outside Contract AID/ta-C-1433. The remaining costs for these functions have been divided (again arbitrarily) among the various project categories under Contract AID/ta-C-1433.

In addition, the following averages include only typical activities which were funded entirely under Contract AID/ta-C-1433.

	Average Direct Cost per Activity	Average Management Function Cost per Activity	Total Average Cost per Activity
Overseas Programs	$65,850	$29,500	$95,350
ACTI Studies	$94,700	$39,350	$134,050

An approximate cost per country where contact was maintained (although no specific program may have been developed) during the contract period was also requested. In approximating this number, all 12 overseas program activities (whether funded entirely under Contract AID/ta-C-1433 or not) plus the number of separate countries in which program development stops were made (20) were used to arrive at an average cost per country of $33,000. This figure, of course, reflects the fact that BOSTID maintains scientific and technical

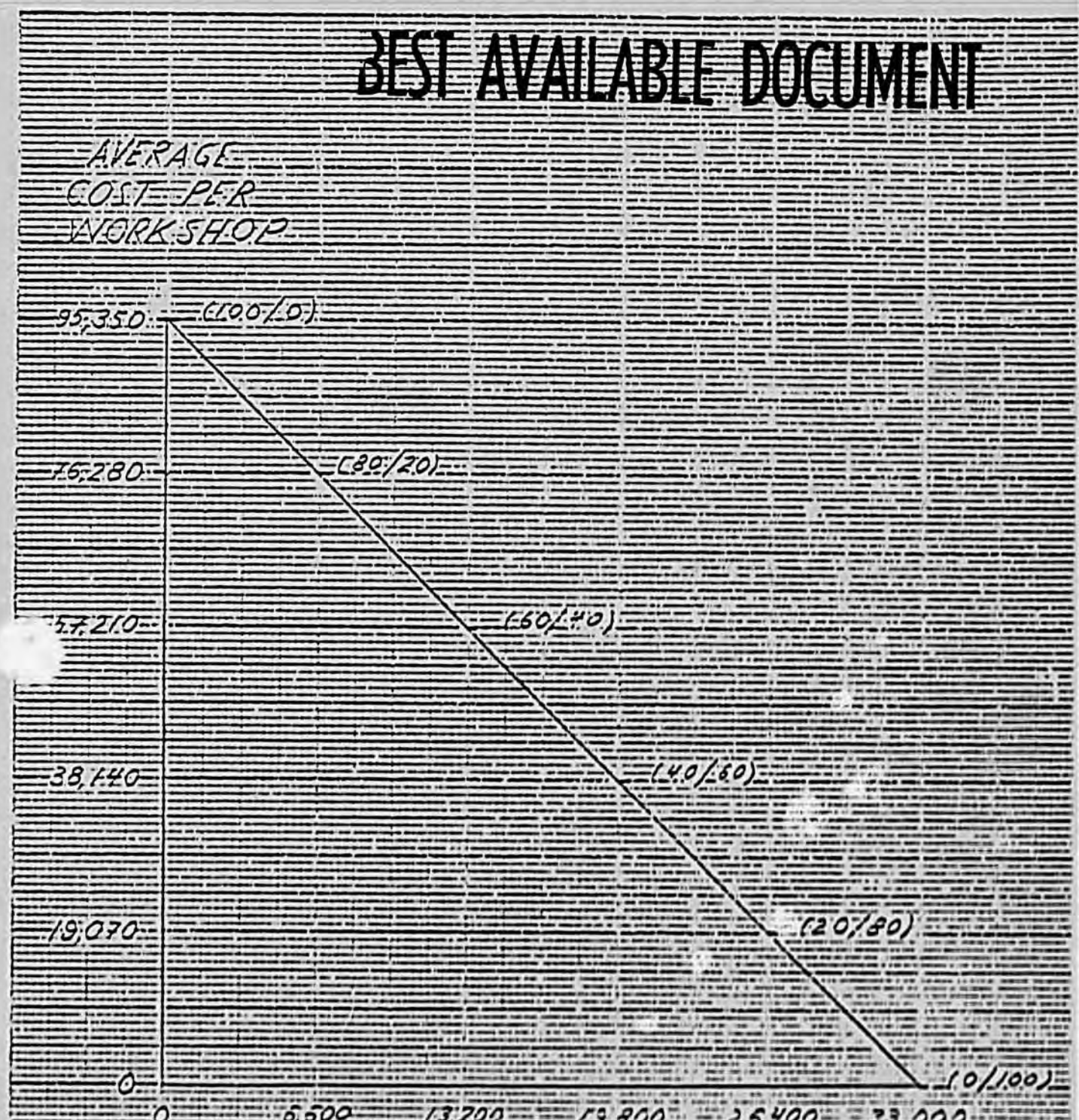
links with many countries through visits there and through receiving visitors in Washington, through correspondence and provision of reports and information, and through a variety of other means; it does not mean that a program development visit costs $33,000.

There have been 17 ACTI studies prior to Contract AID/ta-C-1433, and nine under the current contract (some with partial support from other sources). The average cost per past and current study to Contract AID/ta-C-1433 is approximately $47,500. This figure, it should be emphasized, is derived by dividing the number of all ACTI studies (17 funded under previous contracts) into ACTI costs from the present contract, and is one way of reflecting the fact that earlier studies generated distribution, follow-up, and overhead costs under the present contract.

Figure IA Illustrates alternate estimate unit costs according to the allocation of NAS' total overseas program costs to workshops per se versus maintaining bilateral S&T linkages. The values identified above ($93,350 per workshop or $33,000 per country per 3-1/2 years) are the extreme points, allocating all expenditures to one function. A more reasonable approximation of the real costs would be $60,000 to $80,000 per workshop and $3,000 to $4,000 per country per year for a dual purpose overseas program.

Figure IB Illustrates estimated unit costs for various allocations of ACTI program costs to monograph production versus technology transfer activities. Again the above identified estimates ($134,050 per monograph and 47,500 per area) are extreme points representing an oversimplification of functions of the ACTI program. A more useful interpretation would be that the average cost of a monograph is between $80,000 and $110,000 and the average cost of technology transfer activities following up on ACTI studies is $3,000 to $6,000 per year.

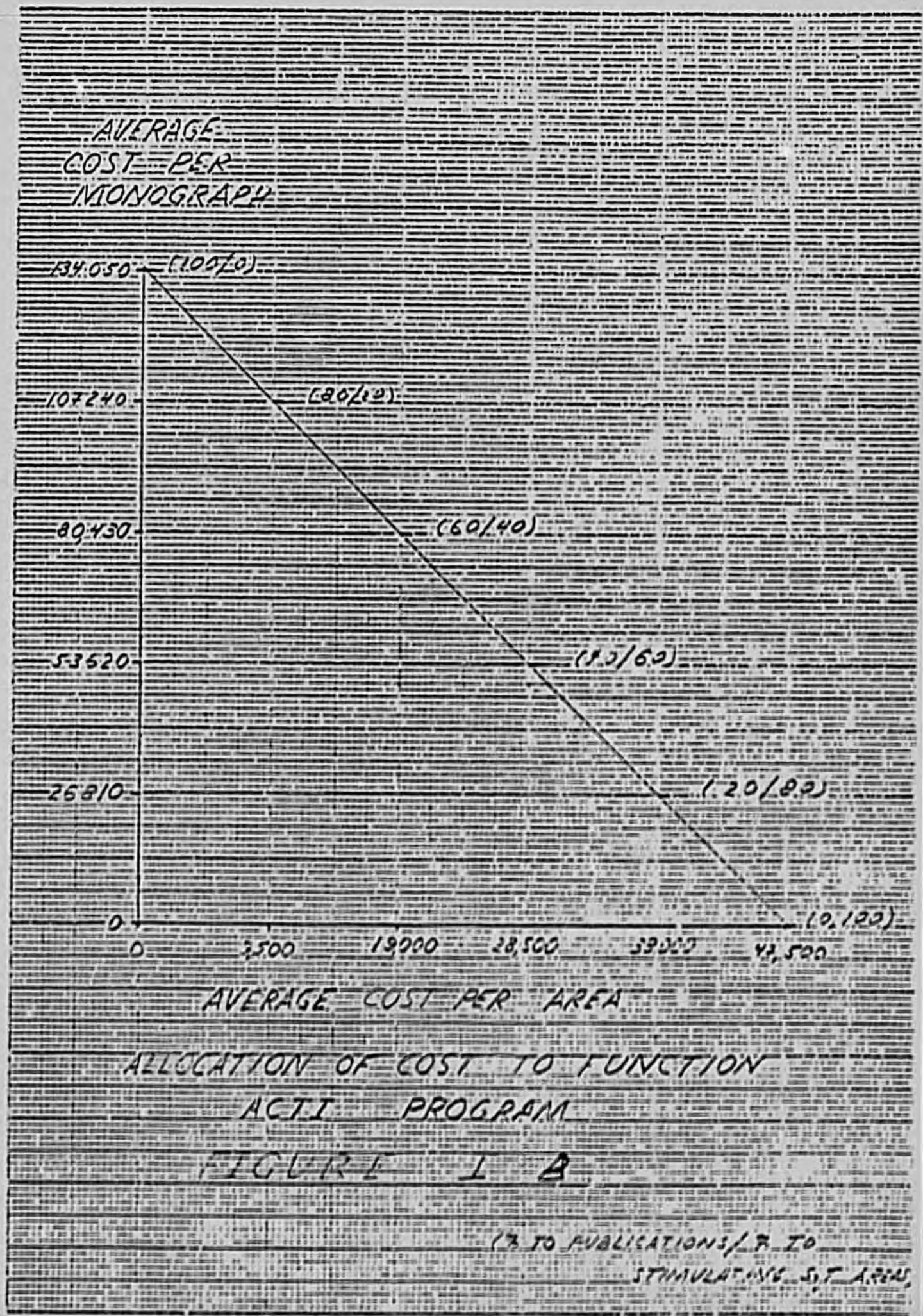
BEST AVAILABLE DOCUMENT



ALLOCATION OF COST TO FUNCTIONS
OVERSEAS PROGRAM

FIGURE 1A

(% TO WORKSHOP / % TO COUNTRY SET RELATIONS)


AVERAGE COST PER MONOGRAPH
134,050
107240
80430
53520
26810
0
(100/0)
(80/20)
(60/40)
(40/60)
(20/80)
(0,100)
0
3500
19000
28,500
38,000
47,500
AVERAGE COST PER AREA
ALLOCATION OF COST TO FUNCTION
ACTI PROGRAM
FIGURE 1A
(% TO PUBLICATIONS/% TO STIMULATING S.T. AREAS

Prepared by: job 7/14/80

Supplement to Background Material BOSTID Evaluation

Contract AID/ta-c-1433

9/30/77 - 3/31/81

Agreement No.	Project	Direct Costs (NAS)	Approximate Staff Costs (NAS)	Subtotal NAS Costs	Indirect NAS Costs*	Total, NAS Costs	Time Contributed by NAS Participants: No. of Days	Time Contributed by NAS Participants: Value**	Time Contributed by Cooperating Country (Days): Participants	Staff	Total
	Overseas Program										
2	Cameroon Workshop	$ 21996	$ 30000	$ 51996	$ 29494	$ 81490	90	$ 17550	270	66	336
3	Philippines Workshop	20596	40000	60596	29494	90090	96	18720	788	88	876
6	Sudan Workshop	30660	40000	70660	29494	100154	126	24570	378	88	466
13	Caribbean Regional Meeting	10045	15000	25045	29494	54539	63	12285	189	88	277
16	Costa Rica Workshop	33293	40000	73293	29494	102787	120	23400	360	88	448
19	Jordan Advisory Panel	18854	30000	48854	29494	78348	50	9750	150	66	216
23	India Workshop	37011	40000	77011	29494	106505	126	24570	378	88	466
24	Sri Lanka Workshop	28206	40000	68206	29494	97700	144	28080	432	88	520
27	Mauritania Workshop	27814	40000	67814	29494	97308	100	19500	300	88	388
—	Ghana Workshop (staff cost only)	—	40000	40000	29494	69494	75	14625	225	88	313
—	Morocco Workshop (planned)	512	40000	40512	29494	70006	120	23400	360	88	448
—	Nepal Workshop (planned)	31923	40000	71923	29494	101417	120	23400	360	88	448
—	Report Reprints	3523	—	3523	—	3523					
	Subtotal, Overseas Program	$244573	$436,000	$701573	$353928	$1055501	1230	$239850	3690	1012	4702
	Special Studies/Advisory Panels										
15AA	Stat Sec—Fast Growing Trees	$ 800	$ 2000	$ 2800	$ 18100	$ 20900	2	$ 390			
4	French Trees Resource Sensing	14930	14300	29230	18100	47330					
9	Stat Sec—Middle East SAT	3150	8700	11850	18100	29950	28	5460			
11	Stat Sec—Urban Problems	2946	13700	16646	18100	34746	42	8190			
14	Stat Sec—Bee Mechanisms	3249	17400	20649	18100	38749	30	5850			
19	Stat Sec—Revegetation	3059	10000	13059	18100	31159	26	5070			
20	Pure stg—US Energy Survey Meth	1227	—	1227	18100	19327	14	2730			
25	Stat Sec—Rsrch Priorities	3177	10000	13177	18100	31277	45	8775			
28	Stat Sec—App Tech Health Care	4389	10000	14389	18100	32489	140	27300			
30	Stat Sec—AID/[illegible]	2303	10000	12303	18100	30403	30	5850			
31	Pure stg—Catalytic Oxidation	2000	10000	12000	18100	30100	72	14040			
32	Pure stg—Vegetable Oils	5000	10000	15000	18100	33100	57	11115			
33	Stat Sec—2-way Comm/Rural Health	5250	10000	15250	18100	33350	225	43875			
34	Stat Sec—Coor Energy Training	5000	10000	15000	18100	33100	36	7020			
	Subtotal, Special Studies/Advisory Panels	$57864	$134,100	$191964	$253,400	$445364	747	$145665			

*Allocable portion of Board support, administration, evaluation, program development, and follow-up costs. 63% of Board support, administration, plus 30% of evaluation, have been allocated to contracts other than Contract AID/ta-C-1433.

**Calculated at $195/day.

Column 1: Travel (domestic & international), communications & shipping, materials & services, & general & administrative costs associated with these expenses.

Column 2: Approximate staff costs, including salaries, fringe benefits, and obligatory NAS overhead and general & administrative costs.

BEST AVAILABLE DOCUMENT

Agreement No.	Project	Direct Costs (NAS)	Approximate Staff Costs (NAS)	Subtotal NAS Costs	Indirect NAS Costs*	Total, NAS Costs	Time Contributed by NAS Participants: No. of Days	Time Contributed by NAS Participants: Value	Time Contributed by Cooperating Country: Participants	Time Contributed by Cooperating Country: Staff	Time Contributed by Cooperating Country: Total
	ACTI										
—	Administration	$ 76,600	$ 74,600	$ 151,200	—	$ 151,200	440	$ 77,300			
7	Water Buffalo (staff costs)	—	82,200	82,200	$ 39,324	121,524	332	64,740			
8	Winged Bean—new edition	25,000	10,000	35,000	39,324	74,324	25	4,875			
10	Peace mtg—CPRO supplement	1,396	10,000	11,396	39,324	50,620	16	3,120			
12	Production Utilization/Nautical	49,200	60,000	109,200	39,324	148,524	337	65,715			
13	Alcohol Fuels	34,750	60,000	94,750	39,324	134,074	273	53,235			
17	CPRO Supplement	46,275	20,000	66,275	39,324	105,599	9	1,755			
21	Revegetating the Range	20,650	67,400	88,050	39,324	127,374	111	21,645			
22	Aerial Seeding	24,100	74,800	98,900	39,324	138,224	108	21,060			
29	Producer Gas	25,170	57,400	82,570	39,324	121,894	231	45,045			
—	Report Reprints	62,099	—	62,099	—	62,099					
	Subtotal, ACTI	$ 304,990	$ 576,400	$ 881,590	$ 353,916	$ 1,235,506	1,532	$ 301,990			
	Program Development (general)	$ 58,595	$ 178,200	$ 236,795	25,614	$ 262,409	—	—			
	Follow-up & Implementation										
29	ACTI—Village Resources	$ 1,250	$ 4,350	$ 5,600	$ 381	$ 5,981					
—	General	91,356	270,000	361,356	25,230	386,586	90	417,550	180	132	312
	Subtotal, Follow-up	$ 92,606	$ 274,350	$ 366,956	$ 25,614	$ 392,570					
	Evaluation										
9	Small Chemistry (staff only)	—	$ 20,000	$ 20,000	$ 1,745	$ 21,745	44	$ 8,580	132	66	198
—	General	$ 21,382	200,000	221,382	19,282	240,664	50	9,750	308	48	356
									440	114	554
	Subtotal, Evaluation	$ 21,382	$ 220,000	$ 241,382	$ 21,027	$ 262,409					
	Board Support	$ 31,195	$ 152,000	$ 183,195	—	$ 183,195	680	$ 139,550			
	Administration	$ 60,108	$ 506,287	$ 566,395	—	$ 566,395					
	Totals	$ 956,223	$ 2,018,837	$ 3,375,060	$ 1,033,477	[illegible]	5,433	$ 864,935	1,310	1,258	5,518

*Based only on identified follow-up travel also.

NOTE: Approximately 3?? persons have been involved in BOSTID programs under Contract AID/ta-C-1433, including panelists, contributors and research contacts for studies, report reviewers, and other assistance such as at discussion seminars.

Average Direct Cost of ACTI Monographs under Strengthening S&T Capabilities Project.

Agreement No.		(Subtotals) NAS Costs
7	Water Buffalo (staff)	82,200
8	Winged Bean	35,000
12	Productive Utilization/ Waste	109,200
15	Alcohol Fuels	94,750
21	Revegetating the Range	88,050
22	Aerial Seeding	98,900
29	Producer Gas	87,570
	TOTAL	590,670
	Average	84,381

APPENDIX J

Review of Recommendations of the Previous Evaluation

The last evaluation of the central support project for NAS/BOSTID was drafted sometime in 1976. That evaluation was never formalized in a finally accepted evaluation report. Consequently, the findings of the evaluation team were never formally communicated to NAS. Accordingly, it would clearly be inappropriate to criticize NAS for any failure to implement recommendation of that report. However, the 11 pages of recommendations included in the final draft of that evaluation provide a useful background against which to view current NAS/BOSTID efforts.

Project Design

1.1 - "The project should be designed as an agency-wide project available to and utilized by all elements of AID' -- the project was designed as agency-wide, and was used by a variety of other bureaus and offices.

1.2 - "The focus, purpose, and goals of the project must be more sharply defined so that all parties understand clearly what is expected of the project...and so that performance, output and effectiveness can be evaluated." This evaluation discovered considerable lack of clarity remain as the specification of project elements, and this fault complicated the evaluation.

1.3 - "The broader and more active involvement of all elements of the Academies is to be encouraged." During the course of this project, agency contracts have been separately managed with the Institute of Medicine the Transportation Research Board, the Assembly on Behavioral and Social Sciences, the Commission on Natural Resources, the Assembly of Life Sciences, and the Committee on Disaster Relief. There still is little involvement of other elements of the NAS/NRC through this project. This has been criticized in the current evaluation. (Except through recommendations of potential panelists and in some instances participation on panels.)

1.4 - "Advice should be provided directed to LDCs and aimed at developing and strenghtening the scientific and technical capabilities necessary for LDCs to deal programmatically with their problems of economic and social development." This recommendation has been implemented.

1.5 - "New mechanisms to provide this advice should be identified and explored." During the course of this project, NAS has begun to accept new and expanded roles in development assistance in

complementary projects in Egypt, Indonesia, and Sahel. This may be categorized as partial implementation of the recommendation. In addition, under the contract, they have carried out one advisory mission and ten discussion seminars which are new mechanisms.

1.6 -"Scientific and Technical advice to AID should address selected, agreed on issues of world-wide importance to development and should identify opportunities and problems associated with innovative scientific or technical solutions or approaches to development problems." Under separate funding, NAS has completed the World Food and Nutrition Study and a major study on recommendations for the U.S. position at UNCSTD. They have continued under central funding to provide advice on innovative scientific and technical solutions to development problems. Under the discussion of the seminar program, they have treated a number of issues of world-wide importance to development. This recommendation appears to have been fully carried out.

1.7 - "Basic level of staff and supporting services should be maintained for carrying out the project purposes." This recommendation appears to have been complied with in some aspects. The spirit of the recommendation, however, calls for a survey of AID bureau requirements and further use of the interbureau Science and Technology Committee for project advice. These have not been done.

1.8 - "The project should be developed around a series of identifiable task categories." This recommendation was not carried out adequately. It has been further elaborated on in the current evaluation.

1.9 - "The core staff services and reasonable program costs under the contract should be available for utilization by all elements of AID, but to an agreed cost limit for a single activity, through negotiations between the Office responsible for overall project management and the academies." While there has been no formally defined cost limit for a single activity as proposed, staff services and program cost for small activities have been covered by the central contract for request from a variety of offices and missions.

1.10 - "Activities costing over the above limit should be separate task orders or contract amendments negotiated and financed separately." There have been a number of separate contracts for larger technical assistance activities negotiated during the current project period.

1.11 - "As specific activities are defined, AID and BOSTID should reach written agreement as to the scope of work, resource commit-

ment, and schedule." This recommendation has been carried out. We suggest that more adequate resource estimates be made in the future for these activities, identifying the total value (dollar) of direct staff input and an estimate of average per unit indirect costs (management, follow-on, evaluation).

1.12 - "Consideration should be given to include a relatively undefined task area, which allows the academies to carry out limited special services requested by AID." The discussion seminar program has been a partial response to this recommendation.

1.13 - "Provision for follow-up, utilization, and evaluation are an integral part of the project." Follow-up, utilization, and evaluation were included in the project design. Evaluation is currently included in the plan for each activity.

1.13.1 - "An attempt must be made to identify assumptions and select evaluation indicators." There appears no reasonable way to qualify the degree to which such an attempt was made in project design.

1.13.2 - "For each definable task, an AID staff member should be formally assigned technical monitoring responsibilities." This recommendation has not been carried out. Subject specialist AID staff members have assumed technical monitoring responsibilities for all of the discussion seminars, some of the overseas workshops, and very few of the ACTI studies. This recommendation is again ensorsed by the current evaluation team for future project management.

Project Performance

2.1 - "A mechanism must be developed that permits appropriate involvement of IAD at all levels." Unfortunately, there are still difficulties with the level of AID involvement in NAS/ BOSTID programs.

2.1.1 - "A yearly meeting held between BOSTID and the AAC to review project accomplishments and current activities." There has not been a formal meeting of this type. Senior officials of AID do attend the BOSTID meetings twice a year and are involved in the overall discussions of the program.

2.1.2 - "Broader contacts should be developed on a limited basis between AID and the academies at the policy level in addition to the current staff level in interaction." There has been occasional ad hoc meetings in compliance with this recommendation.

2.1.3 - "Frequently held meetings at the bureau level to discuss the future and the plan work of the Academies at the detailed working level." This recommendation has not been complied with. It is reiterated in the current evaluation.

2.1.4 - "Periodic regional meetings held overseas to solicit the views of the mission, to inform them of current progress and accomplishments and to establish a dialogue which will identify future specific activities." AID project management has not held such meetings. BOSTID staff have regularly met with missions to accomplish these purposes. The evaluation indicates that 32 country missions have been visited.

2.2 - "Suitable attention must be paid to improving the weaknesses identified in planning, performance, and evaluation, follow-up and utilization." It is difficult to judge if the attention paid to these subjects has been "suitable". Additional attention has been paid to these topics during the current project. There still remain difficulties in follow-up and utilization which has been clearly identified in the current evaluation.

2.3 - "In the case of overseas activities more attention should be paid to pre-planning, such as background analysis of country's needs and the relation of the proposed BOSTID activity to AID's country program." It is difficult to judge on the basis of current evaluation the degree to which progress has been made in pre-planning. NAS professional associates appear to have reasonable strong backgrounds in the development problems of the geographic areas in which they work, and invariably have discussions of priorities with host country counterparts and AID missions in planning overseas activities.

Increasingly, they are a valuable resource for briefing senior U.S. officials on science and technology policy concerns in specific foreign countries. Nonetheless, the current evaluation has suggested the addition of more formal analytic efforts in science policy as a compliment in addition to current program structure.

2.3.1 - "A first step might be reviews of the LDCs' development plans, mission development assistance plans and other relevant documents." See above response. It is recommended that the AID project manager specifically attempt to obtain the appropriate documents for each activity.

2.3.2 - "Involvement of the regional bureaus should occur at the very beginning of LDC or regional activity planning." This recommendation has been carried out. Desk officers are involved before any trip to the field, and corresponding technical officers in the regional bureaus are involved prior to any subjects specific mission to the field. Plus the staff invariably attempts to and usually do discuss the academy's plans in detail with the missions on field visits. BOSTID staff request Mission participation to the extent practical.

2.4 - The recommendations on panel selection are discussed individually in the following paragraphs.

2.4.1 - "The distribution of the institutional background of the members of the various panels should be more balanced." Summary date on 302 participants indicated that 145 of them had academic affiliations, 66 government, 51 industrial, and 51 other affiliations. (The total exceeds the number of participants since some participants had overlapping affiliations.) Further efforts to increase industrial participation might be appropriate, but the balance depends on specific topics to be discussed by the panel. Reviewing the area specialization of participants, we find 62 engineers, 26 chemists, 10 physicists, 18 animal scientists, 20 economists, 14 experts in science policy and R&D management, and dozens of other specialities with six or fewer participants each. It does seem possible with additional industrial participation might have been sought given the relatively high concentration in some professional specialities where industrial sectors are strong in S&T.

2.4.2 - "As a goal, each advisory panel or ACTI panel should have at least one LDC participant." The discussion seminar panels have usually not included LDC participants. ACTI panels have traditionally included LDC participants.

2.4.3 - "The Academies should continue to insure adequate representation on its panels of qualified women and members of minority groups." Ten percent of the 302 panelists studied were members of racial minorities. (2% Black, 2% Spanish, 5% Asian.) There will be noted that 55% of panelists were over age 50, and generally tended to be experts of established national and international reputation. The number of minority group members in the United States with such qualification are, of course, quite small, and this fact should be taken into account in evaluating the relatively low participation of minority group members. Nonetheless, continuing special efforts to involve minority group members in the NAS activities are to be desired.

On the other hand, 286 of the 302 participants studied were male. Only five percent of all participants were female. Bureau of Labor Statistics figures cited by the National Academy of Sciences showed 15.6% of all persons employed Life and Physical Sciences are female. It would appear that NAS efforts to involve women in their activities are inadequate. The evaluation team reiterates the earlier recommendation that greater efforts be carried out to assure adequate representation of qualified women in project.

2.4.4 - "When selecting a panel chairman and other key members, an attempt should be made to obtain a commitment of time for both preparatory and follow-up activities." This recommendation appears to be accepted.

2.5 - Where practicable, AID/Washington should be invited to send an observer to workshop and committee meetings." AID/ Washington observers attended workshops in the Philippines, Sudan and Costa Rica. It appears that stronger efforts should be made to involve AID/Washington personnel in overseas workshops.

2.6 - "There should be a separate, identifiable evaluation and utilization component in each activity as well as for the entire project to provide the necessary feedback on performance." There has been significant strengthening of the evaluation system in BOSTID. We continue to be concerned about utilization.

2.6.1 - "BOSTID might consider setting up a special evaluation and utilization committee for review of overall program performance." An evaluation committee has been set up. There is no utilization committee at this time.

2.6.2 - "At the project level, each activity would include a clear statement of goals and purposes, and where possible, evaluation indicators." This recommendation has been implemented.

2.7 - "The program plan and budget for each activity should contain budgetary and manpower provisions for limited follow-up, even though the particular form this would take would not be known at the start." This recommendation has not been implemented. There is an overall budget for follow-up activities, and increasing use of follow-up evaluation visits. No further provision appears to be required in the Letters of Agreement.

2.8 - "AID should give greater attention to potential follow-up from the Academy's recommendations." Progress as made on this recommendation, but continued efforts in this area are recommended.

2.8.1 - "The procedures for distribution of reports to bureaus and missions should be reviewed and improved." This has been done. Project manager continues to take personal responsibility for complimenting NAS distribution of reports and after measures have been taken, including distributing studies through Resource Reports. It is suggested, however, that more be done specifically that DS/DIU meet with NAS/BOSTID staff in order to continue improving the distribution of reports.

2.8.2 - "An airgram to all missions informing them of the Academy services, activities, and publications should be sent periodically by the AID program manager." This recommendation has been implemented.

project to provide the necessary feedback on performance." -- There has been significant strenghening of the evaluation systems in BOSTID. We continue to be concerned about utilization.

2.61 - "BOSTID might consider setting up a special evaluation and utilization committee for review of overall program performance." -- An evaluation committee has been set up. There is no utilization committee at this time.

2.6.2 - "At the project level, each activity would include a clear statement of goals and purposes, and where possible, evaluation indicators." -- This recommendation has been implemented.

2.7 - "The program plan and budget for each activity should contain budgetary and manpower provisions for limited follow-up, even though the particular form this would take would not be known at the start." -- This recommendation has not been implemented. There is an overall budget for follow-up activities, and increasing use of follow-up evalution visits. No further provision appears to be required in the Letters of Agreement.

2.8 - "A.I.D. should give greater attention to potential follow-up from the Academy's recommendations." -- Progress was made on this recommendation, but continued efforts in this area are recommended.

2.8.1 - "The procedures for distribution of reports to bureaus and missions should be reviewed and improved." -- This has been done. Project manager continues to take personal responsibility for complimenting NAS distribution of reports and other measures have been taken, including distributing studies thru Resource Reports. It is suggested however that more be done specifically that DS/DIU meet with NAS/BOSTID staff in order to continue improving the distribution of reports.

2.8.2 - "An airgram to all missions informing them of the Academy services, activities, and publications should be sent periodically by the A.I.D. program manager." -- This recommendation has been implemented.

2.8.3 - "A series of joint A.I.D./Washington and BOSTID regional conferences on Academy's activities should be considered." -- This recommendation has not been acted upon, and it is reiterated by the current evaluation.

2.8.4 - "Upon completion of each major report, holding a seminar on its content should be considered." -- This recommendation has not been followed. It is recommended that a series of seminars on the four most recent ACTI studies be held and that the series be continued for the publication of additional ACTI studies.

2.8.3 - "A series of joining AID/Washington and BOSTID regional conferences on Academy's activities should be considered." This recommendation has not been acted upon, and it is reiterated by the current evaluation.

2.8.4 - "Upon completion of each major report, holding a seminar on its content should be considered." This recommendation has not been followed. It is recommended that a series of seminars on the four most recent ACTI studies be held and that the series be continued for the publication of additional ACTI studies.

2.9 - "The Academy should consider modification of its internal procedures to enable selected BOSTID reports to be included in the NAS "Publications Listing." Selected publications have been included in NAS's overall distribution system.

2.10 - "The BOSTID staff should be thoroughly acquainted with AID or other donor supported research and operational programs which support the use of Science and Technology for Economic and Social Development." See above comments for responses to this recommendation.

2.11 - "Each BOSTID activity should examine the environmental impact of its recommendations." BOSTID has been increasingly involved in environmental subjects, notably in its Sahelian project. On the other hand, some of the BOSTID panels have ignored the topic of environmental impact. For example, there was no environmental impact discussion in the workshop on two-way radio communication for primary health care. This seems entirely correct and appropriate. Overall, BOSTID Board, staff and participants appear concerned and sensitive about environmental issues.

Project Management and Contracting

3.1 - 'The exact contract instrument used is best determined by AID's contracts office after there is a clear understanding of the project's purpose, scope and mechanisms." No comment.

3.2 - "A new agreement should be for three years with a major evaluation occuring at the end of two years." The new agreement was originally drafted for three years, but was amended to extend for an additional six months. The evaluation will be completed seven months prior to the end of the contract.

3.3 - "Administrative and overall technical management of the contract should remain the responsibility of TA/OST. However, technical management of specific tasks should be the responsibility of the bureau or office having agreed ..cs technical competence or substantive interest in the particular task or activity." In general, this recommendation has been accepted.

3.4 - "Both AID and BOSTID should engage in more formal planning for activities under the project." This recommendation has been accepted.

3.5 - "All project activities need a formal statement of work which includes objectives, output, budget, manpower and estimated time schedule." This recommendation has been implemented.

3.6 - "A brief project report should be submitted every three months, covering activities during the previous quarter." This recommendation has been accepted.

3.7 - "AID project managers, interested offices and missions should receive trip reports after each visit." Trip reports from BOSTID staff are received, however, in many cases they have been less than timely. It is recommended that BOSTID strive to improve the timeliness of these trip reports.

3.8 - "The time lag between completion of an activity panel meeting and the final report has often been too long." The evaluation team reiterates the need to improve timing of completion of reports from meetings.

3.9 - "TA/OST should be kept aware of plans to use BOSTID by other units of AID." Informal mechanisms have been utilized to carry out this recommendation. It is the general feeling of the evaluation team, however, that DS/ST (the successor to TA/OST) has probably not devoted sufficient staff time to carrying out the leadership functions proposed in the prior evaluation.

APPENDIX K

Use of NAS/BOSTID Services of Units of A.I.D. and Other Development Organizations

A fundamental concern of the central project is to provide core funding in order to make NAS/BOSTID services available to other developmental agencies. In order to judge the efficacy of this approach it is useful to examine the demand for NAS/BOSTID services. Table K-A illustrates that NAS/BOSTID expenditures increased from $921,000 in FY '76 to $2,438,000 in FY '80, while central funding (from the current project and its predecessor) dropped from 84 percent of the total to 47 percent. This indicates a clear increase in the demand for NAS/BOSTID services by other A.I.D. entities. In fact, other A.I.D. users are shown to have increased from 8.4 percent to 50.1 percent of total expenditures.

Examination of contracts for future services (existing as of 7/1/80) indicates that these trends have continued in recent contracts.

Table K-A

Sources of Funding of NAS/BOSTID Activities

Source	Percent Actual Expenditures FY '76	FY '77	FY '80	Percent current Contracts 7/1/80
Central Project Funding	83.9	58.5	46.8	33.8
A.I.D. Mission Contracts	6.5	6.1	35.8	41.7
Other A.I.D. Contracts	1.9	14.3	14.3	7.9
All Other	7.7	24.4	3.1	16.6
Total Amount	$921,482	$1,473,975	$2,438,350	$2,649,491