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AGENCY FOR INTERNATIONAL DEVELOPMENT

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A. FUNDING SOURCE	FIRST FY B. FX	FIRST FY C. L/C	FIRST FY D. TOTAL	LIFE OF PROJECT E. FX	LIFE OF PROJECT F. L/C	LIFE OF PROJECT G. TOTAL
AID APPROPRIATED TOTAL	396	-	396	5,670	-	5,670
(GRANT)	(396)	(-)	(396)	(5,670)	(-)	5,670)
(LOAN)	( )	( )	( )	( )	( )	( )
OTHER U.S. 1.						
OTHER U.S. 2.						
HOST COUNTRY						
OTHER DONOR(S)						
TOTALS	396	-	396	5,670	-	5,670

11. PROPOSED BUDGET APPROPRIATED FUNDS ($000)

A. APPROPRIATION	B. PRIMARY PURPOSE CODE	PRIMARY TECH. CODE C. GRANT	PRIMARY TECH. CODE D. LOAN	E. 1ST FY 82 F. GRANT	E. 1ST FY 82 G. LOAN	H. 2ND FY 83 I. GRANT	H. 2ND FY 83 J. LOAN	K. 3RD FY 84 L. GRANT	K. 3RD FY 84 M. LOAN
(1) ARDN	149J	090	-	396	-	1,186	-	1,228	-
(2)									
(3)									
(4)									
TOTALS				396	-	1,186	-	1,228	-

A. APPROPRIATION	N. 4TH FY 85 O. GRANT	N. 4TH FY 85 P. LOAN	Q. 5TH FY 86 R. GRANT	Q. 5TH FY 86 S. LOAN	LIFE OF PROJECT T. GRANT	LIFE OF PROJECT U. LOAN
(1) ARND	1,400	-	1,460	-	5,670	-
(2)						
(3)						
(4)						
TOTALS	1,400	-	1,460	-	5,670	-

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PROJECT PAPER

INTERNATIONAL BENCHMARK SITES NETWORK FOR AGROTECHNOLOGY TRANSFER "IBSNAT" (PROJECT # 936-4054)

A Pilot Activity to
Facilitate Rapid Flow of
Agroproduction Technology in the Tropical
and Subtropical Regions

S&T/AGR/RNR
1981

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ABBREVIATIONS USED IN THE PAPER
ACRONYMS

ACSAD	Arab Center for Studies of Arid Zones and Drylands
AID	U.S. Agency for International Development, (USAIDs: AID Country Missions
ASEAN	Association for Southeast Asian Nations
BNF	Biological Nitrogen Fixation
BSP	Benchmark Soils Project (AID/ST/AGR, # 931-0582, 931-0601)
CIAT	International Center for Tropical Agriculture (Colombia)
CIP	International Potato Center (Peru)
CRSP	Collaborative Research Support Program (AID/ST/AGR, # 931-1311)
CST	Consortium for Soils of the Tropics (AID 211d grant institutions)
CIMMYT	Centro Internacional de Mejoramiento de Maiz y Trigo (Mexico)
IARCS	International Agaricultural Research Centers
IBSNAT	International Benchmark Sites Network for Agrotechnology Transfer (AID/ST/AGR, # 936-4054)
ICARDA	International Center for Agri-research in the Dry Areas (Lebanon)
ICRISAT	International Crops Research Institute for Semi-Arid Tropics
IICA	International Institute for Centeral America
IITA	International Institute of Tropical Agriculture (Nigeria)
IRRI	International Rice Research Institute (Philippines)
ORSTOM	Office de la Research Scientific et Technique Outer-mer (France)
SEARCA	Southeast Asian Regional Center for Graduate Studies and Regional Research in Agriculture
SMSS	Soil Management Support Services (AID/ST/AGR, #931-1229)
USDA-SCS	Department of Agriculture, Soil Conservation Service

PROJECT PAPER

Project Summary

A. Statistical

Project Title:	International Benchmark Sites Network for Agrotechnology Transfer (IBSNAT)
New or Extension	New
Contractor (Proposed)	University of Hawaii Department of Agronomy and Soils Honolulu, Hawaii
Principal Investiagators:	Dr. G. Uehara Dr. F. Beinroth (University of PR)
Duration:	Nine Years
Estimated Cost (5 years) Total:	$5,634,500

First year: $ 395,500
Second year: $1,176,000
Third year: $1,228,000
Fourth year: $1,374,500
Fifth year: $1,460,500

S&T/AGR Evaluation (2nd and 4th year): $35,500

Collaborators Support, Estimated (5 years): $1,500,000

Project Manager: Dr. T. S. Gill, S&T/AGR/RNR

B. Descriptive:

There is no fundamental reason why the people of the world should go hungry. The world can feed its people and many more. Unfortunately the performance so far has been less than reassuring. If the present production and consumption trends continue, the developing countries will face by 1990 a deficit in staple food of 140 million tons, about 3 to 4 times the current deficit. There is need for more intensive use of soils, but there is already much concern about the deterioration of soils through excessive and unwise use. Agricultural research can contribute significantly to the amelioration of these problems. But research costs are high and increasing, thus efforts are needed to make agriclture research more efficient. Many developing countries do not have research resources or time needed to solve their own problems. Greater efforts are needed, therefore, to develop efficient methodologies for agrotechnology transfer from place to place and country to country.

This proposal presents a real possibility of making a contribution towards the resolution of the above problems by increasing the efficiency and effectiveness of agronomic research as well as utilization of the results in the outreach programs in the developing nations. It promises to help establish a new cost-effective mechanism for sharing agricultural information. The principal objective of the proposal is to establish a pilot activity (a network) comprising of existing national and international agricultural centers (about 20 in all) in the tropics and subtropics that will collaborate to demonstrate how agroproduction technology can be transferred among countries, institutions and the farmers. The intent of the activity is to validate the network approach for the transferrence of agrotechnology at the national, regional and worldwide levels which would lead to the establishment of geographically more extensive networks. The network will develop a systematiac transfer mechansim that centers around soil classification, land evaluation, crop requirements, site factors analysis and communication systems.

At the present time, the sharing of technology is hampered by our inability to predict with adequate certainity whether a new technology developed in one location will apply equally well in another location. Agricultural tecahnology, unlike industrial technology, is environmental specific, and its success depends on the physical, biological, and socio-economic conditions of the environment. If the developing countries with limited manpower and resources are to benefit from sharing of the technology, they must use standard parameters and a universal technical language to assess their own resources and environments. The Soil Taxonomy (U.S.) and the FAO land evaluation scheme contain the parameters for the transfer of environmentally sensitive agricultural technology, and the Benchmark Soils Project's (A.I.D. funded) results have shown that crop production and farming technology can be successfully transferred on the basis of these parameters.

The key components for the establishment of this prototype network already exist. A strong commitment to the use of Soil Taxonomy as the basis for international agrotechnology transfer has been made by FAO, the International Agriculture Research Centers, and the host countries of the Benchmark Soils Project -- Brazil, Philippines, Indonesia and Cameroon. U.S. Department of Agriculture - Soil Conservation Service through an AID funded "Soil Management Support Services" program provides the technical assistance needed to standardize soil survey and land use in LDCs. the University of Puerto Rico under the same program has helped in the organization of internaitonal committees to upgrade and extend Soil Taxonomy in tropical and subtropical regions.

The concept of this network proposal has been discussed and supported at international soils conferences and consulation at ICRISAT in 1978 and 1979, IRRI in 1979, Bonn in 1979 and FAO in 1980. We believe this project will catalyse operational networks for agrotechnology transfer in many nations and regions. When that occurs, we feel, this project would have achieved its objectives.

II Project Proposal

A. Introduction

Many people in this world today do not receive enough food, and the propspects for the furture seem depressing. If the present production and consumption trends continue, the developing countries will face by 1990 a deficit in staple food crops of 140 million tons, about 3 to 4 times the current deficit.

The need to produce more food from existing or new lands means more efficient use of soils. So too, does the larger need of economic development within which the production of food must take place. Roads, dams, canals, fertilizer plants, distribution centers and market towns must all be built, and all of these put demands upon the soil; and soils can be destroyed if not wisely used. Soil erosion, soil deterioration, deforestation, and watershed damage continue, and in some areas are accelerating. The loss to mankind is of serious concern.

Fortunately many soils are being used far below their potential. New technologies now exist or are being developed through agricultural research for wise and efficient use of these lands and for increasing agricultural production. But research costs are high and increased efforts are needed to make agricultural research more efficient. Many small deaveloping countries do not have the research resources needed to solve their own problems. Greater efforts are needed, therefore, to develop efficient methodologies for agrotechnology transfer from place to place and country to country.

This proposal presents a real possibility of making contribution towards the resolution of the above problems. IBSNAT is the acronym for a program whose aim is to assist the resource-poor countries of the tropics and subtropics to increase food production by means of appropriate and timely transfers of existing agrotechnology. It stands for an "International Benchmark Sites Nework for Agrotechnology Transfer". IBSNAT's mission was first articulated by a group of 20 prominent leaders of the international agricultural community in a meeting held October 1978 in Hyderabad, India. The meeting was co-sponsored by the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT), the Banchmark Soils Project (BSP), and the U.S. Agency for International Development (AID). The participants at the meeting consisted of the Director General of ICRISAT and the International Rice Research Institute (IRRI); two representatives of AID; the Director of Land and Water Division of FAO; a representative of the World Bank; the Director of Indonesia's Soil Research Institute; the Director of the Soils Bureau of the Philippines; a representative of the Philippines Council for Agriculture and Resources Research; the Director of Agricultural Research of Sri Lanka; two representatives of the Soil Conservation Service of the U.S. Department of Agriculture; the Professor of Soil Science from the University of Utrecht in the Netherlands, and seven scientists and administrators from Cornell University and the Universities of Puerto Rico and Hawaii, representing the Consortium of Soils of the Tropics (CST) and the Benchmark Soils Project (BSP).

At the meeting, the participants identified the need to utilize the immense quantity of agricultural innovations currently being generated by the National and International Agricultural Research Centers to avert food shortages in the resource-poor regions of the tropics. They further identified the slow pace of agrotechnology transfer from research centers to farmers' fields as a major constraint which needed lessening through application of the principles and concepts of the Benchmark Soils project. In the recent past, this recommendation has been reiterated on four separate occasions: first at Los Banos in June 1979 by the Director General of IRRI in his closing address before the participants of an international conference on "Priorities for Alleviating Soil-Related Constraints to Food Production in the Tropics", again in September 1979 by the Director General of ICRISAT in his opening address for an international symposium on "Development of Transfer of Technology for Rainfed Agriculture and the SAT Farmer", once more in the fall of 1979 by a committee of agricultural scientists at the Bonn Conference on Agricultural Development; and most recently by a FAO/BSP Panel Consultation on the "Strategy for Land Evaluation and Agrotechnology Transfer in the Tropics" held in Rome in March 1980.

The project basis is derived from a fundamental premise that empirically observed relationships between soils and climate when classified properly and adequately (as under U.S. Soil Taxonomy system) not only stratify soil population but also that of the agroenvironments wherein they are found. Further, that these stratifications are accomplished in such a way that it can be shown that crops will behave/perform rather similarly on all "like" soil classes, regardless of their geographic location. This premise that soil classification provides a suitable vehicle for the extrapolation of soil-related experience has been held for a long time. Nonetheless, this basic assumption had never been subjected to the scrutiny of field experimentation, neither in tropical nor tropical areas.

AID supported "Benchmark Soils" Project, contracted with the Universities of Hawaii and Puerto Rico, that has field studies in Brazil, Philippines, Indonesia, and Cameroon, in addition to at the two Universities has tested this hypotheisis. While the studies are not complete, the results of a total of 78 transfer experiments conducted by the project clearly supports the general validity of transfer hypothesis. The general shape of the response surface is similar among members of the same soil family, and the general trends are predictable across all sites of each soil family netowrk. (Beinroth et. al, 1980)

The application of Soil Taxonomy's concepts and principles hold great promise for increasing food production in the regions of the tropics and subtropics where food shortage is a way of life. But owing to its newness, Soil Taxonomy's impact on world agriculture is only now beginning to show. For the first time there exists a common international language to assess and inventory land resources to enable new germplasm and technology generated by distant research centers to be matched to similar lands elsewhere in a rational way and with minimum of trial and error.

Beinroth, F. H. , et. al. 1980 "Agrotechnology Transfer in the Tropics Based on Soil Taxonomy", Advances in Agronomy, Vol. 33, 1980, 303-339.

B. Justification

In 1975, the Soil Survey Staff of the U.S. Department of Agriculture released a major document entitled "Soil Taxonomy": A Basic System of Soil Classification for Making and Interpreting Soil Surveys." Soil Taxonomy's forward contains the following statement:

> "Soon after World War II, efforts were launched in many countries to improve agricultural production. Research was stimulated, and soil survey efforts were extended to many new areas.
>
> With new research data and broader experience we came to realize that our soil classification was inadequate in precision for the demands being made of it. In particular we recognized that we needed more precise categories in order to make more quantitative and reliabe interpretation for our soil surveys. Our foreign colleagues agreed with us, and so the decision was made to start work in a new classification system in 1951. We realized that to be successful this effort would require the knowledge and experience of soil scientists not only in the United States but also in all parts of the world."

A year after release of Soil Taxonomy, FAO issued a technical report titled: "A Framework of Land Evaluation", which includes the following statement in its preface:

> By 1979 many countries had developed their own systems of land evaluation. This made exchange of information difficult, and there was a clear need for international discussion to acheive some form of standardization..."

The field experiments conducted by the AID sponsored Benchmark Soils Project of the Universitis of Hawaii and Puerto Rico show clearly that agroproduction technology can be successfully transferred to widely separated parts of the tropics on the basis of the soil family category described in Soil Taxonomy. The pieces of the agrotechnology transfer puzzle were beginning to fall into place. Soil Taxonomy provided the means for stratifying the world's land into precise agroproduction niches; FAO's land evaluation scheme outlined the procedures to match germplasm and agrotechnology to Soil Taxonomy's agroproduction niches; and the Benchmark Soils Project demonstrated the feasibility of transferring agroproduction technology among similar agroproduction niches (soil families). But the fact remains that the immense quantity of agroproduction technology that is being generated at the National and International Agricultural Research Centers awaits delivery to the regions of the world for which it was designed.

There is no shortage of agrotechnology or land to feed the world. What is lacking is the means to transfer appropriate technology to each agroecological zone in a timely, cost-effective, and socially acceptable manner. If the means to do this is lacking, the components for doing so already exist.

The Soil Conservation Service (SCS) of the U.S. Department of Agriculture recently established an Office of International Soil Correlation to provide technial support to standardize soil surveys in the developing countries. This service is provided through an AID funded "Soil Management Support Services Program." The University of Puerto Rico, with AID support and SCS approval, has initiated the organization of international committees to upgrade and extend Soil Taxonomy in tropical and subtropical countries. These committees achieve their objectives by co-sponsoring workshops with developing countries. The first workshop was held in 1977 in South America; a second was held in 1978 in Southeast Asia; a third in April 1980 in the Middle East and a fourth in June 1981 in Africa. The International Soil Science Society invited the Benchmark Soils Project (BSP) to a meeting in New Zealand in Februray 1981 to explain its operational procedures and has expressed a desire to use the BSP concept in international communication and research. A strong commitment to use Soil Taxonomy as the basis for international agrotechnology transfer has been made by FAO, the International Agricultural Research Centers, and the four host countries of the Benchmark Soils Project. FAO hosted a meeting in March 1980 of representatives from developing countries, the Soil Conservation Service of the U.S. Department of Agriculture, the World Bank, the International Agricultural Research Centers, United States and other developed countries universities and institutes, and the Benchmark Soils Porject, to link its land evaluation scheme to the principles and concepts of the Benchmark Soils Project.

But the strongest expression of commitment to agroproduction technology transfer comes from the developing countries that have participated in the Benchmark Soils Project. Brazil, Indonesia, and the Philippines have indicated a willingness to invest their own manpower and resources to collect, store, interpret, and share soil and crop performance data with other nations in the tropics. The emphasis on sharing data with sister countries appeals to the developing countries as it enables them to participate as equal partners in international development programs.

At the present moment, the sharing of teachnology is hampered by our inability to predict with adequate certainty whether a new technology developed in one location will apply equally well in another location. Agricultural technology, unlike industrial technology, is environment-specific, and its success depends on the physical, biological, and and socio-economic conditions of the environment. If the developing countries with limited manpower and resources are to benefit from the sharing of technology, they must use the same parameters to assess the envirimental sensitivity of the agrotechnology. Soil Taxonomy and the FAO land evalution scheme contain the parameters for the transfer of environmentally sensitive technology, and the Benchmark Soils Project's results demonstrate that agrotechnology can be successfully transferred on the basis of these parameters. For the first time, the components for the successful transfer of agrotechnology exist. The purpose of IBSNAT is to braing these components together to facilitate the steady flow of agrotechnology from research centers to farmer fields in a timely and acceptable manner.

AID is much concerned with agricultural development in LDCs and it recognizes that soils and soil classification are of central importance in this context. Over the years a mutually beneficial interaction has emerged between academia ((U.S. and others) and AID. These are comprised in the Consortium on Soils of the Tropics, that received 211d grants to strengthen their capabilities about tropical regions; research contracts with four U.S. Universities to develop technology and information transfer methodology; and numerous small activities involving developed and developing nations. Among the more recent occurances are: the development of a collaborative arrangement with USDA-SCS to provide technical assistance in soil management to LDCs; interest in the subject area of soil classification on the part of commodity (crop) oriented International Agricultural Research Centers; interest on the part of developed and developing nations to formulate a worldwide language in soil classification for exchange of crop management experience, and title XII activities (CRSP) for soil management. AID's programming in many LDCs now include projects on soil survey/soil classification and management of problem soils (deforestation/eroded soils). Thus, AID involvement in a commitment to the study of tropical soils and their classification is very substantial and rapidly increasing, both in terms of scope and funds. Relationship of IBSNAT with other soil programs is shown in Figure 1. Next to water management (rainfed and irrigated) soil management is the most critical area affecting food production. In fact, management of water and soils go hand in hand and together substantially affect LDC agricultural development.

C. Goal

The goal of the proposed International Benchmark Sites Network for Agrotechnology Transfer (IBSNAT) is to expand on a cost-effective basis the georgraphic application of agricultural research findings and thereby enhance resource productivity in the tropics and subtropics through the widespread introduction and adaptation of proven crop yield increasing technology and management practices by means of viable system of agrotechnology transference.

D. Purpose

The purpose fo IBSNAT is to validate the network approach for the transference of agrotechnology at the regional (multi-country) and international levels by: establishing a prototype network comprised of existing national and international research centers servicing the tropics and subtropic regions of the world; developing a separate transfer mechanism for facilitating such transference; and, demonstrating that such an approach is workable, through the conduct of uniform and internationally-coordinated studies at these centers to verify that agrotechnology can be successfully transferred via such a network approach.

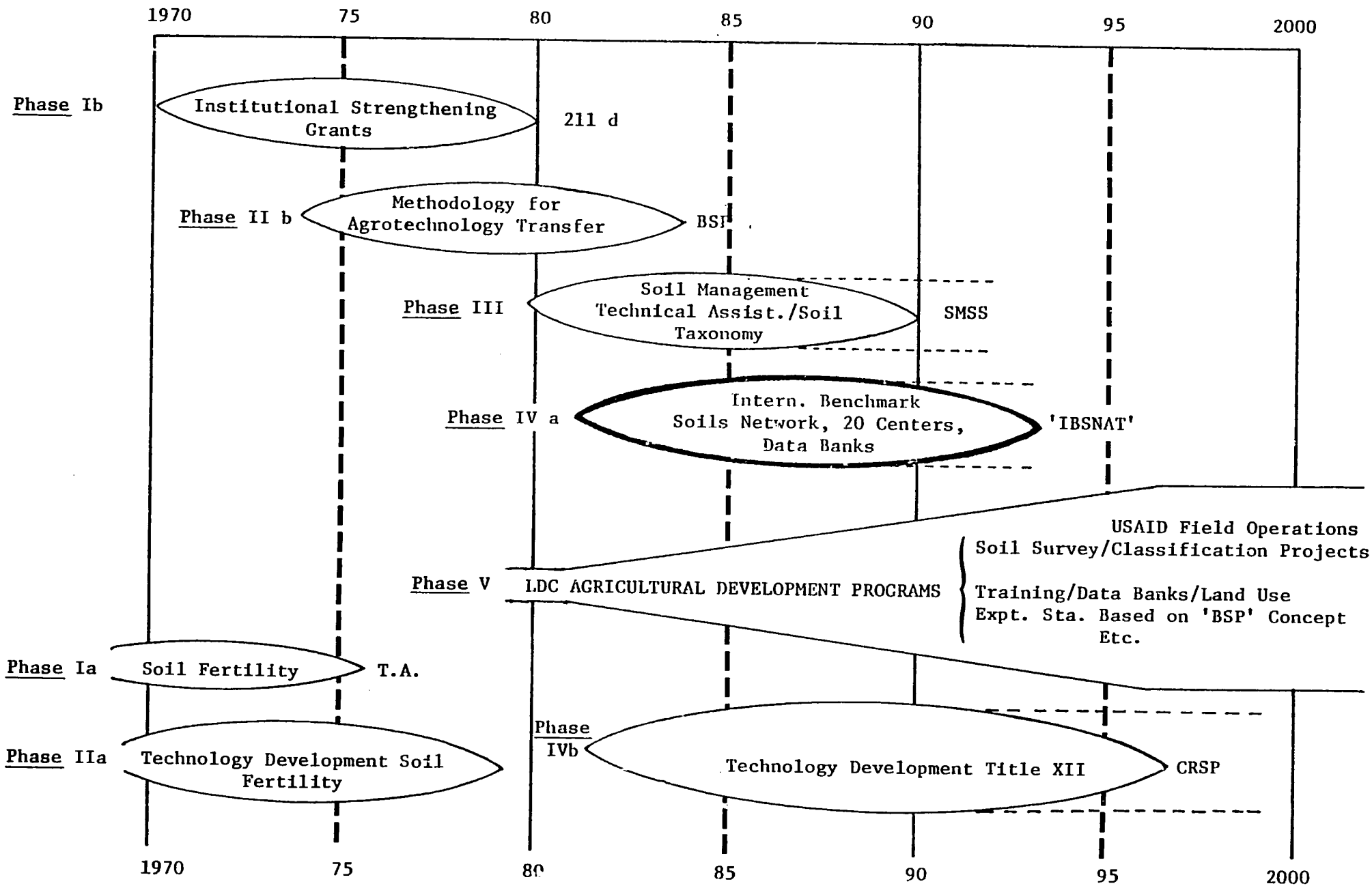


Figure 1. Relationship of International Benchmark Soils Network 'IBSNAT' with Other AID Soils Programs
(For brief description on phases see next page)

BRIEF DESCRIPTION FOR FIGURE 1

Relationship of IBSNAT with other AID Soils Programs

SOILS PROGRAM	INSTITUTION(S)	STATUS
Phase I.a Extension of Existing Knowledge - Soil Fertility Testing (L.A.).	North Carolina State U.	*C
Phase I.b Building U.S. Capability for Tropics; 211-d, Institutions Strengthening Grants.	North Carolina State U. Cornell University U. of Puerto Rico Prairie View A&M U. U. of Hawaii	C C C C C
Phase II.a Technology Development Studies	North Carolina State U. Cornell University	C C
Phase II.b Methodology of Agrotechnology Transference. (Benchmark Soils Project - BSP)	U. of Puerto Rico U. of Hawaii	**O, EOP '81 O, EOP '83
Phase III. Soil Management Support Services. Improvement of Soil Taxonomy Plus Technical Assistance on Land Use. (A follow-up to II.b)	USDA/SCS	O
Phase IV.a International Benchmark Sites Network for Agrotechnology Transfer. (Follow-up to II.b and III)	Cooperative Agreement (U. of Hawaii)	Proposed
Phase IV.b Research and Technology Development: CRSP under Title XII.	Consortium	Starting FY '82
Phase V. LDC Development Programs -- Field Operations: Soil Survey/Soil Classification, Training, Data Banks, Resources Inventory, Land-use Planning.	Private Contractors U.S. Insts./Agencies	Gradual Increase

*C - COMPLETED
**O - ONGOING
EOP - END OF PROJECT

E. Objectives

The principal objectives of IBSNAT are:

1. Consolidate a nucleus of national and international agricultural research centers in a prototype network for agrotechnology transfer in the tropics and subtropics.

2. Design a methodology to establish the knowledge base required for effective transfers of agrotechnology.

3. Develop a communication system for the international exchange and international exchange and diffusion of agroproduction technology.

4. Create international awareness of IBSNAT and promote the assimilation of its concepts and rationales.

5. Validate the network approach for agrotechnology transfer.

6. Motivate LDCs, and regional groups of LDCs, to establish national and regional networks for agrotechnology transfer.

III Project Background

A. General Aspects of Agrotechnology Transfer

Hundreds of agricultural experiment stations around the world are conducting agronomic research on the implicit assumptions tht the results of this research can be applied beyond the confines of its place of orgin. Transfer of experience has been reasonably successful in cases where the factors characterizing the agroproduction environmnet at the research station were largely similar to those encountered at the recipient site. More often than not, however, the variation in these factors is such that transfers have only been marginally successful and there are usually wide gaps in the yields obtained at research stations and on farmers' fields. Distressingly, this appears to be particularly true in many LDCs.

Among the possible reasons for the relative ineffectiveness of extrapolating agriculture research may be the lack of a suitable transfer methodology, poor extension services, the site specificity of agronomic research, or insufficient knowledge of the environmental and socioeconomic conditions at the farm. In many cases it is probably a combination of these conditions which causes the predicament. The central tenant of IBSNAT is that these problems can be overcome and that systematic transfers of agrotechnology from research centers to farmers' field is possible. Key elements of the approach to be taken by the IBSNAT are soil classification, land evaluation and site factor analysis. Sound knowledge of the cause and effect relationships between soil and environmental conditions and management practices on the one hand, and crop requirements and crop performance on the other hand is considered an imperative

prerequisite for the successful transfer of experience. Transfers of both the mechanical and biological components of agricultural teachnology can occur through (1) material transfers, (2) design and knowledge transfers, and (3) capacity transfers.

The proposed IBSNAT would primarily be concerned with knowledge transfers which should be conducive to the development of locally applicable agroproduction technology with a minimum of on-site research. Transferable agrotechnology would mainly involve principles and methodologies of soil management and crop production such as stratagems for phosphorus fertilzation in soils with high P fixation capacity, methods of irrigation relative to crop phenology, correction of subsoil acidity, crop species selection, etc. This experience is derived from empirical experimentation and induction from the knowledge of the interactions among soil characteristics, climatic conditions, crop requirements, and management practices. It should be noted that specific recommendations for a particular kind of land use on a given tract of land can usually not be directly transferred to another place.

In this context, soil classification mainly facilates "horizontal transfer", that is, the transfer of experience from experiment station to experiment station at a certain technology level. Since this information is not necessarily directly applicable to farm situations, it must be adapted to conform to the socio-economic environment of the local farmer. The process of adaptation and extension to the farm level may be termed "vertical transfer" and it is a critical element in the international transfer of agrotechnology.

Knowledge transfer can be made at any category level of taxonomic system, with increasingly precise statements possible at lower levels. Since prediction and transfers of crop performance and soil management could be refined if they were based on information more specific than that contained in soil family taxa, an argument could be made in facor of using the lowest category of Soil Taxonomy, the soil series, as the basis for agrotechnology transfer. In addition, one could also use phases to indicate soil characteristics that are not considered in taxa definitions but are important to a specific land use. Although the most precise predictions can be made for phases of soil series, it would be clearly unrealistic to use this category in the process of international agrotechnology transfers. The lowest category level of Soil Taxonomy that can be universally applied in a uniform and consistent manner is that of the soil family. Families are defined primarily to provide groupings with restricted ranges in particle-size distribution in horizon of major biological activity below plow depth, mineralogy of these horizons, temperature regime, thickness of soil penetrable by roots, and a few other properties to provide additional homogeneity in some families. Eleven partucke-size classes are commonly used; however; 40 additional contracting particle-size combinations are recognized to identify changes in pore-size distributions that seriously affect movement and retention of water. Seventeen classes of mineralogy are recognized to assist in evaluating the presence of toxic materials and degree of weathering that

influence chemical or physical behavior. Eight classes of soil temperature are recognized in the family category, providing such information if not stated or implied at higher categorical levels for a particular soil.

B. The Benchmark Soils Project Experience

Under the Benchmark Soils Project (BSP), contracts AID/ta-C-1108 and AID/ta-C-1158, the Universities of Hawaii and Puerto Rico are currently testing hypothesis of agroproduction technology transfer in the tropics on the basis of soil families as defined in Soil Taxonomy. The strategy of the BSP may be characterized as a test of "analogue transfers." Soils classified into the same families are subjected to the same management practices and yields are compared. Although the project is still accumulating the data needed for the statistical test of the postulated hypothesis, several things are already evident: (1) soil families indeed stratify the agroenvironment, (2) soil families also stratify the population of soils with respect to soil behavior, and (3) soil families allow general predictions of soil potential and problems and management response.

Soil classification, by intent and design incorporates most of the information on soil properties that influence crop performance. Transient surface soil conditions on the other hand are not reflected in the taxonomic name of a soil family as they change with the level and type of management. Also, while the general climate is indicated by soil families, the weather conditions during a given growing season are not.

The BSP has thus defined the role of soil classification (Soil Taxonomy) in the transfer process and reaffirmed the value of soil survey.

C. The Transfer Model (See Next Page)

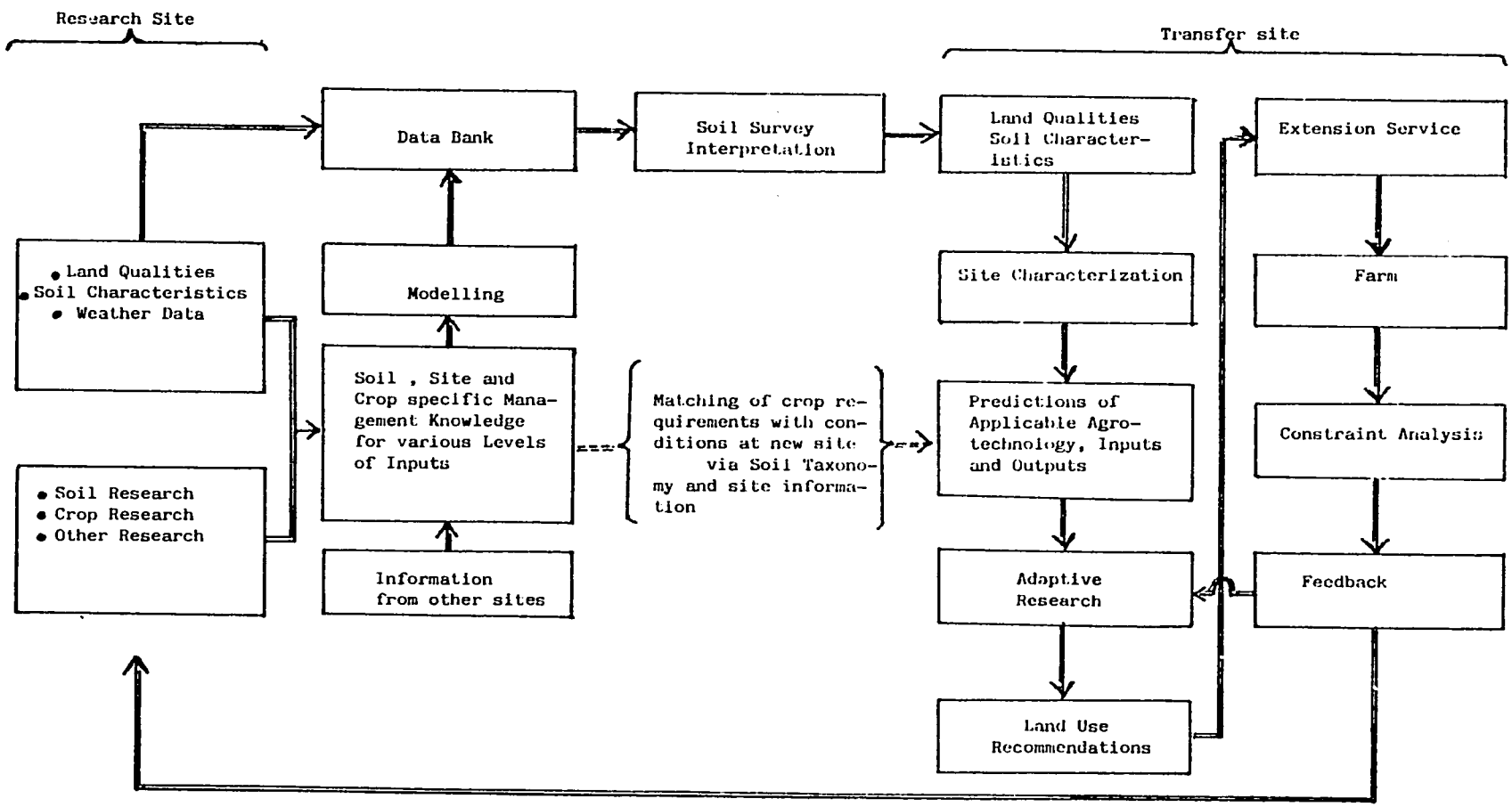
1. Maximum crop yields do not result from the cumulative effect of individual site characteristics and management practices but from the interaction between these characteristics and practices. For maximum crop production, optimum conditions must exist with respect to at least five things: (1) balanced supply of plant nutrients, (2) rooting zone with adequate amounts of both water and oxygen, (3) solar energy, (4) crop varieties with the genetic potential to make effective use of environmental and management inputs, and (5) crop protection from insects, diseases, animals, weeds, and other hazards.

If crop production technology is to be transferred scientifically and systematically, quanitative knowledge of the conditions that have lead to improved yields must be obtained. Once it is known what has been done to the soil and for what reasons, the knowledge can be applied widely and to a variety of soils.

At the research site where transferable agrotechnology is being generated, the soil and climatic conditions must be established. This involves resource surveys, weather data collection, analytical soil characterization, soil classification, etc. Examples of such land

International Benchmark Sites Network
for Agrotechnology Transfer "IBSNAT"

GENERAL MODEL FOR TRANSFERENCE



characteristics that can be measured or estimated are slope angle, rainfall, soil texture, available water capacity, and biomass of the vegetation. These land characteristics are then synthesized into so-called land qualities. As defined by FAO, a land quality is a complex attribute of land which acts in a manner distinct from the actions of other land use. Examples of land qualities related to crop production are moisture availability, soil toxicity, erosion resistance nutritient availability, and solar energy supply. There are a very large number of land qualities, but only those relevant to the land use under consideration need be determined. A land quality is important to a given type of land use if it influences either the level of inputs required or the magnitude of benefits obtained, or both. For example, capacity of the soil to retain fertilizer is a land qulaity relevant to most forms of agriculture and one that influences both fertilizer input and crop yield.

Subsequently it must be determined what a specific crop requires in terms of environmental and management inputs at which time of its growth cycle, and the cause and effect relationships must be established. Matching these crop requirements with the land qualities and land characteristics will indicate the management inputs needed.

2. Role of Soil Classification in the Transfer Process

Because crop performance is co-determined by soil properties and soil properties are reflected in the taxonomic classification of the soil, soil classification defines the sphere of applicability of the crop production technology developed at the research site. Also, because in the proposed medel crop performance and soil management is related to soil and land characteristics rather than to a specific taxonomic group, this knowledge can be extrapolated to all classes of soils that have the combination of characteristics critical to a given land use. In the process of agrotechnology transfer, soil classifiction is therefore a key element as it provides, in conjuction with soil maps, the vehicle for the wide geographical extension of knowledge.

Of the major systems of soil classification currently in use, Soil Taxonomy is particularly suited for use in agrotechnology transfer because it is the most detailed and also stratifies the agroenvironment. Moreover, as a result of AID programs this system is emerging as the defacto international system of soil classification and many LDCs have started using it. Not unexpectedly, the wider application of Soil Taxonomy in the lower latitudes has shown certain inadequacies of some definitions of taxa and criteria relative to tropical and subtropical soils. Under the AID supported Soil Management Support Service Program (PASA #AG/DSB-1129-5-79), the Soil Conservation Service of the USDA is currently in the process of correcting these deficiencies. Several international committees are now working on various aspects of Soil Taxonomy that need improvement. It will, however, require some time to make and publish the amendments. Moreover, the improvement of Soil Taxonomy is a continuing process that will not be concluded in a few years.

It would therefore clearly be unreasonable to await the publication of a revised edition of Soil Taxonomy before considering the proposed project. Rather, both activity should go hand-in-hand, especially as feedback from the proposed project is likely to influence the re-definition of taxa. The Soil Management Support Services Program will therefore continue to be a companion project of IBSNAT.

3. Data Required at the Recipient Site

Resource inventories must be conducted at the recipient site so that the land qualities important to the crop for which production technology is to be transferred can be determined. The land qualities must than be matched with the known requirement of the crop. Existing local experience and the management practices established through research elsewhere must then be combined to determine the kinds and levels of management inputs needed at the new location. This will result in a crop production technology package that is based largely on experience gained elsewhere but incorporates indigenous knowledge and is adjusted to the particular local conditions.

During the process of collection and evaluation of data, an attempt will be made to identify a minimum data set which would account for most (say 75-80%) of variability in productivity. Further, the benefits of each additional factor would be evaluated in reference to how much that factor contributes (say 1%, 2%, 5%, 10% or whatever portion) to the system. Thus, an incomplete, but workable, data set would permit decision-makers to reach nore useful conclusions on a more rational basis as well as to decide whether to invest additional resources to obtain more precise data.

4. Vertical Transfer

The resulting crop production technology for specified conditions of soil, climate and management must now be transposed into a set of recommendations commensurate with local farm situations. Extension agents will deliver this package to farmers on whose fields the improved technology is to be implemented. On-farm yields will likely be lower than those theoretically achievable with the specified inputs.

In an effort to examine the factors leading to the apparently low productivity of improved technology in farmer environments, a "gap analysis" will have to be conducted. Socio-economic conditions are extremely important to vertical transfers. This is implied in the gap analysis. Theoretical models for such studies are available and have been tested in the field, notably by the IARCs. The constraint methodology involves considerable but comparatively simple studies that should be collaborative between agronomists, economists, soil scientists, agroclimatologists, sociologists and statisticians. The issue is to scrutinize mainly those factors which the farmer can realistically control and thus adapt.

The results of this gap analysis should identify the reasons for the yield discripancies and also indicate how the available technology can best be matched with the farmers' technical know-how and resource base. The findings should also provide valuable feedback for reseachers and government agencies involved in rural development and eventually lead to higher on-farm yields.

IV Project Design

In order to accomplish the stated purpose, IBSNAT will orchestrate a concerted collaborative effort designed to achieve the following six major elements.

A. Network Development

We believe IBSNAT will comprise of 15 to 20 centers but the exact number and specific centers will be decided by an international committee that will be convened at a workshop. Most likely these centers will be the existing national and international agricultural research centers located in the tropics and subtropics and will typify the major agroecological environments and represent important soil resources of the tropics and subtropics.

It is expected that the crop-oriented IARCs, like CIAT (for description of acronyms see page 3), CIP, CIMMYT, ICARDA, ICRISAT, IITA. IRRI, etc., will form part of the network. Among the LDCs that have informally expressed interest in participation are Brazil, Malaysia, Morroco, the Philippines, Indonesia, Sudan and Thailand. Regional agricultural research organizations that may wish to collaborate include ACSAD, IICA and SEARCA. In addition, other international and national institutions, such as ASEAN, and ORSTOM, and bilateral technical assistance projects will be approached for collaboration. Collaborative agreements will be negotiated between the contractor and each participating research center. These agreements will specify the scope and nature of the commitments on the part of the contractor and the collaborating institution. It is assumed that the cost of most of the day to day activities will be borne by the respective collaborating institution. The contractor will provide such technical assistance and specialized equipment that is considered critical to the success of the field studies.

Prior to the initiation of the field work, a technical meeting will be help at which each of the participating centers and institutions will be represented. The objective of this meeting is to fully inform the participants of the purpose and expectations of IBSNAT, to discuss the technical and operational aspects, to establish personal contacts and institutional linkages, and to negotiate memoranda of agreement.

AID supported programs such as SMSS, the Soil Management CRSP, CRIES, BSP and BNF will be considered for close collaboration by the project.

B. Relating Crop Requirements to Climate and Soil Characteristics

An international and multidisciplinary committee comprising soil scientists, agronomists, agroclimatologists, plant physiologists, economists and statisticians will be established and convened at a design workshop to determine the program strategy and methodology to be implemented at the sites of the network. The data needed to establish the relationships will be generated by the various centers under greatly different but well-defined conditions. The studies will address priority needs of tropical and subtropical countries and focus primarily on establishing (i) the quantitative relationships between land qualities, soil management, crop requirements and performance, (ii) the relationships between land qualities and parameters used in soil classification, and (iii) the long-term effect of sustained crop performance on land degradation and production capacity. Crops to be used in this work might include maize, rice, wheat, sorghum and millet, potatoes, cassava, groundnuts, beans, cowpeas, and pigeon peas.

More specifically, the studies will comprise:

a. the complete characterization of the environmental conditions at the participating centers, including soil mapping, soil classification in all major taxonomic systems, and continuous monitoring of weather;

b. state-of-the-art studies on the soil, environmental and management conditions required by the selectaed crops to achieve high yields and a validation of the findings of these studies by scrutinizing the records of the collaborating centers;

c. the determination of crop requirements, through field experiments, to fill the knowledge gaps identified by the state-of-the-art studies;

d. the development of check lists of the appropriate parameters to be measured for soil, plant and climate, and a standard methodology for their determination;

e. modeling and interpretation of the relationships between soil characteristics, land qualities, soil taxa, and crop performance conducive to effective transfers of agrotechnology.

Quantitative knowledge of what a specific crop requires will be matched with the characteristics of the land where the crop is grown. Through soil classification this agroproduction knowledge can then be transferred to soils anywhere that have the combination of land characteristics critical to the specific crop.

Two permanent working groups will be established to assist IBSNAT in the analysis and interpretation of the field data. These groups will be concerned with crop modeling and land evaluation, respectively. Leading individuals and institutions from all over the world will be asked to contribute to these efforts.

C. Data Bank Development

IBSNAT will establish a central computerized data bank which will store all of the data generated in the network. This bank will have three basic files: first, complete soil and land characterization data; second, data on crop performance under stated conditions of management for specific soil taxa, and third, weather data. These data will be made available to the working groups on crop modeling and land evaluation.

The central data bank will also store the analyzed data and make them accessible to various users.

A network of computer-compatible data banks located at the participating centers may store the data generated at the respective center and relevant information from other IBSNAT centers. These data banks could serve national and regional needs.

IBSNAT will further work on the development of a systematic methodology whereby soil and land characteristics and crop requirements can be matched by computers to predict management needs and crop performance under high and low levels of inputs. A workshop will be held to standardize computer methodology.

D. Training Workshops

At least three workshops on "Networking for Agrotechnology Transfer" will be held, one each in Africa, Latin America and Southeast Asia. The workshops will have the objectives of creating awareness and understanding of he IBSNAT approach and stimulating the national and regional utilization of the principles and concepts of IBSNAT for agricultural development.

Training sessions for the establishment of national networks will be conducted in countries requesting assistance in this matter. The topics addressed in these training sessions will include the selection of benchmark sites, research design, data banks, and mechanisms for the diffusion of agroproduction technology to the farmer.

Training in soil survey, soil taxonomy, soil survey interpretation, and land evaluation is critical to a successful agrotechnology transfer program in a given country. Graduate training in these subject matter areas, specifically designed for students from LDCs, will be arranged (not paid by this project) at the UNESCO-sponsored International Training Centre for Post-Graduate Soil Scientists of the University of Ghent, Belgium; the University of Wageningen, The Netherlands; by the Soil Conservation Service of the USDA; and at other institutions in the U.S. and abroad.

IBSNAT will provide technical assistance in the form of short-term (less than 30 days) consultation on problem identification, projct design and needs assessments related to agrotechnology transfer to LDCs. LDCs may make such requests through the USAID Mission. In addition to consulting services, IBSNAT will, as a follow-up to these consultations and requests from national governments, accept participants for workshops and University training. IBSNAT will respond quickly to requests for reports, articles and training aids related to agrotechnology transfers.

IBSNAT will respond to request for technical assistance by sending the best available individual from the expert panel and from the collaborating NARCs and IARCs. A major aim of the technical assistance effort is to enlarge the number of self-supporting, participating NARCs in the network.

E. Information Dissemination

Transfer of agrotechnology is basically the communication of knowledge and experience. An efficient and equitable system of information exchange is, therefore, a key element of IBSNAT. The main areas of communication of concern to IBSNAT will be: (1) information exchange within the network, (2) awareness of IBSNAT and its concepts by people and institutions outside the network, and (3) diffusion of research results to activate utilization.

The flow of relevant information will be established and maintained by means of data banks, telecommunications, workshops and conferences, mass media, newsletter, progress reports, leaflets, brochures, technical papers, workshop and conference proceedings, and audio-visual materials.

F. Case Study in a Developing Country

As the primary purpose of IBSNAT is to set up a prototype network for agrotechnology transfer and to organize the knowledge base and infrastructure conducive to effective transfers. The actual transfer of agrotechnology on a broad scale is beyond the scope of the project. However, IBSNAT plans to conduct one or two case studies to demonstrate the viability of the transfer approach. The study will include the transfer across regions and the diffusion of crop production technology to farmers. Such a study may be conducted in Southeast Asia or Latin America with the Philippines or Peru as the recipient countries.

V. Scope-of-Work

IBSNAT will conduct the activities listed below in order to achieve the stated project outputs. A general time frame for these activities is provided in Figure 2. (See Next Page)

Output	Activity
YEAR 1	
Administration	1. Develop organizational frame work of IBSNAT.
	2. Recruit personnel and assign responsibilities
	3. Appoint 5 member Advisory Board
	4. Hold Advisory Board meeting
	5. Prepare annual report
Output A: Network Establishment	
a. Site Identification	1. Organize site selection committee
	2. Develop criteria for selecting benchmark sites and collaborating institutions
	3. Hold site selection workshop
	4. Identify potential sites
b. Negotiations with Collaborators	1. Correspond with potential collaborators
	2. Travel to 6-8 IARCs and 10-15 national centers
	3. Negotiate memoranda of intent

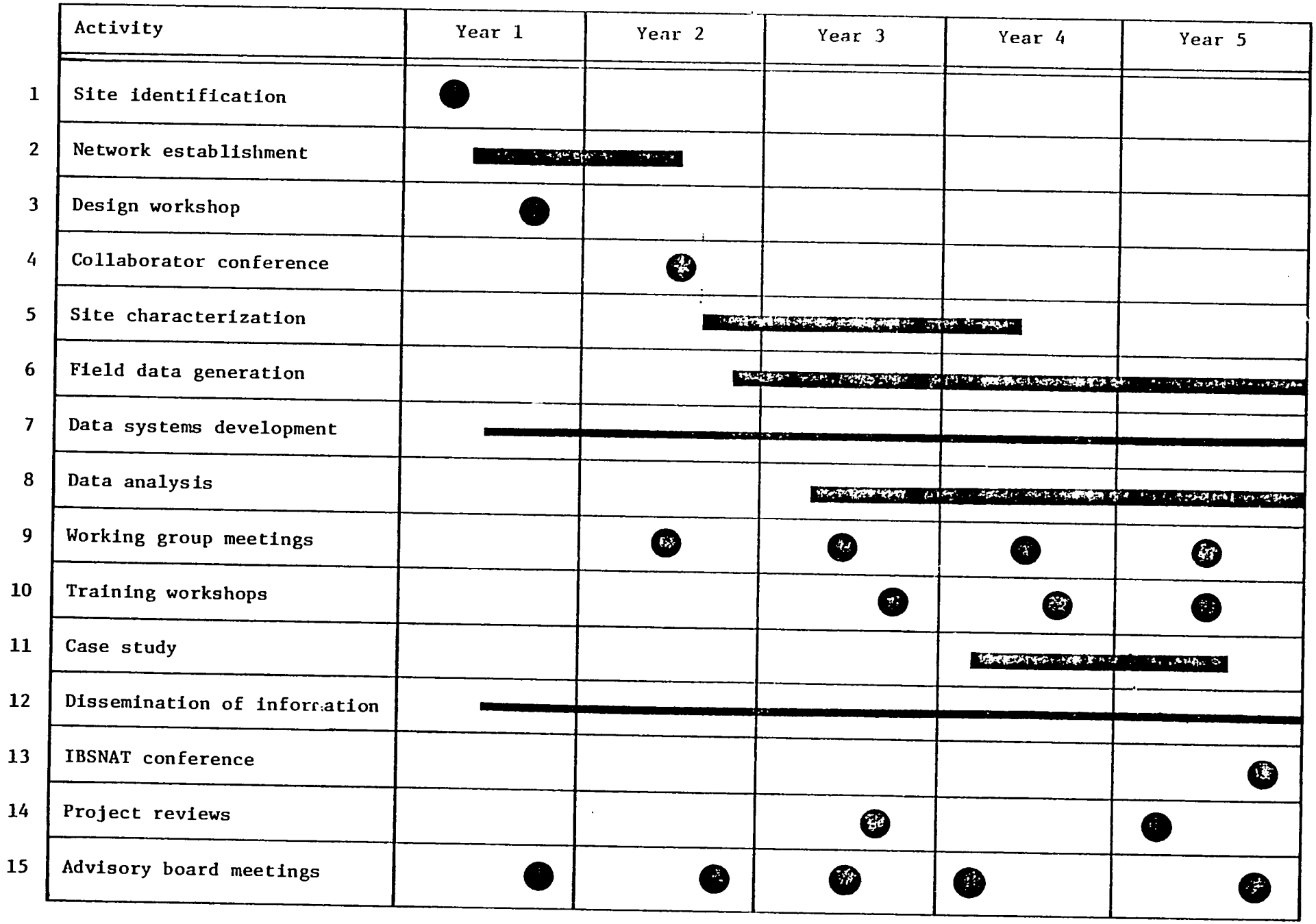


Figure 2. Schedule of Major Activities

	4. Initiate organization of IBSNAT collaborator conference
<u>Output B: Data Generation and Analysis</u>	
a. Program design	1. Identify experts knowledgeable in crop modeling, land evaluation, agrometeorology, soil taxonomy, soil survey interpretation, etc.
	2. Correspond with experts
	3. Establish expert panel
	4. Organize and hold design workshop
	5. Finalize program design
b. General agronomy	1. Initiate SOTA studies on crop requirements
<u>Output C: Data Bank Network</u>	
a. Data Management System	1. Conduct SOTA study
	2. Develop workplan for data storage and retrieval system
<u>Output E: Communication</u>	1. Develop IBSNAT brochure and background reference
<u>YEAR 2</u>	
Administration	1. Organize and hold Advisory Board meetings
	2. Prepare annual report
<u>Output A: Network Establishment</u>	
a. Consolidation of network	1. Continue travel to IARCs and national centers, and negotiation of memoranda of intent

	2. Organize and hold ISBNAT Collaborator Conference
	3. Negotiate memoranda of agreement with collaborating centers
	4. Finalize IBSNAT
b. Program design	1. Publish and distribute proceedings of program and design workshop
c. Site characterization	1. Negotiate collaborative agreement with USDA-SCS to characterize sites
	2. Initiate soil surveys of centers
	3. Conduct soil characterization analysis at SCS laboratory
	4. Classify soils according to Soil Taxonomy, FAO-UNESCO legend, French System and national systems used at local sites
<u>Output B. Data Generation and Analysis</u>	
a. Site preparation (collaborators)	1. Select experimental plots
	2. Install weather recording instruments as necessary
	3. Install irrigation equipment, if needed
	4. Analyze soil for plant nutrients and toxicities
	5. Assess site for plant disease hazards
b. Data analysis and interpretation	1. Establish technical working groups for: i. Crop Modeling ii. Land evaluation

	2. Organize and hold first annual meeting of the working group
c. Agronomic experimentation (collaborators)	1. Install first experiments
	2. Monitor experiments and record phenological data
	3. Record weather data
d. General agronomy	1. Continue SOTA studies on crop requirements
<u>Output C: Data Bank Network</u>	
a. Data Management System	1. Develop storage and retrieval system
<u>Output D: Training in Network</u>	1. Develop general format and structure for training workshops
<u>Output E: Communication</u>	1. Develop system of information exchange
<u>YEAR 3</u>	
Administration	1. Organize and conduct first project review in collaboration with AID
	2. Prepare annual report
<u>Output A: Network Establishment</u>	
a. site characterization	1. Continue soil survey and classification of benchmark sites as in Year 2
<u>Output B: Data Generation and Analysis</u>	
a. Agronomic experimentation (collaborators)	1. continue monitoring of experiments and data collection
	2. Harvest first set of experiments

	3. Analyze soil and plant materials
	4. Install new set of experiments
	5. Manage and monitor experiments
	6. Continue collection of weather data
	7. Harvest second set of experiments
	8. Analyze soil and plant materials
	9. Compile and organize data from all sites for further study by technical working groups
b. Data analysis and interpretation	1. Organize and hold second annual meeting of working groups
c. General agronomy	1. Complete and publish SOTA studies on crop requirements
<u>Output C: Data Bank Network</u>	
a. Data Management System	1. Continue development of data bank
<u>Output D: Training in Networking</u>	1. Organize and hold 1-week workshop in Southeast Asia
<u>Output E: Communications</u>	1. Refine system of information exchange
<u>YEAR 4</u>	
Administration	1. Organize and hold Advisory Board meeting
	2. Prepare annual report

Output A: Network Establishment

a. Site characterization	1. Complete soil survey and classification of centers
	2. Prepare publicaion on the sites of IBSNAT

Output B: Data Generation and Analysis

a. Agronomic experimentation	1. Continue field experimentation and data collection as in Year 3
b. Data analysis and interpretation	1. Organize and hold third annual meeting of technical working groups
	2. Develop first approximation of crop models

Output C: Data Bank Network

a. Data Management System	1. Refine storage and retrieval system
	2. Enter data in bank and retrieve for distribution and analysis

Output D: Training in Network

a. Workshop	1. Organize and hold 1 week workshop in Latin America
b. Technical assistance in networking	1. Assist and advise LDCs in design of national networks

Output E: Communication	1. Continue preparation and distribution of IBSNAT technical material
Output F: Case Study	1. Design case study (s) to demonstrate IBSNAT concepts of transfer of agrotechnology
	2. Initiate case study (s)

YEAR 5

Administration	1. Organize and conduct project review in collaboration with AID
	2. Organize and hold meeting of the Advisory Board
	3. Prepare final report
Output A: Data Generation and Analysis	
a. Agronomic experimentation (collaborators)	1. Continue field experimentation and data collection as in Year 4
b. Data analysis and interpretation	1. Organize and hold fourth annual meeting of technical working groups
	2. Establish nutrient, climatic and management requirements of selected crops
	3. Prepare final report on crop modeling and land evaluation
Output B: Data Bank Network	
a. Data Management System	1. Process and enter data in bank
	2. Complete work on a functional data storage and retrieval system for agrotechnology transfers
Output C: Training in Networking	
a. Workshop	1. Organize and hold 1 week workshop in Africa

b. Technical assistance in networking	1. Assist and advise LDCs in the design of national networks
<u>Output D. Communication</u>	
a. Dissemination of information	1. Continue preparation and distribution of IBSNAT technical materials
b. IBSNAT conference	1. Organize and hold an international conference on IBSNAT to communicate results
<u>Output E: Case Study</u>	1. Complete case study (s) on agrotechnology transfer

VI Program Management

The program will be administrated by the University of Hawaii under the supervision of Principal Investigator 'PI'(not paid by the project). An Associate Principal Investigator 'API'(located at the University of Puerto Rico) will assist in the development and maintenance of the project network. A Project Manager and an Administrative Assistant at the University of Hawaii will be responsible for the day to day activities. A group of professionals (agronomist, climatalogist, soil scientist, crop physiologist, communication specialist, editor, pest management specialist, training officer, computer programmer) and consultants (sociologist, economist etc.) will guide the project in the subject of their expertise.

The PI and API will develop agreements with the National, Regional and the International Crop Research Centers to develop the 'Network'. Under these collaborative agreements these centers will conduct standardized crop response studies at their own expenses. These centers will characterize their soils and record weather data according to agreed upon procedures. Information on crop response, soil and weather from these, and possibily from other interested centers, will be computerized and fed into the data bank at the University of Hawaii. A minimum of ten centers and four crops will be required to make the network functional. But it is likely that up to twenty centers and 8 to 10 crops may make a far superior network with little additional cost. The size of the network and its scope-of-work will be determined by the potential collaborators at a workshop during the first year of IBSNAT's operation.

Through proper interpretation, prediction of applicable agrotechnology regarding input/output will be made for other corresponding sites by the University of Hawaii staff. The staff will make recommendations to the extension service personnel of case study country(s) on agrotechnology for adaptation and systems for its delivery. In cooperation with the case study country(s) the project will make an analysis of the farmer's constraints to the full use of the agrotechnology suggested. The constraints information will be fed back into the network for further adaptation for use by the farmer.

The IBSNAT staff and some select staff from the collaborating centers will assist the developing nations to set-up their own national (N) "Benchmark Sites Network for Agrotechnology Transfer". These 'N' BSNATs will, in turn join hands for mutual benefits, to form Regional (R) BSNATs or based on Soil Taxonomy Classification, Order (O) BSNATs. The project will give technical assistance towards the formation of these networks.

AID's project monitor (S&T/AGR) will stay in constant touch with the contractor through all phases of the project development and operations. He will facilitate, whenever possible contractors activities with the national, regional and international centers as well as with the developing nations and the USAIDs.

A. Responsibilities of Various Parties

a. Contractor Responsibilities

The primary responsibility of the contractor is to create the scientific and operational conditions that will allow a demonstration of the transfer of agrotechnology on a worldwide basis. In particular, the responsibilities of the contractor are to:

- identify benchmark sites in the tropics and subtropics and work in collaboration with the national, regional and international centers (for agricultural research),

- consolidate the collaborating centers into a functional research and transfer network,

- develop, with inputs from an expert panel, a research strategy and experimental designs to disaggregate the genotype x environment interactions into quantifiable crop, soil and weather parameters, and to develop minimum data sets. (The objective of this research is to establish cause/effect relationships that will allow scientific knowledge transfers within a soil taxonomically determined sphere of applicability.),

-develop a standardized field research methodology and data collection procedures for the collaborators,

-coordinate the agronomic field work conducted by the collaborating centers and assist the collaborators in an advisory capacity,

-compile, process and analyze the results obtained at all sites of the network and store informtion for use by high-speed computers,

-identify the leading experts in crop modeling, agrometeorology and data processing, and organize them into working groups,

-arrange and financially support meetings of the working groups,

-develop, in collaboration with the working groups, crop production models that can be used in the computer-assisted transfer of agrotechnology,

-conduct case study (s) of agrotechnology transfer, in cooperation with host country insitutions, that can ve used as a model for other LDCs,

-hold regional workshops on agrotechnology transfer and training sessions in LDCs,

-provide technical assistance to LDCs in the area of agrotechnology transfer, specifically in problem identification and project design,

-establish and maintain liaison and linkages with other relevant programs and entities, such as SMSS, Title XII CRSPs, FAO, ISSS, IARCs, etc.,

-publish and disseminate IBSNAT concepts and results, and sustain a viable communication system and effective public relations program, and

-motivate and encourage governments of participating countries to carry out the vertical transfer of agrotechnology.

b. Advisory Board

Members of the Advisory Board shall be leaders and policy makers for international agricultural development projects. The role of the Board is to ensure that the project's goals and objectives are consistent with those of the recipient countries. The board shall also advise the project on new developments and targets of opportunity that will enhance project effectiveness.

c. Working Groups

The working groups (expert panels) consist of scientists who will periodically (annually) meet to present results of the anlaysis of data collected by IBSNAT. IBSNAT will assign specific tasks to each collaborating scientist and provide him/her with the data to be analyzed.

The scientists are expected to collaborate for the following reasons:

a. Opportunity to participate in a worthwhile and innovative project

b. Have access to data that would otherwise be unavailable

c. Opportunity to publish results

The scientists are expected to analyse the data on their own time.

d. LDC Responsibilities

LDCs have the responsibility to monitor the experiments and collect the minimum data set required for analysis. They will assign their own scientific staff for this purpose. Quality control over the experiments will be acheived by periodic visits by appropriate project scientists from IBSNAT headquarters.

The LDC's major responsibility is to undertake the vertical component of Agrotechnology Transfer. IBSNAT will not be heavily involved in vertical agrotechnology transfer. This should be done by local people, for local people. IBSNAT will assist LDCs in vertical transfer by giving them the opportunity to learn about successful programs and to hold workshops on the principles and concepts of innovation diffusions, ana show ways and means to achieve their objectives.

e. Field Studies

The field studies are the joint responsibility of the collaborating national or intenational center and IBSNAT.

The installatiuon, monitoring, and data collection aspect of field studies will be the responsibility of the national or international center.

IBSNAT will be responsible for:

a. Soil survey and classification of each experiment site

b. Data analyses, interpretation and publication and distribution of the results

f. Workshops

IBSNAT will have to provide the lion's share of the cost of organizing and conducting the workshops and financial support for many of the participants. The collaborating host institution is expected to provide logistic support. USAID Missions of the region will be approached for support of participants from their LDCs.

The selection of participants will be made jointly by the collaborating centers of the region, USAIDs, AID/W, and the contractor and the Advisory Board.

B. Contractor's Qualifications

The proposed contractor, the University of Hawaii (UH) is one of the only two U.S. institutions that are located in the tropical region. The tropical location is essential to the success of IBSNAT. The other institution is the University of Puerto Rico (UPR). Of the two institutions, UH has larger expertise and greater inclination to work in the developing countries. Furthermore, UPR has indicated that it is willing to collaborate very closely with UH amd can provide their key soil scientist, Dr. F. Beinroth to the project. Both UH and UPR have received AID's 211 (d) grants to strengthen their capabilities in tropical soils to assist the developing countries. Under AID sponship Dr. Beinroth (UPR) has organized four international soil classification workshops to improve the Soil Taxonomy for the tropics. These were held in Brazil in 1978, Malaysia/Thailand in 1979, Syria/Lebanon in 1980 and Rwanda in 1981. UH and UPR also participated in all these workshops. UH and UPR also participated in six other AID supported soil technology and awareness conferences during the last ten years that were held at ICRISAT (2), IRRI, CIAT, IITA and FAO (Rome).

The foundation of IBSNAT is based on the concept of the Benchmark Soils Project (BSP), an AID funded contract with UH (AID/ta-C-1108). The project was conceived by UH to test that the agrotechnology (crop/soil management practices) can be tansfered from one tropical region to another tropical region. The UH project which started during 1974 has its test sites in Hawaii, the Philippines, Indonesia and Cameroon. UPR started a parallel project in Puerto Rico and Brazil (AID/ta-C-1158). There is a close link and collaboration among the two projects. These two projects, which are about 4/5 complete, strongly suggest that the BSP concept is correct. Thus, UH has the know-how to take the BSP concept into its next phase - ie, to IBSNAT, which will demonstrate the utilization of this concept by involving 15 to 18 national and international centers, and by helping LDC set-up their own national and regional networks for technology transfer.

Over the past ten years, UH has developed a cadre of expertise to implement the proposed project. It has efficiently trained hundreds of LDC scientists in the area of tropical soil and crop management. The commitment of the UH administration and the staff to LDC development work is very high. The UH staff is keenly aware of sensitivities of LDC people and their socio-economic situations. It is easier for UH to relate to the LDC farmer's problems because Hawaii has not only a wide varity of tropical soils, crops and climate but also a considerable experience in dealing with small farmers at home.

Due to the nature of the project and contractors expertise and fine performance in the past and continuing AID supported activities, and also due to its commitment to the welfare of the LDC people, S&T/AGR feels that it is necessary that UH be the prime contractor for the proposed project. There is no other U.S. institution that can match the subject expertise in the U.S. or anywhere else for this purpose.

VII Project Analysis

A. Impact of the Program Products

IBSNAT's clientele, for the most part, is the same one that is served by the International Agricultural Research Centers, FAO, and AID; namely, the technology-poor, developing countries of the tropics and subtropics that are struggling to extricate themselves from a state of continual degradation of their natural resources. The aim of IBSNAT is not to duplicate the efforts of other development agencies or institutions but to help create facilities that will achieve their mission more effectively and at a rapid pace. IBSNAT's products and their impact on the world food problem are enumerated in Table 1. (See Folllowing Page))

Table 1. Impact of Program Product Utilization

Program product	Impact	
	If utilized	If not utilized
1. Network of cooperating agricultural research centers	Duplication of efforts minimized	Rediscovery of information
	Developing countries contribute to international development as equal partners	Agricultural development projects crippled by manpower shortage
2. Network of cooperating soil, climate, and crop data banks	Economy of thought and action achieved	Inappropriate agrotechnology delivered
3. Methodology for matching agrotechnology to agroenvironments	Ability to predict success of agricultural development projects enhanced	Promised results not delivered and credibility gap widened
4. International body to coordinate agrotechnology transfer	Continuation of program benefits ensured on a broad base	Energy dissipated under rival inefficent systems for technology transfer
5. Cadre of LDC technicians and scientists trained in agrotechnology transfer	Capacity to accommodate development projects enlarged	Continued reliance on foreign assistance
6. Agrotechnology dissemination network	Rapid diffusion of technology	Continued reliance on outdated systems

B. Tangible and Intangible Benefits

IBSNAT will catalyse major tangible and intangible benefits. As indicated earlier in this paper IBSNAT itself will only demonstrate (for a limited period) the functioning of a network system which, stores available useful agricultural knowledge, interprets and correlates the knowledge, and then disseminates it for use. IBSNAT's end product - beginning of numerous comprehensive national, regional and international networks operated by user nations themnselves will make a great a deal of difference in the outcome of the agricultural development process in this world. More than 1/2 billion dollars are spent each year in researching for site-specific management practices for crop production and land use. Net saving as a result of, IBSNAT system, eliminating duplicative work or increasing the efficacy of research via collaboration and attacking complimentary components of a problem, is estimated, very conservatively, at about 25% of the annual cost i.e., 125 million dollars (25% of 1/2 billion dollar cost)

The belief that most agricultureal studies must be site-specific is erroneous especially in today's state-of-the knowledge. Science has made long strides that aids agrotechnology transfer. There are many advances in the basic soil science, the methodologies of transfer, the new instrumentations both physical and chemical, the communication systems and the linkages among the trained personnel of the world. It will be old fashioned, expensive and impractical to do things in the old site-specific ways. Reduction of the site-specific duplicative studies will reduce the need for 1) new experimental stations, 2) trained personnel and 3) time required to conduct studies. Many of the smaller nations are not able to carry the burden of ever increasing cost of doing independent site-specific agricultural research. Research is becoming a luxury even for the better endowed nations. Site-specific studies are needed mostly for adaptive purposes (to adjust to socio-economic conditions).

Other tangible benefits will result because of faster and more efficient implementation of agricultural development projects in the LDCs. Coordinated efforts will provide better and quicker answers to the decision makers. Collaborated efforts will help eliminate isolation of countries and scientists who are facing similar problems. This will also produce most intangible and highly beneficial environment for work. A spirit of association among workers with common cause will creat confidence that they are not alone, that they can now accomplish things more easily with the assistance of colleagues even though they are located accross miles and oceans.

C. Review by International Centers and AID

The Project Identification Document (PID) on International Benchmark Sites Network for Agrotechnology Transfer (IBSNAT) received a very facorable review from the International Agricultural Research Centers (IARCs) and the AID field missions (USAIDs). Of the 6 IARCs and 42 USAIDs contacted, 4 centers and 26 missions responded. (see Attachment C, Page 45). The strongest support to IBSNAT came from the missions in Latin America and the Caribbean region and Asia and the Pacific region. These are the regions where AID's Benchmark Soils Project (BSP) has operated the longest. In Africa BSP has been active only for about a year. No mission or center rejected the project. A few of them have had some concerns. Many made good suggestions to improve the project design for the preparation of the project paper (PP). Where appropriate these suggestions have already been taken into account. Even at that early stage a few of the missions suggested that their countries should be included in the proposed network. Two of the centers indicated their willingness to collaborate with the project to the extent possible.

Here are a few illustrative comments from the reviewers: The Regional Development Officer of the Caribbean region indicated that the project would be useful to small countries in the Caribbean area because they are unable to support large research efforts and therefore are very dependent on knowledge developed in other parts of the world. Peru Mission indicated that the project would allow them to make better etimates of zonal potentials and develop priorities more effectively and efficiently. ICRISAT stated"--There is indeed an immense quantity of agroproduction technology being generated at national and international agricultural research centers that could be transferred --. When IBSNAT is established and functioning, agricultural research information should become available for wider use and the cost of site-specific trials should be greatly reduced."

Suggestions from the reviewers included items such as: "--The project should include adequate technical assistance to host country institutions and respective USAIDs to help determine underlying soil classification requirements, priorities, strategy and methodology to facilitate tie-in with programs--. Also included should be the technical assistance and funds for training of research/extension personnel within countries or subregions. Internationalizing U.S. Soil Taxonomy should contribute significantly to accelerated project development in agriculture and regional development--. Project coordinating body should also monitor and evaluate the response of farmers to the flow of innovations impinging on them. The body should also encourage uniform agronomic research projects to obtain minimum data sets, to set up the necessary data banks, to communicte with and provide feed back to participating research centers and to assist with training activities."

D.. End of Project Status

IBSNAT is designed as a prototype network to transfer agroproduction technology developed at the various agricultural research centers of the tropics and subtropics so that the best and most appropriate technology available can be quickly and successfully passed on to farmers. In order to fully exploit the principles and concepts of IBSNAT, it will be necessary to expand the network to accommodate a large number of collaborating research centers. By the end of the fifth year, sufficient progress should have been made to cause discussion on how, when and where the change-over to either a full-scale operational network or its phase-out should occur. These discussions should clarify the scope and nature of the network, its organization and administration, its modus operandi, and sources of funding. The culmination of these and all previous efforts should be a smooth transition from the prototype IBSNAT to whatever is decided regarding the end of the project status. We believe a periods of nine years would be adequate for the project to fully achieve its objectives.

Verifiable indicators of the success of IBSNAT are:

1. Functional network of collaborating agricultural research centers established.

2. Crop modeling achieved.

3. Land evaluation methodology developed.

4. Computer-compatible communications system in operation.

5. Requests by new countries to become network members.

6. Research effectiveness of collaborating centers increased relative to noncollaborative centers of similar size and funding.

7. Multilateral donor agencies consider funding for expanded network.

8. National and regional networks start to develop.

Critical Assumptions:

The success of IBSNAT will depend in large measure on a number of conditions that will be beyond the control of the contractor. Critical among these are:

1. The Directors of the crop-oriented IARCs agree to join IBSNAT.

2. Sufficient numbers of suitable national agricultural research centers agree to collaborate with IBSNAT.

3. Collaborating centers are willing to invest some money and manpower on a sustained basis to achieve project objectives.

4. Soil Taxonomy, the U.S. system of soil classification, will emerge as the accepted system for international communication to transfer crop and soil management technologies throughout the world.

E. Environmental Impact

The activities of this project fall into the area described in environmental procedure regulations paragraph 216.1(c) "Analysis, studies, academic or investigative research, workshops and meetings." These classes of activities will not normally require the filling of an Environmental Impact Statement or the preparation of an Environmental Assessment. It is possible that an output of this project will be a set of practices, procedures, guidelines or research results which when used would require such assessment. However, the project itself only proposes an agrotechnology transfer mechanism and directly supportive activities. Under these guidelines, this activity clearly qualifies for a Negative Determination at the time when a threshold decision is determined.

F. Women in Development

It is the goal of this project to encourage the widest possible participation of women worker - professional and nonprofessional technicians. The contractor and the subcontractor will be asked to have an agressive Affirmative Action Program to assure opportunities of employment for qualified personne, including minorities and females, in compliance with Title IX. Overall thrust of the program is to advance rapid transference of crop and soil management technology to the developing countries and there it holds great promise for increased involvement, ultimately, of poor farmers especially women, who have traditionally played a major role in agriculture.

G. Budget

Budget for the first five years is given below. However the project is expected to last for nine years at a total estimated cost of $12,134,500.

	Year ($,000) A.I.D. Support					
Item	I	II	III	IV	V	Total
Salaries	140.5	307	399.5	463	482	1792
Overhead (40%)	49	108.5	144	167.5	181	650
Fringe Benefits (23%)	26.5	75.5	105.5	120	129	456.5
Consultant	10	20	40	50	50	170
Travel & P.D.	140.5	323	336	364	391.5	1555
Equipment	-	200	30	20	15	265
Materials/ Supplies	4	12.5	25	20	23	84.5
Services/ Rentals	17	89.5	108	125	129	468.5
Freight Costs	-	20	15	15	20	70
Publications	8	20	25	30	40	123
Total	395.5	1176	1228	1374.5	1460.5	5634.5
S&T/AGR Evaluation Budget	-	10	-	25.5		35.5

				Non-AID Support		($ 000)
Item	I	II	III	IV	V	Total
Inter'l Ctrs.(5)	25	50	100	150	150	475
Nat'l Ctrs.(15)	30	60	150	155	155	550
FAO	5	10	15	15	15	60
Contractor	30	60	75	75	75	315
Others	-	10	30	30	30	100
Total	90	190	370	425	425	1500

After the fifth year the total support from all collaborators is estimated at a level of $500,000 per year.

H. Evaluation Schedule

Comprehensive evaluations of the project will be conducted at the following periods. a) 2 years after the initiation of the project a multidisplinary 3 person team will visit the contractor, b) 4 years after the initition of the project a multidisciplinary 3 person team will visit collaborating international and national institutions (one each), as well as the contractor. This evaluation will also indicate whether the project should be extended beyond the initial five year period. In addition, management evaluation will be conducted on an annual basis by S&T/AGR. Comprehensive evaluations will look at the quality of outputs, test project assumptions and measure progress towards stated objectives and the project purpose. The cost of these evaluations will be about $35,500. (1st, 2nd evaluation and the contingencies are estimated at $8,000, 22,000 and 4,000 respectively)

AID 1020-28 (1-72)

PROJECT DESIGN SUMMARY
LOGICAL FRAMEWORK

Life of Project:
From FY 1982 to FY 1990
Total U.S. Funding $12,134,500
Date Prepared: 1981

Project Title & Number: International Benchmark Sites Network for Agrotechnology Transfer (#936-4054)

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
Program or Sector Goal: The broader objective to which this project contributes: To improve the efficiency of food production in the developing nations through better land use planning and decision making. Expand the geographic utilization and cost-effective application of agricultural research findings.	Measures of Goal Achievement: 1. Economic development accelerated 2. Increased food production. 3. Reduced import of food.	1. Government reports. 2. Spot-checking for results of improved decision making. 3. Government records.	Assumptions for achieving goal targets: A.I.D and the developing nations believe that better information for proper land use is essential to obtain increased food production.
Project Purpose: To establish a pilot-network of collaborating institutions in the tropics and subtropics to demonstrate how agroproduction technology can be transfered among and within countries to skirt the need for expensive site-specific research.	Conditions that will indicate purpose has been achieved: End of project status. 1. Validation of the network approach to expedite transferance and sharing of agriculture technology. 2. Leads to the estab. of more extensive national and regional networks. 3. Development of new experiment stations that believe in networking.	1. Discussions with the Administrators of national and international crop research centers. Increased acceptance of technology in the outreach regions and the farmers. 2. Reports on the establishment of the networks. 3. Government reports.	Assumptions for achieving purpose: 1 and 2, willingness of centers to cooperate.
Outputs: 1. A network of research centers. 2. Coordinating body. 3. Development of data bank. 4. Handbook for matching crop requir. to land characteristics. 5. Infomation gathered and stored. 6. Training LDC scientists. 7. Information dissemination.	Magnitude of Outputs: 1. Agreement with 20 centers 2. 5 member Avisory Board. 3. One data bank. 4. 6 major food crops included. 5. Gather soil, climate and crop response data from centere. 6. Hold workshop in Asia, Africa and Latin America. Hold one international confernece. 7. Distribute network information worldwide.	1. Reports and newsletters.	Assumptions for achieving outputs:
Inputs: 1. Financial support from A.I.D. 2. Limited financial support from the centers. 3. Project monitoring by A.I.D. 4. Guidance from Advisory Board. 5. Expertise from the contractor	Implementation Target (Type and Quantity) 1. Project approved and funded during 1981. 2. Understanding reached with the centers during 1982. 3. Monitoring available from the start. 4. Guidance from the Board start during 1982. 5. Planning and supervision available from the start.		Assumptions for providing inputs:

Attachment A

B. Budget

International Benchmark Sites Network (# 936-4054)
(A.I.D. Funding)

Line Item	Year 1		Year 2		Year 3		Year 4		Year 5		Total
	m-m	$	m-m	$	m-m	$	m-m	$	m-m	$	$
Salaries											
Administrative Staff											
Assoc. Principal Investigator	9	25,000	9	28,000	9	31,000	9	32,500	9	35,000	151,500
Project Manager	9	22,000	12	31,000	12	34,000	12	36,000	12	38,000	161,000
Administrative Assistant	6	7,500	12	16,000	12	17,500	12	18,500	12	20,000	79,500
Fiscal Officer	3	4,000	12	15,000	12	16,000	12	17,000	12	18,000	70,000
Secretaries	18	18,000	18	19,500	18	21,000	18	22,500	18	24,500	105,500
Technical Staff											
Agronomist	6	10,500	12	23,500	12	25,500	24	54,000	24	59,000	172,500
Agr. Climatologist	6	10,500	12	23,500	12	25,500	12	27,000	12	29,500	116,000
Crop Physiologist			6	12,000	12	25,500	12	27,000	12	29,500	94,000
Crop Protection Specialist			3	7,500	6	15,000	6	16,000	6	17,000	55,500
Communication Systems Specialist	6	15,000	12	32,000	12	33,500	12	36,000	12	38,000	154,500
Soil Scientist			6	12,000	6	13,000	6	14,000	6	15,000	54,000
Computer Programmer			6	8,000	12	18,000	12	19,500	12	21,000	66,500
Computer Technicial					6	6,000	12	13,000	12	14,500	33,500
Laboratory Technician			6	7,000	12	15,500	12	17,000	12	19,000	58,500
Editor	6	10,000	12	22,000	12	24,000	12	26,500	12	29,000	111,500
Graphic artist			6	6,000	6	7,000	6	8,000	6	9,000	30,000
Writer/Asst. Editor			3	3,000	6	6,500	6	7,000	6	8,000	24,500
Training Officer			3	6,000	12	25,000	12	26,500	12	28,000	85,500
Student help		18,000		35,000		40,000		45,000		30,000	168,000
Subtotal, Salaries		140,500		307,000		399,500		463,000		482,000	1,792,000

Line Item	Year 1	Year 2	Year 3	Year 4	Year 5	Total
	$	$	$	$	$	$
Overhead Costs (40%)	49,000	108,500	144,000	167,500	181,000	650,000
Fringe Benefits (23%) and DBA	26,500	75,500	105,500	120,000	129,000	456,500
Consultant Fees	10,000	20,000	40,000	50,000	50,000	170,000
Travel and Per Diem						
Site identification	15,000					15,000
Network establishment	25,000	30,000				55,000
Site characterization		7,000	15,000	8,000		30,000
Site visits		140,000	156,000	170,000	100,000	566,000
Design workshop	40,000					40,000
IBSNAT conferences		72,000			90,000	162,000
Training workshops			85,000	85,000	85,000	255,000
Working group meetings	50,000	60,000	60,000	70,000	80,000	320,000
Case studies				15,000	15,000	30,000
Advisory board meetings	7,500	8,000	8,000	8,000	8,500	40,000
Project reviews			5,000		5,000	10,000
Other travel	3,000	6,000	7,000	8,000	8,000	32,000
Subtotal, Travel & Per Diem	140,500	323,000	336,000	364,000	391,500	1,555,000
Equipment						
Meteorological, office, laboratory		150,000	20,000	10,000	5,000	185,000
Other (computer terminals, word processors, etc.)		50,000	10,000	10,000	10,000	80,000
Subtotal, Equipment		200,000	30,000	20,000	15,000	265,000

Line Item	Year 1 $	Year 2 $	Year 3 $	Year 4 $	Year 5 $	Total $
Materials and Supplies						
Field and laboratory supplies		5,000	10,000	8,000	8,000	31,000
Office supplies	4,000	7,500	15,000	12,000	15,000	53,500
Subtotal, Materials and Supplies	4,000	12,500	25,000	20,000	23,000	84,500
Services and Rentals						
Computer time		10,000	15,000	25,000	35,000	85,000
Leases (equipment, vehicle, office)	5,000	36,500	40,000	44,000	48,000	173,500
Communication	10,000	14,000	16,000	18,000	18,000	76,000
Analytical support services		25,000	30,000	30,000	20,000	105,000
Other (postage, courier, etc.)	2,000	4,000	7,000	8,000	8,000	29,000
Subtotal, Services & Rentals	17,000	89,500	108,000	125,000	129,000	468,500
Freight Costs		20,000	15,000	15,000	20,000	70,000
Publication Costs	8,000	20,000	25,000	30,000	40,000	123,000
TOTAL	395,500	1,176,000	1,228,000	1,374,500	1,460,500	5,634,500
S&T/AGR Evaluation Budget	-	10,000	-	25,000	-	35,500
			GRANT TOTAL 5 YEARS			5,670,000

PID Review by USAIDs and IARCs

(Int'l Benchmark Sites Network for Agrotechnology Transfer - IBSNAT)

Concurrence	Suggestions	Concerns	Reference
LAC Bureau:-			
Barbados. Anticipated products of subject PID would be useful to RDO/C countries. This is because small states of Caribbean are unable to support large research efforts and therefore are very dependent on knowledge developed in other parts of the world. RDO/C believes improved technology important element to achieve increased productivity.	Caribbean Agricultural Research Institute (ARDI) could effectively utilize assistance proposed.	RDO/C questions whether or not proposed outputs can be achieved in five years. Shares concerns of TPCA Sub-Committee on subject PID.	Bridgetown 1602
Bolivia. ADO sees high potential pay off of IBSNAT approach for Bolivia where agrotechnology development is complicated by extreme ecological diversity and very weak national research/extension system. ISBNAT approach could enhance impact of resource and information constrained programs in Bolivia.	Andean highlands should receive sufficient attention under the project. Give more information on Benchmark Soils Project concept and its use. Describe linkages with SMSS, BNF etc. Address to the need of a worldwide language -- the Soil Taxonomy. Describe limitation inherent in IBSNAT and factors that must be considered to effectively use the tool. Project should include TA to host country institutions and respective USAIDs to help determine underlying soil classification requirements, priorities, strategy and methodology to facilitate tie-in with program. Also TA and funds for training of research/extension personnel within countries of sub-region.		La Paz 1792
Costa Rica. Proposed project will be useful.	P. P. should carefully detail the mechanics of the network to insure that results are ultimately transferred to farmers. Review ROCAP's "PIADIC" project to note constraints as well as possibilities of transferring agrotechnology. P. P. should address the general problem of lack of information dissemination in LDCs and how that problem affects the project.		San Jose 2047
Dominican Republic. IBSNAT is more correctly a potential technology "screening"project where a screened number of technologies with high probabilities of success could be imported to a country with same soil characteristics. There will then he a need to conduct local research to make final selection/adaptation before large scale extension work is undertaken.	IBSNAT should be better coordinated with CRIES as it is a land classification and evaluation data bank project explicitly dealing with technology transfer.	IBSNAT is being oversold as a technology "transfer" project	Santo Domingo 2508

PID Review by USAIDs and IARCs

(Int'l Benchmark Sites Network for Agrotechnology Transfer - IBSNAT)

Concurrence	Suggestions	Concerns	Reference
Ecuador. Activities proposed are of interest to GOE and USAID. The subject project would improve the knowledge base for a more efficient development of soil resources.		Grant funds are scarce at this time. Mission would prefer these funds be allocated to bilateral programs.	Quito 2633
Guatemala. The project merits a high priority. We believe that the ability to identify soil and climate factors so technology generated in other places can be rapidly and effectively adapted will be useful in Guatemala.	The Agricultural Research Institute (ICTA) will be able to use the proposed assistance.		Guatemala 2052
ROCAP (Guatemala). We believe the basic concept has merit and could contribute to reducing wasteful "rediscoveries" if it can be made operational. Relative to the Central American region the proposed project offers significant potential benefits to help strengthen an established regional network having several similar objectives.	The level of soil classification necessary for reliable transfer of agrotechnology should be addressed in the P.P. It should also lay out the kinds of hardware, software systems, personnel skills needed and cost estimates to a national system in order for them to benefit. Details of how they can ankess and interface with global data/information should be definitively explained. We believe the proposed project could also benefit from experiences gained under the ROCAP sponsored project "Agricultural Research and Information System." Additional TA is needed to effectively match technology to physical parameters and to access information from other parts of the world.	We doubt there are a significant number of national research centers in the LDCs that have ready access to a functional computer with adequate software system to avail of the opportunities offered. The project demands soil survey using Soil Taxonomy which will be a long term undertaking.	Guatemala 1890
Haiti. IBSNAT could be a valuable tool for the transfer of agrotechnology in Haiti. It would make soil related information available to Haiti that is currently available from similar soils in other countries. The proposal will have medium to high priority in 1 to 2 years.			Port au Prince 1690

PID Review by USAIDs and IARCs

(Int'sl Benchmark Sites Network for Agrotechnology Transfer - IBSNAT)

Concurrence	Suggestions	Concerns	Reference
Honduras. USAID/H has reviewed with interest the PID and supports efforts to develop more effective linkages between national research and extension systems and to link national research efforts to international agriculture centers. IBSNAT could be of potential benefit to Honduras upon successful completion of the sector project scheduled for 1985.	Mission is supporting a natural resources data bank which is undertaking soil classification (U.S. Soil Taxonomy). IBSNAT could provide assistance to this effort to ensure that a) soil data meets DSB requirements and b) means for effective utilizing of soil data are known and used by GOH agencies.		Tegucigalpa 2501
Nicaragua. Project is of interest to Nicaragua only over the long run first.		Nicaragua would have to classify their soils to benefit from the proposed system. No such classification exists for most of the country.	Managua 1712
Panama. Mission agrees with the purpose and feels the idea should be tested.	The project must be designed in such a way to insure access to existing research data without creating undue demand on the technical and administrative resources of the cooperating institution. Socio-economic limitations at the very least be clearly stated.	Existing research facilities are already overtaxed in terms of resources, and may, even when well intentioned, be unable to provide the degree of cooperation necessary for a successful project. Socio-economic factors may limit transference of technology from one region to another.	Panama 3076
Paraguay. IBSNAT is highly commendable and would probably be of great value to Paraguayan agricultural development.			Asuncion 1196
Peru. Mission supports proposed project and believes Peru could benefit significantly from establishment of IBSNAT. The ability to identify and match technology to area specific problems is a matter of particular interest to us at the present time as Peru is now placing much greater emphasis on developing its high and low jungle zones. IBSNAT should allow us to make better estimates of zonal potentials and develop priorities more effectively and efficiently. The proposal definitely meets a high priority need in the country program for Peru.	Many of GOP institutions could utilize information developed by proposed network. Mission would like to see more emphasis placed on humid tropical forest inventory correlated with soil, climatic and topographic conditions during P.P. development. "Internationalizing" Soil Taxonomy should contribute significantly to accelerated project development in agriculture and regional development. We believe Peru would be an excellent site for pilot activities.		Lima 4087

PID Review by USAIDs and IARCs

(Int'l Benchmark Sites Network for Agrotechnology Transfer - IBSNAT)

Concurrence	Suggestions	Concerns	Reference
AFR Bureau:-			
Cameroon. Project appears to be technically sound and would be an appropriate follow on for a single country such as one with long ongoing research conducted by the Benchmark Soils Project.		The project as designed is far too small to make an impact upon any of the many countries in which AID works.	Yaounde 2065
Gambia. Soil surveys at a scale of 1:10,000 to 1:20,000 are important in agro-technology transfer.	A forester and a range man be added to data gathering team as some soils are not suited for cultivation but are protective in other ways.	Information transferred above the series level (Soil Taxonomy classification) may be invalid as far as application from one geographic region to another is concerned.	Banjul 1125
Kenya. Mission feels effort to systematize transfer of agro-technology very worthwhile and deserving of support.	Techniques for transfer from research to extension to farmer level should be tried as suggested by Hankins in review meeting. Methods for computerizing and transferring technical messages should be piloted by international centers before expanding. Meteorologist on data gathering should have strong agricultural background.	Problem of lack of uniformity within as well as between countries renders task extremely difficult. Pilot project proposal appears too ambitious. Achievement of stated goals over such a wide geographical area most unlikely with proposed resources.	Nairobi 7151
Sudan. Technology transfer is indeed one of the limiting links in increased agriculture production.	The funds available for this project might be better spent by augumenting the capability of IARCs to make available land capability specialists to join project or activity design team.	Mission questions the priority of funding the activity in face of other needs. Technology transfer is a very complex process and we doubt that it can be based on Soil Taxonomy.	Khartoum 2498
Swaziland. USAID/S and Ministry of Agriculture and Cooperatives(MOAC)are of the opinion that proposed project activities would link very closely with project activities of AID funded, interdisciplinary land use planning team in the MOAC on the rural development areas program.			Mbabane 851
Tanzania. Mission supports the proposed IBSNAT project. The Tanzanian agro-technology system is in great need of some basic soil information. IBSNAT could provide some of the needed information about the production capability of Tanzanian soils.	P.P. should define its parameters more precisely. It should also elaborate on what type of training program will be developed - a training component is essential. P.P. should also elaborate on the known soil research findings of AID and other international organizations in Africa.		Dar es Salaam 2251

PID Review by USAIDs and IARCs

(Int'l Benchmark Sites Network for Agrotechnology Transfer - IBSNAT)

Concurrence	Suggestions	Concerns	Reference
Zaire and Congo. Theoretical concept of IBSNAT indicates a real benefit to recipient countries.	Indicate how detailed soil mapping would have to be. Specify the manner in which participating research stations would be chosen and also the cost of the program to the host countries.	The Mission doubts that either Zaire or Congo is ready for the project. Transfer of soil technology to farmers requires a functioning extension network which presently does not exist in either country.	Kinshasa 5377
ASIA Bureau:-			
Bangladesh. IBSNAT seems to present a cost-effective method of transferring technology on a worldwide basis. We encourage DSB on development of the project. IBSNAT would certainly be instrumental in accelerating the flow of research from IARCs and foreign NARCs to a particular country.	Specify the role of trainers and extension personnel in the process. Project coordinating body should also monitor and evaluate the response of farmers to the flow of innovations impinging on them. This response is not always measured by food yield alone. More subtle farmer reactions should be measured and redirected into research centers in order to sensitize scientists to farmer priorities i.e., straw yield or crop residue for fuel purpose may be a concern of equal value to that of increased grain yield. Specify how IBSNAT will increase the pace of agro-technology transfer from research centers to farmer.		Dacca 1935
India. Mission strongly supports the IBSNAT project and its focus on international cooperation. We think the project will significantly advance soil science research and its practical application in large part by stimulating the efforts of scientists and extension people in many countries to improve utilization of Soil Taxonomy in technology transfer.	Elaborate in more detail the factors on which the process of "agro-technology transfer" is dependent. The project should be able to delineate the available choices of the crop-soil matching process within specified limits of the various production parameters at a practical level which has relevance to farmer's field and extension agent. It will serve considerable clarification and utility if defineable limits of applicability could be ascribed to kinds of information which are retrievable from the data bank. State modes of linkages with SMSS, WMSS, BNF programs as well as other national programs.		Riggs Memo 3-16-81
Indonesia. Mission enthusiastically endorses the idea of agro-technology transfer based upon the stratification of the agro-environment by Soil Taxonomy. We believe that significant production gains can be realized from existing agricultural	Mission would very much like to see Indonesia become a part of IBSNAT. We would be happy to assist DSB in soliciting the views of Ministry of Agriculture personnel on such endeavor in Indonesia when project planning reaches that point.		Jakarta 7850

PID Review by USAIDs and IARCs

(Int'l Benchmark Sites Network for Agrotechnology Transfer - IBSNAT)

Concurrence	Suggestions	Concerns	Reference
Indonesia (continued). production technology if it can be properly transferred horizontly from one location to another, modified to fit local conditions, and then transferred vertically to the farmer. Soil classification by Soil Taxonomy offers us a basis for the proper and logical transfer of agro-technology.			
Nepal. IBSNAT's role appears basically that of collecting and transferring data in support of national and international research institutions. While this is an obviously important function the Mission feels that existing IARCs are fulfilling that task reasonably well. Mission views the project as a relatively low priority for use of scarce funds.	Indicate the mechanism that will remain at the end of the project. State whether animal agriculture research would be included. Linkage of product and impact should be developed and program product defined much more specifically. P.P. should present a reasonable expectation that the program product is likely to be used.	The project seems extremely ambitious. Mission questions how much progress could be made on some of the project's major planned activities. IBSNAT proposed functions would over-lap with those of existing research institutions.	Kathmandu 2008
Philippines. USAID and GOP agencies support IBSNAT. The hypothesis that soils of the same family have a common and predictable response to agronomic management practices has been established. The initial international network has been deemed workable and the need to expand the network to include more countries and to include appropriate IARC's under an international coordinating body is essential to exploit this agro-technology transfer system.	Discussions relative to elimination of some soil family variables and clustering of others should be done after consultation with collaborators and expertise. USAID urges approval of this project and will cooperate in any GOP program in this area.		Manila 7442
Sri Lanka. USAID recognize the magnitude and potential of such a network. We understand the original hypothesis of the Benchmark Soils Project (BSP) have been tested and proven valid.	BSP information should be more widely distributed before branching into other areas.	The proposal is advocating the creation of a very heavy infrastructure having recurring costs and procedures which could become overtaxed and/or strangled in bureaucratic entanglements. A basic problem with the PID is organizational design. A simple organization is needed to disseminate additional information flowing from national programs already in place in LDCs.	Colombo 1654

PID Review by USAIDs and IARCs

(Int'l Benchmark Sites Network for Agrotechnology Transfer - IBSNAT)

Concurrence	Suggestions	Concerns	Reference
Int'l Agr. Res. Centers:-			
CIAT. We agree with the concept that "what is lacking is the means to transfer appropriate technology to each agro-ecological zone in a timely cost effective and socially effective manner, and that the components for doing so already exist." We could not less than agree with the overall "goals and objectives" and "design" (of IBSNAT).	We are quite supportive of this type of initiative though a bit skeptical regarding the effectiveness of a very broad mandate effort in terms of regions, crops and ecosystems. Some modifications will have to be introduced into Family Category of Soil Taxonomy before it should be used as a basis for agrotechnology transfer throughout the tropics.	Goal and objectives are no doubt a bit broad and not sufficiently specific to allow for monitoring of target achievements. Project may be broad and ambitious in terms of coverage of countries, regions and crops. We do not quite agree with the concept that agrotechnology can be transferred between soils having the same "Family" classification according to Soil Taxonomy, at least as those Families presently classify for tropics. It would be a financial and physical impossibility for most national agencies in LDCs to classify soils at Soil Taxonomy Family level, except over a long period of time.	Nores Letter 3-18-81
CIMMYT. There is little doubt that a better and more systematic classification of soils, land potentials and crop requirements would facilitate the exchange of information and perhaps farming systems typologies between nations and regions and with similar agroclimatic circumstances. The project has a long term value.	CIMMYT will be pleased to cooperate with the project to the extent it is feasible within our crop-oriented mandate.		Havener Letter 3-31-81
ICRISAT. The value of existing efforts in agrotechnology transfer through the use of "Soil Taxonomy" and the Benchmark Soils concepts will be greatly enhanced and the benefits of the Benchmark Soils Project extended to many more countries through the creation of IBSNAT. There is indeed an immense quantity of agro-production technology being generated at national and international Agricultural Research Centers that could be transferred. When IBSNAT is established and functioning, agricultural research information should become available for wider use and the cost of site-specific trials should be greatly reduced. The transfer of information on soil management practices, crops and cropping systems, water management practices, erosion control	ICRISAT will participate in this network both from its Center in India where there are semi-arid Vertisols and Alfisols and its Sahelian Center in Niger where there are very sandy semi-arid soils. ICRISAT will supply information to the data banks that are set up (as a result of IBSNAT). A coordinated and systematic program for collection of data and its transformation into agrotechnology transfer interpretations will be needed. The coordinating body is necessary. In addition to its responsibilities mentioned in the PID, coordination will be needed to encourage uniform agronomic research projects to obtain minimum data sets, to set up the necessary data banks, to communicate with and provide feed back to participating research centers and to assist with training activities. Current activities to internationalize Soil		Swindale Letter 4-1-81

PID Review by USAIDs and IARCs

(Int'l Benchmark Sites Network for Agrotechnology Transfer - IBSNAT)

Concurrence	Suggestions	Concerns	Reference
ICRISAT (continued). measures, suitability of new crops, economics of crop production, uses and problems of irrigation and regional national planning priorities for agriculture development will be enhanced. ICRISAT considers IBSNAT to be well designed and worthy of support.	Taxonomy through international cooperation need more assistance and support. A similar effort in international soil correlation will be needed to ensure the accuracy and effectivenessness of transfer.		
IRRI. The project appears to depend on the assumption that identification of similar physical environments provides a sufficient basis for successful extension of agricultural technologies from one region to another.	Social and economic aspects of the introduction of the technology into LDCs should be built into the project. Some modification will be needed in the design to include pest management. IBSNAT should be much more closely integrated with the work of national agricultural research organizations. A stronger training component is needed to enable the national soil survey organizations to be more closely associated with work on crop production and soil fertility. The linkages with national organizations should be developed over a period of several years, with initial development taking place in association with the appropriate IARCs.		Greenland Letter 4-1-81