PD-AAZ-060

CLASSIFICATION

PROJECT EVALUATION SUMMARY (PES) – PART I

Report Symbol U-447

1. PROJECT TITLE	2. PROJECT NUMBER	3. MISSION/AID/W OFFICE
International Benchmark Sites (IBSNAT) DOCUMENT #2	936-4054	S&T/AGR

4. EVALUATION NUMBER (Enter the number maintained by the reporting unit e.g., Country or AID/W Administrative Code, Fiscal Year, Serial No. beginning with No. 1 each FY) 87-1

☐ REGULAR EVALUATION ☒ SPECIAL EVALUATION

5. KEY PROJECT IMPLEMENTATION DATES			6. ESTIMATED PROJECT FUNDING	7. PERIOD COVERED BY EVALUATION
A. First PRC-AG or Equivalent FY 82	B. Final Obligation Expected FY 87	C. Final Input Delivery FY 87	A. Total $ 5,100,000 B. U.S. $	From (month/yr.) 8-30-82 To (month/yr.) 10-4-85 Date of Evaluation Review

8. ACTION DECISIONS APPROVED BY MISSION OR AID/W OFFICE DIRECTOR

A. List decisions and/or unresolved issues; cite those items needing further study. (NOTE: Mission decisions which anticipate AID/W or regional office action should specify type of document, e.g., airgram, SPAR, PIO, which will present detailed request.)	B. NAME OF OFFICER RESPONSIBLE FOR ACTION	C. DATE ACTION TO BE COMPLETED
1. Develop revised extension proposal with quantitative output indicators, scope of work and budget. Statistics: In process.	AID/UH	1-31-87
2. PIO/T for funding current project	AID	2-15-87
3. Approval of extension proposal	AID	3-1-87
4. PAF for new 5-year grant	AID	4-1-87
5. PIO/T for funding new project	AID	5-1-87
(Actions 6 through 30 appear on the following pages)		

9. INVENTORY OF DOCUMENTS TO BE REVISED PER ABOVE DECISIONS

- ☐ Project Paper
- ☐ Financial Plan
- ☐ Logical Framework
- ☐ Project Agreement
- ☐ Implementation Plan e.g., CPI Network
- ☒ PIO/T
- ☐ PIO/C
- ☐ PIO/P
- ☒ Other (Specify) PAF
- ☒ Other (Specify) Proposal

10. ALTERNATIVE DECISIONS ON FUTURE OF PROJECT

- A. ☒ Continue Project Without Change
- B. ☐ Change Project Design and/or ☐ Change Implementation Plan
- C. ☐ Discontinue Project

11. PROJECT OFFICER AND HOST COUNTRY OR OTHER RANKING PARTICIPANTS AS APPROPRIATE (Names and Titles)

S&T/AGR, T. Gill [signature] 1-8-87
S&T/AGR, E. Roche [signature] 1/9/87
S&T/PO, V. Anderson [signature] 3/20/87

12. Mission/AID/W Office Director Approval

Signature [signature]

Typed Name S&T/FA W. Furtick

Date 3-24-87

AID 1330-15 (3-78)

A	B	C
List of decisions and/or unresolved issues; cite those items needing further study. Data Base and Models	Name of officer responsible for action	Date action to be completed
6. Work plans should separate data acquisition activities which are (a) needed to validate models; (b) needed to verify or calibrate models in specific countries or locations; or (c) are related to model applications to on-site problems. Those collaborators selected from above category (a) should be treated as "critical path" activities requiring quarterly reporting and extraordinary support measures to assure production of timely and quality minimum data sets. (MDSs) Status: (a) While data from individual developing country experiments will be used, it is not as critical as originally projected. The number of MDSs can be relatively small, as few as three, as long as a range of stress environments are included. The wheat and maize models have already been verified. The primary source of MDSs for the remaining crops will be provided by International Agricultural Research Centers (IRRI, ICRISAT, CIAT), U.S. university experiment stations and collaborators. A work plan to complete the remaining verifications is being updated (b) calibration or refinement of models for local conditions will be undertaken as part of the (c) applications planned for Phase II.	PI	12-86
7. IBSNAT should provide more training for collaborators regarding how to access and use the data base and the verified models. Status: In August 1986, field experiments were installed in Waimanalo Experiment Station on Oahu, Hawaii, in preparation for training workshops for collaborators. The first is scheduled for January 1987, with follow-on as needed.	PM	Continuing

PI = Principal Investigator (Goro Uehara)
PM = Project Manager (Gordon Tsuji)
UH = University of Hawaii
( )= Additional people involved

8. Specific plans should be made to strengthen data acquisition efforts on genetic coefficients for crop cultivars. This should include a users manual explaining why genetic coefficients are important and specific experimental instructions on how to obtain them. Status: L. A. Hunt, member of Technical Advisory Committee (TAC) has prepared a final draft of the procedures for collecting the genetic coefficients from field experiments. Procedures will be tested on Maui, Hawaii.	PM	12-87
9. The "Users Guide to Integrated Data Base Management and Modeling Systems" should be finalized, translated and distributed as soon as possible. Status: Completed--IBSNAT Technical Reports 3 and 5 printed and distributed in March and October 1986, respectively.	PM (J. Jones) (F. Cady) (C. Chan)	Completed
10. The end-of-project state of the DBMS needs to be addressed soon. It is suggested that the University of Hawaii might consider this an appropriate university function fitting in with its commitment to the international dimension of its programs and, if so, that it initiate action to take over the DBMS at or near project completion. Status: The university will assume responsibility for maintaining and updating DBMS.	PI/UH	Completed
11. Millet, an essential crop in much of Africa and parts of Asia, should be added to the selected crops. If necessary to accommodate this addition, or for other reasons, a lower priority can be allocated to the aroids. Status: A millet specialist from ICRISAT was secunded in November 1985 to develop millet and sorghum models. Aroids will be maintained.	PM (Alagarswamy)	Completed
12. A new sub-output should be added to crop models covering work on submodels to describe the impact of diseases and insects on crop production. Work plans, schedules and the identification of major events and progress indicators should be developed accordingly.	PM (J. Ritchie)	Completed

Status: Three pest management specialists, Kranz--Federal Republic of Germany, P. Teng--University of Minnesota, Kenmore--FAO/Manila, have agreed to assist IBSNAT in adding pest management component to DSSAT. Work plan will be developed at first group meeting in November 1986.		
13. Developing Country, Capabilities and Use. Training activities must be increased to meet the felt needs of collaborators who have signed memorandum of agreements (MOAs). An appropriate IBSNAT response might be to increase "hands-on" workshops, including help in conducting field experiments; data compilation, processing and interpretation; and demonstrations of potential applications.	PM	Completed
Status: In terms of cost-effectiveness, the training recommended in Recommendations 7 and 13 has been combined.		
14. IBSNAT should, as part of this total process, quickly establish "collaborators' support team(s)", each consisting of a least two staff members fully knowledgeable regarding experiment layouts, MDS collection and their rationale, data input, etc., who would visit field sites on a mutually planned and frequent basis (a la Soil Management Support Services (SMSS) site characterization) to provide technical advice, respond to questions, assist in "hands-on" training, provide encouragement and support, and add a new channel of communication and rapid feedback to IBSNAT headquarters.	PI	1-87
Status: It has not been possible to act on this desirable recommendation due to funding limitations, but appropriate proposals will be included in the IBSNAT request for extension.		
15. IBSNAT funds should also be utilized to ensure that each new developing country collaborator has at least an IBM-compatible microcomputer and one weather station so the process of developing capability can begin at the outset of the collaboration.	PI	Completed

Status: IBSNAT has provided such equipment on a selected basis to collaborators who had a need and capability to use it, e.g., Venezuela, Thailand, Zambia, Jordan and Malaysia.		
Demonstrations		
16. Activity should commence as soon as possible to develop criteria for the selection and design of "representative" case studies in relation to the project purpose (objective). This should include the methodology to be used, and the clarification that the preparation and distribution of the case study is the means for demonstrating crop-and-site specific applications and not an end in itself.	PI	12-86
Status: Criteria for selection, i.e., countries representative of various stages of development and strategical and tactical applications, have been agreed upon. A methodology for demonstrating the application of Decision Support System for Agro-technology Transfer (DSSAT) in-country is being prepared as part of the contract extension process.		
17. IBSNAT, with AID assistance, should ensure and accelerate the country application of validated models, including the means to involve the targeted audience(s) in the process and to provide feedback for model improvement.	PI (Dr. Gill)	Continuing
Status: S&T/AGR/RNR, in collaboration with the Regional Bureaus and the country missions, will facilitate the work.		
Regional Networks		
18. IBSNAT should continue to encourage and assist in the creation of regional networks that would (a) assume an increasing role in the planning and execution of training programs to meet their needs; (b) develop and coordinate a regional capability to do modeling; and (c) encourage their members to validate and use crop models.	PI	Continuing

Status: IBSNAT continues to assist in the establishment of the Oceanic Benchmark Sites Network for Agrotechnology Transfer (IBSNAT) and the ASEAN Benchmark Sites Network for Agrotechnology Transfer (ABSNAT).		
Publications		
19. There is a need for an attractive, substantial and "user friendly" publication describing the nature of IBSNAT activities and its *modus operandi* to a wordwide audience.	PI	Continuing
Status: Within the time and resource available and the feedback received from recipients, IBSNAT believes the "Agrotechnology Transfer" newsletter is "user friendly" and adequate.		
20. A publication should be part of an IBSNAT effort to seek wider opportunities and different media to publicize its purpose, activities and achievements (e.g., presentations to professional and other groups, particularly among the bioscientists) with a view to create an understanding of agrotechnology transfer.	PI	12-87
Status: The effort to facilitate understanding and acceptance of DSSAT is the focus of a new major output during the next extension phase.		
21. Future issues of the *Agrotechnology Transfer* news should include some brief, popular-type articles which could be drawn to the attention of local or national media by recipients.	PM (V. Pecsok) (J.L. Palacio)	Continuing
Status: PI concurs.		
Management		
22. Increasing attention, in planning and implementing, should now be given to those outputs concerned with strengthening capability in the developing countries, demonstrating applications, regional networking and communication or outreach.	PI	Continuing

Status: PI concurs to add these outputs during the extension phase.		
23. In order to facilitate AID's legitimate interest in the planning and the monitoring of project progress, a Management Review Group (MRG) should be established and consist of the AID Project Monitor and the Principal Investigator as equal members, with the ad hoc participation of others as required.	PI (Dr. Gill) UH (Kefford)	Completed
24. The MRG should be primarily concerned with (a) approval of strategic decisions, (b) life-of-the-project work planning and progress indicators, (c) annual changes in program priorities and resource allocations by outputs, (d) coordination with other AID projects, (e) progress monitoring and reporting and (f) University and AID support.	PI (Dr. Gill) UH	Completed
Status: AID and PI concur.		
25. On the agenda of the first meeting of the MRG should be a proposal to increase the timeliness and usefulness of progress reporting and work planning, including progress and slippage; and problems concerning all outputs, subcontractors and advisory committees.	PI (Dr. Gill)	1-87
Status: Dr. Gill and PI concur. However, due to the distance and time involved, consultation and resolution on many of the items enumerated above have been and will be carried out by correspondence and telephone.		
26. The purpose and role of the Technical Advisory Committee (TAC) should be updated and its deliberations and advice should be recorded. Adequate liaison with the recently established Collaborators Advisory Panel (CAP) should be maintained. Among other things, the CAP should encourage and facilitate national and regional efforts.	PI	Continuing
Status: PI concurs.		

27. At least two full person-years of additional staff time, including travel and support, should be added to IBSNAT headquarters to increase hands-on training and site visitation and to expedite the preparation and distribution of manuals and publications. Status: During the current contract (see recommendation #7) it does not seem feasible to have extra staff for "hands-on" training or publications. However, before the end of this year, a post-doctoral researcher will join IBSNAT staff to accelerate development of DSSAT components.	PI	12-86
University Support		
28. The University of Hawaii and particularly, the College of Tropical Agriculture and Human Resources (CTAHR), should seek out additional opportunities to support IBSNAT, e.g., increase the amount of contract-generated overhead which is returned to the department(s) involved, take a more active and supportive role in the coordination and monitoring of desirable project interfaces, and eventually to assume responsibility for the DSSAT when the IBSNAT contract is phased out. Status: The State of Hawaii has only recently begun returning overhead to the University, but within the last two years the amount has increased to 50%. Proposals to include DSSAT as an integral part of the University teaching and research programs are being submitted to the Vice President for Academic Affairs and to the Office of the Vice President for Research and Graduate Studies. At the same time, CTAHR has adopted a comprehensive planning system for agricultural commodities which requires a systems approach and draws on IBSNAT developments. Efforts are also underway to link the Hawaii Natural Resources Information System with the IBSNAT DBMS.	PI (El Swaify) (Kefford) (Wounts) (Marsella)	Continuing

29. Most urgently, the University and the State of Hawaii need to provide IBSNAT with additional and adequate on-campus space. The University is requested to undertake a review, as soon as possible, of the affect of the present run-down facilities on work efficiency and its international image as a leader in agricultural development in the tropics and subtropics, and to take appropriate action. Status: The CTAHR is concerned about the constraints that the accommodations provided to IBSNAT place upon its activities. The college administration has not found in one location the quantity and quality of space that IBSNAT needs. The college intends to explore the availability of funding from foundations for a facility to accommodate its international activities in tropical agriculture.	UH (Kefford)	Continuing
Linkages with Other Projects		
30. AID/S&T and IBSNAT Project management should seize every opprotunity to tie in the IBSNAT systems analysis approach to ongoing and proposed projects, e.g., plant tissue culture, dryland agriculture, animal disease and pest control, aquaculture and mariculture, pest control, biotechnology, etc.; and with parallel projects being carried out by the USDA, particularly ARS and SCS. Status: Dr. Gill and PI concur.	PI (Dr. Gill) UH	Continuing

PROJECT EVALUATION SUMMARY - PART II
ENTITY: UNIVERSITY OF HAWAII

PROJECT TITLE: International Benchmark Sites Network
PROJECT NUMBER: 936-4054

The International Benchmark Sites Network for Agrotechnology Transfer (IBSNAT) is one of several soil and water projects supported by S&T/AGR/RNR which focus on subject matters ranging from soil and water management to rainfed agriculture, biological nitrogen fixation and plant tissue culture. IBSNAT is designed to deal with these key ingredients in a holistic manner. It was established to further AID's efforts to link related projects through a systems-based research strategy that enables decision-makers, both at the policy and farm levels, to predict crop yields and simulate the effect of environments and alternate management practices and control outcomes.

The central concept of systems-based research is that the whole system must be understood and related in order to evaluate changes in any single component. In this innovative approach, the project brings together existing knowledge of the farming system, identifies major components and processes and their interaction, and seeks to identify the bottlenecks to improved performance. IBSNAT provides the structure and mechanism to link soil, water, weather, crop and management research projects into a coherent, problem-solving instrument, called the Decision Support System for Agrotechnology Transfer (DSSAT). It consists of: (i) the minimum soil, water, weather, crop and management data needed to simulate crop performance; (ii) a data-base management system (DBMS); and (iii) several crop simulation models that predict and display the consequences of choosing alternative management practices or strategies.

The IBSNAT project (936-4054), as with most S&T/AGR projects, has as its ultimate goal the increase of agricultural productivity and rural income in the tropical and sub-tropical areas of the developing world, by means of cost-effective, accelerated rate of agrotechnology transfer. The purpose of the project is specifically to develop and demonstrate, through a network approach, the use of system analysis and crop modeling for predicting crop performance and management requirements for decision-making at regional, national, intermediate and on-farm levels.

In the late 1970s and early 1980s, the AID-sponsored Benchmark Soils Project demonstrated for the first time that agrotechnology could be successfully tranferred on the basis of the USDA-SCS "Soils Taxonomy", i.e., a transference by analogy. This project involved the Universities of Hawaii and Puerto Rico. The IBSNAT Project was conceived as an attempt to bring these components of successful transfer together with a systems approach of

transference by simulation. The project was approved for a nine year period and a contract was executed in August 1982 for a five year period at a total estimated cost of $5,100,000. As of 23 July 1986, $3,900,000 had actually been made available to the University of Hawaii, the prime contractor.

This PES summarizes the results of a midterm external evaluation exercise held in the fall of 1985 by a team of outstanding scientists, a representative of AID regional bureau, and led by an evaluation and development management specialist.

Performance to date by IBSNAT has been appraised by the team as ranging from fully satisfactory to outstanding. Minumum data sets (MDSs) were established for each selected crop and a data base management system (DBMS) is in place and operational. Crop models for wheat, maize and soybeans are operational, and models for rice and sorghum should be available for testing shortly. Work is progressing satisfactorily on groundnuts and beans but root crops have been slower. This work has been carried out under the guidance of the the Principal Investigator with the assistance of an outstanding Technical Advisory Committee (TAC). While much remains to be accomplished, the progress to date and the latest developments in information technology, e.g., artificial intelligence, give both the evaluators and S&T/AGR confidence that the project purpose will be achieved as originally proposed.

As the development, testing and validation of the selected crop models accelerates in contract year four and five, the project is moving from a conceptualization to an operational phase and soon must begin planning for the final field testing phase. During the first phase, the P.I. was granted a great deal of flexibility which has been a major factor in project success to date. However, as it moves into testing, validation and field testing, there must be closer IBSNAT collaboration with S&T and field missions, more effective coordination with related S&T activities and field projects and more joint management attention given to the so-called non-technical outputs, i.e., securing acceptance of DSSAT, networking and communication, whose production are crucial to project success. At the same time, any changes in the major project design elements must be considered in the light of changing assumptions, resource levels and opportunities.

The project is currently approved until August 31, 1987, but completion of all project outputs and successful achievement of the project objective is not possible within that time frame. Indeed, in the original project paper, it was estimated that a time frame of nine years would be necessary. Part I of the PES shows the actions which have been or will be shortly taken on the issues raised in the evaluation and the recommendations made as a result of consultation between the AID Project Monitor and the University of Hawaii Principal Investigator. Together they form the framework for the preparation of a project paper justifying the extension of the IBSNAT Project to 1992.

14. EVALUATION METHODOLOGY

The purpose of the midterm evaluation was to: (a) assess performance to date; (b) on the basis of this assessment, project the probability of successfully achieving the project purpose within the time-frame and resources provided; and (c) in the light of changes since project approval, review the development hypothesis and project approach. The team was presented with a set of issues and supplied with appropriate background documentation. Meeting in Maui, they heard presentations by IBSNAT staff and collaborators and entered into a dialogue with members of the TAC, the recently formed Collaborators Advisory Panel (CAP), the Executive Management Committee (EMC), and representatives from the USDA-ARS, SMSS, and University of Hawaii.

The first two days of the on-site portion included IBSNAT presentations on: project concept and rationale; overview of project progress; model development, verification and validation; data base management system; regional networks, and SMSS-IBSNAT collaboration. The experimental sites of the MauiNet, situated along an elevation transect of the slopes of Mt. Haleakala, were visited. The third day was used by the team to meet privately with individuals and groups to discuss selected subjects in more depth. A team consensus was established in closed sessions on the fourth day with the fifth and last day devoted to report drafting.

S&T/AGR is in general agreement with the assessments, findings, conclusions and recommendations included in the report and is using them as the basis for a dialogue with the P.I. to review and revise, as necessary, the work plan and fund allocations for the remainder of the current contract term (see Part I) and for a joint project extension proposal.

15. EXTERNAL FACTORS

In the conceptualization phase, external factors have not been very relevant, but this is expected to change somewhat in the operational phase and significantly in the field testing phase. At this time, thay take the form of critical assumptions, e.g., that the IARCs will use the crop models in their research and extension work, demonstrations will convince policy and decision-makers that crop simulation can obviate considerable trial and error efforts, etc. (See Section 17.)

16. INPUTS

Funds for the initial phase of the contract were used to support activities and to determine the minimum data set to validate crop models and to develop a data base management system. Additional fiscal support was provided to principals involved in the development of crop models through subcontracts and in the generation of minimum data sets for model development and testing in Hawaii.

A major portion of the budget was also allocated for travel to permit collaborators and contractors to participate in various joint activities related to the development of various components of DSSAT. Costs involved in conducting training workshops were shared with collaborating host countries.

In the second phase, funding will be necessary to continue activities in the decision support system related to model development including pest and diseases and whole farm systems and model validation. Additional staff scientists and subcontracts to accomplish these tasks are anticipated.

It is anticipated that contract funds may necessarily be used to assist collaborators in overcoming "bottlenecks" to their full participation. Discretionary use of these funds will be made in consultation with the local AID mission.

A budget item to develop training aides for users of DSSAT will be included for Phase II. Such materials will aid and support IBSNAT in disseminating project concepts and information.

17. OUTPUTS

In a project design exercise which took place in late 1984, the original major design elements were further defined and revised in the light of subsequent developments. Five major project results were specified as:

a) Establish an operational agricultural data base management system.

b) Develop, test and validate crop simulation models for selected crops, including an operational general agricultural management model.

c) Establish the capability to use crop models in at least five collaborating developing countries, including demonstrations and case studies.

d) Create a prototype, functioning network for agrotechnology transfer.

e) Communicate project rationale and results to the scientific community, development agencies, and LDC governments.

These outputs are based on the assumptions that: (i) crop models already created for temperate zones can be modified to work in the tropics and sub-tropics; (ii) LDC collaborators and crop-oriented IARCs will use and/or adapt the DBMS on the basis of their involvement in crop modeling, training and other activities; (iii) data can be handled on microcomputers that will become increasingly inexpensive and available to all collaborators; and (iv) collaborators will cooperate with the IBSNAT/PI in the planning, coordinating and support of activities required to produce the project outputs, including the establishment of regional networks for agrotechnology transfer.

As previously indicated (see Section 13), performance in producing outputs has ranged from very satisfactory to outstanding as rated by the External Evaluation Team and endorsed by S&T/AGR/RNR. Similarly, the critical assumptions show every indication of still being valid. As the team points out, however, only the first output, viz, the establishment of a fully operational DBMS, is likely to be fully produced in the current contract term. For example, validation of most crop models will not take place until 1989 and the development of a general agricultural management model, or its equivalent, may require the full project timeframe, i.e., until 1992.

18. PURPOSE

The purpose or project objective is to demonstrate, through a network approach, the use of systems analysis and crop simulation for predicting crop performance (how a crop will perform under specific soil and climate conditions) and management requirements (additional inputs such as nutrients, water, growth regulators and pest control to optimize production) for decision making at regional, national intermediate and on-farm levels.

The Evaluation Team endorsed the project approach, as described in the publication Design Elements, as sound, and concluded that significant progress is being made towards achievement of this purpose. Particular note was made of "...the fascinating prospects of 'expert systems', i.e., computer programs which can make the knowledge of experts available to nonexperts, and for its use in decison-making and its potential interfaces with simulation models". The EOPS indicators were also endorsed.

19. GOAL AND SUBGOAL

The general development goal on increasing agricultural/food productivity, farm income, etc., was supplemented by an S&T/AGR program goal, also reformulated in the 1984 redesign exercise, as follows:

> To accelerate the rate of agrotechnology transfer to and among developing countries on a cost-effective and scientific basis to improve the understanding of cropping systems, provide decision-makers with the means to predict crop yields using alternative management practices, and use crop simulation models to develop management strategies at all levels.

The Evaluation Team, impressed with the progress to date, reaffirmed the validity of the development hypothesis i.e., by using simulation models, scientists can quickly, easily and cheaply predict the effects of different packages of agricultural technology on both crop production and soil resources, and can estimate soil water content, soil erosion, nutrient availability and crop growth on a daily basis. They can also predict the

effects of soil characteristics on water and nutrient movement, erosion, plant nutrition, fertilizer requirements and crop growth. Thus, crop simulation models can be used to predict many of the consequences, and thereby control them, of agrotechnology transferred to new locations.

20. BENEFICIARIES

In making the above reaffirmation, the Evaluation Team concluded that "Models, coupled with management practices and 'expert systems' can enable many developing countries to leap across the existing wide technology gaps and obviate the time and cost for extensive on-site trial and error experiments. This will be particularly significant in areas where infrastructure is limited, diversity extreme and basic data is sparse, e.g., Africa". Ultimately, it will be the farmer who benefits, but the impact will first be felt in the international and national research centers and at policy levels in developing country governments.

Several IARCs are cooperating in IBSNAT activities, including training, providing MDSs and testing, particularly ICRISAT, ACSAD and CIAT. The EOPS indicators are also intended to measure impact on the targeted beneficiaries. While it is premature to attempt to measure impact, the expanding number of IBSNAT collaborators who are cooperating in model development and are showing keen interest in subsequent country calibration and demonstration, coupled with the formation of regional networks, are positive and encouraging signals. Both the horizontal, and increasingly, the vertical transfer of technology will be emphasized in Phase II of the IBSNAT Project.

21. UNPLANNED EFFECTS

Since this project is only now moving from its conceptualization and development phase, unplanned effects are unlikely to show themselves at this time. However, it is interesting to note that the information technology is expanding rapidly and at the time of original project design, little was known about the potential of artificial intelligence. DSSAT has been designed to encompass these developments.

22. LESSONS LEARNED

The IBSNAT Project is a highly innovative and unique project, relying on competent leadership, extraordinary technical inputs and a large collaborative effort based primarily on expectations of mutual benefits. While basically a research and development project, the utilization of its results, i.e., crop prediction and simulation, through demonstration, training and extension is equally important to project success and eventual impact. Among the lessons learned to date, may be included the following:

a. Provision of Maximum Flexibility. The application of system analysis to crop production is new, and advances in information technology are proceeding at an amazing rate. It is crucial that there be good understanding between the Contractor's Principal Investigator and AID's Project Monitor leading to general agreement on the project approach and expected results, but allowing day-to-day flexibility in work planning and operational detail by the P.I.

b. Creation of Adequate Control Mechanisms. In the conditions described just above, and given the largely voluntary nature of the collaboration necessary to produce the desired results, it is necessary to establish formal and informal mechanisms to achieve a resonable degree of management control to assure Project success within a finite time period and resource allocation. In this case, the Technical Advisory Committee (TAC) has proven to be a highly effective device to involve intimately, at minimum or no cost, some of the world's outstanding (modeling) experts in model development and training, including strategizing and work planning. The subsequent creation of a Collaborators Advisory Panel (CAP) has also provided an effective feedback mechanism to IBSNAT from the targeted beneficiaries and a force for the development of regional networks. The need to provide the P.I. with maximum flexibility vis-a-vis the Project Monitor's requirement for oversight also indicates that less reliance can be made on traditional techniques, e.g., annual fiscal and progress reports and formalized work plan approvals, while more reliance must be placed on frequent and informal interchanges at opportune occasions. The mode of a collaborative agreement seems most appropriate with the P.I. and the AID Project Monitor jointly deciding on major changes in strategy, project approach, outputs and output-oriented resource allocations.

c. Classification of Data Collection. The Evaluation Team, reacting to an S&T/AGR issue expressing concern on the progress of critical path activities in the development, testing and validation of selected crop simulation models and after appropriate dialogue on the point, recommended that data aquisition activities be categorized by those needed to: (i) validate models; (ii) verify models in specific countries or locations; and (iii) are related to the application and demonstration of models to on-site problems. The eventual use of data should be clearly defined in projects of this nature as it affects the requirements for quality, quantity and timing.

d. Fostering Collaboration. Where a project's success depends to a large extent on voluntary collaboration and requires some time period before tangible and usable results are achievable, it is important to build-in activities which will foster and sustain collaboration, e.g., participation in training seminars and workshops, representation in project planning and decision-making, providing essential pieces of small equipment (weather gauges, PCs), frequent visitations by project staff and "hands on" assistance, etc.

23. SPECIAL COMMENTS OR REMARKS

The midterm evaluation report and the January 1985 publication on "Design Elements for the IBSNAT Project" is available in S&T/AGR for review as required.