

PROJECT AUTHORIZATION AND REQUEST FOR ALLOTMENT OF FUNDS PART I

1. TRANSACTION CODE

A ADD
 C CHANGE
 D DELETE

PAF

2. DOCUMENT CODE
5

3. COUNTRY/ENTITY DS/AGR/RNR

4. DOCUMENT REVISION NUMBER

Original

Type g. Research Program Support Grant

5. PROJECT NUMBER (7 digits)

[931-1311]

6. BUREAU/OFFICE

A SYMBOL DSB B CODE [10]

7. PROJECT TITLE (Maximum 40 characters)

[CRSP-Scil Management]

8. PROJECT APPROVAL DECISION

ACTION TAKEN
 A APPROVED
 D DISAPPROVED
 DC DEAUTHORIZED

9. EST. PERIOD OF IMPLEMENTATION

YRS. [0] [5] QTRS [0]

10. APPROVED BUDGET AID APPROPRIATED FUNDS (\$000)

A. APPROPRIATION	B. PRIMARY PURPOSE CODE	PRIMARY TECH. CODE		E. 1ST FY 81		H. 2ND FY 82		K. 3RD FY 83	
		C GRANT	D LOAN	F GRANT	G LOAN	I GRANT	J LOAN	L GRANT	M. LOAN
(1) ARDN	141 J	963	-	750	-	2,360	-	4,733	-
(2)									
(3)									
(4)									
TOTALS		750	-	2,360	-	4,733	-		

A. APPROPRIATION	N. 4TH FY 84		O. 5TH FY 85		LIFE OF PROJECT		11. PROJECT FUNDING AUTHORIZED		A. GRANT	B. LOAN
	P. GRANT	Q. LOAN	R. GRANT	S. LOAN	T. GRANT	U. LOAN	(ENTER APPROPRIATE CODE(S)) 1 - LIFE OF PROJECT 2 - INCREMENTAL LIFE OF PROJECT			
(1) ARDN	5,450	-	6,052	-	19,345	-			2	-
(2)										
(3)										
(4)										
TOTALS	5,450	-	6,052	-	19,345	-	C. PROJECT FUNDING AUTHORIZED THRU		[8]	[5]

12. INITIAL PROJECT FUNDING ALLOTMENT REQUESTED (\$000)

A. APPROPRIATION	B. ALLOTMENT REQUEST NO.	
	C. GRANT	D. LOAN
(1)		
(2)		
(3)		
(4)		
TOTALS		

13. FUNDS RESERVED FOR ALLOTMENT N/A

TYPED NAME (C/M/F, S/R/FM/FSD)

SIGNATURE

DATE

14. SOURCE/ORIGIN OF GOODS AND SERVICES

000 941 LOCAL OTHER _____

15. FOR AMENDMENTS, NATURE OF CHANGE PROPOSED

FOR PPC/PIAS USE ONLY	16. AUTHORIZING OFFICE SYMBOL	17. ACTION DATE			18. ACTION REFERENCE (Optional)	ACTION REFERENCE DATE		
		MM	DD	YY		MM	DD	YY

Project Authorization

Name of Country: Interregional
Name of Project: Soil Management Collaborative Research Program
Number of Project: 931-1311

1. Pursuant to Section 103 of the Foreign Assistance Act of 1961, as amended, I hereby authorize the centrally-funded project entitled "Soil Management Collaborative Research Program" involving planned obligations of not to exceed \$12,850,000 in grant funds over a five-year period from date of authorization, subject to the availability of funds in accordance with the A.I.D. OYB/allotment process, to help in financing foreign exchange and local currency costs for the project.

2. The project will conduct research in two agro-ecological zones, the humid tropics and the semi-arid tropics, to increase the productivity of these marginal soils on an agronomically, economically and ecologically-sound basis.

3. The contract grant or other agreements which may be negotiated and executed by the officer(s) to whom such authority is delegated shall be subject to the following essential terms and covenants and major conditions together with such other terms and conditions as A.I.D. may deem appropriate.

- a. Each developing country where training, research or other assistance takes place shall be deemed to be a cooperating country for the purpose of permitting local cost financing.
- b. Goods and services, except for ocean shipping, financed by A.I.D. under the project shall have their source and origin in a cooperating country or in the United States except as A.I.D. may otherwise agree in writing.
- c. Ocean shipping financed by A.I.D. under the project shall, except as A.I.D. may otherwise agree in writing, be financed only on flag vessels of the United States.

- d. Upon signature of this grant by SER/CM, A.I.D. may disburse (grant) funds as reimbursement for eligible costs incurred on or after September 25, 1981 provided that evidence of such costs is furnished to A.I.D. in form and substance satisfactory to A.I.D.

WML 15 SEP 1981 **
 M. Peter McPherson
 Administrator

Clearance:

DAA/S&T, BChapnick (Acting) BC Date: 8/26
 S&T/PO, AKMorales 13e Date _____
 S&T/AGR, JWalker J. Walker Date 26 VIII 81
 GC, JBolton J. Bolton Date 9/12/81
 A-AA/PPC, LSmucker LS Date 9-10-81

**Ask the CRSP Management Entity, North Carolina State University, to ask its External Advisory Committee to explore the costs and benefits of inclusion of research on acid savanna soils beginning in FY 1982, and to report back to AID by December 31, 1981. The Committee should also re-examine at some point the merits of initiating research on steep lands soils.

11 SEP 1981

ACTION MEMORANDUM FOR THE ADMINISTRATOR

THRU: ES

FROM: SAA/S&T, Curtis Farrar (Acting)

Problem: Your approval is required to establish a Collaborative Research Support Program (CRSP) on Soil Management. In order to obligate FY 1981 funds for this CRSP, your signature on the attached PAF is required by September 4, 1981.

Background: The purpose of this research program is to develop techniques for soil management to increase the productive capacity of soils in the tropics and to foster the transfer of such knowledge throughout a network of institutions having similar interests. This CRSP is to focus upon the soil management problems of the humid and semi-arid tropics since these comprise some 75% (4,000 million hectares) of the soils in the tropics. The 200 million hectares of newly cleared land that the FAO estimates will be needed within the next 20 years to meet the food demands in the developing countries will be carved largely from the zones that are the target of this CRSP. Most of this land will be marginal land having serious soil-related crop production constraints. This CRSP will conduct the research necessary to develop the soil management technologies necessary to enhance the food production capacities of the soils in these two major tropical zones.

This soil management CRSP will be conducted jointly by four U. S. universities and four host country institutions located in Peru, Indonesia, Upper Volta and Niger. The research in the humid tropics will be conducted in the Amazon of Peru and the transmigration areas of Sumatra, Indonesia by North Carolina State University (NCSU), the University of Hawaii, Cornell University, Peru's Instituto Nacional de Investigación Agraria and three Indonesian institutions: The Soils Research Institute, the Central Research Institute for Agriculture and the Bogor Agricultural University. Work in the semi-arid tropics will be conducted by Texas A&M University in conjunction with ICRISAT's West Africa Program in Upper Volta and Niger. The work presently being done by NCSU at Yurimaguas in Peru will be continued under this CRSP.

The program will be administered by NCSU, the management entity, under the direction of a board of directors and with the assistance of a technical committee and an external review committee. The estimated AID contribution to this Soils Management CRSP is \$12,350,000 over the first five years. Of this amount, planned fiscal year obligations are as follows: FY 1981, \$750,000; FY 1982, \$2.1 million; FY 1983, \$3.0 million; FY 1984, \$3.5 million; FY 1985, \$3.5 million. The CRSP will be funded within the overall budget for CRSPs as ~~to be~~ determined by you.

The original Soil Management CRSP proposal recommended to the Agency by the JRC, BIFAD and the TPCA included, in addition to the two agro-ecological zones mentioned, the acid savanna zone with field work in Brazil by Cornell University and North Carolina State and field work in Colombia by the University of Puerto Rico and Cornell. It also included research in the management of tropical steplands with field work in the Dominican Republic by the University of Kentucky. Because of budget constraints, however, S&T/AGR decided, as recommended by BIFAD, to limit the program to two priority agro-ecological zones. Accordingly, work in the acid savanna zone and in tropical steplands has been deleted.

Justification to the Congress: The project appears on page 61 of the S&T Data Base submitted to Congress. A technical notification is required, however, and is being made, to inform the Congress that we intend to obligate \$750,000 in FY 1981 rather than \$600,000 as previously reported.

Clearances Obtained: JRC, BIFAD and the TPCA concurred in the targetting of the research by agro-ecological zones, the selection of the zones and the priority order in which they were ranked. The Regional Bureaus, SER, PPC and LEG cleared on the original CRSP proposal.

Recommendation: That you sign the attached PAF.

Attachment:
PAF (Project No. 931-1311)

Clearance:
DAA/S&T, Bernard Chapnick (Actg.) BC Date: 8/26
S&T/PO, Ann K. Morales Be Date: _____
S&T/AGR, John Malcolm JM Date: 8/26/81
S&T/AGR, James Walker J Walker Date: 26 VIII '81
A-AA/PPC, Larry Smucker LS Date: 9-11-81
GC, John Bolton KB Date: 6-12-81

PROJECT DATA SHEET

1. TRANSACTION CODE

A = Add
 C = Change
 D = Delete

Amendment Number

DOCUMENT CODE

3

2. COUNTRY/ENTITY
 Interregional

3. PROJECT NUMBER
 931-1311

4. BUREAU/OFFICE
 S&T

5. PROJECT TITLE (maximum 40 characters)
 Soils Management - CRSP

6. PROJECT ASSISTANCE COMPLETION DATE (PACD)
 MM DD YY
 0 6 1 58 6

7. ESTIMATED DATE OF OBLIGATION
 (Under 'B' below, enter 1, 2, 3, or 4)

A. Initial FY 81

B. Quarter 4

C. Final FY 85

8. COSTS (\$000 OR EQUIVALENT \$1 =)

A. FUNDING SOURCE	FIRST FY 1981			LIFE OF PROJECT		
	B. FX	C. L/C	D. Total	E. FX	F. L/C	G. Total
AID Appropriated Total	675	75	750	10,350	2,500	12,850
(Grant)	(675)	(75)	(750)	(10,350)	(2,500)	(12,850)
(Loan)	()	()	()	()	()	()
Other U.S.						
1. Universities	250		250	4,280		4,280
2.						
Host Country		100			4,000	4,000
Other Donor(s)						
TOTALS	925	175	1,000	14,630	6,500	21,130

9. SCHEDULE OF AID FUNDING (\$600)

A. APPROPRIATION	B. PRIMARY PURPOSE CODE	C. PRIMARY TECH. CODE		D. OBLIGATIONS TO DATE		E. AMOUNT APPROVED THIS ACTION		F. LIFE OF PROJECT	
		1. Grant	2. Loan	1. Grant	2. Loan	1. Grant	2. Loan	1. Grant	2. Loan
(1) ARDN	141	963				12,850		12,850	
(2)									
(3)									
(4)									
TOTALS						12,850		12,850	

10. SECONDARY TECHNICAL CODES (maximum 6 codes of 3 positions each)
 021 092 093 080

11. SECONDARY PURPOSE CODE
 121

12. SPECIAL CONCERNS CODES (maximum 7 codes of 4 positions each)

A. Code R/AG XII
 B. Amount 12,850 12,850

13. PROJECT PURPOSE (maximum 400 characters)

14. SCHEDULED EVALUATIONS

Interim MM YY MM YY Final MM YY
 1 1 8 1

15. SOURCE/ORIGIN OF GOODS AND SERVICES

000 941 Local Other (Specify)

16. AMENDMENTS/NATURE OF CHANGE PROPOSED (This is page 1 of a page PP Amendment)

17. APPROVED BY

Signature *Curtis Farrar*
 Title Acting, SAA/S&T, Curtis Farrar

Date Signed August 25, 1981
 MM DD YY

18. DATE DOCUMENT RECEIVED IN AID/W, OR FOR AID/W DOCUMENTS, DATE OF DISTRIBUTION
 MM DD YY

SOIL MANAGEMENT CRSP

REPORTS OF THE

**THIRD EXTERNAL ADVISORY PANEL MEETING
September 13-16, 1980**

and

**MEETING ON THE ORGANIZATION OF THE MANAGEMENT ENTITY
September 25, 1980**

Submitted to AID and JRC

by

**THE PLANNING ENTITY
North Carolina State University**

supported by

Grant AID/DSAN-G-0133

October 7, 1980

SUMMARY

The External Advisory Panel evaluated the proposals of the 16 universities requesting participation in the Soil Management CRSP, according to the approved program and guidelines of the General Program Proposal. Six universities are recommended for participation in the CRSP: Cornell University, University of Hawaii, University of Kentucky, North Carolina State University, the University of Puerto Rico and Texas A & M University. The recommended lead and support roles for each institution in the priority agroecological zones are as follows:

<u>Agroecological Zone: Country</u>	<u>Lead Role</u>	<u>Support Role</u>
I. Humid Tropics: Peru Indonesia	NCSU Hawaii	Cornell NCSU
II. Semiarid Tropics: Upper Volta and Niger	Texas A & M	-
III. Acid Savannas: Brazil Colombia	Cornell Puerto Rico	NCSU Cornell
IV. Steeplands: Dominican Republic	Kentucky	-

The rationale for the evaluation of each proposal are given. Some program modifications were made with representatives of the universities recommended for participation and the collaborating institutions overseas, during the following two days.

At a subsequent meeting in Washington representatives of the six universities recommended for participation selected by majority vote North Carolina State University as the groups' recommendation for the Management Entity role in the Soil Management CRSP. A proposed organizational structure was developed at that time and is presented herewith.

The Planning Entity concurs with the conclusions and recommendations of these two meetings and submits them to JRC/BIFAD and AID for approval.

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FOREWORD

This report describes the outcome of Phase III (Program Organization) of the Soil Management CRSP. It includes the selection of eligible institutions recommended for participation in the Soil Management CRSP and the proposed organization and functions of the Management Entity. The first task was achieved during the Third External Panel Meeting held in Arlington, Virginia, September 13-16. This portion of the report has been written by the Panel Members, because the Planning Agency was not directly involved in this process.

The second portion reports on a meeting by the administrative officers of the six universities recommended for participation in the CRSP on September 25 in Washington to select the Management Entity and determine its structure.

The Planning Entity, North Carolina State University, concurs with the above recommendations and submits them to JRC/BIFAD and AID for approval.

The Planning Entity wishes to express its appreciation to the members of the External Panel, the representatives of the collaborating institutions abroad, AID, JRC, and BIFAD representatives, for their significant contribution to this crucial phase of the planning process.

Appreciation is also due to the staff of the 16 universities who submitted final proposals for participation. The Panel had indeed a very difficult task selecting which universities to recommend for participation from among the excellent proposals received.

THIRD EXTERNAL PANEL MEETING REPORT*

Arlington, Virginia, September 13-16, 1980

I. The Selection Process

Evaluation of the 16 university proposals was made by the External Panel in counsel with representatives of collaborating institutions in the developing countries where research is to be conducted. Selection of participating institutions was made by the Panel according to the criteria specified in the CRSP General Program Proposal, June 16, 1980, pages 23 and 24. Evaluation of the research work plan proposed by each university was made in accordance with each of the items enumerated on page 23 and in accordance with the research topics outlined in the CRSP program proposal for the specific agroecological zone in which the university proposed to conduct research. This was accomplished during September 13 and 14, 1980. Principal investigators of selected universities were notified by telephone and requested to join the meeting September 15 and 16 to discuss details of research proposed, plans to initiation of activity, decision regarding the Management Entity and other relevant matters. Principal investigators or Title XII representatives of the universities not selected were also notified by telephone on September 13 or 14. Principal investigators from four of the selected universities attended. Puerto Rico and Kentucky were represented by alternates, since their principal investigators were unavailable. Institutional representatives who might serve on the Board of Directors were also invited and those from Cornell, Kentucky, and North Carolina State attended. Principal investigators or alternates who attended from the other universities were authorized by their institutions to represent them officially in the selection of the Management Entity.

Representatives of the Planning Entity (NCSU) and of USAID met with the External Panel and the developing country representatives during the evaluation of research proposals. Present during evaluation of most research proposals were representatives of JRC and the BIFAD staff. The two Panel members who are faculty members of institutions submitting proposals, University of Florida and University of Illinois, absented themselves while their respective university proposals were evaluated. North Carolina State University representatives also absented themselves while the proposal from their university was evaluated. The AID representative was present throughout the evaluation process but neither he nor the representatives of North Carolina State University nor the representatives of collaborating institutions in developing countries participated directly in the final evaluation and ranking of university proposals. That was the responsibility of the External Panel only. The developing country representatives were asked their opinions about the proposals for work in their countries and were asked to indicate if they had preference for working with a particular university. The reasons for selection or rejection of each university proposal is given in Part III of this report, with universities listed in alphabetical order.

Section II lists each agroecological zone in which research is proposed to be conducted under this CRSP. The universities which submitted proposals for that zone are indicated and the one selected to be the lead university is

*Prepared by M. D. Thorne, Panel Member and approved by other Panel Members.

indicated, along with the senior scientist positions at the research site for which the university has staffing responsibility. If a supporting university was selected, this is indicated along with on-site senior scientist positions for which it has staffing responsibility. Since two of the zones have two proposed site locations each, there is indication of the selected institutions for each site as well as the institutions submitting proposals not selected.

The following participated in the Third External Panel meeting:

External Advisory Panel

Dr. John K. Coulter, Chairman, World Bank
 Dr. Peter E. Hildebrand, University of Florida
 Dr. Amirul Islam, Bangladesh Ministry of Agriculture
 Dr. Kenneth F. S. King, ICRAF, Nairobi, Kenya
 Dr. Frank R. Moormann, Utrecht University, Netherlands
 Dr. Marlowe D. Thorne, University of Illinois
 Dr. Carlos Valverde, INIA, Peru

Representatives from Collaborating Institutions Overseas

Dr. D. Muljadi, Soils Research Institute, Indonesia
 Dr. Carlos Valverde, INIA, Peru
 Dr. Gamini Gunasekera, ICRISAT, West Africa
 Dr. Elmar Wagner, Centro de Pesquisa Agropecuaria dos Cerrados, Brazil
 Dr. Rodrigo Lora, Instituto Colombiano Agropecuario, Colombia
 Dr. Gustavo A. Nores, CIAT, Colombia
 Dr. Cesar E. Lopez, Secretaria de Estado de Agricultura, Dominican Republic
 Dr. James Spain, CIAT, Colombia

AID, JRC, BIFAD Representatives

Mr. Eugene Babb, Deputy Assistant Administrator, DSB/AID
 Dr. John L. Malcolm, AID, Washington, D. C. (Project Monitor)
 Dr. Elmer Kiehl, BIFAD Staff Chairman
 Mr. Harold Jones, Africa Bureau USAID and JRC member
 Dr. Fred Johnson, BIFAD Staff

North Carolina State University (Planning Entity)

Dr. J. Lawrence Apple*
 Dr. C. B. McCants*
 Dr. Pedro A. Sanchez
 Dr. John J. Nicholaides, III
 Ms. Bertha Monar

Other University Representatives

Dr. Frank Calhoun, Texas A & M University*
 Dr. Fred Beinroth, University of Puerto Rico*
 Dr. Douglas Lathwell, Cornell University*
 Dr. Jack Hiatt, University of Kentucky*
 Dr. Robert Blevins, University of Kentucky*
 Dr. Goro Uehara, University of Hawaii*
 Dr. Joseph P. Metz, Cornell University*

*Attended September 15 and 16 only.

II. Proposals Selected for Agroecological Zones

A. Humid Tropics (Priority I)

Ten research topics are outlined (page 10 of the CRSP General Program Proposal of June 16, 1980) for work in this zone. Two research sites are proposed with three senior scientist positions for each site.

1. Peru: Research Site - Yurimaguas

Universities submitting proposals requiring senior scientist position(s) on-site:

Cornell University
North Carolina State University
University of Illinois

Selected universities:

Lead: North Carolina State University, with responsibility for staffing positions 1.1 and 1.3.

Supporting: Cornell University with responsibility for staffing position 1.2.

2. Indonesia: Research Site - Transmigration Areas of West Sumatra and Jambi Provinces; possible headquarters in Bukittinggi, Sukarami, or Padang.

Universities submitting proposals requiring senior scientist position(s) on-site:

University of Guam
University of Hawaii
North Carolina State University
Prairie View A & M University

Selected universities:

Lead: University of Hawaii with staffing responsibility for positions 1.5 and 1.6.

Supporting: North Carolina State University with staffing responsibility for position 1.4.

Universities submitting proposals for supportive work not requiring senior scientist positions on-site:

University of Florida
University of Kentucky
University of Minnesota
Pennsylvania State University
Washington State University
University of West Virginia

The Panel did not select any of these for funding but has called attention of the lead institutions to these proposals. It recommends that complete copies of the relevant proposals be made available to the lead and supporting universities. Cooperative arrangements for utilizing the research and graduate training capabilities of cooperators is encouraged, within limits of the budgets available for research and training in this zone.

B. Semi-Arid Tropics (Priority II)

Twelve main research topics are outlined (page 13 of CRSP General Program Proposal of June 16, 1980) for work in this zone. Research site locations at Kamboinse and Saria Stations in Upper Volta and in the neighborhood of Niamey in Niger are proposed with collaboration with ICRISAT's West Africa Program, INRAN and SDS. Three senior scientist positions were specified.

Universities submitting proposals requiring senior scientist position(s) on-site:

Texas A & M University

Universities submitting proposals for supportive work not requiring senior scientist positions on-site:

Pennsylvania State University
Purdue University
Washington State University

The Panel did not select any of the supporting universities for funding, but has called attention of the selected university to these proposals. It recommends that complete copies of the relevant proposals be made to the selected university. Cooperative arrangements for utilizing the research and graduate training capabilities of cooperators is encouraged, within limits imposed by budget for work in this zone.

C. Acid Savannas (Priority III)

Thirteen main research topics are outlined (page 15 of the CRSP General Program Proposal) for work in this zone. Two research sites are proposed with one senior scientist position at each site.

1. Brazil: Research Site - EMBRAPA's CPAC, near Brasilia

Universities submitting proposals requiring senior scientist position(s) on-site:

Cornell University
Purdue University

Universities submitting proposals for supportive work not requiring senior scientist positions on-site:

University of Florida
University of Minnesota
North Carolina State University
Pennsylvania State University

University of Puerto Rico
 Washington State University
 University of West Virginia

Selected universities:

Lead: Cornell University with responsibility for staffing position 3.1.

Supporting: North Carolina State University

2. Colombia: Research Site - ICA's Carimagua Research Station in the Llanos Orientales.

Universities submitting proposals requiring senior scientist position(s) on-site:

North Carolina State University
 University of Minnesota
 University of Puerto Rico
 Purdue University

Universities submitting proposals for supportive work not requiring senior scientist positions on-site:

Cornell University
 University of Florida
 Pennsylvania State University
 Washington State University
 University of West Virginia

Selected universities:

Lead: University of Puerto Rico with responsibility for staffing position 3.2.

Supporting: Cornell University

Other than the lead and supporting universities selected for each site, no others were selected for funding. The Panel has called attention of the lead institutions to these proposals. It recommends that complete copies of the relevant proposals be made available to the lead and supporting universities. Cooperative arrangements for utilizing the research and graduate training capabilities of these universities is encouraged, within limits of the budgets available for research and training in this zone.

D. Steeplands (Priority IV)

Eleven main research topics are outlined (page 17 of the CRSP General Program Proposal of June 16, 1980) for work in this zone. One research site is proposed with three senior scientist positions on-site.

1. Dominican Republic: With locations in the Cordillera Central - One between Ocoa and Constanza, the other near San José de las Matas.

Universities submitting proposals requiring senior scientist position(s) on-site:

University of Florida
University of Kentucky
Ohio State University

Selected universities:

University of Kentucky with responsibility for staffing positions 4.1, 4.2, and 4.3.

Universities submitting proposals for supportive work not requiring senior scientist positions on-site:

Prairie View A & M University
University of Minnesota
University of West Virginia

The Panel did not select any of these for funding but has called attention of the selected university to these proposals. It recommends that complete copies of the relevant proposals be made available to the selected university. Cooperative arrangements for utilizing the research and graduate training capabilities of cooperators is encouraged, within limits imposed by budget for work in this zone.

Table 1. Universities recommended for selection of the Soil Management CRSP.

Agroecological Zone	Country	U. S. University	
		Lead	Supporting
Humid Tropics	Peru	NCSU (2)*	Cornell (1)
	Indonesia	Hawaii (2)	NCSU (1)
Semi-Arid Tropics	Upper Volta/ Niger	TAMU (3)**	
Acid Savannas	Brazil	Cornell (1)	NCSU**
	Colombia	P. Rico (1)	Cornell
Steeplands	Dominican Republic	Kentucky (3)	

*Figures in parentheses indicate number of senior scientist positions on-site for which the university has staffing responsibility.

**TAMU = Texas A & M University
NCSU = North Carolina State University

III. The Panel's Evaluation of Each University Proposal

A. Cornell University

The proposal requested leadership in the acid savannas project in Brazil, a supporting role in the acid savannas project in Colombia and a supporting role in the humid tropics project in Peru. The Panel approved all these requests.

The project and work plans proposed were well conceived and addressed the specific research topics outlined in the CRSP General Program Proposal. Evidence was presented that the University has wide experience in the characterization and management of tropical soils and that the proposed activity would be a logical extension of work now underway. Cornell has conducted research at the Cerrado Center in Brazil in soil fertility management, water management, variety selection and low input cropping systems research. All these topics are included in those listed for research in the humid tropics and/or the acid savannas. Studies of phosphorus management, liming, cation imbalance in low activity soils, water management, legume nitrogen management, utilization of plant residues and investigation of suitability of legume crops not now grown were also specifically mentioned in Cornell's proposal.

A senior soil scientist was named as principal investigator with an additional solid commitment of time from four other soil and crop scientists with excellent professional qualifications and experience. Six additional senior scientists in crops, soils and atmospheric sciences were indicated for directing graduate student training, including short-term commitments in connection with such activity.

Cornell University has demonstrated a long-term interest in developing country problems and the willingness of faculty to study such problems on a continuing basis. It has shown interest and leadership in training persons from developing countries and in organizing and conducting workshops on such subjects as soil resources and fertility, plant adaptation to mineral stress conditions, priorities for alleviating soil-related constraints to food production in the tropics. The University also has an abundance of courses available on the campus dealing with international agriculture.

Materials presented indicated an excellent record in filling long-term overseas contract positions with tenured faculty members. While no faculty commitments were yet made for the positions proposed under this CRSP, the expectation is that both on-site senior scientist and campus support positions would be filled by recruitment from outside present staff.

Cornell has demonstrated excellent working relationships with the other two U. S. universities, North Carolina State University and the University of Puerto Rico, with which it will be associated in research under this CRSP.

The documentation provided did not show strong faculty competence in Portuguese or Spanish languages. It does have adequate courses in both these languages on-campus and it is stated that senior scientists and graduate research assistants assigned overseas would be proficient in the local language.

The representative from EMBRAPA (Brazil) indicated preference for Cornell as the lead institution at that site. The collaborating institution representatives from ICA and CIAT (Colombia) and INIA (Peru) indicated Cornell would be most acceptable in a supporting role at their sites.

B. University of Florida

The proposal requested leadership in the steeplands project in the Dominican Republic and interest in the supportive role at both locations in the Acid Savannas and in Peru in the Humid Tropics. The Panel did not select Florida for any of the zones.

The University of Florida proposal was judged by the External Panel to be weaker than desired for research in the steeplands. It was agreed that many faculty members have expertise and interest in the problems outlined for the steeplands, but there was inadequate evidence in the proposal that their experience in this zone is as strong as that of the other universities proposing major work in this zone. It appears that the majority of faculty named have experience in tropical agroecological zones but the extent of the experience in steeplands of those to be involved in this project is not clearly stated.

It is recognized that the university has an active training project in the Dominican Republic. The representative of the Dominican Republic testified as to the value of that project and expressed the hope and expectation that it would continue. The Panel was favorably impressed by the experience and competence of the forest soil scientist and the agricultural economist who would contribute to the project. It was also impressed by the high degree of faculty competence in the Spanish language.

The Florida proposal failed to indicate appreciation of the importance of erosion control for the steeplands. This was listed as the overriding problem for the zone. Inadequate evidence was given of recognition of need to optimize utilization of the limited soil water or the need to develop small system irrigation with a minimum of investment. There was not strong evidence of experience in studying physical properties of soils in Florida's international activities. Competence of some interested staff members in forage production and management was indicated, but involvement of other staff who have worked extensively in tropical forages was not indicated and presumably is not available for this project. The Panel felt that more evidence of interest in cropping system research for tackling the problems of the steeplands should have been present.

No clear plan of work was indicated and no principal investigator was named. While the Panel recognizes the difficulty in providing such information until the project is more certain of approval, without it the Panel was at a serious disadvantage in giving a more favorable rating to the proposal.

The Florida proposal indicated a desire to collaborate in the Humid Tropics and the Acid Savannas but did not request on-site positions in these zones. Faculty expertise in the problems of acid, infertile soils was indicated and the Panel recognizes such competence. No clear work plan was presented, no principal investigator named, and no budget presented. It was concluded that no major supportive role was indicated but that collaboration of the lead and major supportive institutions in each of the zones with the University of Florida might be mutually beneficial.

C. University of Guam

The proposal indicated interest in a collaborative role with North Carolina State University in the Indonesia research site of the Humid Tropics. It requested staffing responsibility for one year only for one soils specialist and one extension specialist. The Panel did not select Guam's proposal for research in this zone.

The Guam proposal was centered mainly on soil testing, including evaluation of laboratory facilities in Indonesia. The representative of the Soils Research Institute in Indonesia who met with the Panel indicated that quite satisfactory soils laboratories already exist in his Institute. He did not give high priority to the proposal from the University of Guam. The Panel appreciates the interest of the Guam soils staff in the problems of the Humid Tropics and has called attention of the lead university to the opportunity for collaborative work in Indonesia with the University of Guam and the potential benefits of mutual collaboration.

D. University of Hawaii

The proposal indicated interest in a leadership role at the Indonesia site in the Humid Tropics and requested responsibility for staffing the three senior scientist positions at that location. The Panel approved the leadership role for Hawaii in Indonesia and agreed that it should have staffing responsibility for two of the positions at that site.

The University of Hawaii proposal showed a multidisciplinary approach directed towards the problems of the Humid Tropics enumerated in the CRSP document. A well respected senior faculty member was named as principal investigator. A team of capable scientists representing disciplines such as entomology, foods and nutrition, agricultural engineering, microbiology, environmental psychology, economics, anthropology and agricultural engineering as well as soil science had been assembled to participate in the research and training program.

Emphasis was indicated on the development of energy efficient farming systems and on studying ways to get faster adoption of improved farming systems. The indicated contribution of the social scientists was judged important, as was the systems analysis approach. The emphasis on measuring outputs as an indication of success or failure was also favorably received. Work was indicated on essentially all the research topics which had been previously considered important by the Panel and the Planning Agency.

The NIFTAL program and the East-West Center backstopping support added strength to the campus component of the program proposed. It was evident that considerable planning and detailed contacts with Indonesia had preceded the proposal's preparation. The University of Hawaii has an ongoing research program in Indonesia and a number of participating faculty members, including the principal investigator have Indonesian experience and some language competence.

The training component of the Hawaii proposal was sufficiently detailed and apparently well conceived. Emphasis was placed on utilizing Indonesian nationals for junior positions and on giving language training in Indonesian and English as needed by the individuals involved.

The Panel had two concerns which were resolved by a telephone conversation between the Panel Chairman and the principal investigator before a decision was reached. The proposal made the assumption that "there is adequate soil management knowledge and technology ready for immediate application in the humid tropics." Panel members could not accept this assumption as they interpreted its meaning. The principal investigator indicated he meant that knowledge is ready for adaptation to the humid tropics. The adaptation will, of course, come through research of the type Hawaii proposes to do. The other concern is the lack of a clear statement of the number of senior scientists to be located in Indonesia. The principal investigator assured the Panel Chairman that any of the senior scientist positions awarded Hawaii which had been intended for on-site work in Indonesia would, in fact, be located in Indonesia.

The Panel was also concerned about the indicated emphasis on fuelwood production in the Hawaii proposal. While this is recognized as a problem in the tropics, it was not intended to be a significant thrust of the humid tropics portion of the CRSP. The principal investigator indicated agreement that this would not be a major segment of the research under this CRSP. The Hawaii proposal emphasized the need for Indonesian input regarding the specific sites for research in Sumatra. The principal investigator was assured that the tentative locations of Bukittinggi, Sukarami and Padang had been selected in cooperation with the Indonesian collaborative institutions.

E. University of Illinois

The proposal was for research at Yurimaguas, Peru in the Humid Tropics and requested one senior scientist position on-site. The Panel did not select this proposal for funding.

The proposal was judged meritorious and the University capable of contributing to the CRSP as indicated in the proposal. The competence of the principal investigator and the proposed senior scientist to be located in Peru were not questioned. The proposal indicated involvement of only three resident faculty members. All are soil scientists and none has had extensive experience in the humid tropics.

The Panel judged that the resources and expertise seemed to duplicate in some measure those of the lead university selected. The proposal of the University of Illinois has been called to the attention of the lead university for consideration for a supportive role in the Peru program.

F. University of Kentucky

The proposal requested a leadership role in the Steeplands Zone with responsibility for staffing all three positions on-site. It also indicated interest in a supportive role in the Humid Tropics site in Indonesia but made no specific proposal for that. The Panel selected the University of Kentucky for the lead institution in the Steeplands with responsibility for three positions at the Dominican Republic site.

The proposal was well written, addressed the major problems of the zone as outlined in the CRSP document, and gave evidence of faculty expertise and enthusiastic involvement in the proposed research and training programs. It is evident that Kentucky faculty have extensive experience in working on the problems of the steplands. The domestic research program has found satisfactory solutions to many of the constraints to production on their own stepland soils. The work of the University of Kentucky in reduced tillage systems is well known and adaptation to soils in other countries has already begun. Kentucky faculty have valuable experience in adapting the tillage and cropping system to Latin America and many nationals of Latin American countries have visited Kentucky to view their work. It is emphasized, however, that no export of a specific "system" is planned. Rather, the understanding of principles has helped to devise a multiplicity of systems in tropical areas.

It was judged that the proposed activity of Kentucky was more in line with its in-state program than were those of the other two universities submitting stepland proposals.

The Kentucky proposal named a senior faculty member as principal investigator and was the only one of the steeplands proposals which gave tentative personnel assignments to all the on-site positions. It was indicated that if contractual arrangements could be completed without undue delay, the scientists could be in the field as early as July 1981. A strong positive response and commitment from faculty to serve as campus support scientists was reported. These include six soil and water conservationists, five farming systems agronomists and four farming systems economists. A staffing pattern was presented with complete staffing for campus support by senior scientists and for two of the three overseas positions through 1985.

Reasonably good faculty competence in the Spanish language was indicated. On-campus training in the language is available and deficiencies would be corrected before overseas assignment.

The representative of the collaborating institution in the Dominican Republic indicated a preference for the Kentucky proposal with a desire for continuing ties with the other universities submitting proposals for that zone. The emphasis on training in the Kentucky proposal was judged good. The high ratio of junior to senior scientists proposed by Kentucky was favorably received.

G. University of Minnesota

The proposal, entitled "Management of Phosphorus on the Acid, Infertile Soils of Latin America," covered work in the Humid Tropics, Acid Savannas and Acid Steeplands of South America. Proposed research sites were Carimagua, Colombia in the Acid Savannas and Yurimaguas, Peru in the Humid Tropics. A senior scientist position stationed at Carimagua (CIAT) was requested to be filled on a rotating basis by a team of faculty members from the university. The Panel did not select the University of Minnesota proposal for funding under the CRSP.

The proposal identified a principal investigator with valuable experience during previous employment as a project leader of the IFDC/CIAT phosphorus project for tropical Latin America. Additional soil scientists were named as contributors to the research proposed. The scope of work proposed was very limited in relation to the research topics listed for the three zones. It appeared that the other universities proposing to work in these zones would adequately cover the research Minnesota proposed. There might be distinct advantages in collaboration with the University of Minnesota and especially with the scientist named as principal investigator. This possibility has been pointed out to the lead university in each of the zones involved.

H. North Carolina State University

The proposal requested leadership in the Humid Tropics and a supporting role in the Acid Savannas. Staffing responsibility for four senior scientist positions overseas was requested: Two in Peru, one in Indonesia, and one in Brazil. The Panel selected North Carolina State University as the lead institution at the Peru site in the Humid Tropics with two senior scientist positions, for a supporting role at the Indonesia site with one senior scientist; and for a supporting role at the Brasilia site in the Acid Savannas, but with no senior scientist staffing responsibility at this location.

The Panel rated the proposal as the strongest received for research at the Peru site. NCSU has an ongoing program at Yurimaguas which has contributed much information towards the alleviation of soils restraints to production in the Humid Tropics. Linkages with national institutions, international centers and other U. S. universities involved in Latin America already have been developed and can be utilized in the project proposed. The work envisioned under this CRSP would become a logical extension of the current program. The senior scientist at Yurimaguas on the current project would become the lead scientist of this project at that location so continuity would be effected.

Two senior soil scientists with excellent backgrounds and extensive experience in tropical soils were named as co-principal investigators. Both have adequate Spanish language capability and have personal experience with the countries in which research is to be conducted. One has Portuguese capability also. Other university faculty members also have extensive experience in tropical agriculture and in developing countries. Eight other soil scientists, two crop scientists, two weed scientists, one economist and one forester were named as campus support faculty. Six are fluent in Spanish and two are fluent in Portuguese. Six junior scientists, three of whom are from developing countries, were named for the Peru location.

The training component of the proposal was judged very strong and NCSU has a long history of providing training for nationals of developing countries, particularly from Latin America. Students trained by NCSU on-campus and in connection with research in developing countries have adequately demonstrated by their professional contributions that the training is excellent and is relevant to country needs. The project document from NCSU indicates that fifteen Ph.D. and 10 M.S. degrees awarded since December 1973 have dealt with soil management in developing countries. Eighteen of the 25 theses were by nationals of developing countries. All these 18 plus two of the U. S. students are now involved in agricultural research in developing countries.

The proposal for the Humid Tropics addressed very well the problems of this zone enumerated in the CRSP document. NCSU has demonstrated its capability to research the problems and its interest in doing so. Its faculty experience is strong in Latin America but not in Indonesia. The proposal concentrates mainly on Peru and is quite brief in regard to Indonesia. The Panel judged that while there may be advantages in having one university play a leadership role for both locations in the zone, greater advantage would result from having a university with more experience in Indonesia performing the leadership functions there. The assigning of a major supportive role in Indonesia to NCSU, including staffing responsibility for one position, will help to assure that maximum utilization of pertinent experience in Peru is effected in the Indonesia program.

The NCSU proposal for research in the Acid Savannas was brief and lacking in a detailed work plan. While it indicated work would be done on many of the critical problems of this zone, it indicated only that details would later be developed. The close working relationship of NCSU with Brazil at the Cerrado Center strengthened the request for a continuing role at that location. The fine working relationship between NCSU and Cornell is expected to continue with both universities being involved in Peru and Brazil with each having one lead and one supporting role. It was concluded that the NCSU proposal for the Colombia site was not as strong as that of the university assigned the lead role or the university assigned the major supportive role at this location. However, it was felt that mutually profitable collaboration of those universities with NCSU might be developed and this was called to their attention.

I. Ohio State University

A leadership role in the Steeplands zone was proposed with continuing staffing responsibility for two of the positions and for the third position in the first and fifth years only. The Panel did not select this proposal for funding under this CRSP.

The proposal shows good recognition of erosion as the overriding problem of the Steeplands. It proposes a multidisciplinary approach involving systems analysis. The University has demonstrated capability in tropical soils and in conducting research projects in developing countries. A senior scientist with extensive experience in tropical soils and developing country problems was identified as the principal investigator. The involvement of many faculty in soils, crops, agricultural engineering, agricultural economics and forestry was indicated. Title XII Strengthening Grant funds have been used to give soils specialists greater familiarity with the Dominican Republic, although there is not an indication as to how many might be involved in the proposed research. Spanish language training is available and apparently is being utilized. The principal investigator is apparently the only one with the Spanish fluency at present, however.

The Panel judged the Ohio proposal as being weak in the experience of faculty in steeplands research and in steeplands agriculture. There is less opportunity to gain such experience within the state as is the case with the institution selected for the lead role in the Steeplands zone. A research project coordinator would have to be recruited. Apparently persons would have to be recruited for the on-site positions in the Dominican Republic also. The proposal indicates over 90 percent of previous overseas positions have been filled with faculty in tenure track positions, however. The attention of the lead university has been called to OSU's interest and the suggestion made that collaborative arrangements should be explored.

J. Pennsylvania State University

This proposed research applicable to all sites and did not request responsibility for any overseas positions. The Panel did not select this proposal for funding under this CRSP.

An interesting line of research was proposed, with two main components: (1) Improving the land resource data base, and (2) technical soil classification systems for practical management purposes. A senior scientist was proposed as principal investigator with support by eight graduate assistants over a five-year period. The proposed activity would complement a domestic program of similar nature. This is currently restricted to the state because of funding sources. The budget requested is modest. The Panel felt this was a worthwhile activity which might add to the success of the CRSP. It suggests that the Pennsylvania State proposal be called to the attention of the Management Entity as this might logically become a part of the program management. It was also suggested that the Management Entity should be familiar with the computer data base maintained by CIAT and another maintained by the University of Hawaii.

K. Prairie View A & M University

Research in the Humid Tropics at the Indonesia site and at the Steeplands site in the Dominican Republic was proposed. No specific senior overseas positions were requested, but two graduate student positions on-site were proposed. The Panel did not select this proposal for funding under the CRSP.

The proposal was vague with regard to exactly what work would be undertaken and how it might contribute to the overall objectives of the CRSP. The main effort proposed appeared to be in training by means of on-campus courses, seminars and workshops along with "on-site, non-formal instruction for extension and administrative personnel" and "formal competency-based instruction" for "graduate and senior staff at collaborating, indigenous institutions in areas of research thrust." Five senior faculty members were identified as contributors to the program with four departments involved.

The Panel judged that while a contribution might well be made by this proposal, the resources and expertise appeared to duplicate to some extent those of the lead institution in the zones concerned. Attention of the principal investigators of the lead institutions has been called to the Prairie View A & M University proposal with the suggestion that collaborative arrangements be explored.

L. University of Puerto Rico

A lead role at the Acid Savannas site in Colombia was proposed, with staffing responsibility for the senior scientist position on-site. The Panel selected the University of Puerto Rico to be the lead institution at Carimagua, Colombia with the on-site senior scientist position staffing responsibility.

The Puerto Rico proposal addressed the main research topics envisioned in the planning process and presented a five-year work plan aimed at their solution. The Panel members and the representative of the collaborating institution of the host country were impressed with the presentation of the proposed research. Ten faculty members indicate involvement, with a senior scientist as principal investigator. The senior scientist to be located on-site will have to be recruited but would be appointed to a tenured position. Two of the campus-based faculty members involved are Colombian nationals with extensive experience in Colombia. All except two of the ten faculty who will play supportive roles speak Spanish as their native language and the other two have reasonable fluency in Spanish.

The University is currently involved in LDC-oriented research in soil and crop sciences. Graduate programs through the Master of Science are offered and students from 20 countries in Latin America and the Caribbean have been trained in tropical agriculture. The University of Puerto Rico has previous linkages with many other U. S. universities. Of particular note is the association with Cornell University over many years in soil fertility problems in the tropics, since Cornell was selected as the major supportive institution for the Colombia site. The resident faculty at the university are not so numerous and do not cover such a wide range of disciplines as the Cornell faculty so the combination of the two universities for the Carimagua site should provide adequate backstopping for the field research team.

M. Purdue University

A leadership role in the Acid Savannas Zone with responsibility for on-site positions in Brazil and Colombia was proposed. The Panel did not select Purdue's proposal for funding under the CRSP.

The Purdue proposal did not seem directed to the problems of the Acid Savannas nearly so well as some other proposals for this zone. While the Panel did not question the capability of Purdue to undertake research for this zone nor its record in tropical soils research and in training of LDC nationals, the proposal did not convey a well planned program for the zone towards which directed. The proposal repeated numerous segments of CRSP documents but did not show adequately that Purdue's proposed efforts would satisfactorily address the problems enumerated.

The proposal recognized that research proposed is not site-specific (page 18), but claims that "results will be generally applicable and will allow the researchers to make predictions for all locations." The Panel had serious concerns about this approach and questioned such wide adaptability because of the great variation in soils, climates and other relevant factors.

It appeared that much of the work proposed by Purdue would be done in laboratory and greenhouse facilities with field testing by senior scientists. It was unclear whether the major part of the effort would be in the developing countries themselves as envisioned in the planning of this CRSP.

The Panel was favorably impressed by the indicated involvement of senior faculty members from Purdue who have extensive experience in tropical soils. The availability of a senior professor with previous experience in Brazil for immediate assignment in that country was also most favorably noted.

The Purdue proposal indicated filling a high proportion of the junior scientist positions on-site with post doctoral scientists. The Panel questioned the wisdom of this as compared to using degree candidates as part of their training programs. While it was felt that both staffing patterns have advantages and disadvantages, the utilization of post doctorals seemed unduly heavy in the proposal. There appeared to be concomittant weakness in the training component of Purdue's proposal.

The language competence of the Purdue staff was not adequately addressed in the proposal. While it was indicated that many have experience in Latin America, their competence in Portuguese or Spanish was generally not indicated. Likewise the University's capability in language instruction for proposed senior and junior scientists was not indicated.

N. Texas A & M University

The proposal requested a leadership role in the Semi-Arid Tropics Zone with staffing responsibility for the three senior scientist positions in Upper Volta/Niger. The Panel selected Texas A & M University for the role requested, including responsibility for the positions.

The proposal was judged excellent by the Panel and the representative of the collaborating institution in the host countries for the research proposed. This was the only proposal, however, which was not in direct competition with

another since it was the only one requesting leadership in the zone. Other universities proposed supportive work and it is hoped their collaboration can be considered by Texas A & M University.

The proposal addressed the research topics of the Semi-Arid Tropics outlined in the CRSP document. A team of four specialists has been assembled to devote primary effort to soil crusting problems and their alleviation under semi-arid conditions. This problem was identified in the CRSP document as one of the primary constraints in these soils. Specialists in ground cover agronomy and crop drought tolerance as well as faculty with specialization in numerous sub-disciplines of soil science also were listed as campus support personnel. As pointed out in the Texas A & M University proposal, the soil scientists in Texas deal with semi-arid soils very similar to those in the SAT zone for which research is proposed. Basic management principles learned in the domestic research program may be adapted to the SAT zone during the course of this project.

The supportive faculty is generally weak in French language speaking capability, but plans are indicated to correct the deficiency.

Texas A & M University has demonstrated competence in international research and training. Currently eleven international projects are being conducted by the university and five have been completed in Africa. Internationally-oriented courses in appropriate disciplines are offered on-campus. Over 60 participants from developing countries have received training at Texas A & M University in soil and crop sciences since 1963. Participant field research has been conducted in the native country whenever funding and resources have permitted.

A senior scientist with six years experience in tropical areas was named principal investigator. Twelve other senior scientists were proposed for involvement in the research. The on-site senior scientists would be recruited from present faculty for one position, if possible. Two positions will likely be filled by recruiting from outside current staff and all three may be so recruited. It is indicated that most staff hired outside the university to date for overseas contract positions have been absorbed back into the system upon completion of the contract service.

0. Washington State University

The proposal involves the Humid Tropics, Semi-Arid Tropics and Acid Savannas but does not request senior scientist staffing responsibility at any of the sites. The Panel did not select this proposal for funding under the CRSP.

Washington State University presented an interesting proposal for specific lines of research which might be conducted at all sites except the Steeplands one. On-campus research was proposed to adapt to a variety of crops the "rapid, simple procedures previously developed for screening Al-tolerant cereals. It further proposed to develop similar procedures for screening these crops for Mn tolerance and P efficiency. These screening procedures will permit research personnel of primary research sites and collaborating international centers to select locally adapted varieties for increased food production at low cost."

The competence of the university and of the three investigators for undertaking the study appears to be good. The approach indicated may well be worth attempting and some of the universities awarded funding might explore a collaborative arrangement with Washington State University. Perhaps the approach indicated may be superior to that envisioned by other universities and inter-

national centers for evaluation of plants for tolerance to Al and Mn and for efficiency in utilization of phosphorus. The proposal should be referred to those universities which will receive funding.

The Panel did not judge that this proposal should be allocated any of the limited funding expected to be available under this CRSP unless it be through a collaborative arrangement with one of the lead universities.

P. University of West Virginia

The proposal envisioned multidisciplinary support to other universities and possible participation in the Humid Tropics, Steeplands and Acid Savannas. It did not request any on-site positions. The Panel did not select this proposal for funding under this CRSP.

Campus support in pedology, pasture, livestock, economic analysis and technology transfer was proposed. Eight faculty are willing to contribute a total personnel equivalent of 0.7 FTE. The credentials of the university and of the faculty members available for support activity was not questioned. However, the Panel felt this proposal should not participate directly in the limited funding of the CRSP, but might work out a cooperative arrangement with one of the lead universities to mutual benefit. The proposal should be referred to all lead universities for their consideration.

The University of West Virginia proposal had strong emphasis on livestock. It was pointed out that Australia has a large livestock program in Indonesia and CIAT in Latin America, both which may have application to the objectives of the CRSP for the Humid Tropics and Acid Savannas, at least. The lead universities should investigate the applicability of this research as well as the West Virginia support possibilities.

IV. Modifications in Program

A. Field and Campus Position Assignments

In the selection process, assignment of the senior scientist positions on-site was made. The Panel, the Planning Entity, the representatives of collaborating institutions in the host countries and AID representatives gave further consideration to assignment of junior positions on-site and to campus-based senior and junior scientist positions. The following two tables give the agreed-upon assignments. Table 2 shows senior and junior scientist assignments for field and campus locations for each zone. Table 3 summarizes positions assigned to each university.

B. Work Plans/Position Descriptions/Other

The Panel met with the principal investigator(s) and country representative(s) for each zone to discuss relationships between cooperating universities and host countries. Some modifications were suggested and discussed and several changes agreed upon.

Suggestions applicable to all programs included:

1. Training should have a top priority. The ratio of junior/senior overseas positions should be as high as possible at each location.

Table 3. Summary of positions assignment by university (for second and subsequent years of funding).

University	Zone*	Senior Scientists			Junior Scientists**		
		Field	Campus	Total	Field	Campus	Total
----- SY's -----							
Cornell	HT	1.0	0.5	1.5	2.0	1.0	3.0
	AS	1.0	1.2	2.2	3.0	1.5	4.5
	Total	2.0	1.7	3.7	5.0	2.5	7.5
Hawaii	HT	2.0	1.5	3.5	4.0	2.0	6.0
Kentucky	STP	3.0	2.0	5.0	6.0	3.0	9.0
NCSU	HT	3.0	2.0	5.0	5.0	2.5	7.5
	AS	0.0	0.2	0.2	1.0	0.5	1.5
	Total	3.0	2.2	5.2	6.0	3.0	9.0
TAMU	SAT	3.0	2.0	5.0	5.0	4.0	9.0
P. Rico	AS	1.0	1.0	2.0	2.0	1.0	3.0
Total		14.0	10.4	24.4	28.0	15.5	43.5

* Zones: HT = Humid Tropics; SAT = Semiarid Tropics; AS = Acid Savannas; STP = Steeplands.

** Training positions.

2. Discretionary funds might be set aside for training, to be administered by the Managing Entity, so that if one university cannot fill its training positions, the funds could easily be used elsewhere for training.
3. Counterpart staff should be actively involved in training plans.
4. Training of nationals from other countries in the same ecological zone should be considered, not just those from the countries with primary research sites.
5. The Panel endorsed the need for an early flow of funds for on-site visits and planning at each location.
6. There is need to develop concrete plans for each research site as soon as possible.
7. Agreement with USAID missions in countries where research is to be conducted should be secured in writing by principal investigators on policy and business matters concerned with the program. It was suggested that a satisfactory way to propose securing approval of travel of scientists might be for the principal investigator to notify the mission directly of proposed travel at least 30 days ahead of arrival date. If no objection is received, the travel might be considered approved by the mission.
8. Each university senior or junior scientist should be on the payroll of his/her university and abide by its applicable regulations. Each has a technical responsibility, defined as well as possible.
9. A team leader at each location speaks for the program when one voice is needed to represent the total program.

There were discussions, suggestions and some modifications for specific zones as follows:

1. Humid Tropics

a. Peru. North Carolina State University, Cornell University and the representative of the Instituto Nacional de Investigaciones Agrarias (INIA), Peru all seemed to be in agreement regarding the program there. The position descriptions in the Soil Management CRSP General Program Proposal are satisfactory. The host institution representative pointed out the necessity for his organization's input in selection of senior scientists. He also pointed out the essentiality of Spanish language capability in persons selected for in-country positions. Third country training possibilities were mentioned and discussed. The possibility of cross linkages with the Acid Savannas programs was pointed out. Both NCSU and Cornell are involved at the Brazil location and Cornell at the Colombia location in that zone.

b. Indonesia. The principal investigator from the University of Hawaii reported that as a result of discussions with the Panel Chairman, the principal investigator of NCSU, and the representative from the Soil Research Institute, Indonesia, the Hawaii proposal had been modified. The locations specified in the General Program Proposal would be the principal research sites in Indonesia.

Fuelwood production would be de-emphasized and made a subtopic under erosion control. He requested that the roles of the lead and supporting institutions be defined as clearly as possible to avoid future uncertainty and/or misunderstanding. He also requested that the qualifications of the counterpart staff be clearly defined.

The representative from Indonesia indicated contributions of the host institution would be of two types: In-kind and in-cash. In-kind contributions would be the provision of people and facilities. In-cash contributions would be utilized for operational expenses mainly. There are less difficulties in using Indonesian funds for operations than for equipment purchases. He raised the question about the project providing supplementary salary for counterpart staff. It was pointed out that it is difficult to get local staff to work in rural areas such as the selected sites because living conditions for families are not good and there is little opportunity to supplement salary with second jobs or with spouses' employment as may be done in larger cities. Such supplementation is possible but it must have host country and USAID Mission approval even if funds are available.

The principal investigator from Hawaii reported that his university has good training available in the Indonesian language and all who will work on the project in Indonesia will be expected to have such training, if needed.

Hawaii had suggested modifications in description of the three senior scientist positions located in Indonesia. After considerable discussion amongst all parties involved, the following position descriptions were agreed upon by principal investigators, the host country representative and the Panel:

Position 1.4 Soil Management Specialist (NCSU responsible for staffing). A scientist experienced in the science and art of land clearing operations and their impact on agricultural land use. His/her role is to bring the full research capability of NCSU to bear on the CRSP, including the site-specific measures and research in respect to soil fertility required to arrive at a sustained level of economic production.

Position 1.5 Soil/Crop Scientist/Agronomist (Hawaii responsible for staffing). A scientist who will conduct soil management research in the context of farming systems, emphasizing the conservation and improvement of the soil resources for sustained agricultural production.

Position 1.6 Farming Systems Socioeconomist (Hawaii responsible for staffing). A scientist who will identify socioeconomic factors that lead to adoption or rejection of soil management innovations and aid in research on constraints analysis.

It was pointed out that the three positions must function as a team. Hawaii will designate one of its senior scientists as team leader.

2. Semi-Arid Tropics

The representative of ICRISAT's West Africa Program served as collaborating institution representative of the host countries: Upper Volta and Niger. He informed the group that ICRISAT has plans well underway for appointment of a soil physicist for the West Africa Program, so he requested a change in priority of filling of positions in the CRSP for this zone. It was agreed that attention

should be given by Texas A & M University to filling the other two on-site senior scientist positions and defer filling Position 2.1, Soil Physics, until 1982. In the meantime, further discussion of need for that position can be held amongst all concerned, including the Management Entity. The Panel emphasized the need for keeping the three person team intact.

The Texas A & M University principal investigator inquired whether budget adjustments might be made amongst the zones to account for different start-up and personnel costs in the various zones. A Panel member inquired as to how well Texas A & M University staff are aware of research by French scientists in West Africa's Semi-Arid Tropics. He pointed out that one of the first priorities of the principal investigator and other senior scientists should be to become familiar with the pertinent French literature. Competence in the French language is essential and involved scientists who do not have such competence must take corrective action as soon as possible. The need for an early planning session with ICRISAT and the principal investigator was emphasized.

3. Acid Savannas

a. Brazil. The Director of EMBRAPA's Centro de Pesquisa Agropecuaria dos Cerrados indicated that his organization would handle matters such as those connected with entry of CRSP personnel into Brazil and exit from Brazil. Three months notification of arrival of staff in Brazil is needed. He indicated that the CRSP senior and junior scientist would be considered staff members of CPAC. CRSP senior staff and local senior staff should be co-advisors of junior scientists and graduate students. Graduate students should not be assigned to sites other than CPAC until they have had time to get oriented at CPAC regarding research, Brazilian culture, etc.

There was a short discussion about NCSU's involvement with Cornell at the Brazil site. NCSU will have junior scientists assigned at the site but no senior scientist. Cornell and NCSU have worked at this site before and should do so again with minimum problems, it was concluded.

b. Colombia. Two representatives of CIAT and one representative of the Instituto Colombiano Agropecuario (ICA), Colombia represented the host country. Agreement between them and the principal investigators of the lead and supporting institutions, University of Puerto Rico and Cornell, respectively was evident. No major changes in the program was envisioned and it can start as soon as funding and personnel are available. A host institution representative pointed out that housing for outside staff is critically short at the site. This will hinder staffing and training of students unless project funds can be made available for renovation of some houses.

Host country representatives indicated that ICA was not interested in soybean research when planning agency personnel visited the country. Now they would like to see this work included. The Puerto Rico investigator reported his university is a partner with the University of Illinois in the INTSOY (International Soybean) program and could provide all the expertise required.

4. Steplands

The representative of the Secretaria de Estado de Agricultura, Dominican Republic indicated agreement with the program planned. He urged an early on-site planning session. One Panel member expressed concern that there was no

clear statement about the use of trees in the uplands for erosion control in the Kentucky proposal. He was assured this would be included and backstopping would be secured from other universities, if needed.

V. The Management Entity

The BIFAD staff representative outlined the general requirements of the Management Entity as follows:

1. It cannot be a governmental agency.
2. It is accountable for the funds assigned to the CRSP.
3. It is responsible for the CRSP program; it works up agreements with the institutions/agencies involved.
4. It is to be selected by the lead institutions funded under the CRSP. Their selection is sent to the Joint Research Committee as their recommendation. JRC then approves or disapproves and transmits to BIFAD which similarly transmits to AID with approval or disapproval.
5. A full time Director is to be appointed by the Management Entity with approval of the Board of Directors. He/she cannot be a principal investigator.
6. The Board of Directors includes one administrative level representative of each university participating in the CRSP as a lead institution.

The BIFAD staff representative indicated that the Management Entity is responsible to the Board of Directors and not to the university at which it is housed. It must, however, comply with that university's regulations concerning the handling of funds. The question was raised about possible inconsistency in having the Director responsible to the Board of Directors and yet the Management Entity is responsible for the program and accountable for the funds. He conceded that there may be some inconsistency but the Director must be protected from improper interference by administrators of the university at which he is housed. The Director must be given adequate responsibility and freedom to administer the program in line with policies set down by the Board of Directors.

A. Suggestions for Its Organization

The Panel considered some aspects of the Management Entity at its second meeting and made some recommendations which appear in the CRSP General Program Proposal. The following statements and recommendations came from the Third meeting and supersede statements in the General Program Proposal whenever they are not in agreement with the previous write-up.

1. Board of Directors

The Board of Directors will consist of one representative of each university selected for a leadership role at one of the agroecological zone primary sites (6) and one representative of the collaborating institution at each primary site (6). Each institution will appoint a member with authority to make

institutional commitments to the CRSP. The Board will elect its chairman at the first meeting. The Director appointed by the Management Entity will be an ex-officio member of the Board.

Since the recommended size of the Board is somewhat large, the Panel recommends that the Board appoint an Executive Committee with authority to act for the Board in designated matters. It was suggested that the Executive Committee might be composed of three representatives of U. S. universities and two representatives of collaborating host country institutions. The Board Chairman should, of course, be one of the members of the Executive Committee.

Some concern was expressed regarding the legality of permitting host country representatives to have an official vote in allocation of U. S. funds for which the U. S. universities are accountable. This must have further study. However, there was unanimous agreement amongst Panel members that, in principle, there should be some representation of host country representatives on the Board of Directors.

The Board decides broad policy issues, including the allocating of funds to the participating universities and primary research sites and overseas relationships between the Management Entity and the individual universities.

2. Technical Committee

The Technical Committee will consist of the Director appointed by the Management Entity plus the principal investigators (6) of lead universities plus the principal investigator of the collaborating institution at each primary site (6). It is suggested that the Technical Committee might meet at each primary site, on a rotational basis.

Suggestions were made for four subcommittees of the technical committee-- one for each of the agroecological zones. This was judged to have merit and would reduce the frequency of meetings of the full technical committee required.

The Technical Committee has responsibility for development of the total program under this CRSP and for recommending to the Board the allocation of funds.

3. External Review Panel

An external review panel should be appointed by the Board of Directors for each primary site. It is suggested that each panel should consist of not more than four members. Two of the members of each panel should be persons willing to commit themselves to a continuing relationship to the CRSP and might serve on review panels for all the zones. The other members of each panel should be ad hoc appointments for review of the specific site and should have some familiarity with the site and the CRSP.

Reviews should be periodic but not necessarily on an annual basis. The first review should not be held at a site until the program has been underway for more than one year.

B. Selection of the Management Entity for Soil Management CRSP

Representatives of each of the six universities were asked if their institution was interested in becoming the Management Entity for this CRSP. Cornell

University and North Carolina State University replied in the affirmative; the University of Hawaii, University of Kentucky, University of Puerto Rico and Texas A & M University replied in the negative.

Each of the two universities interested in becoming the Management Entity was asked to state briefly how they envisioned it would be set up at his institution. The following summarizes the responses.

Cornell University. The Management Entity would be located in the Department of Agronomy, which the soils staff are a part of. The Director would be selected from amongst the senior professors in soil science. One such faculty member had expressed interest already.

North Carolina State University. The Management Entity would not be in the Soils Department. It would be attached to the office of Associate Director of Agricultural Research Service and Coordinator of International Programs. The Director would be selected in the same manner as any other campus position, i.e., open recruitment.

It was pointed out that each of the six lead universities had one vote. In the event of a tie vote, the meeting would be adjourned for a time and then another vote taken.

The voting was completed: Cornell University - 3 votes
North Carolina State University - 3 votes.

When the meeting convened again, the following procedure was suggested and approved in the event of another tie vote: Dr. Lawrence Apple, Associate Director of the Agricultural Research Service and Coordinator of International Agricultural Programs, North Carolina State University, as administrative representative of the CRSP Planning Entity will call a meeting of the administrative representatives of the other U. S. universities and they would decide the matter.

The second vote was a 3-3 tie again. The Third and final meeting of the External Panel adjourned.

MEETING ON THE ORGANIZATION OF THE MANAGEMENT ENTITY

Washington, September 25, 1980

The Planning Entity recommends this organizational and management structure for the Soil Management Collaborative Research Support Program (CRSP). It is understood that the details of this structure may require modification and refinement after the collaborating institutions and the management entity are confirmed. However, administrative representatives from the universities recommended by the Planning Entity for participation in the CRSP met in Washington, D. C. on 25 September 1980 and adopted this as a tentative descriptive statement of the Management Entity.*

I. Recommended Institution:

At the same meeting, the group selected North Carolina State University, by majority vote, as the institution to be recommended as the management entity for the program.

The organizational components and their functions are described below:

II. Functions of the Management Entity:

The Management Entity shall perform the following functions:

- A. Negotiate and execute a grant agreement with AID to provide funds for the CRSP.
- B. Negotiate and execute with the collaborating U. S. universities an agreement embodying the general principles contained in this statement. These agreements shall stipulate that the lead U. S. university for each research site is jointly responsible with the Management Entity for negotiating and signing the necessary agreements with collaborating host country and international institutions.
- C. Assume fiscal accountability to AID for all grant funds.
- D. Employ a qualified CRSP Director and other such supporting staff as authorized in the Management Entity budget of the grant. The Board shall concur in the selection of the CRSP Director.
- E. Make annual fund allocations to each project and obligate funds received from AID through subgrant agreements with the respective collaborating institutions, including suitable procedures for

* Participants in the meeting were: Dr. William Furtick (U. Hawaii), Dr. Theodore Hullar (Cornell U.), Dr. W. Fred Johnson (BIFAD), Dr. Morris Bloodworth and Dr. Frank Calhoun (TX A&M), Dr. Thomas Dowe (U. Puerto Rico), Dr. John Malcolm (AID/DS/AGR), and Dr. J. Lawrence Apple (NCSU). The participation of Dr. Herbert Massey (U. Kentucky) was prevented by inclement weather, but he has subsequently reviewed and concurred with this statement.

fiscal and programmatic reporting and for commitment of cost sharing. The annual allocations will be based on an annual budget plan prepared by the CRSP Director with the collaboration of the Technical Committee and the approval of the Board of Directors.

- F. Provide for central administration, in accordance with the annual budget plan, of program funds allocated for purposes of (but not limited to) the meetings of the Technical Committee and its working groups, meetings of the Board of Directors, meetings of the External Evaluation Committee, and reproducing reports, publications and other documents.
- G. Recommend and negotiate with AID the addition or deletion of component projects and program elements or their modification based upon the advice and recommendations of the External Evaluation Committee and/or the Technical Committee and with the approval of the Board.
- H. Provide general administration of the CRSP through the appropriate administrative office of the university.
- I. Report in accordance with the requirements of the grant agreement to AID and to JRC/BIFAD on the progress and accomplishments of the CRSP.

III. Board of Directors:

Each participating eligible U. S. institution shall appoint one administrative representative to the Board. Each institution may also appoint an alternate representative. Board members should be able to make institutional commitments for the CRSP. They may not also be members of the Technical Committee. Three administrators from collaborating host country institutions will also be members of the Board. (The term of appointments and the method of selection of host country institutional members will be determined by the Board in consultation with all members of the host country administrative representatives group). The Board will:

- A. Provide liaison between institutional administration and the Management Entity.
- B. Establish policy for the program.
- C. Review the general expenditure patterns of the CRSP and approve the annual budget plan for allocation of funds to projects and overseas sites.
- D. Approve the addition or deletion of component projects and program elements and changes in program objectives.

- E. Receive and utilize in its decisions reports from the External Review Committee.
- F. Review the progress and accomplishments of the CRSP.
- G. Concur in the selection of the CRSP Director.
- H. Form an Executive Committee (if deemed necessary) to plan for meetings, to act for the Board between meetings, and to be available to the Management Entity for consultation.
- I. The Board shall elect a Chairman by procedures and for a term of office as determined by the Board.
- J. Invite other host country administrators who are not members of the Board and administrative representatives of international institutions collaborating in the program to attend Board meetings at their discretion and with their own support.
- K. Schedule as appropriate special joint meetings of the Board with the host country administrators (those not members of the Board), the Technical Committee, the External Evaluation Committee, and host country principal investigators for indepth assessment of program progress and for development of long-term projections.

IV. Technical Committee:

The principal investigator of each component project shall be a member of the Technical Committee, and the CRSP Director shall be an ex-officio member. Under the leadership of the CRSP Director, the Technical Committee will develop plans for integrating the research and training activities of the component projects to maximize progress toward the objectives of the program. The Technical Committee will develop liaison procedures with overseas colleagues to obtain their inputs into program activities. The Committee will collaborate with the CRSP Director on:

- A. Development of plans for the research and training programs including the addition, modification, or deletion of components.
- B. Development of the annual budget plan for allocation of funds to the component projects and overseas sites.
- C. Development of policies on publication and dissemination of research results, including joint publications.
- D. Preparation of reports.

- E. Establishment of Technical Subcommittees for each research site as a mechanism of research planning, coordination, and communication.
1. Membership of individual subcommittees will comprise the principal investigators of the U. S. universities collaborating host country principal investigator(s), a representative of the country USAID Mission (by mutual consent), and a representative of international institutions(s) where appropriate. An administrator from the host country collaborating institution may serve as advisor to the subcommittee.
 2. The annual plan of work for each research site should originate with the appropriate technical subcommittee.
 3. The normal channel of communication of each technical subcommittee would be through the Technical Committee Chairman; however, a technical subcommittee may direct communications, as judged appropriate, to the CRSP Director, Board of Directors, or to the External Evaluation Committee.

V. External Evaluation Committee:

This Committee shall consist of two or three eminent scientists. Its members shall be appointed to specified terms by the Management Entity in consultation with the Technical Committee and upon the advice and consent of the Board and JRC. Members of the Committee shall be from institutions other than those participating in the Soil Management CRSP. The Committee membership shall be augmented as necessary from an approved list of scientists for specific evaluation assignments. The Committee shall:

- A. Review the projects and program of the CRSP as requested and provide written evaluation reports to the Management Entity, the Board, AID, and JRC/BIFAD.
- B. Make recommendations on the addition, elimination, or modification of component projects and overall objectives.
- C. Make recommendations to the Management Entity on retention or elimination of overseas work sites and on the selection of new ones as necessary.

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John - 3
Yoda signed
copy
5/2/83

ENVIRONMENTAL THRESHOLD DETERMINATION

TO: AA/DS, Sander Lavin
THRU: DAA/DS/FN, Tony Babb
FROM: DS/AGR, James K. McDermott
SUBJECT: Environmental Threshold Decision

DEC 11

Project Title: CRIS Soil Management
Project Number: 001-1011
Specific Activity: Research Program

Reference: Initial Environmental Examination (IEE)
contained in Proposal for subject project
dated October 20, 1980 (page 1)

On the basis of the Initial Environmental Examination (IEE) referenced above and attached to this memorandum, I recommend that you make the following determination:

- 1. The proposed agency action is not a major Federal action which will have a significant effect on the human environment.
- 2. The proposed agency action is a major Federal action which will have a significant effect on the human environment, and:
 - a. An Environmental Assessment is required; or
 - b. An Environmental Impact Statement is required.

The cost of, and schedule for this requirement is fully described in the referenced document.

- 3. Our environmental examination is not complete. We will submit the analysis no later than _____ with our recommendation for an environmental threshold decision.

Approved: _____

Disapproved: _____

Date: 12 Nov 83

Clearance:

DS/AGR/RNR,	J. Malcolm	Date	11/20/80
DS/AGR/RNR,	C. Sinkins	Date	11/20/80
DS/AGR,	M. Mozynski	Date	11/20/80
DS/PO,	B. Chapnick	Date	11/20/80

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NO. 30 - 31

VIII. PROJECTED IMPACT OF UTILIZATION

A. On World Food and Energy Production

The potential impact of INTSOIL on world food production is perhaps greater than that of any other CRSP. This is due to the fact that soil is the basic common denominator of the bulk of the world's food supply and its vegetatively-produced energy supply. INTSOIL'S development of proper soil management technology for food and energy production in the four agro-ecological zones which encompass the developing world will make it possible to increase substantially food production in these areas. The improved soil management technologies to be developed by INTSOIL can be used to support the commodity-oriented program of the international agricultural research centers and the other CRSPs. The National Academy of Sciences has projected that a proper soil management technology in the humid tropics alone can increase crop yields to 150-200% greater over those of the present state on a per hectare per year basis.

B. On Farming System Stability

The use of proper soil management technologies is the key to improved farming systems in the developing world. The National Academy of Sciences has projected that without these improved soil management technologies in the agro-ecological zones of INTSOIL'S impact area, both spontaneous and planned settlements will fail as farming systems fail due to the deterioration and irreversible loss of the non-renewable soil resource base. No group is more affected by the production, or lack of production, from a limited land area than is the small farmer and his family. Their very lives are tied to their soil. Improved soil management technologies for the farming system are utilized by the small farmers and their families and will enable these systems to be productive while at the same time conserving the soil resource base.

C. Initial Environmental Examination

The activities of this project fall into the area described in Environmental procedure regulations, Para 216.2 (c) "Analyses, Studies, Academic or Investigative Research, Workshops and Meetings." These classes of activities will not normally require the filing of an Environmental Impact Statement or the preparation of an Environmental Assessment. It is possible that an output of this project will be set of procedures, guidelines or research results which when used would require such assessment. However, the project itself only proposes research and directly supportive activities. Under these guidelines this activity clearly qualifies for a negative determination at the time when a threshold decision is determined.

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Use of improved soil management technologies developed by INTSOIL will result in considerable conservation and improvement of the environment. In the humid tropics, replacing shifting cultivation with continuous cultivation through improved soil management will result in less areas being cleared for agriculture and hence, the retention of the ecological integrity in much of the humid tropics. In the semi-arid tropics, improved soil management could lead to establishment of permanent agriculture in this zone and hence, a reduction in the desertification of these areas. In the acid savannas, development of appropriate soil management technologies will result in developing countries with other agro-ecological zones which are more environmentally sensitive to center food and energy production on the acid savanna soils which can be farmed with less adverse impact on the environment. In the steppelands, improved soil management technologies produce food and energy yields consistent with the necessary conservation of the soils of that zone.

D. Development of Host Country Capabilities

INTSOIL is envisioned to have a major impact on developing capabilities of scientists within the host countries. Training of host country capabilities was stressed from inception of planning by the host countries and USAID Missions responding to questionnaires by those countries visited by planning teams and finally by those host countries participating in the development of the Final Program Proposal. It is strongly felt that one of the most lasting impacts of INTSOIL will be the host country research capability that is developed during the program and remains after the program. Therefore, the INTSOIL's ratio of junior scientists to senior scientists is approximately 2:1. Although graduate training at participating and other U. S. universities is planned, the degree research will be conducted within the host country itself. In this way, research capabilities for host country scientists will be developed within the countries themselves on soil management problems pertinent to the particular agro-ecological zone represented.

E. On Women

In every agro-ecological zone of INTSOIL's impact area, women are involved in various phases of land clearing, planting management and harvesting of crops. Current estimates are that women perform nearly 60% of the soil management work in the agro-ecological zones of INTSOIL. Improved systems for soil-crop management to be developed by INTSOIL are expected to reduce the women's work load and thus time involvement in backbreaking agricultural production. A spin-off effect of this could be a more stable family unit. Certainly, women, men and children will receive a greater return from their use of improved soil management systems to be developed by INTSOIL.

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SOIL MANAGEMENT CRSP
FINAL PROGRAM PROPOSAL

for the implementation of the
INTERNATIONAL SOIL MANAGEMENT PROGRAM
(INTSOIL)

Submitted to AID and JRC

by

North Carolina State University
(The Planning Entity)

Supported by

Grant AID/DSAN-G-0133

October 14, 1980

(Revised Version)

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I. SUMMARY

A. Statiscal Summary

1. Title: International Soil Management Program -- INTSOIL (Soil Management CRSP).

2. Institution (Management Entity): North Carolina State University, Raleigh, North Carolina 27650

3. Starting Date: January 1, 1981

4. Duration: 5 years minimum

5. TOTAL AID Funds Requested:

Year 1	\$ 2,928,000
Year 2	4,733,000
Year 3	5,450,000
Year 4	6,052,000
Year 5	6,688,000
	<u>\$25,851,000</u>

6. Participating U. S. Universities:

Cornell University
University of Hawaii
University of Kentucky
North Carolina State University
University of Puerto Rico
Texas A & M University-

7. Participating Host Country Institutions:

Instituto Nacional de Investigaciones Agrarias (INIA), Peru
Soils Research Institute (SRI), Indonesia
Central Research Institute of Agriculture (CRIA), Indonesia
Bogor Agricultural University (IPB), Indonesia
International Crop Research Institute for the Semiarid Tropics (ICRISAT), West Africa Program
Empresa Brasileira de Pesquisa Agropecuaria (EMBRAPA), Brazil
Instituto Colombiano Agropecuaria (ICA), Colombia
Centro Internacional de Agricultura Tropical (CIAT), Colombia
Secretaria de Estado de Agricultura (SEA), Dominican Republic

8. AID Project Manager: John L. Malcolm DSB/AGR

B. Narrative Summary

The outcome of the Soil Management CRSP planning process is the proposed International Soil Management Program (INTSOIL). Its main objective is to develop improved soil management technology for increasing the productivity of marginal soils of the tropics on an agronomically, economically and ecologically-sound basis. Stable farming systems on marginal soils of the tropics are a most crucial component of world food production since many of the major breakthroughs have already been made on the better soils of the Third World.

INTSOIL is a collaborative research program to be conducted jointly by six U. S. universities and nine collaborating host country institutions located in Peru, Indonesia, Upper Volta, Niger, Brazil, Colombia and the Dominican Republic. It consists of four major agroecological zones. Research on the Humid Tropics will be conducted in the Amazon of Peru and transmigration areas of Sumatra, Indonesia by North Carolina State University (NCSU), the University of Hawaii, Cornell University, Peru's Instituto Nacional de Investigación Agraria and three Indonesian institutions: The Soils Research Institute, the Central Research Institute for Agriculture and the Bogor Agricultural University. Work on the Semi-Arid Tropics will be conducted by Texas A & M University in conjunction with ICRISAT's West Africa Program in Upper Volta and Niger. Research in the Acid Savannas will be conducted in the Cerrado of Brazil and the Llanos of Colombia by Cornell University, the University of Puerto Rico, NCSU, EMBRAPA, ICA and CIAT. The Steeplands research will take place in the Dominican Republic and will be executed by the University of Kentucky and the Secretaría de Estado de Agricultura. INTSOIL will be administered by a Management Entity (NCSU) under the direction of a Board of Directors and with the assistance of a Technical Committee and an External Review Committee.

The detailed program is described herein with a time-phased staffing pattern and budget. It should be emphasized that the program design is largely the outcome of the needs of developing countries and the interaction between the participating U. S. universities and the host country institutions.

INTSOIL could make a significant contribution to solving the world food problem by increasing the productivity of marginal soils of the developing world while preventing their erosion and degradation.

II. BACKGROUND AND JUSTIFICATION

A. The Problem: Increase Production in Marginal Soils While Conserving Them

Soil is the basic common denominator of the bulk of the world's food supply and its vegetatively-produced energy supply. This axiom holds true whether one is concerned with crop or livestock production or energy production from vegetation, wood or dung. The lives of the rural poor of the world depend almost exclusively on what they can produce on their impoverished soils for their food and energy supplies.

Those food and energy yields are determined by the management of the basic common denominator, soil. If that soil management is proper, the food and energy production will be high; if it is bad, likewise will be the food and energy yields. It is only through long-term, collaborative research on soil management in the developing countries that the proper soil-crop management systems can be found. This is precisely what the Soil Management CRSP will do.

The contribution of agricultural research in increasing food production in developing countries has been most impressive during the 1970's. The President of the World Food Council, Antonio Tanco, attributed the overall food production increase of 3.5% per year in the developing countries largely to the application of breakthroughs in agricultural research. Secretary Tanco has also stated at no other time in history has the world had the political awareness and the will to solve the world food crisis.

The two remaining decades of this century, however, harbor a less optimistic picture. Most of the increases in food production have been accomplished when green revolution-type technology was applied to fertile soils with irrigation. Although continuing efforts in this direction are essential, the rate of increase in food production based on high energy inputs is decreasing, because the best soils are already in such use and because of the increasing cost of energy derived from fossil fuels.

FAO's "Agriculture Towards the Year 2000" study shows that a 4% per year growth in food production during the 1980's and 3.8% during the 1990's is needed in order to meet food demands in the developing countries. Approximately 1/3 of the additional food will be produced on new land and 2/3 by increasing yields on soils already under cultivation. In order to accomplish this goal, a staggering 200 million hectares of newly cleared soils must be brought into production within the next 20 years. This is equivalent to the entire area presently devoted to cropland in the United States.

Because the better soils of the developing countries are being cultivated more intensively, the main concerns are shifting from the production of high yielding varieties to the management of marginal soils for sustained food production. By marginal we mean those lands which have serious soil and rainfall distribution constraints, which cannot be intensively irrigated, but which have favorable temperatures for year-round growth. The bulk of these soils are located in the tropics.

Those marginal soils will undoubtedly play a major role in world food production during the next 20 years, either in a positive or a negative way. Most of the expected increases in cultivated area is expected from the humid tropics and acid savannas which, for the most part, are not under heavy population pressures and have generally favorable rainfall and temperature regimes, but severe soil chemical constraints. In other marginal areas, intense population pressures are causing yield declines and the deterioration of the land resource base. Such is the case of the semiarid tropics and many steep-land areas.

The focus on marginal soils is not only relevant for food or energy production purposes, but also for the preservation of the natural resource base. Severe soil erosion and unnecessary deforestation is taking place in the humid tropics, the acid savannas, the semiarid tropics and the steplands when farmers cultivate land without appropriate soil management technology. The humid tropics, the semiarid tropics, the acid savannas and the steplands have been identified as some of the world's most crucial ecosystems, not only by the assessment phase of this study but also at the Soil Constraints Conference held at IRRI in June of 1979 and the Conference on Agricultural Production in the 1980's held at Bonn, West Germany in October 1979.

These marginal areas are in great need of research to develop improved farming systems that can increase food production on a sustained basis in a way compatible with existing socioeconomic conditions. Since soil constraints are the major limitation, the development of appropriate soil management technology is an essential requirement for improved farming systems. While many past and present attempts to alleviate world hunger and energy scarcity have centered on commodities, it is now well recognized that soil limitations to food and energy production cut across commodity lines.

Three years ago, the World Food and Nutrition Study of the National Academy of Sciences, which required two years of intensive effort by some of the United States' most outstanding scientists, recommended the twelve highest priority research areas to increase world food production to alleviate world hunger. Eight of the twelve, either totally or partially, are dependent directly upon soil management. The recently released Report of the Presidential Commission on World Hunger (March, 1980) and the "Global 2000" report (July, 1980) underscore these recommendations with a vivid scenario of mass starvation, pestilence and consequent unstable world conditions which will affect even the most insulated developed countries unless food and energy production in the developing countries is increased. Secretary of State Muskie succinctly stressed the interrelationship recently in a speech before the Foreign Policy Association (August, 1980) when he stated, "It is in our interest to do all we can now to counter the conditions that are likely to drive people to desperation later. We would rather send technicians abroad to help grow crops than send soldiers to fight the wars that can result when people are hungry and susceptible to exploitation by others."

Two years ago, the Joint Research Committee and AID had the foresight to realize both this urgent situation and the unique, positive impact that a Soil Management CRSP could have on changing it. The JRC voted Soil Management as highest priority of the potential CRSP's and, in May 1979, awarded to North Carolina State University a grant for planning that program.

The priorities of the Soil Management CRSP in the agroecological zones of the humid tropics, semiarid tropics, acid savannas and steeplands from the beginning have centered on food and energy. Substitution of human energy for fossil fuels, use of crops and varieties and protection of the non-renewable soil resource base have been integral parts of the Soil Management CRSP since inception of planning. The four agroecological zones of the program cover most developing country situations where population pressures are forcing settlement and farming of the marginal soils, be they the acid, infertile soils of the humid tropics and savannas, the infertile, parched soils of the semiarid tropics or the erosion-susceptible soils of the steeplands.

The planning of the Soil Management CRSP by North Carolina State University and an External Advisory Panel of internationally renowned development experts, is in its last stages of development. The planning process began with consultation with host country institutions and the USAID Missions in the developing countries and was conceived with their needs and desires foremost. A well-integrated, truly collaborative Soil Management CRSP which links those needs with on-site research capability of U. S. universities is the result. Representatives from the developing country institutions with the External Panel selected the U. S. universities being recommended to participate. This Final Proposal is based on the views of the representatives of the developing country institutions, representatives of the recommended U. S. universities, the External Panel, the Planning Agency and Representatives from JRC, AID and BIFAD.

It is, therefore, with a sense of urgency and commitment that the six participating U. S. universities and the nine collaborating institutions located in developing countries submit this Final Proposal to AID and JRC for approval. With your support, we can, and will, accomplish this task upon which rests the very future of this planet we call Earth.

B. Summary of the Planning Process

The planning grant was awarded on May 8, 1979 to develop the Soil Management CRSP. The planning process has consisted of three phases: 1) The assessment phase, to canvass the needs of the developing countries, establish research priorities and indicate potential collaborative sites; 2) the program development phase, to identify where work would be done, and cooperating national institutions, the level of effort, staffing pattern and budget; and 3) the program organization phase, to identify the participating U. S. institutions and develop the CRSP management structure. Each phase required the approval of JRC and AID.

1. The Assessment Phase. A seven-member External Advisory Panel composed of outstanding scientists and administrators with ample experience in developing countries was recruited to assist NCSU in various phases of the grant, including travel to various countries and participating in the decision-making process.

Inquiries were sent to all USAID Missions informing them of the Soil Management CRSP and requesting expressions of interest from national institutions and USAID Missions. Forty-one missions responded, 23 of them expressing strong interest from the national research institutions and themselves.

A seven-member team participated in the Soil Constraints Conference held in Los Baños, Philippines, June 4-8, 1979 in which 70 soil scientists from 31 countries discussed priorities to alleviate soil constraints. The conclusions were most helpful in defining research priorities for this CRSP.

Visits were made to eight international centers and to national institutions in 11 countries to further assess research priorities. Additional assessment was done via personal communications or correspondence with scientists and administrators from developing and developed countries, including members of the U. S. research community. A total of 197 individuals from 46 countries, representing 118 different institutions contributed their assessment of research priorities to this CRSP.

The first meeting of the External Panel, NCSU and AID staff was held in Raleigh, September 3-6, 1979, to arrive at recommendations on research priorities based on the materials assembled and on intensive discussions. The Panel recommended that a) the CRSP be structured along agroecological zones, b) twelve criteria be used for establishing priorities, c) the following priority research areas and potential primary sites: 1-Humid Tropics (Peru and Indonesia); 2-Semiarid Tropics (Upper Volta and Tanzania); 3-Acid Savannas (Colombia and Brazil); 4-Steeplands (no sites identified), and 5-Wetlands (Bangladesh). A list of principal research components for each priority and for all agroecological zones was also drawn. The Panel traveled to Washington and presented the results to AID officials on September 7.

The Joint Research Committee of BIFAD, at its September 12 meeting, unanimously approved the Panel meeting recommendations and thus set the research priorities. The JRC also agreed that a) funding be allocated in accordance with the established priorities, i.e., Priority 1 is to be funded at a functional level before priority 2 is funded, etc., b) the potential interest of Title XII eligible institutions be canvassed. The Technical Program Committee for Agriculture (TPCA) approved the Panel recommendations on October 16. The assessment phase terminated. Its results are reported in the First External Panel Meeting Report, dated September 3, 1979.

2. The Program Development Phase. A call for preproposals was developed according to guidelines received from AID and JRC monitors and was sent to all Title XII eligible institutions on October 17, 1979. It requested institutional expressions of interest specifying a) the executing agency within the institution and potential principal investigator, b) portion of the CRSP of interest, including which potential primary research sites, c) justification for such interest, d) potential participants, and e) complementarity with domestic activities. Only those institutions sending a preproposal by December 17, 1979 would be eligible for further involvement in the CRSP. Twenty-three institutions sent preproposals by the deadline and thus became eligible to participate.

Arrangements for visits to potential primary sites were developed through correspondence. The purpose of such visits was to assess the interest of collaborating institutions, identify research sites and available resources, and to discuss with national institutions or international centers the nature of cooperative programs. After consultation with AID and JRC it was decided to develop letters of intent with each relevant institution if discussions were of sufficient mutual interest. Such documents would describe the framework for cooperative work and the contribution of the collaborating national institutional or international center.

Given time limitations, it was decided after consulting with AID that only the most promising primary research sites would be visited. These were Peru and Indonesia for the Humid Tropics, Upper Volta, Niger and Tanzania for the Semiarid Tropics, Colombia and Brazil for the Acid Savannas. The following potential primary sites were then identified for the Steeplands in consultation with AID: Sri Lanka, Dominican Republic-Haiti and Peru. Also, on AID's recommendation plans to develop priority 5 (Wetlands) were postponed.

Visits were made to Peru, Indonesia, Upper Volta, Niger, Tanzania, Colombia, Brazil, Sri Lanka, and the Dominican Republic from January to May 1980. Letters of intent were signed with national institutions and international centers of these countries, except for Sri Lanka where sufficient mutual interest was not found. Detailed trip reports and copies of the letters of intent were distributed to representatives of the 23 interested universities.

The interest expressed by the developing countries exceeded the expectations of the CRSP planners. It was immediately evident that not all the work implied in the letters of intent could be accomplished within the means of this CRSP. NCSU assembled the available information and distributed it to the representatives of 23 interested universities that participated in the Second External Advisory Panel Meeting on May 28 and 29, 1980. The Panel took note of all the questions raised by university representatives. The Panel then met with AID and NCSU staff on May 29-31 and developed a draft of the General Program Proposal. The Chairman of the External Panel, along with Drs. Nicholaides and Malcolm presented the results and the draft proposal to the TPCA of AID on June 2, where it was favorably received. Drs. Sanchez and Malcolm presented the results and the draft proposal at the June 9-11 JRC meeting where this proposal was approved with some modifications which were incorporated into the final version, which describes the Program Development Phase (General Program Proposal, June 16, 1980).

3. The Program Organization Phase. Solicitation of formal proposals were made on July 20, 1980 to the 23 interested universities with an August 15 deadline. The proposals were sent directly to the AID Project Manager who distributed them to the External Advisory Panel, representatives of the host country institutions, USAID Missions in the collaborating countries, the regional bureaus and the Planning Agency. Sixteen U. S. universities sent formal proposals for participation.

The proposals were evaluated and universities recommended for selection by the External Panel and representatives of the host country institutions from Peru, Indonesia, ICRISAT-West Africa, Brazil, Colombia, CIAT and the Dominican Republic, according to the approved program and guidelines described in the General Program Proposal at the Third External Advisory Panel Meeting, held in Arlington, Virginia, September 13-16, 1980. Representatives of JRC, AID and BIFAD were present during the evaluation and university selection process.

Six universities were recommended for participation in the CRSP: Cornell University, University of Hawaii, University of Kentucky, North Carolina State University, University of Puerto Rico and Texas A & M University. The recommended lead and support roles for each institution in the priority agroecological zones are as follows:

Table 1. Agroecological zones, countries, lead and supportive universities of the Soil Management CRSP.

Agroecological Zone: Country	Lead Role	Support Role
I. Humid Tropics: Peru Indonesia	NCSU Hawaii	Cornell NCSU
II. Semiarid Tropics: Upper Volta and Niger	Texas A & M	---
III. Acid Savanna: Brazil Colombia	Cornell Puerto Rico	NCSU Cornell
IV. Steeplands: Dominican Republic	Kentucky	---

The rationale for the evaluation of each proposal are given. Program modifiers were made with representatives of the universities recommended for participation and the collaborating institutions overseas during the following two days.

At a subsequent meeting in Washington, D. C. on September 25, 1980 representatives of the six universities recommended for participation selected by majority vote North Carolina State University as the group's recommendation for the Management Entity role. The organizational structure of the CRSP was developed at that time. The outcome of these two meetings is included in the Third Panel Report dated October 7, 1980. It has been submitted to AID and JRC for approval along with this document.

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Table 2. Assignment of field senior staff positions by agroecological zone.

Zone	Country	Position*	University
Humid Tropics	Peru	1.1 Soil/Crop Mgmt.	NCSU
		1.2 Soil Fertility	Cornell
		1.3 Farming Systems	NCSU
	Indonesia	1.4 Soil Management	NCSU
		1.5 Agronomist	Hawaii
		1.6 Farming Systems	Hawaii
Semiarid Tropics	Upper Volta/ Niger	2.1 Soil Physics	TAMU
		2.2 Soil Fertility	TAMU
		2.3 Ground Cover Agr.	TAMU
Acid Savannas	Brazil	3.1 Soil Water Mgmt.	Cornell
	Colombia	3.2 Agronomist	P. Rico
Steeplands	Dom. Rep. —	4.1 Soil-Water Conserv.	Kentucky
		4.2 Agronomist	Kentucky
		4.3 Farming Systems Economist	Kentucky

* See Table 2, General Program Proposal.

III. GENERAL PROGRAM SCOPE AND ORGANIZATION

A. Name

The name used so far in describing this program "Soil Management CRSP" is somewhat confusing particularly with persons not familiar with Title XII. It is suggested that an alternative name be given. One possibility is International Soil Management Program (INTSOIL). This term will be used on a tentative basis in the rest of this proposal, subject to future modifications and final approval.

B. Goal

The goal of the International Soil Management Program is to increase food production, conserve the natural soil resource base and increase the efficiency of fossil energy use through improved soil management practices in developing countries.

C. Objectives

1. To develop and adapt, in cooperation with national institutions and international centers, improved soil management technology for productive, sustained farming systems in marginal lands of the tropics on an agronomically, economically, and ecologically-sound basis.

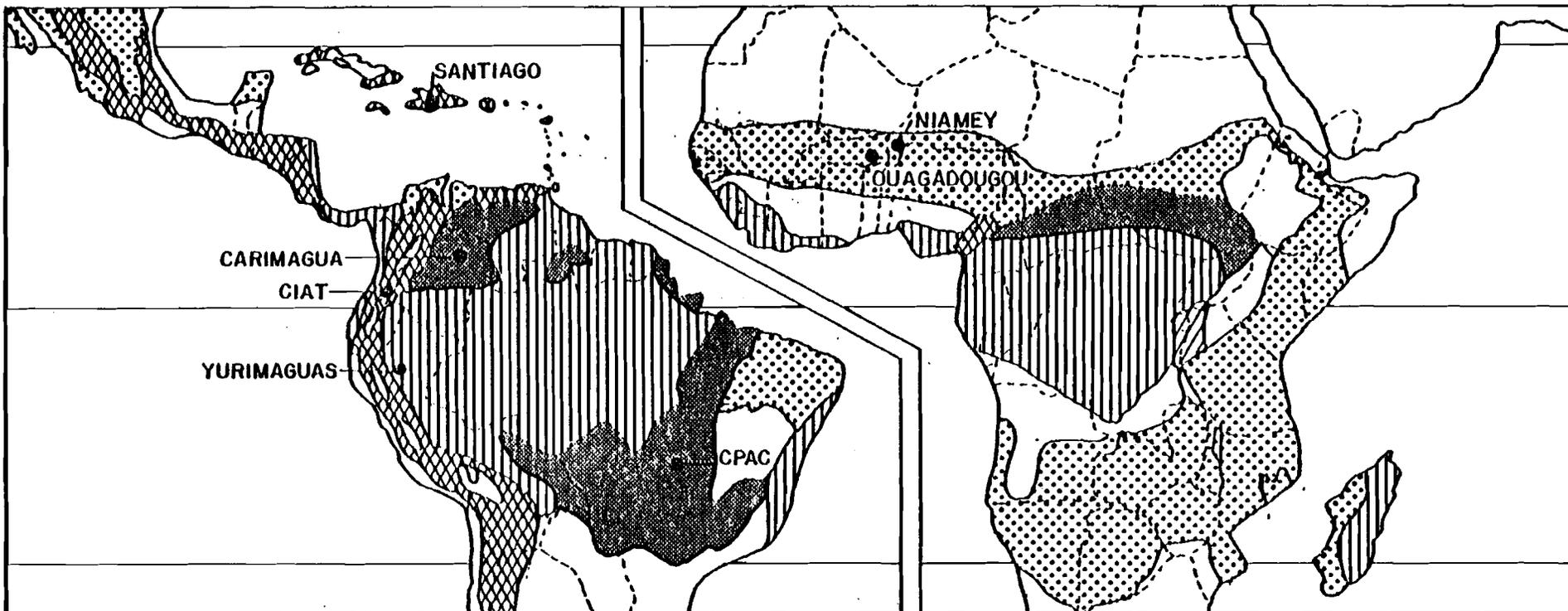
2. To foster the transfer of such technology through a network of institutions with similar interests.

D. Scope

INTSOIL is a collaborative soil management research program conducted jointly by six U. S. universities and nine collaborating host country institutions located in Peru, Indonesia, Upper Volta-Niger, Brazil, Colombia and the Dominican Republic. Its major source of support is this request to AID. In addition, however, the U. S. universities will provide matching funds and the host country institutions will contribute a substantial portion of their own resources to the Program.

INTSOIL will be administered by a Management Entity overseen by a Board of Directors with the assistance of a Technical Committee and an External Review Committee. Research activities will be conducted initially at the six primary research sites. Training of developing country scientists is a major and integral part of the program. Outreach activities are expected to be developed to encompass other important areas in the four agroecological zones (humid tropics, semiarid tropics, acid savannas and steplands) as network sites.

Figure 1 portrays the geographical scope of INTSOIL, and the locations of the primary research sites. The interaction among subject matter specialties and common problems in all agroecological zones weaves the four projects into an integrated program. All component projects which are described in subsequent sections meet the following criteria:



SOIL MANAGEMENT CRSP

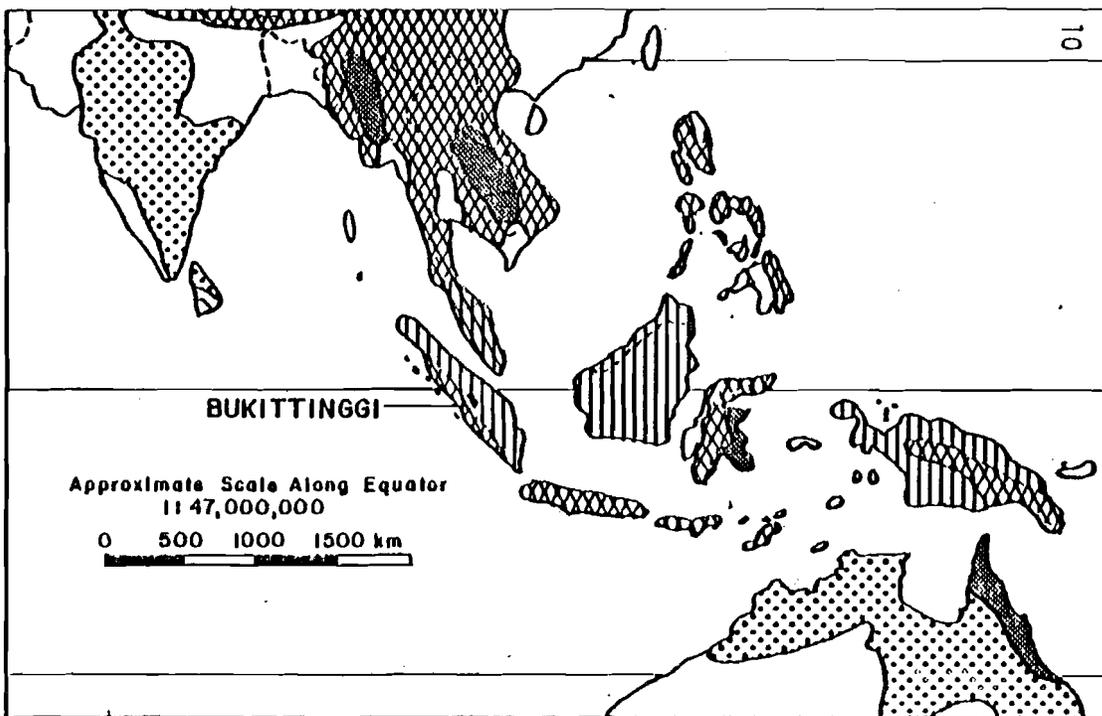
AGROECOLOGICAL ZONES

HUMID TROPICS 

SEMIARID TROPICS 

ACID SAVANNAS 

STEEPLANDS 



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1. Match the INTSOIL research priorities and integrate the main researchable soil constraints for each agroecological zone.
2. Form part of a larger program of the collaborating host country institutions which consider the proposed INTSOIL activities of high priority.
3. Have sufficient critical mass of personnel to properly conduct the research at each primary site when the proposed INTSOIL resources are joined with existing resources. The INTSOIL levels of effort in terms of personnel take into account existing local strengths.
4. Will be planned, executed and evaluated jointly with the host country institutions, according to the mechanisms proposed in each Letter of Intention (see Section XI).
5. Include, as an integral package, experiments to develop improved soil management technology, trials to validate this technology outside the research stations and training by on-hands research. The collaborating host country institutions emphasize the value of training in this Program as one of the most important contributions.
6. Complement and strengthen existing efforts rather than duplicate or rediscover them. This applies both to national institutions, international centers and AID-sponsored projects worldwide.
7. Have the support of the local USAID Missions, and in all countries INTSOIL strengthens ongoing or projected rural development projects sponsored by USAID, other international organizations and the national governments.

E. Terminology

1. Soil Management: The manipulation of soil properties and inputs to increase agricultural production on a sustained basis, to conserve and improve the natural soil resource base. It is the subdivision of soil science that puts together the knowledge of soil characterization, physics, chemistry, microbiology and fertility into an agronomic and socioeconomic context.

2. Humid Tropics: The portion of the tropics with no more than three months dry season. In Soil Taxonomy terminology, the dominant soils are udic, isohyperthermic or isothermic. The native vegetation is tropical rainforests. Figure 1 shows its distribution.

3. Semiarid Tropics: The portion of the tropics characterized by a protracted dry season of six to nine months duration. In Soil Taxonomy terminology the dominant soils are at the drier end of the ustic soil moisture regime and are isohyperthermic. See Figure 1 for distribution.

4. Acid Savannas: The portion of the tropics with a strong dry season of four to six months duration, savanna vegetation and predominantly acid soils of the orders Oxisol and Ultisol. They are ustic, isohyperthermic or isothermic. See Figure 1 for distribution.

5. Steeplands: Steep, densely populated regions of the tropics and subtropics where soil erosion is a major concern. Soil properties, moisture and temperature regimes vary. Figure 1 shows their distribution.

6. Senior Scientists: Are those assigned to INTSOIL with a Ph.D. degree or equivalent experience. They will be faculty members at one of the participating universities and will be based at one of the primary sites or at the university campuses.

Campus-based senior scientists assigned on a part-time or full-time basis to INTSOIL will initiate supportive field research projects at the primary sites which will be carried out by their graduate students or as cooperative projects with scientists from the host country institutions. They would also provide assistance on specialized problems through short-term assignments, or conduct laboratory, greenhouse or computer-related research on campus. Since only a limited number of INTSOIL scientists can be stationed overseas, these campus-based faculty will provide the necessary breadth and depth that may be absent at the research sites.

7. Junior Scientists: Are those with a B.S. or M.S. degree level working at one of the primary or network sites or at the university campuses. Included in this category are graduate student candidates for M.S. or Ph.D. degrees at one of the participating universities. They are expected to conduct a major portion of their thesis research at the primary sites, normally with a period of residency of one to two years. They will complete the degree requirements at the respective university campus.

8. Collaborating Host Country Scientists: Both senior and junior scientists from the host country institutions will participate in INTSOIL on an equal basis as INTSOIL-funded personnel and will receive the necessary assistance from campus-based faculty when appropriate.

9. Principal Investigator: One campus-based faculty member with the greatest time commitment to INTSOIL would be designated as Principal Investigator by each participating university, and will coordinate all technical INTSOIL activities of that university.

10. Team Leader: One senior scientist will act as team leader of each primary site (with Upper Volta and Niger considered as one site) in addition to the person's research responsibilities. This scientist would belong to the university assigned the lead role for that site. No major administrative duties are envisaged for this position. If such responsibilities develop, a junior scientist position could be used to give the team leader the necessary administrative support.

11. Primary Research Sites: These are established research stations in the case of Yurimaguas, Peru, Upper Volta (Kamboinsé and Saria), the Cerrado Research Center (CPAC) at Planaltina, Brazil, the Carimagua station in Colombia. In Niger, the primary site is the ICRISAT's proposed Sahelian Center to be established near Niamey and INRAN's soils laboratory at the outskirts of the city. In the case of Indonesia, field research will be conducted primarily in farmer's fields in the transmigration areas of Sitiung and Rimbo Bujan, possibly with headquarters at the Bukittinggi soils laboratory of the Soils Research Institute

or in other nearby centers. Work in the Steeplands project will be conducted at two watershed areas along the Cordillera Central (one between Ocoa and Constanza and the other at San José de las Matas), Dominican Republic. Possible headquarters are at CENDA laboratories located at the Instituto Superior de Agricultura in Santiago de los Caballeros.

As previously mentioned, all work, including planning, execution and evaluation, will be conducted jointly with the host country institutions. INTSOIL personnel will live close to these work locations.

12. Network Sites: Collaborative relationships are expected to be developed with several institutions working at other locations on similar problems in the same agroecological zone. No permanent INTSOIL senior staff are envisioned to be stationed at those locations, although graduate students at the junior scientist level may be, where appropriate. The purpose of these activities would be to test the validity of the results obtained at the primary site to other locations and to identify the necessary adjustments. Another very important purpose is to gain insights from ongoing work at other locations and improve communications between researchers from one country to another. The networks could be of a formal or an informal nature. Training of scientists of the network sites is also suggested, being either graduate training or short-term non-degree training.

F. The Participating Universities

The six U. S. universities recommended for participation in the Program at the Third External Panel Meetings are:

Cornell University
 University of Hawaii
 University of Kentucky
 North Carolina State University
 University of Puerto Rico
 Texas A & M University

The main roles proposed for these universities as related to the research priorities are summarized in Table 2.

1. Lead role. One U. S. university has been assigned the lead role for each primary research site. The lead role involves the major responsibility for conducting the program including negotiating and implementing agreements with the host country institutions, under the overall guidance of the Management Entity. A senior scientist stationed in that country and affiliated with the lead university will be assigned as team leader for that country. The lead universities are identified in Table 2.

2. Support role. In four countries, other universities have been identified to play a support role. In such cases both lead and supporting universities will work together in developing and implementing the program. In the two Humid Tropics locations, the support universities will provide one senior scientist on-site. In all cases the supporting universities will provide junior scientists on-site and campus-based support. The support roles are identified in Table 1.

Table 2. Organization and responsibilities of institutions participating in INTSOIL

Program Components	Primary Research Site	U. S. University*		Host Country Institution
		Lead	Support	
Humid Tropics	Yurimaguas, Peru W. Sumatra, Indonesia	NCSU (2) Hawaii (2)	Cornell (1) NCSU (1)	INIA SRI, CRIA, IPB
Semiarid Tropics	Ouagadougou, U. Volta Niamey, Niger	Texas (3)	-	ICRISAT
Acid Savannas	Planaltina, Brazil Carimagua, Colombia	Cornell (1) P. Rico (1)	NCSU Cornell	EMBRAPA-CPAC ICA, CIAT
Steeplands	Santiago, Dom. Rep.	Kentucky (3)	-	SEA
Management Entity		NCSU	all	all

* () = Numbers of field senior scientists positions.

3. Potential participation of other universities. Additional U. S. universities may also participate in INTSOIL. Requests for such participation should be made to the Management Entity by any of the six participating U. S. universities and should have technical and budgetary justification. The Technical Committee and Board of Directors must approve such requests prior to submission by the Management Entity to JRC/BIFAD/AID for final approval.

G. The Host Country Institutions

The six U. S. universities will work jointly with seven national research institutes and two international centers, hereinafter grouped together as host country institutions. The basis for cooperation is described in the Letters of Intention signed by the host country institutions and the Planning Entity, which are included in Section XI of this report. In fact, the INTSOIL program is based on the text of these Letters of Intention which encompass the viewpoints and expectations of the host country institutes and the local USAID Missions.

The host country institutions are noted in Table 1 and are identified as follows:

Instituto Nacional de Investigación Agraria (INIA), Peru
 Soils Research Institute (SRI), Indonesia*
 Central Research Institute of Agriculture (CRIA), Indonesia*
 Bogor Agricultural University (IPB), Indonesia*
 International Crop Research Institute for the Semiarid Tropics
 (ICRISAT), West Africa Program
 Empresa Brasileira de Pesquisa Agropecuária (EMBRAPA), Brazil
 Instituto Colombiano Agropecuario (ICA), Colombia
 Secretaría de Estado de Agricultura (SEA), Dominican Republic

The agreements embodied in the Letters of Intention constitute the established linkages for INTSOIL. In some countries, a more formal agreement will have to be drawn to comply with government regulations. In others, it is a matter of agreeing on the first year work plan. These follow-up activities are the joint responsibility of the lead university for that particular site and the Management Entity. In all cases the Letters of Intention establish the procedures for annual joint planning, execution and evaluation of the research results. The first work plans should be developed as soon as funding is available.

Leaders of the participating U. S. universities and all host country institutions met on September 15-16, 1980 and developed further details of collaboration. They are summarized in the Third Panel Report and incorporated in this document. The overall summary of institutional responsibilities and established linkages are shown in Table 1.

*According to the Letter of Intention with Indonesia the three Indonesian institutes will operate as a unit, with the Soils Research Institute as the lead institution.

H. The Management Entity

The Management Entity is the institution responsible to AID for the overall performance of INTSOIL, including technical and administrative matters. North Carolina State University has been recommended by the participating U. S. universities for the Management Entity role. Administrative representatives of the six universities recommended for participation developed the following structure, which may require subsequent modification and refinement. The Management Entity shall perform the following functions:

1. Negotiate and execute a grant agreement with AID to provide funds for INTSOIL.
2. Negotiate and execute with each participating U. S. university an agreement embodying the general principles contained in this proposal. These statements shall stipulate that the lead U. S. university for each primary research site is jointly responsible with the Management Entity for negotiating and signing the necessary agreements with collaborating host country institutions.
3. Assume fiscal accountability to AID for all grant funds.
4. Employ a qualified Director and other such supporting staff as authorized in the Management Entity budget of the grant. The Board shall concur in the selection of the Director.
5. Make annual fund allocations to each project and obligate funds received from AID through subgrant agreements with the participating U. S. universities, including suitable procedures for fiscal and programmatic reporting and for commitment of cost sharing. The annual allocations will be based on an annual budget plan prepared by the Director with the collaboration of the Technical Committee and the approval of the Board of Directors.
6. Provide for central administration, in accordance with the annual budget plan, of program funds allocated for purposes of (but not limited to) the meetings of the Technical Committee, meetings of the Board of Directors, meetings of the External Evaluation Committee, subject matter workshops and reproducing reports, publication and other documents.
7. Recommend and negotiate with AID the addition or deletion of component projects and program elements or their modification based upon the advice and recommendations of the External Evaluation Committee and/or the Technical Committee and with the approval of the Board.
8. Provide general administration of INTSOIL through the appropriate administrative office of the university.
9. Report in accordance with the requirements of the grant agreement to AID and to JRC/BIFAD on the progress and accomplishments of INTSOIL.

10. Seek, in collaboration with the Technical Committee, means of closer collaboration with other internationally supported soil research efforts by other donor agencies and international organizations with similar objectives such as IFDC, FAO, the World Bank, UNDP, UNEP and the proposed International Board on Soil Resources Management.
11. Organize a computerized data-bank/documentation center into which the research results of INTSOIL and other data will be fed and make available to the participating universities and host country institutions.
12. Establish a contingency fund for use of graduate training of scientists whose research contributes directly to the objectives of INTSOIL, but who may be based at non-participating U. S. universities. Allocation of such funds will be at the discretion of the Management Entity following recommendation and/or approval by the INTSOIL universities involved in the agroecological zones to be benefited by the third party research.

The Management Entity staff shall consist of a full-time Director, an Associate Director, an Administrative Officer, a Communications Specialist-Editor and secretarial staff.

The Director is a full-time position who will provide the overall leadership of INTSOIL. He/she should be a soil scientist or agronomist with an established international reputation and proven administrative competence. The Director should be fluent in at least one of these three languages: Spanish, French or Portuguese and should be willing to travel extensively.

The Associate Director is a part-time position designed to provide technical backstopping for the Director. Other CRSP Program Directors strongly recommend that such a position be established in order to provide the needed support while the Director is traveling. The Associate Director also should be fluent in at least one of the three languages and should travel rather extensively.

The Administrative Officer is a full-time position and will provide logistical support on administrative and fiscal matters such as contracts and sub-contracts, regulations of AID and developing countries shipment, travel arrangements, preparation and organization of meetings and workshops. He/she should have experience in the administrative intricacies of conducting international programs and with AID procedures. He/she should also have reading knowledge or fluency in at least one of the three languages--Spanish, French or Portuguese.

The Communications Specialist/Editor will be responsible for the production of INTSOIL documents targeted at different audiences. They include annual reports, newsletters, audiovisuals and other forms of technical and non-technical communications. Competence in Spanish and French is highly desirable as it is anticipated that many program documents will be produced in these two languages in addition to English.

Secretarial staff will be provided, including bilingual competence in Spanish and French.

The External Panel and Planning Entity suggest that maximum operational flexibility be given to the participating universities by the Management Entity. The initial role of the Management Entity will be to assist the universities in initiating the field programs. Afterwards it should play a largely supportive role, though it is acknowledged that the dynamic management of INTSOIL will be the responsibility of the Management Entity.

I. The Board of Directors

Each participating U. S. university shall appoint one administrative representative to the Board of Directors. Each institution may also appoint an alternate representative. Board members should be able to make institutional commitments for INTSOIL. They may not also be members of the Technical Committee. Three administrators from collaborating host country institutions will also be members of the Board. The term of appointments and the method of selection of host country institutional members will be determined by the Board in consultation with all members of the host country administrative representatives group. The Board will:

1. Provide liaison between institutional administrators and the Management Entity.
2. Establish policy for INTSOIL.
3. Review the general expenditure patterns of INTSOIL and approve the annual budget plan for allocation of funds to component projects.
4. Approve the addition or deletion of component projects and program elements and changes in program objectives.
5. Receive and utilize in its decisions reports from the External Review Committee.
6. Review the progress and accomplishments of INTSOIL.
7. Concur in the selection of the INTSOIL Director.
8. If deemed necessary by the Board, form an Executive Committee to plan for meetings, to act for the Board between meetings, and to be available to the Management Entity for consultation.
9. The Board shall elect a Chairman by procedures and for a term of office as determined by the Board.
10. Invite other host country administrators who are not members of the Board to attend Board meetings at their discretion and with their own support.
11. Schedule as appropriate special joint meetings of the Board with the host country administrators (those not members of the Board), the Technical Committee, the External Evaluation Committee, and host country principal investigators for in-depth assessment of program progress and for development of long-term projections.

J. The Technical Committee

The principal investigator of each U. S. university shall be a member of the Technical Committee, and the INTSOIL Director shall be an ex-officio member. Under the leadership of the INTSOIL Director, the Technical Committee will develop plans for integrating the research and training activities of the component projects to maximize progress toward the objectives of the program. The Technical Committee will develop liaison procedures with overseas colleagues to obtain their inputs into program activities. The Committee will collaborate with the INTSOIL Director on:

1. Development of plans for the research, training and outreach components, including the addition, modification, or deletion of components.
2. Development of the annual budget plan for allocation of funds to the component projects and overseas sites.
3. Development of policies on publication and dissemination of research results, including joint publications.
4. Preparation of reports.
5. Establishment of Country Committees for each research site as a mechanism of research planning, coordination, and communication. Membership of individual country committees will comprise the principal investigators of the U. S. universities, collaborating host country principal investigator(s), a representative of the country USAID Mission (by mutual consent), and a representative of international institution(s) where appropriate. An administrator from the host country collaborating institution may serve as advisor to the subcommittee. The annual plan of work for each research site should originate with the appropriate technical subcommittee.

The normal channel of communication of each technical subcommittee would be through the Technical Committee Chairman; however, a technical subcommittee may direct communications, as judged appropriate, to the INTSOIL Director, Board of Directors, or to the External Evaluation Committee.

6. An internal review of INTSOIL will be held annually. This review will summarize what has been done and the plans for the forthcoming year. It should be held at different sites each year in order to acquaint members with the field activities. AID and JRC representatives should participate in such reviews. Participants will bring in drafts of their annual reports, which will be assembled later by the Management Entity.

K. The External Evaluation Committee

This Committee shall consist of two or three eminent scientists. Its members shall be appointed to specified terms by the Management Entity in consultation with the Technical Committee and with the advice and consent of

the Board and JRC. Members of the Committee shall be from institutions other than those participating in INTSOIL. The Committee membership shall be augmented as necessary from an approved list of scientists for specific evaluation assignments. The Committee shall:

1. Review the projects and program of INTSOIL as requested and provide written evaluation reports to the Management Entity, the Board, AID, and JRC/BIFAD.
2. Make recommendations of the addition, elimination, or modification of component projects and overall objectives.
3. Make recommendations to the Management Entity on retention or elimination of overseas work sites and on the selection of new ones as necessary.

A major evaluation is envisioned after three years of funding in order to assess performance and progress of established programs and provide a rationale for whether funding should be continued after the initial five-year period.

Evaluation of INTSOIL will include both agronomic and socioeconomic aspects. The proposed INTSOIL staff of the six universities and the nine host country institutions is quite strong in socioeconomic aspects. Research design will include provision to insure that data is adequate for socioeconomic analysis and evaluation. After all, soil management technology is useless unless it is acceptable within the local socioeconomic context.

IV. PLAN OF WORK FOR THE HUMID TROPICS

The top priority of INTSOIL is the development of improved soil management practices for continuous agricultural production on an economically and ecologically-sound basis for the humid tropics. These fragile but potentially very productive ecosystems are presently under shifting cultivation and are experiencing large settlement attempts. Together with acid savannas, this is where much of the 200 million hectares of new lands will be cleared during the remainder of this century.

Continuous food production on tropical Oxisols and Ultisols has been attempted for decades. After a classic failure of trying to transplant temperate region high-energy technology in what is now Zaire in the 1930's, progress has been virtually limited to small areas with ample available capital for export crops. Systematic research toward developing realistic soil management practices for food production in tropical Ultisols and Oxisols is underway at a few locations with significant international support. Where present population densities are low, national governments do not feel the immediate political pressures to develop their "new" lands until it is too late. Crash programs or forced colonization projects without a sound agronomic base are then launched and usually fail.

These attempts are now proceeding at an unprecedented rate in many parts of the humid tropics. Significant proportions of the Amazon basin are being rapidly settled, as new road networks or petroleum drilling operations attract people from crowded areas of the Andes and Northeast Brazil. Peru and Ecuador are probably experiencing the greatest pressures, as well as certain parts of Brazil. Three Amazon cities; Belem, Manaus and Iquitos have over half a million inhabitants already. The Indonesia Transmigration program is shifting about 2.5 million people from overcrowded Java and Bali to Sumatra, Kalimantan and other islands.

This rapid growth has caused major worldwide ecological concerns, particularly in the Amazon region. Many of these concerns have no scientific base, e.g., worldwide oxygen depletion, increases in CO₂, transformation of the soil into laterite or into a desert. Nevertheless, it is most unwise to destroy natural ecosystems and replace them with unstable, unproductive farming systems. There are real dangers of soil erosion, changes in the hydrological cycle and others if this happens in a large proportion of the humid tropics. This problem cannot be solved by decrees even if strongly enforced by governments. Land-hungry people will go to empty areas. As the University of Hawaii proposal indicates, a poor farmer can become rich on fertile land, a rich farmer can make infertile lands productive, but a poor farmer on infertile land has little chance of extricating his family from poverty's grip. The development of a set of practices to make these acid infertile soils productive on an economically and ecologically sound basis is critically needed in order to assure that each hectare of land that is cleared remains productive.

INTSOIL proposes to concentrate its research efforts on the humid tropics in the two countries where the needs for a rapid solution are most acute: Peru and Indonesia. The research strategy is basically the same for both areas, although the means to accomplish the objectives varies somewhat.

The main lines of research NCSU, Cornell and INIA propose to conduct in Peru are:

1. Develop lower input annual crop production systems, while maintaining the present systems in operation.
2. Screen cultivars of many species for tolerance to Al, low levels of P, and improve the efficiency of fertilizer applications.
3. Develop alternative land clearing methods, monitor soil physical properties with time and methods to correct soil compaction problems.
4. Develop productive and persistent grass/legume pasture systems in cooperation with CIAT.
5. Utilize to the maximum, symbiotic N fixation via legumes.
6. Characterize soil differences in humid tropical regions and toposequence variability; characterize and classify soil of extrapolation and network sites and develop technical interpretation systems.
7. Incorporation of trees and perennial crops into present annual crops and pasture systems towards the development of agroforestry systems.
8. Develop continuous cultivation of soil management systems in the hillsides of the Peruvian Selva.
9. Determine the potential of managed fallows.
10. Validate continuous production technology with farmer in the area with a wide range of soil conditions.
11. Estimate the socio-economic implications of continuous crop production systems in Yurimaguas and elsewhere.
12. Develop a humid tropics network with interested collaborations in tropical America and Africa.
13. Conduct basic laboratory studies on the development of secondary acidity, organic matter--aluminum interactions and other chemical reactions that may help understanding some of the field results.
14. Incorporate low input weed control methods for continuing annual cropping systems and pastures.
15. Develop an on-the-job training program for researchers and extension workers for the humid tropics at Yurimaguas.

The operational aspects will follow the Letter of Intention signed with INIA, and the present cooperative agreement with the International Potato Center. An administrative assistant will be located in Lima to provide support for local purchases, shipment, travel arrangements, logistics and other administrative procedures.

Successful research is already in progress in Yurimaguas, Peru on soil management for continuous annual crop production. This work needs continuation and strengthening on-site, and validation and adaptation to other sites in the humid tropics with different socio-economic conditions. In Indonesia, we propose to develop a systematic soil management program for transmigration areas of Sumatra chosen by the host country institutions (SRI, CRIA and IPB).

A. Country Profiles: Peru

1. Research site location: Yurimaguas, 5°45'S, 76°0'S; altitude 182 m.
2. Soils: Acid, infertile soils which are representative of approximately 70% of the soils of the humid tropics of South America. The main soils at the research site are Typic Paleudults, fine loamy, siliceous, isohyperthermic.
3. Climate: 2134 mm mean annual rainfall; 100 mm/month in June, July, August; the rest 200 mm/month; mean annual temperature 25°C. Udic soil moisture regime.
4. Socio-economic: Subsistence farmers, many of whom are new settlers. Average farm size 5 ha; cropped area approximately 1 ha. Shifting cultivation with slash and burn. Major crops: rice, cassava, plantains, peanuts, corn, soybeans, cattle. Average annual family cash income is U.S. \$75. Average annual per capita agricultural production growth rate for Peru is -3.8%.

B. Country Profile: Indonesia

1. Research site location. Transmigration areas of West Sumatra and Jambi provinces; possible headquarters in Bukittinggi, Sukaramei or Padang.
2. Soils: acid infertile soils which are representative of much of the transmigration areas of Sumatra. Soils at the field research sites in West Sumatra Province are Oxic Dystropepts, Typic Paleudults, and Tropeptic Haplorthoxes, all clayey, kaolinitic isohyperthermic. In the Jambi Province, research site soils are Oxic Humitropepts, clayey, kaolinitic, isohyperthermic.
3. Climate: 2000 mm mean annual rainfall; well distributed mean annual temperature 25°C. Udic soil moisture regime.
4. Socio-economic: Subsistence settlers, each family on 1/2 ha farms, mechanically cleared. Rice yields average 1.1 t/ha, corn 2.5, peanuts 0.7 and soybeans 0.8 t/ha. Cassava yields are also low; all yields decrease with time. Average annual per capita agricultural production growth rate for Indonesia is -0.1%.

C. Research Components

The main research components are outlined below, based on the first Panel report, the Letters of Intent with Peru and Indonesia, the proposals submitted by the participating universities (NCSU, Hawaii and Cornell). These and discussions between representatives of Peru and Indonesia with those of the three universities at the Third External Panel Meeting.

Being a new project, work in Indonesia needs to be carefully planned with the three collaborating national institutions. The main thrusts are:

1. Characterize soil of experimental sites, relating them to crop response patterns, including work along toposequences or other ways of working with variability.
2. Develop better alternative land clearing methods and monitor the soil physical and chemical consequences of different land clearing methods with time.
3. Establish a procedure for soil fertility evaluation and determine the effects of fertilizers and lime in overcoming subchemical constraints.
4. Evaluate the potential of grass/legume pasture mixtures adapted to the soil systems of the humid tropics.
5. Soil erosion control. Catchment, subcatchment, and runoff plots will be selected, surveyed, and instrumented with raingauges, runoff water-stages, and sediment-sampling and -storage devices. Two sets of plots will be required--one for standard tests of causative erosion parameters and the other for imposing land and crop-management treatments. The erosion-control treatments will be integrated with farming systems experiments.
6. Increased yields of better quality food crops through energy efficient farming systems. High yields of nutritious food crops can be obtained in the humid tropics, but the input requirements are often too high and inappropriate for the resource-poor farmer. In the impoverished soils of the humid tropics, some input is unavoidable. The high costs of these inputs, however, are avoidable. High costs can be avoided by reducing input losses through soil erosion control, increasing soil nitrogen levels through biological nitrogen fixation and green manures, substituting low-cost phosphate rock for costly superphosphates, increasing phosphorus utilization with mycorrhiza, judicious selection of adapted crops, and minimizing crop losses through a program of integrated pest management. All these activities must be conducted in harmony with a cropping system and in the context of a farming system.
7. Increased farmer adoption of yield-increasing soil-management practices. During the course of the work, every effort will be made to assess the likes, dislikes, needs and resource characteristics of the farmer. This will enable the researcher to tailor his outputs to the farmer's needs and capabilities.
8. Reduced yield gaps between researchers' plots and farmers' fields. Mismatches between the requirements of an innovation and the socio-economic characteristics of a farmer result in yield gaps between researcher plots and farmer fields. Gap analysis, a systematic study of this discrepancy, provides a means to assess the economically recoverable gap and serves as a feedback mechanism to warn researchers of defects in their innovations.

D. Senior Scientist Position Description for Peru

1. Soil/Crop Management Specialist: A scientist who will develop stable, low input systems to change from shifting to continuous agriculture, including intercropping or sequential plantings of annual crops, grass-legume pastures and/or trees. This position will be filled by an NCSU scientist.

2. Soil Fertility Specialist: A scientist who will research fertility management for continuous production with emphasis on soil acidity, P, micro-nutrients, N (organic and inorganic) and cation balance, including long-term residual effects; to evaluate plants and rhizobia tolerant to soil constraints. This position will be filled by a Cornell University scientist.

3. Farming Systems Agroeconomist: A scientist who will validate or adapt experimental results from Yurimaguas for different farming systems in the area through farm studies and farm trials; to provide a feedback mechanism to the Yurimaguas station and to serve as a catalyst for network sites in the Amazon and Africa. This position will be filled by a North Carolina State University scientist.

These positions will be supplemented by junior scientists positions on-site and on campus, and senior scientists positions on campus in order to accomplish the projected work.

E. Senior Scientist Positions Description for Indonesia

1. Soil Management Specialist: A scientist experienced in the science and art of land clearing operations and their impact on agricultural land use. His/her role is to bring the full research capability of NCSU to bear on INTSOIL, including the site-specific measures and research in respect to soil fertility required to arrive at a sustained level of economic production. This position will be filled by a North Carolina State University scientist.

2. Soil/Crop Scientist/Agronomist: a scientist who will conduct soil management research in the context of farming systems, emphasizing the conservation and improvement of the soil resource for sustained agricultural production. This position will be filled by a University of Hawaii scientist.

3. Farming Systems Socioeconomist: A scientist who will identify socioeconomic factors that lead to adoption or rejection of soil management innovations and aid in research on constraints analysis. This position will be filled by a University of Hawaii scientist.

The three positions shall function as a team. Hawaii will designate one of its senior scientists as team leader.

These positions will be supplemented by junior scientists positions on-site and on campus, and senior scientists positions on campus to accomplish the professional work.

F. Role of the Host Country Institutions

The Instituto Nacional de Investigaciones Agrarias (INIA) will provide senior and junior scientists to collaborate with those of INTSOIL. Additionally, INIA will provide fields, laboratories, and offices with clerical, technical and non-professional staff such as field laborers at the Yurimaguas station.

The Soils Research Institute (SRI), Bogor Agricultural University (IPB), and the Central Research Institute of Agriculture (CRIA) in Indonesia will provide several senior and junior scientists to collaborate with those of the INTSOIL. In addition, the SRI/IPB/CRIA collaborators will provide fields, laboratories and offices with clerical, technical and non-professional staff such as field laborers.

G. Network Development

It is envisioned that INTSOIL would work with other research efforts in the humid tropics. In the Amazon, potential network sites can be developed in conjunction with the newly formed Amazon Land Research Network with several sites in Bolivia, Brazil, Ecuador, Peru, Colombia and Venezuela. In Africa, collaboration with the IITA network is expected and also with specific countries such as Sierra Leone and Cameroon. In Southeast Asia, the main thrusts will be in other areas of Sumatra, in Kalimantan and in other countries where appropriate.

V. PLAN OF WORK FOR THE SEMIARID TROPICS

The second thrust of INTSOIL is to tackle the major soil constraints of the semiarid tropics of West Africa, which includes the Sudano-Sahelian zone. This is one of the most impoverished regions of the world where soil constraints are major obstacles to increased food production. The main problems are related to surface soil crusting, erosion hazards and low soil fertility.

Arrangements have been made with ICRISAT, the international center with the worldwide mandate on the semiarid tropics, to join their efforts in West Africa, at Upper Volta and Niger. Operations in the latter location will depend on pending arrangements between ICRISAT and the Government of Niger for the establishment of a Sahelian center. Linkage with ICRISAT would share INTSOIL's contributions in relation to other areas such as plant breeding and socioeconomics. The USAID Missions in both countries are strongly supportive of the link with ICRISAT. The logistical arrangements would permit INTSOIL staff to operate in both countries under ICRISAT's umbrella as per the Letter of Intent with ICRISAT. Due to this arrangement, both countries will be regarded as a single primary site. Texas A & M University is the responsible INTSOIL institution for the semiarid tropics component.

A. Country Profiles: Upper Volta and Niger

1. Research site locations. Kamboinse and Saria Stations in Upper Volta and in the neighborhood of Niamey.

2. Soils: Upper Volta--Representative of much of the northern Sudan Savanna: Plinthustalfs; Oxidic Paleustalfs; Aerobic Paleaqualfs. Niger--Much of the southern Sahel; top-sequence: Ultic, Psammentic, Aridic and Plinthic Paleustalfs.

3. Climate: Upper Volta (Saria Station)--600 mm ppt. annually, 8-month dry season. Niger (Niamey)--480 mm ppt. annually, only during June to September. Heavy rainfall during short rainy season. Strong ustic soil moisture regime bordering on the aridic at Niamey.

4. Socio-economic: Appalling poverty; per capita GNP in Upper Volta and Niger is \$130 and \$160, respectively. Sparse pastures for free roaming goats and cattle; sorghum, millet, cowpeas and peanuts are major subsistence crops. Average annual per capita agricultural production growth rate is -0.8% and -1.8% for Upper Volta and Niger, respectively. Literacy is 11 and 6%, respectively.

B. Research Components

The following is derived from the Letter of Intent, the TAMU proposal and discussions between TAMU and ICRISAT representatives at the Third Panel Meeting. The main components are:

1. Practices to prevent or reduce detrimental effects of surface capping and crusting:

a. Develop and test cultural practices to diminish soil crusting.

b. Determine crust strength as a function of rainfall density, temperature and humidity, soil moisture and drying rate of Ustalfs of UV/N and Texas using force transducers.

c. Determine seeding emergence force through crusts of differing strengths for major crop species and varieties.

d. Study the influence of iron compounds in soil crusting.

e. Model crust formation process with minerals selected or synthesized to match the physical and chemical properties of the indurated zone.

f. Test soil amendments to alter the hardening process: eg. colloidal iron, hydroxy-Al, gypsum, calcium carbonate and amorphous silica.

g. Identify forms of silica in crusts, their labile nature and distribution using micromorphic, microprobe, wet chemistry, thermal and electron optical approaches as appropriate.

h. Study the processes of dehydration and rehydration during crusting by absorption isotherms; kinetics of rehydration; effect of management practice, exchange cation and subsequent rehydration of a severely dried system and, spectroscopic studies of cementing agents upon dessication and subsequent rehydration.

i. Study factors affecting formation of stable disoriented vs. stable oriented aggregates.

2. Erosion control, prevention and reclamation:

a. Initial transfer of promising applicable new technologies in erosion control.

b. Transfer and modification of low input, economical methods for reclaiming severely eroded lands.

3. Develop low input systems that maximize the use of available soil water and maintain a continuous plant cover, including intercropping and agroforestry:

a. Develop cultural practices to establish, utilize and maintain cover crops for the intended purposes (green manure, pasture "living" mulch, etc.) during the dry season.

b. Provide for long-term studies of intercropping systems and legume grass pasture-crop rotations.

c. Investigate the adaptability of "alley cropping" using Leucaena leucocephala, Cajanus cajan, Tephrosia candida, Gyricidia sepium, or other legume shrubs adapted to the region, intercropped with sorghum, millet, maize, cowpeas or peanuts.

4. Evaluate plants and rhizobia tolerant to drought, low P and acidity:

- a. Increase the use of available soil water through screening of diverse cultivars and subsequent introduction to UV/N.
- b. Determine the soil water available to major crops on different soil taxa.
- c. Evaluate under UV/N conditions (biophysical and economic) promising technology in growth regulators, antitranspirants and artificial subsoil barriers as a means to maximize available soil water.
- d. Identify species and cultivars adapted to the semiarid tropics with initial emphasis on tropical legumes such as Stylosanthes humilis, S. hamata, S. scabra, and Desmodium sp.
- e. Investigate, in cooperation with the campus backstop agronomists rhizobium strains specific to Stylosanthes sp. cultivars for adaption to stress factors common to the semiarid tropics including high temperature, moisture and acidity.
- f. Screen diverse genotypes of the major crops for N and P use efficiencies and tolerance to acid soil conditions.

5. Management of soils with low activity clays to prevent secondary acidity and cation imbalances, including phosphorus and micronutrient research:

- a. Determine build-up and depletion patterns and chemical reaction products of native and applied nutrients under intensive crop production using long term fertilizer field trials on Ustalfs of UV/N compared with those of Texas.
- b. Evaluate crop response to applied fertilizer in terms of yield and quality as modified by methods and time of applications, sources, rates and ratios on Ustalfs of UV/N compared with those of Texas.

6. Nitrogen fertilizer research with emphasis on minimizing risk:

- a. Investigate $\text{NO}_3\text{-N}$ "flushes" in the Ustalfs of UV/N. Ascertain the possibilities for relating time-of-planting to "capture" the nitrate pool.
- b. Determine optimal sources, rates, timing and placement of nitrogen for cropping systems in UV/N.

7. Alternatives to shifting cultivation, including use of improved land clearing methods, grass-legume pastures:

- a. Investigate viable alternatives to existing land clearing methods in UV/N that will maintain the soil in maximum physical and chemical condition for sustained economic crop yields.

b. Investigate promising legume/grass pasture combinations for UV/N.

8. Supplemental irrigation, where appropriate:

a. Develop efficient supplemental irrigation systems eg. portable and inexpensive drip irrigation systems that could be used in seedling establishment and irrigating crops during short but critical dry periods.

9. Soil fertility evaluation, including characterizing soil nutrient deficiencies and critical plant nutrient levels:

a. Develop soil fertility evaluation methodology involving investigation of nutrient extraction methods best suited to UV/N soils, relating soil test values to crop growth and assisting UV/N national agricultural research institutions develop their soil fertility evaluation services.

10. Improving the land resource data base, including soil characterization and classification, evaluation, use and improvement of Soil Taxonomy:

a. Interpretation of French pedological literature from UV/N in terms of agronomic implications.

b. Inventory and evaluation of soil landscape distribution patterns and geomorphology in addition to the magnitude of spacial variability at the polypedon and pedon level for research areas in UV/N.

11. Technical soil classification systems for practical management:

a. Test the validity of the Fertility Capability Classification system for soils and fertility management in UV/N.

b. Develop other systems with applicability to soils of the semiarid tropics.

12. Training soil scientists on the job, including graduate training.

a. On-the-job in-country training of UV/N collaborating institution personnel.

b. Graduate training of UV/N participants and U. S. students.

c. At least two short courses/conferences for soil management researchers from other semiarid tropical countries.

13. Continued field research to determine long-term effects of management practices. Improved delivery systems, including data banks and a documentation center:

a. Promising cropping systems and soil management treatment groups to be developed and tested over a long period of time in order to ascertain ability to maintain continuous economic crop yields while maintaining the soil resource in optimal physical and chemical condition.

b. Establish a complete collection of all semiarid tropics soils literature in a central location on the TAMU campus; summarize and publish a thorough review of this literature.

c. Establish a system for managing and communicating research data among other semiarid tropics soil scientists and to integrate with the international and U. S. data bases.

d. Establish a pilot outreach program to extend promising soil management technology to subsistence farmers in UV/N.

C. Senior Scientist Postions for Upper Volta/Niger

Three field senior staff positions have been approved. All will be filled by TAMU staff. Priority is assigned to fill the soil fertility and ground cover agronomist positions first at the request of the ICRISAT representative at the Third External Panel Meeting.

1. Soil Physicist. This scientist will develop and conduct a soil physics research program for crops grown in Upper Volta and Niger. Responsible for all phases of the soil physics research program, including crusting, erosion, soil water utilization, and supplemental irrigation (where applicable) and assist in the training of soil scientists.

2. Soil Fertility Specialist. This scientist will develop and conduct a soil fertility research program for crops grown in Upper Volta and Niger. Responsibilities include all phases of soil fertility research, such rates, ratios, sources, times and methods of fertilizer applications, soil test correlations, evaluation of plant nutrient status and field screening for nutrient use efficiencies.

3. Ground Cover Agronomist. This scientist will initiate and conduct a research program in Upper Volta and Niger concerned with the development and maintenance of legume ground cover, including interrelated rhizobia and nitrogen fixation, for soil protection and prevention of crusting with food crop intercropping in the wet season; development of permanent legume-grass stands as substitutes for shifting cultivation; and training junior agronomists and graduate students. Involves cooperation with on site soil scientists and microbiologists, collaborating institution scientists in Upper Volta and Niger, Texas A & M University campus-based faculty, and ICRISAT professional personnel.

D. Network Development

1. It is proposed that INTSOIL should collaborate with the ICRISAT Network.

2. Since TAMU has been or is negotiating USAID contracts in Tanzania, Kenya, Haiti and the Dominican Republic, it is suggested that advantage be taken of such opportunities to establish secondary research sites in these countries where logistics are more easily facilitated by an existing TAMU base.

VI. PLAN OF WORK FOR THE ACID SAVANNAS

The third thrust of INTSOIL is to help develop stable food production systems in the vast areas of acid savannas of the tropics which, along with the humid tropics, is where the major areas of projected new lands are envisioned for the world. The acid savannas are being very rapidly developed without a sound soil management base, which often leads to very low productivity and widespread erosion. The main research institutions working in these regions are producing valuable results but require and welcome the support of the INTSOIL Program. We are fortunate in being able to establish linkages with the leading institutions working in the acid savannas; the Centro de Pesquisa Agropecuaria dos Cerrados of EMBRAPA, Brazil, the Instituto Colombiano Agropecuario of Colombia, and CIAT, the international center with the mandate of developing agricultural technology for the acid savannas. Letters of Intention have been signed with these three institutions. Cornell University, the University of Puerto Rico and North Carolina State University will be working in the acid savannas. These three universities have had previous satisfactory working relationships with the three host country institutions.

A. Country Profiles: Brazil and Colombia

1. Research site locations: EMBRAPA's CPAC, near Brasilia, Brazil and ICA's Carimagua Research Station in the Llanos Orientales.

2. Soils: Representative of the vast expanses of Oxisol and Ultisol savannas of South America, Africa and Southeast Asia. At Carimagua the main soil is a Tropeptic Haplustox; at CPAC the two main subgroups are Typic Haplustox and Typic Acrustox.

3. Climate: Strong ustic soil moisture regime. A 4-month dry season at Carimagua and a 5-month dry season at CPAC. Annual rainfall is 2000 and 1500 mm, respectively. The soil temperature regime is isohyperthermic at Carimagua and isothermic at Brasilia.

4. Socio-economic: Although these two countries are better off than the previous ones, their savanna areas are some of the least developed parts of Colombia and Brazil. Population pressure is increasing rapidly along new roads, as the agricultural frontier moves further in. Main crops: Rice, beef cattle, soybeans, cassava, corn.

B. Research Components

The following research topics describe the main thrusts of the INTSOIL activities and are based on the Letters of Intention, the university proposals and discussions held between representatives of EMBRAPA, ICA, CIAT, Cornell, Puerto Rico and NCSU at the Third Panel Meeting.

For the Cerrado of Brazil the work has two major thrusts:

1. Increase the efficiency of fertilizers in acid, infertile Oxisols through:

- a. Decreasing costs of lime and fertilizer applications in crops and pastures through the implementation of different management strategies.
 - b. Increase the efficiency of utilization of the most expensive input, phosphorus, through the joint use of cheaper sources of P, varieties tolerant to low levels of available P, and increased efficacy of mycorrhizal associations.
 - c. Characterize the dynamics of soil fertility parameters as a function of time, farming systems and timing of corrective fertilizer application.
 - d. Increase knowledge on micronutrient fertilizer responses, basic micronutrient relationships and critical soil-test levels.
 - e. Develop practices to maintain an adequate balance of Ca, K and Mg, and study S-Mg interaction in legumes.
 - f. Develop crop rotation systems that optimize input use and control erosion.
 - g. Determine the economic feasibility of fertilizer and lime use in the Cerrado.
 - h. Characterize soils in relation to their productivity limitations.
2. Increase rooting depth of crops and pastures in order to decrease drought stress through soil management practices such as:
- a. Increase the amount and availability of calcium in the subsoil.
 - b. Identify physical or chemical limitations that prevent deep root development in Cerrado soils.
 - c. Select varieties of the main crop and pasture species for deeper root development.

Cornell, NCSU, EMBRAPA and CIAT staff working cooperatively will formulate specific work plans to accomplish these objectives.

For the Llanos of Colombia, the INTSOIL contribution aims at developing annual crops production systems to complement the work in pasture production systems presently carried by ICA and CIAT at Carimagua. The University of Puerto Rico proposal lists the following five main components:

1. Identify cultivars of the main annual food crops that can tolerate soil acidity, low phosphorus levels in the soil and drought.
2. For the legume species selected, identify rhizobia strains tolerant to soil acidity, low phosphorus content and drought.
3. Determine the productivity constraints of the Carimagua soils relative to the selected crops and develop soil and crop management practices that alleviate soil and climate constraints. With low inputs, minimize erosion and soil depletion and optimize soil moisture utilization.

4. Devise crop production systems that incorporate the previous finds and that mesh with present pasture production systems where appropriate.

5. Relate crop requirements, crop performance and soil management to soil taxa and land qualities.

C. Senior Scientist Position Descriptions

1. Soil Fertility-Water Management Specialist (Brazil): To research specific soil fertility problems related to alleviation of water deficits on acid, infertile Oxisols by increasing depth of root proliferation via improved soil management practices; to support soil fertility evaluation programs. This position will be filled by Cornell University.

2. Annual Crops Agronomist (Colombia): The scientist will develop with minimum inputs, annual crop production systems adapted to acid, infertile Oxisols and merge them with pasture production systems. This position will be filled by the University of Puerto Rico.

These positions will be supplemented by junior scientist positions from Cornell, Puerto Rico and NCSU, and senior scientific positions at the three campuses in order to accomplish the projected work.

D. Role of the Host Country Institutions

CPAC, ICA and CIAT will supply at least 12 senior and 10 junior scientists to work with CRSP personnel. Field, laboratory and office facilities with appropriate staff will be furnished by the collaborating institutions.

E. Network Development

Anticipated is extrapolation of research results to similar agroecological sites such as San Ignacio, Bolivia, Khon Kaen, Thailand and when possible, to acid savanna regions of Central Africa. CPAC has a network of 14 sites in the states of Minas Gerais, Mato Grosso and Goias. CIAT has a pasture regional network throughout the Oxisol-Ultisol regions of Latin America which could interact with the CRSP. ICA has the Villavicencio Station in the Llanos and trials in many farmers' fields.

VII. PLAN OF WORK FOR THE STEEPLANDS

Important areas of steepplands are located throughout the developing world. The primary and overriding concern for the steepplands is improved management of sloping land to conserve the soil resource base and to protect the adjacent lowlands. There is a need for even broader multidisciplinary farming systems research efforts in the steepplands than normally envisioned in the soil management research. Initial primary site development of the Steeplands Project will be in the Dominican Republic. This project is fourth priority, because of its complexity and extreme site specificity, not because of its importance and urgency.

A. Country Profile: Dominican Republic

1. Research site location: Two locations in the Cordillera Central--one between Ocoa and Constanza, the other near San Jose de las Matas.

2. Soil: Dystropepts and Eutropepts.

3. Climate: Ocoa-Constanza--Average annual temperature is 18⁰ C, 1034 mm average annual ppt. San Jose de las Matas--Average daily temperature is 24⁰ C, 1253 mm average annual ppt.

4. Socio-economic: Small farmers crop the hillsides on 5 ha or less farms with beans, pigeon peas, cassava, peanuts, corn, and have chickens and small livestock. Soil conservation measures are not practiced as many prefer to plant along the slopes. Family cash income of these small steeppland farmers is estimated to be \$250. Average annual per capita agricultural production growth rate for the Dominican Republic is -0.2%. Coffee or pastures on many of these steepplands are being cleared for food crop production on slopes near to or exceeding 100%. Small farmers in the area have indicated that they expect the soil to be eroded away in three years.

B. Research Components

The following outline is based on the Letter of Intention signed with the Secretaria de Estado de Agricultura of the Dominican Republic and the University of Kentucky proposal. Representatives of both institutions met during the Third Panel Meeting and agreed on the general format. Both institutes, however, felt that more specific details would have to be developed after joint site visits. The general areas are the following:

1. Characterization of steeppland soils in danger of erosion which can be protected by improved soil management systems.

2. Develop low-input cropping systems that may include annual crops, pastures or trees either intercropped or in sequence, that will prevent soil erosion, that will promote nutrient recycling and that will use most efficiently limited soil water during drought periods. Emphasis will be on the use of plants that develop a quick cover and have nitrogen fixing capability.

3. Establish and evaluate soil conservation practices under different cropping systems. These include contouring, permanent grass waterways, reduced tillage systems, permanent tree crops and the management of surface mulches.

4. Acquire base line socio-economic data for the project area. Evaluate the socio-economic feasibility of cropping systems and combination of conservation practices.

5. Evaluation of project success and long-term management practices. Design a system of evaluating the success of the project and the long term effect of management practices. Identify these systems or practices that can be transferred to other steep land areas.

6. Training soil scientists on the job, including graduate training.

C. Senior Scientist Position Descriptions for the Dominican Republic

Three on-site senior scientist positions are proposed to have a closely integrated team of physical, biological and social scientists.

1. Soil/Water Conservation Specialist: To develop and adapt soil/water conservation practices suitable for the varied soil and rain conditions of the northern and southern slopes of the Cordillera Central which are compatible with the farming requirements and economic potential of the people who earn a living in the steep lands.

2. Farming Systems Agronomist: To develop and adapt, in collaboration with the soil water conservation specialist and the farming systems socio-economist, crop/forest/livestock systems complementary to the soil/water conservation practices and consistent with the needs, desires and socio-economic conditions of the farmers in the steep lands.

3. Farming Systems Economist: To conduct, in collaboration with the other two INTSOIL scientists and scientist in collaborating institutions, studies and trials in the work area to provide agro-economic information for orienting and evaluating the overall, integrated effort in developing and adapting technology for stable steep lands farming systems.

These senior staff positions must be complemented by junior scientist positions on-site and on campus, and senior staff positions on campus to accomplish successfully the projected work. The University of Kentucky has identified tenured professors who are interested in filling these positions.

D. Role of the Host Country Institution

Senior and junior scientists of the Secretariat of Agriculture (SEA) through CENDA (Northern Region Agricultural Research Center), ISA (Instituto Superior de Agricultura), and CESDA (Southern Region Agricultural Research Center) will link with those of IICA, Plan Sierra, FERQUIDO (a private fertilizer company) and USAID in providing logistical and on-site support for the necessary laboratory, field and office operations.

E. Network Development

As soon as feasible, establishment of another primary or secondary research site in Haiti should be done. Other potential primary research sites should be established in steepland sites such as Nepal or Peru.

VIII. PROJECTED IMPACT OF UTILIZATION

A. On World Food and Energy Production

The potential impact of INTSOIL on world food production is perhaps greater than that of any other CRSP. This is due to the fact that soil is the basic common denominator of the bulk of the world's food supply and its vegetatively-produced energy supply. INTSOIL'S development of proper soil management technology for food and energy production in the four agro-ecological zones which encompass the developing world will make it possible to increase substantially food production in these areas. The improved soil management technologies to be developed by INTSOIL can be used to support the commodity-oriented program of the international agricultural research centers and the other CRSPs. The National Academy of Sciences has projected that a proper soil management technology in the humid tropics alone can increase crop yields to 150-200% greater than those of the temperate zone on a per hectare per year basis.

B. On Farming System Stability

The use of proper soil management technologies is the key to improved farming systems in the developing world. The National Academy of Sciences has projected that without these improved soil management technologies in the agro-ecological zones of INTSOIL'S impact area, both spontaneous and planned settlements will fail as farming systems fail due to the deterioration and irreversible loss of the non-renewable soil resource base. No group is more affected by the production, or lack of production, from a limited land area than is the small farmer and his family. Their very lives are tied to their soil. Improved soil management technologies for the farming system are utilized by the small farmers and their families and will enable these systems to be productive while at the same time conserving the soil resource base.

C. Initial Environmental Examination

The activities of this project fall into the area described in Environmental procedure regulations, Para 216.2 (c) "Analyses, Studies, Academic or Investigative Research. Workshops and Meetings." These classes of activities will not normally require the filing of an Environmental Impact Statement or the preparation of an Environmental Assessment. It is possible that an output of this project will be set of procedures, guidelines or research results which when used would require such assessment. However, the project itself only proposes research and directly supportive activities. Under these guidelines this activity clearly qualifies for a negative determination at the time when a threshold decision is determined.

Use of improved soil management technologies developed by INTSOIL will result in considerable conservation and improvement of the environment. In the humid tropics, replacing shifting cultivation with continuous cultivation through improved soil management will result in less areas being cleared for agriculture and hence, the retention of the ecological integrity in much of the humid tropics. In the semi-arid tropics, improved soil management could lead to establishment of permanent agriculture in this zone and hence, a reduction in the desertification of those areas. In the acid savannas, development of appropriate soil management technologies will result in developing countries with other agro-ecological zones which are more environmentally sensitive to center food and energy production on the acid savanna soils which can be farmed with less adverse impact on the environment. In the steeplands, improved soil management technologies produce food and energy yields consistent with the necessary conservation of the soils of that zone.

D. On Developing Host Country Capabilities

INTSOIL is anticipated to have a major impact on developing capabilities of scientists within the host countries. Training of host country capabilities was stressed from inception of planning by the host countries and USAID Missions responding to questionnaires by those countries visited by planning teams and finally by those host countries participating in the development of the Final Program Proposal. It is strongly felt that one of the most lasting impacts of INTSOIL will be the host country research capability that is developed during the program and remains after the program. Therefore, the INTSOIL's ratio of junior scientists to senior scientists is approximately 2:1. Although graduate training at participating and other U. S. universities is planned, the degree research will be conducted within the host country itself. In this way, research capabilities for host country scientists will be developed within the countries themselves on soil management problems pertinent to the particular agro-ecological zone represented.

E. On Women

In every agro-ecological zone of INTSOIL's impact area, women are involved in various phases of land clearing, planting management and harvesting of crops. Current estimates are that women perform nearly 50% of the soil management work in the agro-ecological zones of INTSOIL. Improved systems for soil-crop management to be developed by INTSOIL are expected to reduce the women's work load and thus time involvement in backbreaking agricultural production. A spin-off effect of this could be a more stable family unit. Certainly, women, men and children will receive a greater return from their use of improved soil management systems to be developed by INTSOIL.

IX. STAFFING PATTERN AND BUDGET

A. Time Phased Staffing Pattern

The proposed staffing pattern for the first five years of INTSOIL is shown in Table 3. It assumes that 44 percent of the positions will be filled during the first year and 90 percent during the second. The most critical positions would be filled first, but this would largely depend on the results of the universities' recruiting efforts. This table was modified slightly at the Third Panel Meeting in order to have a uniform ratio of junior to senior scientists of approximately 2:1 in the four agroecological zones. Table 4 shows the summary of positions allocated at the Third Panel Meeting to the six participating universities. The budget requests are based on those allocations, with certain modifications to allow for differences in in-country costs and traveling distances.

B. Overall Budget Request to AID

Table 5 shows the INTSOIL budget request to AID as approved by the JRC meeting of June 10, 1980 with subsequent modifications arising from the Third Panel Meeting report. The six universities had the opportunity of revising their budget requests after that meeting and resubmitted them to the Planning Agency.

C. Budget Requests by Individual Universities

Table 6 presents the breakdown of the overall budget requests by university. Table 7 breaks these requests down by agroecological zone and Table 8 by major line item.

The budget request of the Management Entity is shown in Table 9. It is separate from the budget request submitted by NCSU as a participant university.

D. Matching Contribution

These budgets reflect only components chargeable to AID (both direct and indirect costs). Since these budgets are preliminary and subject to negotiation when institutional subgrants are awarded, development of the institutional cost-sharing schedules (25% of total cost) will be deferred until that time. The matching requirements will be satisfied principally by the designation of ongoing research activities within each participating U. S. university that are complementary and supportive of the INTSOIL program. The ongoing research activities so designated will become a component part of INTSOIL and thus satisfy the INTSOIL matching requirement. None of the U. S. universities nominated for participation in this program have the potential for allocating significant amounts of new institutional funds in support of INTSOIL.

Since a significant portion of these AID funds will be expended overseas, it is deemed inappropriate to require U. S. universities to provide 25% of the cost of all of these activities. Consequently, it is recommended that the following budget components be exempt from the 25% matching requirement:

- Training costs for host country or other country nationals.
- Pass through funds in support of host country institutions.
- Pass through funds in support of activities carried out by collaborating international centers.
- Costs of the Management Entity.

It is also recommended that any participating U. S. university that agrees to assess an indirect cost rate below its established institutional rate be allowed matching credit for the difference between the assessed and the established institutional rate.

Table 3. Time-phased staffing pattern for INTSOIL.

Program Component	Location*	Senior Staff					Junior Staff** and Support				
		81	82	83	84	85	81	82	83	84	85
----- Scientist Years -----											
1. HUMID TROPICS PROJECT:											
1.1 Soil/Crop Mgmt.	PE	1	1	1	1	1	2	3	3	3	3
1.2 Soil Fertility	PE	½	1	1	1	1	2	2	2	2	2
1.3 Farming Systems Econ.	PE	½	1	1	1	1	1	2	2	2	2
1.4 Soil Management/Fert.	IN	½	1	1	1	1	2	2	2	2	2
1.5 Agronomist	IN	½	1	1	1	1	1	2	2	2	2
1.6 Farming Systems Econ.	IN	½	1	1	1	1	0	2	2	2	2
1.7 Campus Support	--	2	3	4	4	4	2	5	5	5	5
Total		5	9	10	10	10	10	18	18	18	18
2. SEMIARID. TROPICS PROJECT:											
2.1 Soil Physics	UVN	½	1	1	1	1	0	1	1	1	1
2.2 Soil Fertility	UVN	½	1	1	1	1	0	1	1	2	2
2.3 Ground Cover Agron.	UVN	½	1	1	1	1	0	2	2	2	2
2.4 Campus Support	-	1	2	2	2	2	3	4	4	4	4
Total		2½	5	5	5	5	3	8	9	9	9
3. ACID SAVANNAS PROJECT:											
3.1 Soil Fert-Water Mgmt.	BR	½	1	1	1	1	½	2	3	3	3
3.2 Annual Crops Agron.	CO	0	1	1	1	1	½	2	3	3	3
3.3 Campus Support	--	½	1	2	2	2	1	3	3	3	3
Total		1	3	4	4	4	2	7	9	9	9
4. STEEPLANDS PROJECT:											
4.1 Soil Water Conserv.	DR	½	1	1	1	1	½	2	2	2	2
4.2 Farming Systems Agron.	DR	½	1	1	1	1	½	2	2	2	2
4.3 Farming Systems Econ.	DR	½	1	1	1	1	1	2	2	2	2
4.4 Campus Support	--	1	2	2	2	2	1	2	2	3	3
Total		2½	5	5	5	5	3	8	8	9	9
5. MANAGEMENT ENTITY:											
5.1 Director	--	1	1	1	1	1	0	0	0	0	0
5.2 Assoc. Director	--	½	½	½	½	½	0	0	0	0	0
5.3 Commun./Editor		0	0	0	0	0	1	1	1	1	1
5.4 Administrative Officer	--	0	0	0	0	0	1	1	1	1	1
Total		1½	1½	1½	1½	1½	2	2	2	2	2
INTSOIL TOTAL		12½	23½	25½	25½	25½	20	45	46	48	48

*PE = Peru; IN = Indonesia; UNV = Upper Volta/Niger; BR = Brazil;
CO = Colombia; DR = Dominican Republic.

**Majority are training positions.

Table 4. Summary of positions assignment by university for second and subsequent years of funding. Management Entity staff not included.

University	Zone*	Senior Scientists			Junior Scientists**		
		Field	Campus	Total	Field	Campus	Total
----- Scientist Years -----							
Cornell	HT	1.0	0.5	1.5	2.0	1.0	3.0
	AS	1.0	1.2	2.2	3.0	1.5	4.5
	Total	2.0	1.7	3.7	5.0	2.5	7.5
Hawaii	HT	2.0	1.5	3.5	4.0	2.0	6.0
Kentucky	STP	3.0	2.0	5.0	6.0	3.0	9.0
NCSU	HT	3.0	2.0	5.0	5.0	2.5	7.5
	AS	0.0	0.2	0.2	1.0	0.5	1.5
	Total	3.0	2.2	5.2	6.0	3.0	9.0
TAMU	SAT	3.0	2.0	5.0	5.0	4.0	9.0
P. Rico	AS	1.0	1.0	2.0	2.0	1.0	3.0
TOTAL		14.0	10.4	24.4	28.0	15.5	43.5

*Zones: HT = Humid Tropics; SAT = Semiarid Tropics; AS = Acid Savannas; STP = Steeplands.

**Training positions.

Table 5. INTSOIL budget request to AID.

Program Component	1981	1982	1983	1984	1985	Total
	----- 1000 \$ -----					
Humid tropics	1,501	2,233	2,510	2,829	3,193	12,266
Semiarid tropics	419	938	1,184	1,302	1,431	5,274
Acid savannas	280	598	712	788	857	3,235
Steeplands	358	564	604	653	687	2,866
Subtotal	2,558	4,333	5,010	5,572	6,168	23,641
Management Entity*	370	400	440	480	520	2,210
TOTAL	2,928	4,733	5,450	6,052	6,688	25,851

* Not subject to 25% matching contribution.

Table 6. Budget request to AID of the four projects by individual university.

University	1981	1982	1983	1984	1985
	----- 1000 \$ -----				
Cornell	206	319	368	406	448
Hawaii	398	955	1,051	1,157	1,272
Kentucky	358	564	604	653	687
North Carolina State Univ.	1,095	1,260	1,452	1,668	1,917
Puerto Rico	83	298	352	386	413
Texas A & M	419	938	1,184	1,302	1,431
Total	2,559	4,334	5,011	5,572	6,168

Table 7. Budget request to AID by university and agroecological zone.

Zone and University	1981	1982	1983	1984	1985
	----- 1000 \$ -----				
Humid Tropics					
NCSU	1,015	1,140	1,302	1,498	1,727
Hawaii	398	955	1,051	1,157	1,272
Cornell	88	138	157	174	194
Semiarid Tropics					
Texas A & M	419	938	1,184	1,302	1,431
Acid Savannas					
Cornell	117	180	210	232	254
Puerto Rico	83	298	352	386	413
NCSU	80	120	150	170	190
Steeplands					
Kentucky	358	564	604	653	687
Totals	2,558	4,333	5,010	5,572	6,168

Table 8. Individual university budget requests to AID by major line item.

	1981	1982	1983	1984	1985
----- \$1000 -----					
CORNELL UNIVERSITY					
Salaries	59	119	138	153	168
Fringe benefits	9	18	20	22	24
Allowances	20	40	50	60	70
Overhead	32	61	69	76	85
Travel and freight	75	50	50	55	60
Supplies and equipment	5	20	25	25	25
Other direct costs	5	10	15	15	15
Total	206	319	368	406	448
UNIVERSITY OF HAWAII					
Salaries	93	221	244	269	295
Fringe benefits	18	44	48	53	59
Allowances	30	72	79	87	95
Overhead	60	144	159	175	192
Travel and freight	42	102	112	123	135
Supplies, equipment and other costs	155	372	409	450	496
Total	398	955	1,051	1,157	1,272
UNIVERSITY OF KENTUCKY					
Salaries	86	186	203	243	268
Fringe benefits	14	28	30	40	45
Allowances	40	82	89	118	131
Overhead	41	84	90	102	110
Travel and freight	18	34	37	50	53
Supplies and equipment	144	120	125	70	50
Other direct costs	15	30	30	30	30
Total	358	564	604	653	687
NORTH CAROLINA STATE UNIVERSITY*					
Salaries	309	367	442	487	536
Fringe benefits	56	66	80	89	96
Overhead	112	130	152	167	184
Travel and freight	80	110	121	133	198
Supplies and equipment	276	280	321	400	450
Other direct costs	263	307	335	393	452
Total	1,095	1,260	1,452	1,668	1,917

* Does not include the Management Entity function.

Table 8 (Continued).

	1981	1982	1983	1984	1985
----- 1000 \$ -----					
UNIVERSITY OF PUERTO RICO					
Salaries	41	141	185	204	224
Fringe benefits	9	29	38	42	46
Allowances	4	13	19	21	23
Overhead	0	0	0	0	0
Student help	0	10	10	14	15
Travel & freight	12	40	40	40	45
Supplies & equipmt.	11	50	45	45	35
Other direct costs	5	15	15	20	25
Total	83	298	352	386	413
TEXAS A & M UNIVERSITY					
Salaries	95	212	268	294	323
Fringe benefits	23	51	64	71	78
Allowances	49	110	139	153	168
Overhead	33	73	92	101	111
Travel & freight	60	134	169	186	205
Supplies & equipmt.	107	240	303	333	367
Other direct costs	52	118	148	163	179
Total	419	938	1,184	1,302	1,431

Table 9. Management Entity budget request to AID

Item	1981	1982	1983	1984	1985
	-----\$1000-----				
Salaries	149	164	180	198	218
Fringe benefits	27	30	33	36	39
Travel and freight	40	44	48	52	56
Supplies	17	18	20	21	22
Other direct costs	15	18	20	21	24
Overhead @ 40% of all costs but equipment	99	110	120	131	144
Equipment	23	16	19	21	17
Total	370	400	440	480	520

X. AGREEMENTS SIGNED WITH HOST COUNTRY INSTITUTIONS

- A. INIA, Peru (and translation of Spanish original)
- B. SRI, CRIA, IPB, Indonesia
- C. ICRISAT, West Africa
- D. EMBRAPA, Brazil
- E. ICA, Colombia
- F. CIAT, Colombia
- G. SEA, Dominican Republic

ACUERDO DE ENTENDIMIENTO ENTRE EL INSTITUTO NACIONAL DE
INVESTIGACION AGRARIA DEL PERU Y NORTH CAROLINA STATE
UNIVERSITY PARA ESTABLECER UN PROGRAMA COOPERATIVO EN
MANEJO DE SUELOS TROPICALES

El Instituto Nacional de Investigación Agraria (INIA), organismo responsable de la investigación agropecuaria en el Perú y la Universidad Estatal de Carolina del Norte (NCSU), organismo responsable de la planificación del "Proyecto Colaborativo de Investigación de Manejo de Suelos del Título XII (AID)-CRSP, desearon de intensificar las investigaciones en manejo de suelos tropicales en el Perú han acordado celebrar el presente Acuerdo de Entendimiento.

1. OBJETIVO

Desarrollar y transferir sistemas de manejo de suelos tropicales para una producción agropecuaria estable, económicamente rentable y ecológicamente viable.

2. JUSTIFICACION

El manejo correcto de suelos tropicales es un elemento básico en el desarrollo racional de los trópicos. El Perú, mediante el Proyecto Yurimagos, es un país líder en este tipo de investigación. El INIA ha acordado dar alta prioridad a las investigaciones en manejo de suelos tropicales con el objeto de desarrollar sistemas de uso de suelos que permitan el desarrollo racional de la Selva.

El proyecto de planificación del Proyecto Colaborativo de Investigación de Manejo de Suelos del Título XII (AID) ha determinado como primera prioridad las investigaciones en el manejo de suelos del trópico húmedo, indicando al Perú como una de las sedes principales para realizar esta investigación colaborativa.

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3. SEDE

La sede del proyecto será la Estación Experimental de Yurimagua, propiedad del INIA, con condiciones ambientales, edáficas y socio-económicas típicas de la Amazonía Sudamericana. Las actividades se desarrollarán no solamente en la sede sino a través de la amazonía peruana en forma de red de investigaciones de acuerdo con las disposiciones del INIA, y en coordinación con actividades en otros países con condiciones agroecológicas similares.

4. DESCRIPCION DE ACTIVIDADES

Los objetivos se lograrán mediante el desarrollo de un programa de investigación y transferencia de tecnología, planificado anualmente y ejecutado en conjunto por especialistas del INIA y de las instituciones norteamericanas seleccionadas para participar en dicho programa. Las actividades principales son:

- Selección y caracterización de los suelos amazónicos, con énfasis en su variabilidad y su interpretación para establecer sistemas de manejo de tierras.
- Desarrollo de métodos de diagnóstico más adecuados para diferentes sistemas de uso de tierras y condiciones económicas.
- Seguimiento de la dinámica de los componentes químicos, físicos y biológicos del suelo bajo diferentes sistemas de manejo.
- Resolver las limitaciones de fertilidad de los suelos con énfasis en acidez, fósforo, nitrógeno (orgánico e inorgánico), balance catiónico, elementos secundarios y micronutrientes, mediante abarcamiento en parcelas experimentales y el estudio del efecto residual de los mismos.
- Seleccionar variedades o ecotipos de cultivos anuales, pastos y cultivos permanentes tolerantes a la acidez del suelo de bajos niveles de fósforo disponible y otros factores adversos.

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- Seleccionar espas de nitrofixación también tolerantes a dichos factores adversos para asegurar una buena fijación simbiótica del nitrógeno en leguminosas anuales y forrajeras.
- Desarrollar sistemas de bajo uso de insumos para cambiar los actua los sistemas de agricultura migratoria en sistemas de agricultura con tinuos, incluyendo rotaciones o cultivos intercalados, pertos, cultivos permanentes y sistemas agroforestales.
- Desarrollar prácticas para prevenir o controlar la erosión del suelo en los trópicos húmedos.
- Desarrollar sistemas de transferencia de tecnología al agricultor, incluyendo recomendaciones de abastecimiento y otros.
- Adiestrar técnicos peruanos y de otras nacionalidades en el manejo de suelos tropicales mediante el establecimiento de un Centro de Adiestramiento en Yurimaguas y estudios de post-graduados en universidades de los Estados Unidos y el Perú.

5. INSTITUCIONES PARTICIPANTES

- El INIA es la entidad ejecutiva por parte del Perú y por lo tanto coordinará la participación de otras instituciones nacionales en el Programa.
- La AID dentro del Título XII seleccionará a un número de universi-
dades norteamericanas para participar en el "CRSP" a través de una entidad administrativa (EA).
Las participaciones de universidades norteamericanas y sus científicas en el Perú, necesitará la previa aprobación del INIA. La entidad administrativa previo acuerdo con el INIA seleccionarán a un Líder del Programa con sede en Yurimaguas.
- El INIA y la EA promoverán la participación de otras instituciones de asistencia técnica en el Programa con miras a ampliar su base científica impcialmente en otras disciplinas de la ciencia del suelo.

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6. PERSONAL

- La EA, previo entendimiento con el INIA, destacará científicos (a nivel de Ph.D.) en Yurimaguas a tiempo completo. Asimismo el INIA destacará científicos al nivel correspondiente.
- Los científicos principales serán escogidos para cubrir las siguientes áreas: fertilidad de suelos, conservación de suelos, agrónomos-cultivos anuales, agrónomos-cultivos permanentes, economistas, capacitación, transferencia de tecnología.
- Se espera que otras entidades internacionales proporcionen científicos principales en las ramas siguientes: postes tropicales, ganadería, agroforestales y protección de cultivos.
- Además la EA designará a un número de científicos asistentes (a nivel de Ing. Agr. o M.S.) para trabajar como investigadores o efectuar sus tesis de post-gradúo en el Perú con una de las universidades participantes. Igualmente el INIA designará a un número de profesionales asistentes, al mismo nivel. Todos los profesionales asistentes recibirán apoyo científico necesario.
- Algunos de los profesionales mencionados, ya principales como asistentes, podrán estar ubicados en otras zonas de la Selva además de Yurimaguas, de acuerdo con los planes anuales de trabajo.
- Todos los participantes del programa trabajarán en equipo, bajo la coordinación de un Líder del Proyecto CRSP en el Perú.

7. RESPONSABILIDADES DE LAS UNIVERSIDADES NORTeamERICANAS Y LA ENTIDAD ADMINISTRATIVA

- Seleccionar los científicos principales y asistentes y trasladarlos a Yurimaguas, previo entendido con el INIA.
- Pagar todos los salarios, beneficios sociales, vivienda, viajes, víveres y otros gastos adicionales del personal norteamericano.

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- Proveer un vehículo de trabajo para el científico principal.
- Proveer costos directos de operación y equipo, no incluidos en el presupuesto operacional del INIA.
- Proporcionar un funcionario administrativo en Lima para apoyo logístico.
- Proporcionar oportunidades de estudio de post-graducción.

8. RESPONSABILIDADES DEL INIA

- El INIA proporcionará facilidades de tierras para la realización de los trabajos científicos del Proyecto, así como personal obrero, personal asistentes, laboratorio, oficinas, animales para experimentación y otros, que sean necesarios para la ejecución del mismo.
- Seleccionar científicos principales y asistentes y trasladarlos a Yurimagua, previo entendimiento con la EA.
- Pagar los salarios, beneficios sociales, viajes, vísticos del personal peruano.
- Los costos directos asociados con el trabajo en el Perú, incluyendo costos de electricidad, agua, personal de secretariado, limpieza y mantenimiento de oficinas.

9. RESPONSABILIDAD DE AMBAS PARTES

- Designar una Junta Directiva compuesta por tres miembros del INIA y tres de la EA para proporcionar guía general de la planificación y evaluación de los trabajos. La Junta Directiva se reunirá en Yurimagua por lo menos una vez al año.
- Elaborar en conjunto la programación de los trabajos y evaluarlos también en conjunto una vez al año.
- Producir un informe anual de actividades en inglés y castellano.

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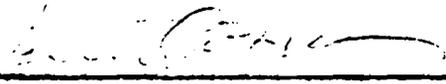
- Difundir resultados del Proyecto pudiendo dichos resultados ser utilizados libremente por ambas Instituciones, dando el crédito recíproco a las Instituciones participantes.

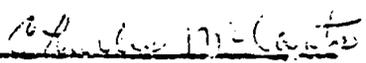
10. EFECTUACION

La adjudicación de fondos al Proyecto Colaborativo de Investigación en Manejo de Suelos - Título XII - CRSP y las actividades a desarrollarse con el INIA serán formalizadas mediante un Convenio, tan pronto como se reciba la aprobación final del AID.

11. DURACION

La duración de este Acuerdo es indefinida, sujeto a la disponibilidad de fondos. Cualquiera de las partes lo pueda cancelar mediante un aviso por escrito a la otra con seis meses de anticipación.


Dr. Javier Guzzo Fernández Dávila
Director Ejecutivo
Instituto Nacional de Investigación Agraria


Dr. Charles Mc Cant's
Jefe Dept. de Suelos
Universidad del Estado de
Carolina del Norte - U.S.A.

Fecha: 14 de Enero de 1980

Fecha: 14 de Enero de 1980

BEST AVAILABLE DOCUMENT

(Translation of Spanish Original)

MEMORANDUM OF UNDERSTANDING BETWEEN THE INSTITUTO NACIONAL DE
INVESTIGACION AGRARIA OF PERU AND NORTH CAROLINA STATE UNIVERSITY
TO ESTABLISH A COOPERATIVE PROGRAM IN TROPICAL SOIL MANAGEMENT

The Instituto Nacional de Investigación Agraria (INIA), as the responsible entity for agricultural research in Peru, and North Carolina State University, the planning entity for the Soil Management CRSP of Title XII and AID, wishing to intensify management research in tropical soils of Peru have agreed to the present memorandum.

1. OBJECTIVE

Develop and transfer management systems for economically stable and ecologically sound agricultural production in soils of the humid tropics.

2. JUSTIFICATION

The proper management of tropical soils is a basic element in the rational development of the tropics. Peru, through the Yurimaguas Project, is a leading country in this type of research. INIA has given high priority to tropical soils management research leading to the development of management systems that would permit the rational development of the Selva.

The planning process of the Soil Management CRSP has given first priority soil management research of the humid tropics, suggesting Yurimaguas, Peru as one of the potential primary sites to conduct this cooperative research.

3. HEADQUARTERS

The headquarters of the project will be the Yurimaguas Experiment Station, property of INIA, with climatic, soil and socio-economic conditions

typical of the South American Amazon. Activities would be conducted not only at headquarters but also as a research network throughout the Peruvian Amazon according to INIA guidelines, and in other countries with similar agroecologic conditions.

4. ACTIVITIES

The objectives would be attained through the development of a research and technology transfer program, annually planned and jointly executed by INIA specialists and those from U. S. institutions selected to participate in this program. The principal activities will include:

- Selection and characterization of Amazon soils with emphasis on their variability and its interpretation to establish management systems.
- Development of appropriate land clearing methods for different land use systems and economic conditions.
- Monitoring changes in chemical, physical and biological properties of soils under different management practices.
- Solve soil fertility limitations with emphasis on acidity, phosphorus, nitrogen (organic and inorganic), cationic balance, secondary elements and micronutrients, through fertilization in field trials and the study of the residual effect of those fertilizers.
- Select varieties or ecotypes of annual crops, pastures and permanent crops tolerant to soil acidity and low levels available phosphorus as well as other adverse soil factors.
- Select Rhizobium strains also tolerant to such factors, in order to insure adequate nitrogen fixation of grain and forage legumes.

- Develop low input systems to change from shifting cultivation to continuous cropping systems, including rotations or intercropping systems, pastures, permanent crops, and agroforestry.
- Develop practices to prevent or control soil erosion in the humid tropics.
- Develop systems of technology transfer to farmers, including fertilizer and other recommendations.
- Train Peruvian technicians and those of other nationalities in management of tropical soils through establishment of a training center at Yurimaguas and through post graduate studies at universities in the United States and in Peru.

5. PARTICIPATING INSTITUTIONS

- INIA is the executive entity on behalf of the Government of Peru and therefore will coordinate the participation of all other national institutions in this program.
- AID, through its Title XII program, will select a number of universities to participate in the CRSP and among them a Management Entity (ME).
- The participation of the North American Universities and its scientists in Peru is subject to prior approval of INIA. The Management Entity through an agreement with INIA will select a Program Leader headquartered in Yurimaguas.
- INIA and the Management entity will promote the participation of other technical assistance institutions in the Program in order to broaden its scope, particularly in disciplines other than soil science.

6. PERSONNEL

-The ME, with INIA's approval, will assign scientists at the Ph.D. level in Yurimaguas on a full-time basis. Likewise, INIA will assign several scientists at the appropriate level. The principal scientists will be selected to cover the following areas: soil fertility, soil conservation, annual crop agronomy, permanent crop agronomy, economics, training, and technology transfer.

-It is hoped that other international agencies would provide principal scientists in the following areas: tropical pastures, animal sciences, agroforestry, and crop protection.

-Furthermore, the ME will assign a number of assistant scientists, at the B.S. or M.S. levels, to work as scientists or graduate students in Peru with one of the participating universities. Likewise, INIA will assign a number of assistant scientists at the same level. All these scientists will receive the necessary scientific backstopping.

-Some of the aforementioned scientists could be assigned to other areas of the Selva of Peru according to the annual work plan.

-All participants of this program will work as a team under the coordination of the CRSP project leader in Peru.

7. RESPONSIBILITIES OF THE AMERICAN UNIVERSITIES AND THE MANAGEMENT ENTITY

-Select the principal and assistant scientists and move them to Yurimaguas according to an agreement to be developed by the ME and INIA.

-Pay salaries, allowances, fringe benefits, housing, travel and other additional costs of the North American personnel.

- Provide one work vehicle for each principal scientist.
- Cover the direct costs of operation and equipment not included in the operational budget of INIA.
- Provide an administrative officer in Lima for logistical support.
- Provide opportunities for post graduate studies.

8. RESPONSIBILITIES OF INIA

- INIA will provide facilities for conducting the scientific work of the project, such as land, laborers, technicians, laboratories, offices, animals for research and other facilities necessary for executing the project.
- Select principal and assistant scientists and move them to Yurimaguas according to an agreement to be developed by the ME and INIA.
- Pay salaries, fringe benefits, travel and per diem of the Peruvian personnel.
- Cover direct costs associated with the work in Peru, including electricity, water, secretarial work, janitoring and maintenance of offices.

9. RESPONSIBILITIES OF BOTH SIDES

- Name a Board of Directors composed of three members of INIA and three members nominated by the ME to provide general guidelines in the planning and execution of the work. The Board of Directors will meet in Yurimaguas at least once a year.
- Develop and evaluate annually the work plan.
- Provide an annual report of activities in English and Spanish.
- Disseminate project results, allowing free use by either institution giving proper credit to all participating institutions.

10. EXECUTION

Assignment of funds to the Soil Management CRSP and the activities to be developed with INIA will be formalized through a Convenio as soon as final approval from AID is received.

11. DURATION

Duration of this agreement is indefinite, subject to the availability of funds. Each party could cancel in writing to the other with six month's notice.

Signed by:

Ing. Javier Gasso Fernandez Dávila
Director Ejecutivo
Instituto Nacional de Investigación
Agraria

Dr. Charles McCants
Head, Soil Science Department
North Carolina State University

LETTER OF INTENTION

BETWEEN THE SOIL RESEARCH INSTITUTE, THE CENTRAL RESEARCH INSTITUTE OF AGRICULTURE, BOGOR AGRICULTURAL UNIVERSITY AND NORTHCAROLINA STATE UNIVERSITY TO ESTABLISH A SOIL MANAGEMENT COLLABORATIVE RESEARCH PROGRAM IN INDONESIA

The purpose of this letter is to state the intention of the three Indonesian research institutions, hereinafter referred to as the Indonesian Research Group (IRG) and North Carolina State University, the planning agency for the Tittle III Soil Management CRSP to develop a Soil Management Collaborative Research Program.

I. OBJECTIVE

The objective of this Program is to develop and transfer soil management technology leading to stable farming systems, mainly food crops, for the transmigration areas of the humid tropics of Indonesia.

II. JUSTIFICATION

Information of land use systems in the new transmigration areas derived from primary or secondary forest, or along-alang land is scarce. Well coordinated research on alternative to develop newly opened lands is urgently needed.

III. DESCRIPTION OF ACTIVITIES

Research and transfer of technology activities will be jointly planned and executed by the IRG and the U.S. Universities selected to participate. The principal activities are listed below.

1. Develop soil fertility evaluation and improvement system for determining fertilizer and lime needs.

2. Soil characterization with emphasis on interpretation for various purposes.
3. Develop improved land clearing methods to minimize soil damage.
4. Monitor the soil dynamics with time and correlate with crop dynamics.
5. Develop methods to overcome soil factors limiting crop production, such as aluminum toxicity, high phosphorus fixation and deficiency of macro, secondary and micronutrients.
6. Select crop varieties tolerant to adverse soil and climatic conditions such as aluminum toxicity, low levels of available soil phosphorus and temporary droughts.
7. Utilize adapted Rhizobium strains that will improve nitrogen fixation by legumes.
8. Develop low input soil management systems.
9. Develop practices to prevent or control soil erosion including intercropping, grass: legume pastures and permanent crops.
10. Integrate these and other components into viable farming systems.
11. Develop systems for transferring technology to farmers.
12. Train scientists and extension workers on tropical soil management.
13. Involve graduate students in research activities leading to advanced degrees at Indonesian or U.S. Universities.

IV. WORK LOCATIONS

Field research will be initially conducted in Sumatera, in transmigration areas and scientists will be located nearby, taking into consideration the Soil Research Institute's facilities at Bukittinggi, and CRIA'S facilities at Sukarame and Padang.

V. INSTITUTIONAL COORDINATION

The Soil Research Institute will coordinate the research activities among the Indonesian institutions.

AID will select a Management Entity (ME) to coordinate the activities of the U.S. Universities.

The Management Entity, with the concurrence of the IRG will appoint a Project Leader.

The ME and IRG will promote the involvement of other agencies to cooperate in this Program, in order to broaden and strengthen its scope, especially in areas other than soil science.

VI. PERSONNEL

The ME and IRG will assign scientists at the PhD level on a full-time basis and will station them in Sumatera.

VII. COMPLEMENTARITY

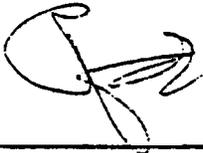
This program is highly complementary to the existing USAID Technical Assistance Program in Indonesia, such as Sumatera Agricultural Research, Benchmark Soils Project, MUSIA Project, and FAO/UNDP Projects such as: Assistance to Transmigration Project, Land Suitability Evaluation with special emphasis on Outer Islands, Assistance to Rainfed Agriculture and IBRD loan for Transmigration such as Transmigration I, Transmigration II, etc.

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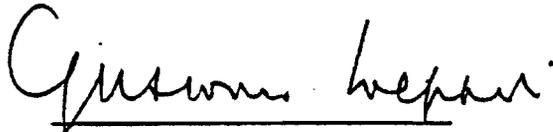

D. Muljadi
Director
Soil Research Institute



Pedro Sanchez, Coordinator
Soil Management Planning
Grant
North Carolina State University



Rusli Hakim
Director
Central Research Institute for Agriculture



Goeswono Soepardi
Dean
Faculty of Agriculture
Sogor Agricultural University

Bogor, February 29, 1980

MEMORANDUM OF UNDERSTANDING
BETWEEN ICRISAT (WEST AFRICA)
AND NORTH CAROLINA STATE UNIVERSITY
FOR COOPERATION IN SOIL MANAGEMENT
COOPERATIVE RESEARCH PROGRAM (CRSP)

The purpose of this note is to state the intention of ICRISAT's Program in Africa to establish a cooperative research program with the Soils Management (CRSP) as outlined by the planning agent, North Carolina State University.

Given the commonality of interests between ICRISAT and the CRSP's research priority in the semi-arid (seasonal - non acid) tropics, representative of both institutions agree to develop the following joint project, subject to the approval of ICRISAT's Director and AID and the Joint Research Committee in BIFAD :

- 1 - The CRSP team will be incorporated as part of the ICRISAT teams located at its research centers in Ouagadougou, Upper Volta and Niamey, Niger. Work will be designed, executed and evaluated jointly between both programs on an annual basis.
- 2 - The Soil Management CRSP effort should consist of three senior scientists stationed at either of the two locations, but working on both countries, covering the Sudan and Sahelian zones within the semi-arid tropics : the axes of concentration of the senior scientists would be :
 - (a) Soil Fertility, including fertilization and the development of soil fertility evaluation services for the principal cropping systems of the regions. This position could preferably be headquartered in Upper Volta.

- (b) Soil Physics - management, working jointly with ICRISAT land and water scientist on developing improved systems for utilizing better limited supply of water and reduce surface crusting, sealing run off and erosion problems. Headquarters preferably in Niger.
 - (c) Pasture Agronomist emphasizing on developing continuous ground cover of legumes throughout the year including improving the efficiency of nitrogen utilization. Headquartered preferably in Upper Volta.
- 3 - The CRSP would also provide opportunity for graduate students to conduct research for MS and Ph.D degrees with field work done in Upper Volta or Niger on mutually agreed upon project. Preference will be given to the training of soil scientists for the National Institution INRAN (the Institut National de Recherches Agronomiques du Niger) and the Service du Sol of the Ministry of Rural Development of Upper Volta. Examples of graduate student thesis research would include : (1) basic investigations on the nature of the severe soil hardening process via silicate chemistry investigation and (2) interpretation of the vast and excellent pedological data available in this area into agronomic terms; (3) soil microbiology, nitrogen and organic matter dynamics in sandy soil of Niger; (4) water management dynamics in watersheds.
- 4 - Short term assignments of U.S. professors for specific, mutually agreed upon purposes.
- 5 - ICRISAT would consider the CRSP scientists at equal level of ICRISAT senior or junior scientists according to rank, with all the international and protocol privileges, including accreditation to the respective governments.
- ///

6 - This proposed program is agreeable by the USAID Missions in Niger and Ouagadougou (SAFGRAD) as well as with the two previously mentioned national institutions.

C. CHARREAU
Coordinator,
ICRISAT West African Program



Pedro SANCHEZ
Coordinator, Soil Management CRSP
North Carolina State University

A handwritten signature in dark ink, appearing to read "Pedro Sanchez", written over the text of the signature block.

Ouagadougou, 28 March 1980



CARTA DE INTENÇÃO ENTRE A EMPRESA BRASILEIRA DE PESQUISA AGROPECUÁRIA - EMBRAPA ATRAVÉS DE SEU CENTRO DE PESQUISA AGROPECUÁRIA DOS CERRADOS-CPAC, E A UNIVERSIDADE DO ESTADO DA CAROLINA DO NORTE - NCSU/USA, PARA ESTABELECEER UM PROGRAMA COOPERATIVO EM MANEJO DE SOLOS TROPICAIS.

A EMBRAPA, organismo responsável pela pesquisa agropecuária no Brasil, representada neste instrumento pelo seu Presidente, Dr. Eliseu Roberto de Andrade Alves, e a UNIVERSIDADE DA CAROLINA DO NORTE, organismo responsável pelo planejamento do "PROJETO DE COOPERAÇÃO DE MANEJO DE SOLOS", integrante do TÍTULO XII (AID) - CRSP (Collaborative Research Support Program), por seu representante autorizado, o coordenador do Projeto referido, Dr. Pedro Sanchez no intuito de intensificar os trabalhos de pesquisa em manejo de solos tropicais nos Cerrados, resolvem firmar a presente Carta de Intenção:

1. OBJETIVO

Desenvolver e transferir sistemas de manejo de solos tropicais para uma produção agropecuária estável, economicamente rentável e ecologicamente viável.

2. JUSTIFICATIVA

No mesmo local onde funciona o CPAC, se desenvolveu, no período de 1972 a 1977, um programa cooperativo com as Universidades de Cornell e da Carolina do Norte, com resultados que em muito auxiliaram e permitiram montar um Programa de Aproveitamento dos Recursos de Solo-Água-Planta para os Cerrados brasileiros.

Representando uma área (180 milhões de ha) com imenso potencial para a produção de alimentos e de fibras, o CPAC/EMBRAPA de

ε VINCULADA AO MINISTÉRIO DA AGRICULTURA

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ciduiu dar alta prioridade às pesquisas relacionadas com a baixa fertilidade natural dos solos e a deficiência hídrica, principalmente aquela ocasionada pela ocorrência de "veranicos".

O enfoque das ações de pesquisa deverá se concentrar fundamentalmente nas inter-relações entre planta, manejo de solo e manejo de água, em agricultura de sequeiro, objetivando ao aprofundamento dos conhecimentos básicos, capazes de explicar os mecanismos que regem causas e efeitos, permitindo, através dessa compreensão, uma melhor extrapolação de resultados.

3. SEDE

A sede do programa de cooperação com o Brasil será o Centro de Pesquisa Agropecuária dos Cerrados-CPAC, órgão integrante da EMBRAPA situado em Planaltina, no Distrito Federal, que conta com uma área experimental de 3.500 ha, com equipamentos laboratoriais, com acervo bibliográfico farto e cujas condições ambientais e edáficas representam significativamente padrões climáticos e dos solos predominantes em toda a região dos Cerrados brasileiros.

Além do programa objeto da presente Carta de Intenção, o CPAC conta com um Programa de Avaliação dos Recursos Naturais e Socio-econômicos e com um Programa de Sistemas de Produção para os Cerrados.

As atividades objeto desta Carta de Intenção poderão ser desenvolvidas nas quatorze (14) estações e campos experimentais, distribuídos em 07 (sete) Estados da Federação, todos sob a coordenação programática do CPAC.

4. DESCRIÇÃO DAS ATIVIDADES

Dentro do enfoque expresso na justificativa (item 2), pretende-se que as ações de pesquisa, planejadas anualmente, segundo o Modelo de Programação Circular, adotado pela EMBRAPA, sejam concentradas primordialmente nos seguintes componentes de pesquisa:

- 4.1. Resolver problemas específicos de baixa fertilidade de "Oxisoils" dos Cerrados, visando a uma maior eficiência no uso de fertilizantes e corretivos, tais como:

como:

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- 4.1.1. A interação de aplicação de fósforo e calcário para minimizar custos em diferentes culturas e pastagens de interesse para os Cerrados.
 - 4.1.2. Incrementar a eficiência de utilização do elemento de mais alto custo, o fósforo, mediante melhor uso de fontes, variedades tolerantes a baixos níveis de P disponível, e associação de plantas com microorganismos.
 - 4.1.3. Caracterizar a dinâmica dos parâmetros de fertilidade de solo, em função de manejo de cultura e de tempo, depois da aplicação de insumos. Como exemplos, temos as taxas de mineralização de matéria orgânica e as mudanças de níveis críticos e extratores de fósforo em função do tempo.
 - 4.1.4. Aprofundar o conhecimento da resposta, níveis críticos e aspectos básicos dos micronutrientes em solos de Cerrados.
 - 4.1.5. Desenvolver práticas para manter um balanço entre potássio, cálcio e magnésio, bem como as interações entre enxofre e magnésio em leguminosas.
 - 4.1.6. Desenvolver sistemas de rotação de culturas, com ênfase em um melhor uso de insumos e prevenção e controle da erosão.
 - 4.1.7. Avaliação econômica do uso de fertilizantes e corretivos nos solos de Cerrados.
- 4.2. Aumentar a profundidade radicular das culturas e pastagens, para atenuar a deficiência hídrica, mediante práticas de manejo de solo, tais como:
- 4.2.1. Aumentar a quantidade e disponibilidade de cálcio no subsolo.




VINCULADA AO MINISTÉRIO DA AGRICULTURA

- 4.2.2. Caracterizar e identificar as limitações físico-químicas, no desenvolvimento radicular dos solos predominantes nos Cerrados, e
- 4.2.3. Selecionar variedades de plantas, visando ao melhor desenvolvimento radicular em solos ácidos.

5. INSTITUIÇÕES PARTICIPANTES

O CPAC, em nome da EMBRAPA, é a entidade executora por parte do Brasil e, portanto, coordenará a participação de outras instituições nacionais no Programa.

Face à responsabilidade exercida pela Universidade da Carolina do Norte de planejamento do "Projeto de Cooperação de Manejo de Solos" que por sua vez se insere no Título XII (AID) CRSP, as partes atribuem à AID-CRSP a faculdade de selecionar um número de Universidades norte-americanas para possível participação técnica no Programa objeto desta Carta de Intenção, mediante a prévia solicitação o das instituições participantes e expressa aprovação da EMBRAPA, através de pronunciamento formal do CPAC, podendo ainda a seleção referida ser efetuada por delegação da AID-CRSP, pela entidade que vier a ser por ela designada como executora do Programa, acatando as partes a decisão a respeito, a que se submeterão.

5.1. Atribuições genéricas de responsabilidade da EMBRAPA/CPAC.

Promover a participação dos bolsistas da EMBRAPA em pós-graduação nas Universidades envolvidas, neste Programa Cooperativo, mediante a realização de pesquisas de teses no CPAC.

Fornecer as facilidades completas de escritórios, de mobiliário em geral, de campos experimentais, de

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laboratórios, biblioteca e de computação, para o bom cumprimento do Programa no Brasil.

Prover serviços de mão-de-obra e outros, previstos nos Planos Anuais de Trabalho referidos no item 4.

Fornecer serviços administrativos locais para as despesas incorridas pela AID-CRSP, incluindo os controles requeridos para os seus próprios fins administrativos.

- 5.2. Atribuições genéricas a serem providas pela Universidade da Carolina do Norte, como responsável pelo planejamento do "Projeto de Cooperação de Manejo de Solos", integrante do Título XII, através da AID-CRSP:

Selecionar, para possíveis participações, quaisquer estudantes e pesquisadores de interesse para o Programa Cooperativo.

Custear todas as despesas decorrentes dessas participações previstas nos Planos Anuais de Trabalho a que se referem os itens 4 e 5.1, elaborados de comum acordo.

Prover aos estudantes e pesquisadores selecionados as demais facilidades, tais como custos diretos de operações, materiais necessários e outros eventuais, não previstos ou providos diretamente nos orçamentos próprios da EMBRAPA/CPAC.

- 5.3. Responsabilidades de ambas as partes

Elaborar, em conjunto, respeitando as peculiaridades de cada parte, a programação dos trabalhos e promover, anualmente, a avaliação dos resultados.

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Produzir um informe anual das atividades desenvolvidas em português e em inglês, podendo ser específico ou constar de veículos de informação e divulgação das partes.

Difundir os resultados do Programa, utilizados livremente por ambas as partes, resguardando sempre o crédito recíproco e a natureza dos resultados, mormente quando se referir a pesquisas de teses.

6. PESSOAL ENVOLVIDO

6.1. Em função dos enfoques abordados na descrição das atividades e dos Planos Anuais de Trabalho, as Universidades norte-americanas selecionadas e a entidade designada para a execução do Programa, na forma do item 5, mediante prévio entendimento com o CPAC, indicarão:

- a) estudantes de pós-graduação para os trabalhos de pesquisas de teses;
- b) consultores a curto prazo para apoiar as atividades cooperativas;
- c) pesquisadores a longo prazo requeridos pelo Programa. Neste particular, pelo menos um pesquisador a nível de Ph.D. será requerido.

6.2. Os professores orientadores de estudantes das Universidades norte-americanas envolvidas, prestarão assistência local, na sede do Programa no Brasil, quando necessária.

6.3. Considerando que localmente existe o Programa de Aproveitamento dos Recursos Solo-Água-Planta, o CPAC compromete sua participação nos projetos da AID-CRSP, utilizando a equipe multidisciplinar local de pesquisadores, principal -

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mente aqueles que atuam mais diretamente nos Projetos de Fertilidade do Solo e de Deficiência Hídrica.

6.4. Todo o pessoal locado no CPAC, participante dos projetos da AID-CRSP, será considerado, para efeitos técnicos, como integrante da equipe multidisciplinar do CPAC.

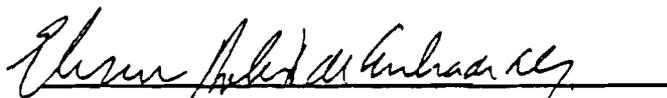
7. EXECUÇÃO

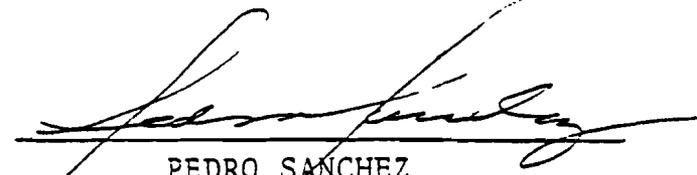
A adjudicação de fundos ao Programa Cooperativo de Pesquisa em Manejo de Solos Tropicais - abrangido pelo Título XII (AID) - CRSP, e as atividades a serem desenvolvidas com o CPAC /EMBRAPA, serão formalizadas mediante a elaboração dos Planos Anuais de Trabalho, tão logo se disponha da aprovação final da AID-CRSP.

8. DURAÇÃO

A vigência desta Carta de Intenções é indefinida, sujeita à disponibilidade de recursos financeiros, por parte do Título XII (AID) - CRSP. Qualquer das partes poderá rescindir seus termos, mediante um aviso por escrito com seis meses de antecedência.

Brasília, 12 de maio de 1980


ELISEU ROBERTO DE ANDRADE ALVES
Presidente da EMBRAPA


PEDRO SANCHEZ
Coordenador do Planejamento de
Manejo do Solo - NCSU

CARTA DE ENTENDIMIENTO ENTRE EL INSTITUTO COLOMBIANO AGROPECUARIO DE COLOMBIA Y NORTH CAROLINA STATE UNIVERSITY PARA ESTABLECER UN PROGRAMA COOPERATIVO EN MANEJO DE SUELOS TROPICALES

El Instituto Colombiano Agropecuario (ICA), como ejecutor de la investigación agropecuaria de Colombia, y la Universidad Estatal de Carolina del Norte (NCSU), organismo responsable de la planificación del "Programa Cooperativo de Investigaciones en manejo de suelos" (CRSP), expresan en esta Carta de Entendimiento su interés en colaborar en el desarrollo de un programa de investigación en manejo de suelos en los Llanos Orientales de Colombia, con base en el Centro Nacional de Investigaciones Agropecuarias de Carimagua.

OBJETIVO.- Mediante la conservación y el manejo del recurso suelo, desarrollar y difundir sistemas de producción agrícola con especies alimenticias, que permitan iniciar, sostener y mejorar la producción y productividad agrícola de la región.

JUSTIFICACION.- Los Llanos Orientales de Colombia ocupan 11.137.642 hectáreas, en las que predominan las clases agrológicas VI y VII. Se considera que el suelo es el factor más limitante para el desarrollo de la zona.

En los últimos años el ICA ha venido trabajando en la observación del comportamiento agrónómico y en aspectos nutricionales de varias especies anuales, perennes

y semiperennes. Así como en aspectos de erosión y erodabilidad de los suelos.

Las actividades del CRSP serían complementarias a los trabajos que el ICA ha realizado y que tiene en ejecución en Carimagua.

ESTRATEGIAS.- Para cumplir el objetivo general se seguirán las siguientes estrategias:

1. Selección de plantas y cepas de rizobium tolerantes a la acidez, bajo contenido de fósforo y sequía.
2. Continuación de la evaluación de la fertilidad de los suelos determinando las deficiencias nutricionales y los niveles críticos para la nutrición de las plantas.
3. Desarrollo de sistemas de manejo de suelos y de cultivos que minimicen los problemas de erosión.
4. Corrección de los problemas de acidez, de micro y macronutrientes.
5. Caracterización y clasificación taxonómica de los suelos.

LOCALIZACIÓN.- Los trabajos de investigación se conducirán especialmente en Carimagua y serán apoyados por otros Centros de Investigación del ICA.

INSTITUCIONES PARTICIPANTES.- El ICA es la entidad ejecutora por parte de Colombia y, por tanto, coordina la participación de otras instituciones nacionales cuando el Programa lo requiera.

Teniendo en cuenta el Convenio ICA - CIAT para Carimagua, las actividades que se realicen en base a esta carta de entendimiento entrarán a formar parte del Convenio ICA - CIAT. El personal científico internacional que el CRSP localice en Carimagua será considerado para fines de este convenio, como miembros del CIAT de acuerdo a una carta similar de intención entre el CRSP y el CIAT.

RESPONSABILIDADES DEL ICA. -

1. El ICA proporcionará las facilidades de tierra e infraestructura con que cuenta en Carimagua y en los Centros Experimentales en que se desarrollen actividades propias de este Convenio.
2. Nombrará dos Ingenieros Agrónomos con sede en Carimagua y un técnico a nivel de Ph.D. que supervisará y coordinará el Programa.
3. El ICA asignará una partida presupuestal para el apoyo de este programa.

RESPONSABILIDADES DEL CRSP. -

1. Asignar un agrónomo a nivel de Ph.D. en Carimagua, de tiempo completo.
2. Asignar un número de estudiantes de posgrado para realizar sus trabajos de tesis de M.Sc. p Ph.D. en Carimagua, sobre temas de común acuerdo.

3. Proveer colaboración a corto plazo de profesores de las Universidades participantes en temas específicos de común acuerdo.
4. Proveer los insumos necesarios y algunos equipos para la realización de dichos trabajos, que no puedan ser suministrados por el ICA.

EJECUCION.-

La ejecución de este proyecto está supeditada a la aprobación por la AID del "Soil Management CRSP" y específicamente de este componente. Al obtener dicha aprobación las actividades se concretarán mediante un Convenio que especifique las responsabilidades y planes de trabajo de cada una de las entidades involucradas.

En constancia se firma en Bogotá, D.E., a los 21 días del mes Abril
de 1980.

PEDRO LEON VELASQUEZ LONDOÑO
Gerente General ICA

PEDRO A. SANCHEZ
North Carolina State University

LETTER OF INTENTION

BETWEEN CIAT AND NORTH CAROLINA STATE UNIVERSITY FOR
COOPERATION IN THE SOIL MANAGEMENT COLLABORATIVE
RESEARCH PROGRAM UNDER TITLE XII.

The purpose of this letter is to state CIAT's intention to collaborate with the Soil Management Collaborative Research Program (CRSP) as outlined by the planning agency, North Carolina State University. Two main areas of work have been found to be of mutual interest, which are described, including the general framework for cooperation.

Research Components

1. Land Resource Evaluation in Latin America, including soil characterization and classification, evaluation use and improvement of Soil Taxonomy, developing technical classification systems, and a data bank on soil resources for the region. CIAT's ongoing Land Evaluation Project would be strengthened by CRSP direct involvement in soil aspects working jointly with the CIAT Land Resource Specialist and Climatologist. Work outside Latin America could be considered as the program progresses.

2. Seasonal Acid Tropics (Carimagua). Development of low input systems for annual crops as components of a larger farming system which includes pastures and possibly tree crops. The CRSP would conduct field-soil management research with emphasis in selecting plants and rhizobia tolerant to soil acidity, low P and drought; secondary elements and micronutrients.

3. Soil Fertility Evaluation in Latin America with emphasis on standardization and correlation of soil test methods, plant analysis and strengthening of national programs through training, working chiefly with CIAT commodities.

Personnel

The desired level of CRSP personnel is as follows:

1. One senior soil scientist headquartered at CIAT-Palmira to work in the Land Evaluation Program and serve as on-site Project Leader.
2. One agronomist to be headquartered at Carimagua at the Ph.D. level to conduct the second component.
3. A number of graduate students to be headquartered at Palmira to support the Land Evaluation and Soil Fertility Evaluation components. One graduate student in Carimagua, given present housing limitations.
4. A second senior scientist headquartered at Palmira could be considered to lead the Soil Fertility Evaluation research and training efforts, or instead these activities could be covered by short term assignments.

Other

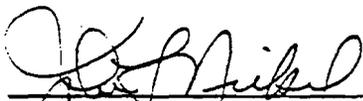
All direct and indirect costs of these activities will be covered by CRSP funds which will be considered as an Special Project of the Division of Land Resources Research under the Director's supervision. These activities will have access to all CIAT facilities and benefit from the established infrastructure and complementary research and training activities of the Center.

CRSP personnel stationed at CIAT Palmira or Carimagua will follow the administrative procedures and regulations of CIAT and will be regarded as Senior Staff, Post Doctoral fellows or Research Associates.

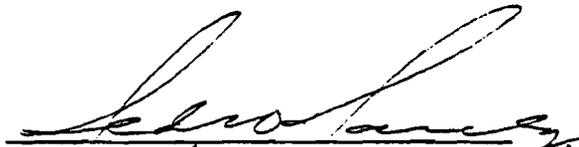
The Carimagua component of this program is subject to the concurrence of ICA, the host institution.

CIAT will request to the Colombian government official visas and other privileges accorded to CIAT staff of equal rank.

Upon approval of the CRSP by AID and of this particular activity, as well as ICA's approval with regards to the Carimagua portion, a formal agreement will be then signed between the CRSP Management Entity and CIAT including a detailed work plan and budget projections.



John L. Nickel
Director General
CIAT



Pedro A. Sánchez, Coordinator
Soil Management Planning Grant
North Carolina State University

Palмира, 16 January 1980

CARTA DE INTENCION ENTRE LA SECRETARIA DE ESTADO DE AGRICULTURA
DE LA REPUBLICA DOMINICANA Y LA UNIVERSIDAD ESTATAL DE CAROLINA
DEL NORTE PARA ESTABLECER UN PROGRAMA COOPERATIVO DE APOYO EN
INVESTIGACION EN MANEJO DE SUELOS

La Secretaría de Estado de Agricultura (SEA) organismo responsable de la investigación agropecuaria en la República Dominicana, y la Universidad Estatal de Carolina del Norte, organismo responsable de la planificación del Proyecto Cooperativo de apoyo en Investigación de Manejo de Suelos del Título XII AID, deseosos de intensificar las investigaciones en manejo de suelos en ladera en la República Dominicana han acordado elaborar la presente Carta de Intención.

1.-Objetivo

Desarrollar y transferir sistemas de manejo de suelos de ladera para una producción agropecuaria estable, económicamente rentable y ecológicamente viable, con miras a prevenir la erosión y proteger las tierras bajas que puedan ser afectadas por ella.

2.-Justificación

El manejo correcto de suelos de laderas es un elemento básico en el desarrollo racional en las zonas montañosas de los trópicos. Las presiones demográficas en muchos países en desarrollo está formando colonizaciones, caserios, poblaciones y agricultura en suelos con fuertes pendientes.

Sin técnicas adecuadas de manejo el recurso del suelo puede ser destruido irreparablemente por erosión causando serias consecuencias de orden económico, social y político. La República Dominicana es un país que está tomando este problema con gran interés desde el punto de vista científico. Programas actuales en elaboración de la SEA, IICA y USAID están dando énfasis a investigaciones en problemas de erosión en suelos. Dichos esfuerzos pueden ser mejor encauzados a través de un esfuerzo operativo de estas entidades con universidades de los Estados Unidos. En la planificación del Proyecto de Suelos ha acordado dar alta prioridad a las investigaciones en manejo de suelos de laderas y ha recomendado considerar la República Dominicana como una de las sedes principales para realizar esta investigación operativa.

3.-Sede

La sede del Proyecto será definida por la Secretaría de Estado de Agricultura, considerando los objetivos del Proyecto, oportunamente.

4.-Actividades

Las actividades se desarrollarán en varias zonas de ladera, incluyendo la Cordillera Central entre Ocoa y Constanza de acuerdo con las disposiciones de la SEA.

Los objetivos se lograrán mediante el desarrollo de un programa de investigación y transferencia de tecnología planificado anualmente y ejecutado en conjunto por especialistas del SEA, científicos de otras instituciones en la República Dominicana y de las universidades norteamericanas seleccionadas para participar en dicho programa. Las actividades principales incluirán lo siguiente:

- a.-Identificación y caracterización suelos de ladera con peligro de erosión, los cuales pueden ser protegidos por sistemas de manejo.
- b.-Desarrollar y evaluar en términos socioeconómicos y de la erosión, sistemas de manejo apropiados; de bajo uso de insumos; incluyendo cultivos continuos, cultivos intercalados anuales con pasturas y arboles, promoviendo el reciclaje de nutrientes del suelo y la conservación de tierras con vegetación permanente.
- c.-Utilizar mejor la humedad limitada durante el período de sequía.
- d.-Desarrollar prácticas de fertilización adecuada.
- e.-Seleccionar plantas que desarrollen una rápida cobertura de suelo y cepas de rhizobium para leguminosas ambas tolerantes a acidez, sequía y bajos niveles de fósforo.
- e.-Desarrollar en pequeña escala sistemas de irrigación de bajo costo donde sean factibles.

5.-Instituciones Participantes

- a.-La SEA es la entidad ejecutiva por parte del Gobierno de la República Dominicana y por lo tanto coordinará la participación de otras instituciones nacionales e internacionales como (IICA, FAO, etc.) en el programa.
- b.-La participación de universidades norteamericanas y sus científicos en la República Dominicana necesitará la previa autorización de la SEA. La Entidad Administrativa (E.A.) mediante un acuerdo con la SEA seleccionará un Líder de programa. La AID, dentro del Título XII, seleccionará entre las universidades norteamericanas participantes una Entidad Administrativa (E.A.).
- c.-La SEA y la EA promoverán la participación de otras instituciones de asistencia técnica, ya sean nacionales o internacionales, con miras a ampliar la base científica del programa, especialmente en otras disciplinas.

6.-Personal

- a.-La EA, previo entendimiento con la SEA, ubicará científicos a nivel de Ph.D. en la República Dominicana. Asimismo, la SEA destacará por lo menos, igual número de científicos contrapartes también a tiempo completo para este programa. Los científicos principales serán escogidos para cubrir las siguientes áreas: manejo y conservación de suelo, fertilidad de suelos, agronomía de cultivos permanentes y anuales. Desarrollar actividades de entrenamiento y transferencia de tecnología.
- b.-Además, la EA designará un número de científicos asistentes a nivel de Ing. Agr. o M.S. para trabajar como

investigadores o efectuar sus tesis de post-grado en la República Dominicana mediante una de las universidades participantes. Asimismo, la SEA designará a un número de profesionales asistentes al mismo nivel. Todos los profesionales asistentes recibirán el apoyo científico necesario por parte de las universidades.

c.-Todos los participantes del programa trabajarán en equipo bajo la coordinación de un Líder del Proyecto en la República Dominicana.

7.-Responsabilidades de las Universidades Norteamericanas y la Entidad Administrativa

a.-Seleccionar los científicos principales y asistentes y trasladarlos a la República Dominicana de acuerdo a un entendimiento previo con la SEA.

b.-Pagar los sueldos, prestaciones y beneficios sociales, vivienda, viajes, viáticos y otros gastos adicionales del personal contratado por ellos.

c.-Proveer vehículos de trabajo para los científicos principales.

d.-Proveer costos directos de operación y equipos no incluidos en el presupuesto operacional de la SEA.

e.-Proporcionar oportunidades y administrar los fondos para estudios de post-grado.

8.-Responsabilidad de la SEA

- a.-La SEA proporcionará facilidades de tierras para la realización de los trabajos del Proyecto, así como personal obrero, de mando medio, laboratorios, oficinas y otras facilidades que sean necesarias para la ejecución del mismo.
- b.-Selecciónar científicos principales y asistentes y trasladarlos a los sitios de ejecución del Proyecto previo un entendimiento con la EA.
- c.-Pagar los sueldos, beneficios sociales, viajes, viáticos del personal contratado por la SEA.

9.-Responsabilidades de Ambas Partes

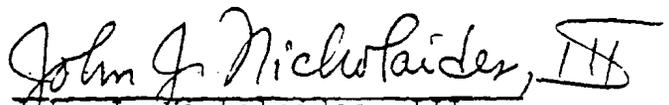
- a.-Designar una Junta Directiva compuesta por tres miembros de la SEA y tres miembros de la EA para aprobar un Reglamento interno y sancionar y planificación y evaluación de los trabajos. La Junta Directiva se reunirá en la República Dominicana por lo menos una vez al año.

10.-Ejecución

La adjudicación de fondos al Proyecto Cooperativo de apoyo en investigación en Manejo de Suelos y las actividades a desarrollarse con la SEA entrarán en ejecución tan pronto como se reciba la aprobación final de la AID y se suscriba un acuerdo entre la SEA y la EA.

FIRMADO POR:


 Agrón. R. Hipólito Mejía D.,
 Secretario de Estado de
 Agricultura.


 John J. Nicholaides, III
 Coordinator, Soil Management
 Planning Grant, North Carolina
 State University.

signed May 8, 1980

Proposed Budget by DS/AGR

For

PROJECT TITLE: CRSP - Soil Management
PROJECT NUMBER: 931-1131

<u>Fiscal Year</u> <u>for Obligations</u>	<u>Funding in Thousands (\$000)</u>		
	<u>A.I.D.</u>	<u>U.S. Universities</u>	<u>Total</u>
FY 1981	\$750	\$250	\$1,000
FY 1982	2,360	787	3,147
FY 1983	4,733	1,578	6,311
FY 1984	5,450	1,817	7,267
FY 1985	<u>6,052</u>	<u>2,017</u>	<u>8,069</u>
TOTAL	\$19,345	\$6,449	\$25,794

BEST AVAILABLE DOCUMENT

ENVIRONMENTAL THRESHOLD DETERMINATION

TO: AA/DS, Sander Levin
 THRU: DAA/DS/FN, Tony Babb
 FROM: DS/AGR, James K. McDermott
 SUBJECT: Environmental Threshold Decision

DEC 11

Project Title: CRSP Soil Management
 Project Number: 901-1311
 Specific Activity: Research Program

Reference: Initial Environmental/Examination (IEE)
 contained in Proposal for subject project
 dated October 24, 1980 (page 38)

On the basis of the Initial Environmental/Examination (IEE) referenced above and attached to this memorandum, I recommend that you make the following determination:

1. The proposed agency action is not a major Federal action which will have a significant effect on the human environment.
2. The proposed agency action is a major Federal action which will have a significant effect on the human environment, and:
- a. An Environmental Assessment is required; or
 - b. An Environmental Impact Statement is required.

The cost of, and schedule for this requirement is fully described in the referenced document.

3. Our environmental examination is not complete. We will submit the analysis no later than _____ with our recommendation for an environmental threshold decision.

Approved: *Acting AG*

Disapproved: _____

Date: 12-11-80

Clearance:

DS/AGR/RNR,	J. Malcolm		Date	<u>11/26/80</u>
DS/AGR/RNR,	C. Simkins		Date	<u>11/26/80</u>
DS/AGR,	M. Mozynski		Date	<u>11/26/80</u>
DS/PO,	B. Chapnick		Date	<u>12/11/80</u>

~~CONFIDENTIAL~~

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VIII. PROJECTED IMPACT OF UTILIZATION

A. On World Food and Energy Production

The potential impact of INTSOIL on world food production is perhaps greater than that of any other CRSP. This is due to the fact that soil is the basic common denominator of the bulk of the world's food supply and its vegetatively-produced energy supply. INTSOIL'S development of proper soil management technology for food and energy production in the four agro-ecological zones which encompass the developing world will make it possible to increase substantially food production in these areas. The improved soil management technologies to be developed by INTSOIL can be used to support the commodity-oriented program of the international agricultural research centers and the other CRSPs. The National Academy of Sciences has projected that a proper soil management technology in the humid tropics alone can increase crop yields to 150-200% greater than those of the temperate zone on a per hectare per year basis.

B. On Farming System Stability

The use of proper soil management technologies is the key to improved farming systems in the developing world. The National Academy of Sciences has projected that without these improved soil management technologies in the agro-ecological zones of INTSOIL'S impact area, both spontaneous and planned settlements will fail as farming systems fail due to the deterioration and irreversible loss of the non-renewable soil resource base. No group is more affected by the production, or lack of production, from a limited land area than is the small farmer and his family. Their very lives are tied to their soil. Improved soil management technologies for the farming system are utilized by the small farmers and their families and will enable these systems to be productive while at the same time conserving the soil resource base.

C. Initial Environmental Examination

The activities of this project fall into the area described in Environmental procedure regulations, Para 216.2 (c) "Analyses, Studies, Academic or Investigative Research, Workshops and Meetings." These classes of activities will not normally require the filing of an Environmental Impact Statement or the preparation of an Environmental Assessment. It is possible that an output of this project will be set of procedures, guidelines or research results which when used would require such assessment. However, the project itself only proposes research and directly supportive activities. Under these guidelines this activity clearly qualifies for a negative determination at the time when a threshold decision is determined.

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Use of improved soil management technologies developed by INTSOIL will result in considerable conservation and improvement of the environment. In the humid tropics, replacing shifting cultivation with continuous cultivation through improved soil management will result in less areas being cleared for agriculture and hence, the retention of the ecological integrity in much of the humid tropics. In the semi-arid tropics, improved soil management could lead to establishment of permanent agriculture in this zone and hence, a reduction in the desertification of those areas. In the acid savannas, development of appropriate soil management technologies will result in developing countries with other agro-ecological zones which are more environmentally sensitive to center food and energy production on the acid savanna soils which can be farmed with less adverse impact on the environment. In the steeplands, improved soil management technologies produce food and energy yields consistent with the necessary conservation of the soils of that zone.

D. On Developing Host Country Capabilities

INTSOIL is anticipated to have a major impact on developing capabilities of scientists within the host countries. Training of host country capabilities was stressed from inception of planning by the host countries and USAID Missions responding to questionnaires by those countries visited by planning teams and finally by those host countries participating in the development of the Final Program Proposal. It is strongly felt that one of the most lasting impacts of INTSOIL will be the host country research capability that is developed during the program and remains after the program. Therefore, the INTSOIL's ratio of junior scientists to senior scientists is approximately 2:1. Although graduate training at participating and other U. S. universities is planned, the degree research will be conducted within the host country itself. In this way, research capabilities for host country scientists will be developed within the countries themselves on soil management problems pertinent to the particular agro-ecological zone represented.

E. On Women

In every agro-ecological zone of INTSOIL's impact area, women are involved in various phases of land clearing, planting management and harvesting of crops. Current estimates are that women perform nearly 50% of the soil management work in the agro-ecological zones of INTSOIL. Improved systems for soil-crop management to be developed by INTSOIL are expected to reduce the women's work load and thus time involvement in backbreaking agricultural production. A spin-off effect of this could be a more stable family unit. Certainly, women, men and children will receive a greater return from their use of improved soil management systems to be developed by INTSOIL.

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Planning Process: The CRSP has been planned with participation of USAIDs, host country institutions and an external panel of experts from the outset. JRC, BIFAD and A.I.D. (TPCA) concurred in the targeting of the research by agro-ecological zones, the selection of the zones and the priority order in which they were ranked. Likewise, after field visits to each potential host country, the planning agent proposed a research program. Letters of intent, demonstrating country support, were signed with the host institutions in each case. The research program was accepted by JRC, BIFAD, and A.I.D. The participating universities were selected on the bases of detailed activity proposals. Then the participants chose North Carolina as the Management Entity for the CRSP. JRC and BIFAD have concurred in these recommendations.

The JRC expressed misgivings about the management structure proposed by the planning agent and concurred in by the six participating institutions. The issue was the membership for the representatives of the host countries on the CRSP Board of Directors. DS/AGR supports the recommendations to include their representatives since it recognizes the stake which the host countries have in the operation and outcome of the research. Although each participating university will be contributing its own funds toward the ultimate purpose of the program, control of both the funds and the program remain in the hands of that university. Furthermore, whatever is done overseas can only be done with the approval and active participation of the host country. Such approval and involvement should be much easier to secure if the host countries feel adequately represented at the highest policy level.

Details of procedure, planned research and management structure are given in an appended proposal - TAB A. Other required documentations are TAB B and TAB D.

Recommendation: That you sign the accompanying Project Authorization for the Soil Management Collaborative Research Program which approves A.I.D. grant funds totaling \$19,345,000. It also approves North Carolina State University as the Management Entity and the six participating universities.

Attachments:

- TAB A - Project Authorization
- TAB B - Proposal
- TAB C - Budget
- TAB D - Environmental Threshold Determination

Clearances:

AA/AFR, G. T. Butcher	_____	Dated	_____
AA/ASIA, A. A. Sullivan	_____	Dated	_____
AA/LAC, F. W. Coy	_____	Dated	_____
AA/NE, A. D. White	_____	Dated	_____
CG/TFHA, A. R. Richstein	_____	Dated	_____
GC, N. Holmes	_____	Dated	_____
PPC/PDPR, J. Erickson	_____	Dated	_____
BIFAD, E. Kiehl	_____	Dated	_____
AA/Ser, J. F. Owens	_____	Dated	_____
AA/LEG, G. Hawkins	_____	Dated	_____

DS/AGR/RNR: J. Malcolm:lsl:12/3/80:Ext. 235-8877

AGENCY FOR INTERNATIONAL DEVELOPMENT PROJECT AUTHORIZATION AND REQUEST FOR ALLOTMENT OF FUNDS PART I	1. TRANSACTION CODE <input type="checkbox"/> A ADD <input type="checkbox"/> C CHANGE <input type="checkbox"/> D DELETE	PAF 2. DOCUMENT CODE 5
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3. COUNTRY/ENTITY DS/AGR/RNR Type <u>g.</u> Research Program Support Grant	4. DOCUMENT REVISION NUMBER <input checked="" type="checkbox"/> Original
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5. PROJECT NUMBER (7 digits) <input type="text" value="931-1311"/>	6. BUREAU/OFFICE A. SYMBOL DSB B. CODE <input type="text" value="10"/>	7. PROJECT TITLE (Maximum 40 characters) <input type="text" value="CRSP-Scil Management"/>
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8. PROJECT APPROVAL DECISION ACTION TAKEN <input type="checkbox"/> A APPROVED <input type="checkbox"/> O DISAPPROVED <input type="checkbox"/> DE DEAUTHORIZED	9. EST. PERIOD OF IMPLEMENTATION YRS. <input type="text" value="05"/> QTRS <input type="text" value="0"/>
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10. APPROVED BUDGET AID APPROPRIATED FUNDS (\$000)									
A. APPROPRIATION	B. PRIMARY PURPOSE CODE	PRIMARY TECH. CODE		E. 1ST FY <u>81</u>		H. 2ND FY <u>82</u>		K. 3RD FY <u>83</u>	
		C GRANT	D LOAN	F GRANT	G LOAN	I GRANT	J LOAN	L GRANT	M LOAN
(1) ARDN	141 J	963	-	750	-	2,360	-	4,733	-
(2)									
(3)									
(4)									
TOTALS				750	-	2,360	-	4,733	-

A. APPROPRIATION	N. 4TH FY <u>84</u>		Q. 5TH FY <u>85</u>		LIFE OF PROJECT		11. PROJECT FUNDING AUTHORIZED	
	O. GRANT	P. LOAN	R. GRANT	S. LOAN	T. GRANT	U. LOAN	A. GRANT	B. LOAN
(1) ARDN	5,450	-	6,052	-	19,345	-	2	-
(2)								
(3)								
(4)								
TOTALS		5,450	-	6,052	-	19,345	-	

C. PROJECT FUNDING AUTHORIZED THRU PY

12. INITIAL PROJECT FUNDING ALLOTMENT REQUESTED (\$000) N/A A. APPROPRIATION B. ALLOTMENT REQUEST NO. _____ C. GRANT D. LOAN	13. FUNDS RESERVED FOR ALLOTMENT N/A TYPED NAME (C/M/F, SER/FM/FSD) SIGNATURE DATE
(1)	
(2)	
(3)	
(4)	
TOTALS	

14. SOURCE/ORIGIN OF GOODS AND SERVICES
 000 341 LOCAL OTHER _____

15. FOR AMENDMENTS, NATURE OF CHANGE PROPOSED

FOR PPC/PIAS USE ONLY	16. AUTHORIZING OFFICE SYMBOL	17. ACTION DATE MM DD YY	18. ACTION REFERENCE (Optional)	ACTION REFERENCE DATE MM DD YY
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UNITED STATES INTERNATIONAL DEVELOPMENT COOPERATION AGENCY
AGENCY FOR INTERNATIONAL DEVELOPMENT
WASHINGTON D C 20523



PROJECT AUTHORIZATION

Name of Project: CRSP-Soil Management

Number of Project: 931-1311

Number of Grant: N/A

1. Pursuant to Section 103 of the Foreign Assistance Act of 1961, as amended, I hereby authorize the CRSP-Soil Management Project for the Development Support Bureau, involving planned obligations of \$19,345,000 in grant funds over a five year period from the date of authorization, subject to the availability of funds in accordance with the A.I.D. OYB/Allotment. Local currency and foreign exchange costs may be paid from the grant with A.I.D. approval.

2. North Carolina State University, Raleigh, North Carolina, is recognized as the Management Entity for the Soil Management CRSP, and is direct recipient and custodian of grant funds. The following universities are approved as collaborating institutions: Cornell University, North Carolina State University, Texas A&M University, University of Hawaii, University of Kentucky, and University of Puerto Rico.

3. This project is intended to provide a long-term basis for joint research on problems of tropical soil management involving six U.S. universities and comparable research organizations in seven developing countries. If individual farmers and nations are to survive, they must obtain greater production from their soils now and in the future. Technology to conserve soils physically and chemically is available for temperate regions, but not for the tropics. Some limited research, especially on plantation crops shows that such technology can be developed. This CRSP program should discover viable systems for producing essential food crops, perhaps in combination with some of the traditional cash crops.

Sustained programs are essential to almost all research, but are most important in soils research because many problems develop very slowly and many benefits of indicated treatments last through successive crops. A single rotation cycle may last five to seven years. The true value of a series of practices may be judged only after three or four cycles.

Each of the agro-ecological areas to be addressed in the CRSP is extensive. Each has severe unsolved technical problems in soil management. Each has major social problems rooted in the low productivity of agriculture as it is currently practiced. In all of them, inappropriate methods of land development and farming can lead to soil destruction, robbing farmers and the country of an irreplaceable asset and condemning rural people to eternal poverty.

Consistent with the guidelines of Title XII, this research is expected to be beneficial to both the developing countries and the U.S. Although not the primary intent, many scientists will be trained in research and management of tropical soils. The quality of education offered by the U.S. institutions will be improved and the capability of institutions in the developing countries will be strengthened so that they may solve more and more of their own problems.

4. The Project Agreement(s) which may be negotiated and executed by the officer(s) to whom such authority is delegated in accordance with A.I.D. regulations and Delegations of Authority shall be subject to the following essential terms and covenants and major conditions, together with such other terms and conditions as A.I.D. may deem appropriate.

a. Source of Origin of Goods and Services (Grant):

Goods and services, except for ocean shipping, financed by A.I.D., under the project shall have their source and origin in the United States and cooperating countries, except as A.I.D. may otherwise agree in writing. Ocean shipping financed by A.I.D. under the project shall, except as A.I.D. may otherwise agree in writing, be financed only on flag vessels of the United States.

b. Reimbursement of Expenses:

Upon signing of the Grant by AID/CM/COD, A.I.D. may disburse (grant) funds as reimbursement for eligible costs incurred on or after January 1, 1981 provided that evidence of such costs is furnished to A.I.D. in a form and substance satisfactory to A.I.D.

Douglas J. Bennet, Jr.
Administrator

Date: _____

Clearance:

DS/AGR, James Walker	_____	Dated	_____
DS/AGR, D. R. Fiester	_____	Dated	_____
DS/AGR, M. E. Mozynski	_____	Dated	_____
DS/PO, B. Chapnick	_____	Dated	_____
DAA/DS/FN, T. Babb	_____	Dated	_____
AA/DS, S. Levin	_____	Dated	_____
AA/AFR, G. T. Butcher	_____	Dated	_____
AA/ASIA, A. A. Sullivan	_____	Dated	_____
AA/LAC, F. W. Coy	_____	Dated	_____
AA/NE, A. D. White	_____	Dated	_____
GC, N. Holmes	_____	Dated	_____
AA/PPC, A. Shakow	_____	Dated	_____
BIFAD, E. Kiehl	_____	Dated	_____

Drafter of Project Authorization:

DS/AGR/RNR: J. Malcolm:lsl:l2/3/80:Ext. 235-8877

Planning Process: The CRSP has been planned with participation of USAIDs, host country institutions and an external panel of experts from the outset. JRC, BIFAD and A.I.D. (TPCA) concurred in the targeting of the research by agro-ecological zones, the selection of the zones and the priority order in which they were ranked. Likewise, after field visits to each potential host country, the planning agent proposed a research program. Letters of intent, demonstrating country support, were signed with the host institutions in each case. The research program was accepted by JRC, BIFAD, and A.I.D. The participating universities were selected on the bases of detailed activity proposals. Then the participants chose North Carolina as the Management Entity for the CRSP. JRC and BIFAD have concurred in these recommendations.

The JRC expressed misgivings about the management structure proposed by the planning agent and concurred in by the six participating institutions. The issue was the membership for the representatives of the host countries on the CRSP Board of Directors. DS/AGR supports the recommendations to include their representatives since it recognizes the stake which the host countries have in the operation and outcome of the research. Although each participating university will be contributing its own funds toward the ultimate purpose of the program, control of both the funds and the program remain in the hands of that university. Furthermore, whatever is done overseas can only be done with the approval and active participation of the host country. Such approval and involvement should be much easier to secure if the host countries feel adequately represented at the highest policy level.

Details of procedure, planned research and management structure are given in an appended proposal - TAB A. Other required documentations are TAB B and TAB D.

Recommendation: That you sign the accompanying Project Authorization for the Soil Management Collaborative Research Program which approves A.I.D. grant funds totaling \$19,345,000. It also approves North Carolina State University as the Management Entity and the six participating universities.

Attachments:

- TAB A - Project Authorization
- TAB B - Proposal
- TAB C - Budget
- TAB D - Environmental Threshold Determination

Clearances:

AA/AFR, G. T. Butcher	_____	Dated	_____
AA/ASIA, A. A. Sullivan	_____	Dated	12/14/80
AA/LAC, F. W. Coy	_____	Dated	_____
AA/NE, A. D. White	_____	Dated	_____
CG/TFHA, A. R. Richstein	_____	Dated	_____
GC, N. Holmes	_____	Dated	_____
PPC/PDPR, J. Erickson	_____	Dated	_____
BIFAD, E. Kiehl	_____	Dated	_____
AA/Ser, J. F. Owens	_____	Dated	_____
AA/LEG, G. Hawkins	_____	Dated	_____

DS/AGR/RNR: J. Malcolm:lsl:12/3/80:Ext. 235-8877

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AA/ASIA, A. A. Sullivan	_____	Dated	_____
AA/LAC, F. W. Coy	<i>[Signature]</i>	Dated	12/16/80
AA/NE, A. D. White	_____	Dated	_____
CG/TFHA, A. R. Richstein	_____	Dated	_____
GC, N. Holmes	_____	Dated	_____
PPC/PDPR, J. Erickson	_____	Dated	_____
BIFAD, E. Kiehl	_____	Dated	_____
AA/Ser, J. F. Owens	_____	Dated	_____
AA/LEG, G. Hawkins	_____	Dated	_____

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AA/ASIA, A. A. Sullivan	_____	Dated	_____
AA/LAC, F. W. Coy	_____	Dated	_____
AA/NE, A. D. White	<i>A. D. White</i>	Dated	12-11-80
CG/TFHA, A. R. Richstein	_____	Dated	_____
GC, N. Holmes	_____	Dated	_____
PPC/PDPR, J. Erickson	_____	Dated	_____
BIFAD, E. Kiehl	_____	Dated	_____
AA/Ser, J. F. Owens	_____	Dated	_____
AA/LEG, G. Hawkins	_____	Dated	_____

DS/AGR/RNR: J. Malcolm:lsl:l2/3/80:Ext. 235-8877

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AA/LAC, F. W. Coy	_____	Dated	_____
AA/NE, A. D. White	_____	Dated	_____
CG/TFHA, A. R. Richstein	_____	Dated	_____
GC, N. Holmes	_____	Dated	_____
PPC/PDPR, J. Erickson	_____	Dated	_____
BIFAD, E. Kiehl	<i>Moni O. White</i>	Dated	12/11/80
AA/Ser, J. F. Owens	_____	Dated	_____
AA/LEG, G. Hawkins	_____	Dated	_____

DS/AGR/RNR: J. Malcolm:lsl:12/3/80:Ext. 235-8877