

931 1045

9311005-5
PD-AAF-582

COST REIMBURSEMENT CONTRACT WITH AN EDUCATIONAL INSTITUTION

AGENCY FOR INTERNATIONAL DEVELOPMENT NEGOTIATED CONTRACT NO. AID-48-C-1412

NEGOTIATED PURSUANT TO THE FOREIGN ASSISTANCE ACT OF 1961, AS AMENDED, AND EXECUTIVE ORDER 11721	TOTAL ESTIMATED CONTRACT COST \$341,536 (See ARTICLE X)
CONTRACT FOR: The Determinants of Developing Country Irrigation Project Programs PROJECT NO: 931-1005	CONTRACTOR (Name and Address) Cornell University
ISSUING OFFICE (Name and Address) Central Operations Division Office of Contract Management Agency for International Development Washington, D. C. 20523	NAME 123 Day Hall, P.O. Box D. D.
ADMINISTRATION BY SEC/CIV/COO/TAB	STREET ADDRESS Ithaca, New York 14853
MAIL VOUCHERS (Original and 3 copies) TO: Office of Financial Management Agency for International Development Washington, D.C. 20523	CITY, STATE, AND ZIP CODE
EFFECTIVE DATE September 30, 1977	COGNIZANT SCIENTIFIC/TECHNICAL OFFICE TA/AR
	ACCOUNTING AND APPROPRIATION DATA PROY NO. 317/612 APPROPRIATION NO. 72-11A1023 ALLOTMENT NO. 402-31-099-00-22-21
	ESTIMATED COMPLETION DATE September 30, 1980

The United States of America, hereinafter called the Government, represented by the Contracting Officer executing this Contract, and the Contractor, an educational institution chartered by the State of New York with its principal office in Ithaca, New York, agree that the Contractor shall perform all the services set forth in the attached Schedule, for the consideration stated therein. The rights and obligations of the parties to this contract shall be subject to and governed by the Schedule and the General Provisions. To the extent of any inconsistency between the Schedule and the General Provisions and any specifications or other provisions which are made a part of this contract, by reference or otherwise, the Schedule or the General Provisions shall control. To the extent of any inconsistency between the Schedule and the General Provisions, the Schedule shall control.

This contract consists of this Cover Page, the Table of Contents, and the Schedule consisting of _____ pages, the General Provisions (Form AID 1420-23C), dated 7/1/76, ~~Additional General Provisions~~ (Form AID 1420-23D) dated 7/1/76, and Attachments A through C.

NAME OF CONTRACTOR CORNELL UNIVERSITY	UNITED STATES OF AMERICA AGENCY FOR INTERNATIONAL DEVELOPMENT
BY (Signature of authorized individual) <i>Thomas R. Rogers</i>	BY (Signature of Contracting Officer) <i>Morton Darwin</i>
TYPED OR PRINTED NAME Thomas R. Rogers	TYPED OR PRINTED NAME MORTON DARVIN
TITLE Director, Office of Academic Funding	CONTRACTING OFFICER
DATE 9-28-77	DATE

(not Evaluative)
931005 - 0
FD-1AF-582
PR #1005-1

SUMMARY OF RAC RECOMMENDATIONS TO A.I.D.

PROPOSALS REVIEWED AT THE MAY 24-25, 1976 MEETING

3p

1. Effect of Protein-Calorie Interventions on Human Growth Retardation and Mortality Rates (New) - Institute of Nutrition of Central America and Panama (INCAP). Duration of project, 5 years; estimated cost, \$2,288,020; authorization requested for 3 years, \$1,500,000. Schweigert, Carter, Linder, Montgomery.*

Recommendation: That Phase I of the Project be approved for a period of 18 months in an amount approximating \$650,000 with the provision that RAC suggestions concerning design, food sources, data analysis, etc., be considered. It is understood that AID staff will utilize advice from RAC member consultation during Phase I, and any proposed extension will require RAC review and action.

2. The Determinants of Developing Country Irrigation Project Problems: A Multifactor Analysis for Improved System Operation & Performance (New) - Cornell University. Duration of project, 3 years; estimated cost, \$280,000. D. Peterson, Heady, M. Peterson, Wittnebert.

4-612

Recommendation: That AID staff consider suggestions of the RAC and present a revised proposal at the October (RAC) meeting.

3. Improvement of Winter Wheat for Developing Countries, Based on Hybridization of Spring and Winter Forms (New) - Oregon State University. Duration of project, 3 years; estimated cost, \$943,000. M. Peterson, Ludington, D. Peterson, Whitney.

Recommendation: That the project be approved with the provisions that (a) objectives be identified more specifically and (b) AID staff review the budget request for appropriate reductions in the total funding.

* RAC review subcommittee; chairman underscored.

4. Research on Hemoprotozoal Diseases of Food Producing Livestock in LDCs (Augmentation) - Texas A&M University. Duration of project, 3 years; approved May 1975 at an estimated cost of \$1,185,000; estimated additional cost, \$75,000. Schweigert, Adams, Connell, Wishik.

Recommendation: That the project augmentation be approved as requested.

5. World Fertility Survey (Extension) - International Statistical Institute. Duration of extension, 3 years, 3 months; estimated additional cost, \$7,500,000. Montgomery, Anderson, Connell, Wishik.

Recommendation: That the project extension be approved for support as proposed.

6. Enhancement of Lactational Infertility and Infant Nutrition (New) - Johns Hopkins University. Duration of project, 3 years; estimated cost, \$986,164. Wishik, Carter, Connell, Linder.

Recommendation:

1. Studies in Phase I in Baltimore be approved with particular focus on thyroid-related side effects encompassing (a) a new immunobiossay test for TRH in human milk, (b) testing for TRH and T4 in blood of women receiving OTRH, (c) testing for elevation of basal prolactin level, (d) assessing ovarian steroid hormone activity, (e) measurement of spontaneous TRH and T4 levels among lactating women, and (f) standarization of laboratory procedures for field trials; and exclusion of nutrition and metabolism studies with corresponding reduction in budget.
2. Budgetary provision be made for possible later field phase in Bangladesh, but not in Chile, including attention to the thyroid question among undernourished women.
3. Prior to initiation of Phase II a revised proposal and budget be prepared on the basis of Phase I results and reviewed by RAC.
4. AID obtain independent consultation on estimation of the potential demographic impact of the proposed method under different levels of effectiveness and practice, and try to obtain results for reporting at the time of RAC review of the Phase II proposal.

7. **Socio-Economic Analysis of Environmental Health Problems (New)**
- Resources for the Future. Duration of project, 18 months;
estimated cost, \$128,042. Heady, Adams, Carter, D. Peterson.

Recommendation: That AID (a) provide limited funds for Dr. Rosenfield to continue her schistosomiasis transmission simulation model applications to data available through WHO in Geneva, and (b) request Resources for the Future to develop a more comprehensive project proposal including complete cost-benefit analyses of schistosomiasis transmission simulation models.

8. **The Relationship Between Trade Strategies and Employment Growth (Expansion)** - National Bureau of Economic Research. Duration of extension, 15 months; estimated additional cost, \$93,169. Heady, Anderson, Montgomery, Wittnebert.

Recommendation: That the budget and time period be extended as requested.

931005-①
PO-AAF-02

PROCUREMENT SOURCE WAIVER
DRAFTED: 12/20/79
INITIALED: _____
WAIVER CONTROL NO: DS/AGR/TSWM FY80-1

4p

**ACTION MEMORANDUM FOR THE DEPUTY ASSISTANT ADMINISTRATOR
FOR FOOD AND NUTRITION, BUREAU FOR DEVELOPMENT SUPPORT**

FROM: DS/AGR, Ray Solem *for ANB*

SUBJECT: Indonesia-Source Waiver for Purchase of One Four-Wheel Drive Utility Vehicle Under Contract AID/ta-C-1412 for the "Determinants of Irrigation" Project with Cornell University.

Problem: Request for Waiver of Section 636 (i) of FAA, U.S. Source Requirement and Procurement.

- (a) Cooperating Country: Bureau for Development Support
- (b) Authorizing Document: Contract AID/ta-C-1412
- (c) Project: "Determinants of Irrigation" -Cornell (931-1005)
- (d) Nature of funding: Research contract with Cornell University
- (e) Description of Goods: One (1) 4-wheel drive utility vehicle
- (f) Approximate total value: \$9,000 to \$9,500
- (g) Probable Source: Jakarta Motors (AMC) assembled in Indonesia .

Discussion: Cornell University is conducting AID funded research in Indonesia under the "Determinants of Irrigation" Project. The purposes of this project are (1) to analyze interactions between physical, biological, economic and organizational dimensions of existing irrigation systems; (2) to develop procedures to make these analyses; (3) to identify design and operation implications that derive from socio-economic factors; and (4) to identify planning and policy implications resulting from these analyses.

The research methodology involves case study data collection in two countries (Philippines and Indonesia). One contractor representative is located at each site and he works with host country research agencies in development of techniques and collection of data. The project is in the data collection phase which involves gathering a great deal of accurate data on the operation of existing irrigation systems.

A 4-wheel drive vehicle is needed in Indonesia (Central Java) to transport field investigators and the necessary equipment for water flow measurements, meteorological measurements, cropping surveys, and other types of activities

DS/PO OFFICIAL FILE

essential to the project. The work entails travel on unpaved roads and into agricultural fields in wet and dry weather. Therefore a 4-wheel drive utility vehicle is necessary. To conform to local traffic regulations and for safety the vehicle must also be of right-hand drive type.

The government of Indonesia restrictions on importation of vehicles are such that a vehicle could not be imported into the country during the course of the project life. USAID/Jakarta is operating under strict importation limitations and cannot provide a vehicle for the project. Similarly, the Indonesian Ministry of Agriculture (the cooperating agency) is not in a position to supply the vehicle.

Jeep type vehicles using predominantly U.S. parts are assembled in Indonesia exclusively among U.S. subsidiaries, by Jakarta Motors (AMC) using 90 percent U.S. source components.

Although section 636(1) of the Foreign Assistance Act of 1961, as amended, FAA requires that AID limit its financing of motor vehicles to those manufactured in the United States, this limitation may be waived when special circumstances exist.

Primary Justification: The subject equipment is essential to this AID-financed research contract, a vehicle is authorized in the contract, but it is not readily available from the authorized source.

I request that you waive the restrictions of Section 636(1) of the FAA and authorize U.S. and sole source waivers for the following reasons:

1. Jakarta Motors (AMC) is the only U.S. affiliated assembler in Indonesia of jeeps which are based on U.S. source components and which met the needs of our program in Indonesia. These AMC vehicles contain a predominant amount — 90 percent — of parts and subassemblies from the United States.
2. Vehicles used in Indonesia must be right-hand drive (RHD) in order to comply with local laws requiring motor vehicles to travel on the left-hand side of the roadway. Although RHD utility vehicles are available in the United States, they are available only on extended lead time and a special order basis.
3. The cost of locally assembled AMC vehicles is close to those of U.S. manufactured vehicles; however, AMC vehicles assembled in Indonesia are immediately available to meet program requirements.
4. Service and spare parts for locally assembled vehicles are readily available throughout Indonesia.
5. Procurement of vehicles assembled by U.S. companies or subsidiaries in Indonesia will strengthen U.S. efforts to expand in overseas markets.

Recommendation: For the above reasons, I find that special circumstances exist to waive the requirement of section 636(1) of the FAA and conclude that exclusion of procurement from the source requested above would seriously impede attainment of U.S. foreign policy objectives and the objectives of the foreign assistance program, and I recommend that you certify by approving this request for waiver.

Approved: IS/S LEVIN

Disapproved: _____

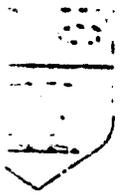
Date: JAN 4 1980

Attachment: Letter from Cornell

Clearances:

DS/AGR/TSWM:GCorey 188 Date 12/20/79
 SER/CM/COD/AN:EP 188 Date 12-20-79
 SER/COM/A:BViragh 188 Date 12-31-79
 GC/TFHA:ARichstein 188 Date 1-2-80
 DS/AGR:Mozynski 188 Date 1-3-80
 DS/PO:ASilver PC for Date 1-4-80
 DS/PO:BChapnick 188 Date 1-4-80

DS/AGR/TSWM:GLCorey:ap:12/20/79:X58877



Cornell University

CENTER FOR ENVIRONMENTAL RESEARCH

1100 Thurston Avenue, Ithaca, New York 14853

November 30, 1979

Mr. Morton Darwin, Contracting Officer
Agriculture/Nutrition Branch
Central Operations Division
Office of Contract Management
Department of State
Agency for International Development
Washington, D.C. 20523

RE: Contract Number AID/ta-C-1412

Dear Mr. Darwin:

This letter is a request for permission to purchase a vehicle in Indonesia under our contract number AID/ta-C-1412.

The contract budget includes provision for the purchase of a utility vehicle for use in Indonesia. The vehicle will be used in conjunction with the field studies being carried out in Central Java. It will be used for transport of the field investigators, and the equipment necessary for waterflow measurement, meteorological measurements and other types of activities essential to the project. The work entails travel on unpaved roads and into the fields, thus, a four-wheel drive utility vehicle is necessary. For safety, the vehicle should be right-hand drive type, to conform to local traffic regulations.

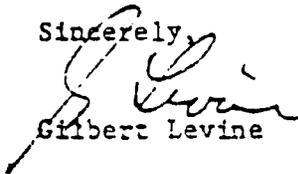
The Indonesian Government restrictions on importation of vehicles are such that a vehicle could not be imported into the country during the course of the project life. The USAID/Indonesian Mission is operating under strict importation limitations and is not in a position to provide a vehicle for our project use. Similarly, the Indonesian Ministry of Agriculture, with whom we are cooperating, is not in a position to supply the vehicle.

We have explored price estimates for the type of vehicle necessary and are enclosing this information. (The current rate of exchange is \$1.00 US = 620 rupiah.) We anticipate purchase of the lesser cost vehicle, approximately \$8,300.00.

To our knowledge, there are no comparable US vehicles assembled or available in Indonesia.

To facilitate the expeditious completion of the project we would appreciate action on this request at your earliest convenience. If additional information is required please do not hesitate to contact me directly.

Sincerely,


Gilbert Levine

Encl.

Endorsed:
cc: J.A. Youngers, G. Corey

Office of Sponsored Programs

PROJECT AUTHORIZATION AND REQUEST FOR ALLOTMENT OF FUNDS PART I

1. COUNTRY ENTITY **TA/AGR**
~~XXXXXXXXXXXX~~ - Research **RDA#4**
 5. PROJECT NUMBER (7 digits) **[931-1005]**
 6. BUREAU OFFICE
 A. SYMBOL **TAB** B. CODE **[30]**
 ACTION TAKEN
 [A] A. APPROVED
 B. UNAPPROVED
 C. DEAUTHORIZED

1. TRANSACTION CODE
 [A] A. ADD
 B. CHANGE
 C. DELETE
 2. DOCUMENT CODE **5**
 4. DOCUMENT REVISION NUMBER **-(Original)**
 7. PROJECT TITLE (Maximum 40 characters)
[Determinants of Irrigation - Cornell]
 9. EST. PERIOD OF IMPLEMENTATION
 YRS **[05]** QTRS **[0]**

931005-8
PD-ADD-502

8p

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

A. APPROPRIATION	B. PRIMARY PURPOSE CODE	PRIMARY TECH CODE		E. 1ST FY <u>77</u>		H. 2ND FY <u>78</u>		K. 3RD FY <u>79</u>	
		C. GRANT	D. LOAN	F. GRANT	G. LOAN	I. GRANT	J. LOAN	L. GRANT	M. LOAN
(1) FN	121 I	973	-	\$185	-	-	-	\$100	-
(2)									
(3)									
(4)									
TOTALS				\$185	-	-	-	\$100	-

A. APPROPRIATION	N. 4TH FY <u>80</u>		O. 5TH FY <u>81</u>		LIFE OF PROJECT		11. PROJECT FUNDING AUTHORIZED		
	P. GRANT	Q. LOAN	R. GRANT	S. LOAN	T. GRANT	U. LOAN	(ENTER APPROPRIATE CODE(S))	A. GRANT	B. LOAN
(1) FN	-	-	-	-	\$285	-	1 - LIFE OF PROJECT	2	-
(2)							2 - INCREMENTAL, LIFE OF PROJECT		
(3)									
(4)									
TOTALS					\$285	-	C. PROJECT FUNDING AUTHORIZED THRU	FY [79]	

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

A. APPROPRIATION	D. ALLOTMENT REQUEST NO. _____	
	E. GRANT	F. LOAN
(1) FN	\$185	-
(2)		
(3)		
(4)		
TOTALS		\$185

13. FUNDS RESERVED FOR ALLOTMENT

TYPE NAME (City, SER, FM, FSD)
 SIGNATURE
 DATE

14. SOURCE/ORIGIN OF GOODS AND SERVICES 000 941 LOCAL OTHER _____

15. FOR AMENDMENTS, NATURE OF CHANGE PROPOSED

N/A

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
			N/A	

PROJECT AUTHORIZATION AND REQUEST
FOR ALLOTMENT OF FUNDS PART II

ENTITY : TA/Bureau
PROJECT : Determinants of Irrigation - Cornell
PROJECT NUMBER: 931-1005

I hereby authorize grant funds not to exceed \$285,000 for a three year contract to be negotiated with Cornell University for research on "Determinants of Irrigation." This research project will involve the collection, in two to three developing countries, of field data on the interactions of social, economic, use, design and management factors affecting irrigation. From this data will be developed a set of analytical and operational procedures for use by planning, design and management organizations involved with irrigation. This project will be incrementally funded with \$185,000 in FY 77 for the first two years of the contract and with \$100,000 in FY 79 for the third contract year depending on the availability of funds. It is anticipated that a future request for authorization and approval for a two year project extension costing approximately \$200,000 will be made after completion of an interim evaluation of the project. This project was reviewed and endorsed by R&DC during their meeting in March 1976 and reviewed by RAC in their May 1976 meeting and subsequently endorsed at their October 1976 meeting.

M. Farrar for C. Larrow

Curtis Farrar
Assistant Administrator
for Technical Assistance

Date: JAN 7 1977

Clearances:

TA/AGR/SWM:GCorey *JGC*
TA/AGR:GBaird *GB*
TA/AGR:LHesser *LH*
TA/RES:MRehcigl *MR*
TA/PPU:JGunning *JG*
SER/ENGR:JHowe *JH*

References:

1. Research Project Statement: "The Determinants of Developing Country Irrigation Project Problems" submitted by Cornell to AID/TAB - dated September 1976 (attached).
2. Minutes of RAC Meeting - October 1976
3. Minutes of RAC Meeting - May 1976
4. Minutes of R&DC Meeting - March 1976
5. A/AID's approval memo subject to RAC recommendation dated May 6, 1976

UNITED STATES GOVERNMENT

Memorandum

TO : SER/CM, Mr. Hugh L. Dwelley

DATE: December 16, 1976

FROM : AA/TA, Curtis Farrar

MSB/CF

SUBJECT: Determination of Unsolicited Research Proposal for "The Determinants of Developing Country Irrigation Project Problems" - Cornell University

Pursuant to 7-3.101.80(d)(1) and 7-4.5301(e) of 41 CFR Chapter 7, I hereby determine that the unsolicited research proposal for "The Determinants of Developing Country Irrigation Project Problems" submitted by the proposers - Milton L. Barnett, E. Walter Coward and Gilbert Levine of Cornell University and Leslie E. Small of Rutgers University is the product of original thinking, has significant scientific and technical merit and contributes to AID's research program objectives sufficiently to warrant negotiation with the proposers without the requirement to seek competition from other sources formally or informally.

Expanded irrigation has been identified as a major factor in the development of the LDC's. Its critical role relative to world hunger problems was recently stressed at the World Food Conference. USAID alone has invested over 100 million dollars in water-related projects. Notwithstanding the long history of irrigation, increased understanding of the basic engineering and agricultural sciences and massive investments, many modern irrigation projects encounter major problems. Some of the problems relate to the physical components of the systems, but the most serious ones occur in management and utilization. These are especially serious where the systems are supposed to meet small-holder needs. The problems encountered have been serious enough on many projects that they have altered the course of future governmental policies. It is the thesis of the proposed research that the causes of these failures are an inadequate recognition of the critical importance of the interactions of the socio-economic factors with the physical aspects of the systems and a lack of understanding of these interactions. The research proposers for this project will first, describe and analyze these critical interactions; second, identify those interactions that are critical to system success; and third, identify the implications for policy, design and operation. It is anticipated that this increased understanding will be incorporated into a set of analytical and operational procedures designed for use by planning, design and operations organizations. The results will be accomplished by detailed study and analysis of existing systems. The important rice producing systems of Asia will be the target systems. The research must be done by an interdisciplinary team and the research proposers have demonstrated strong abilities in this regard. The

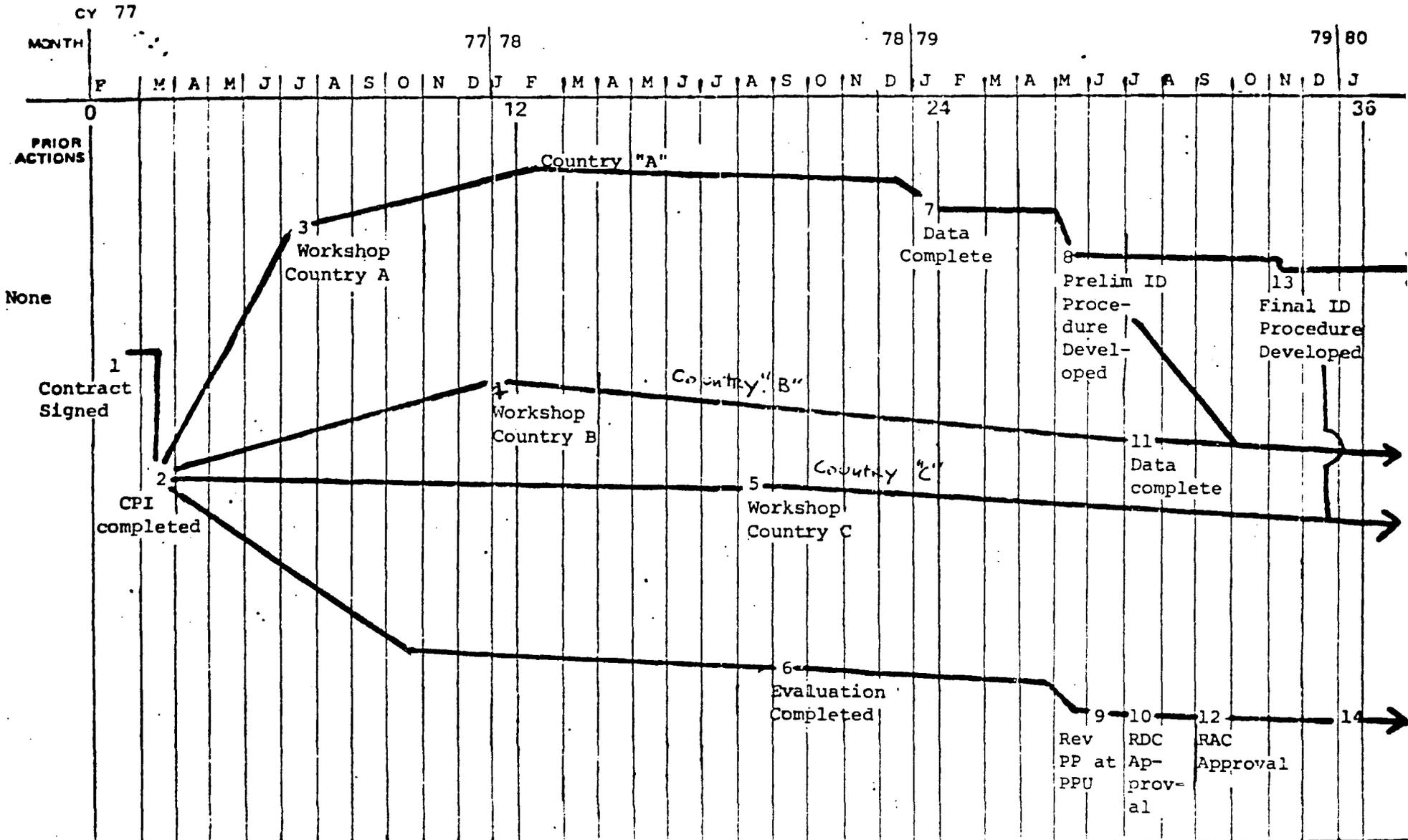


5010-108

Buy U.S. Savings Bonds Regularly on the Payroll Savings Plan

over

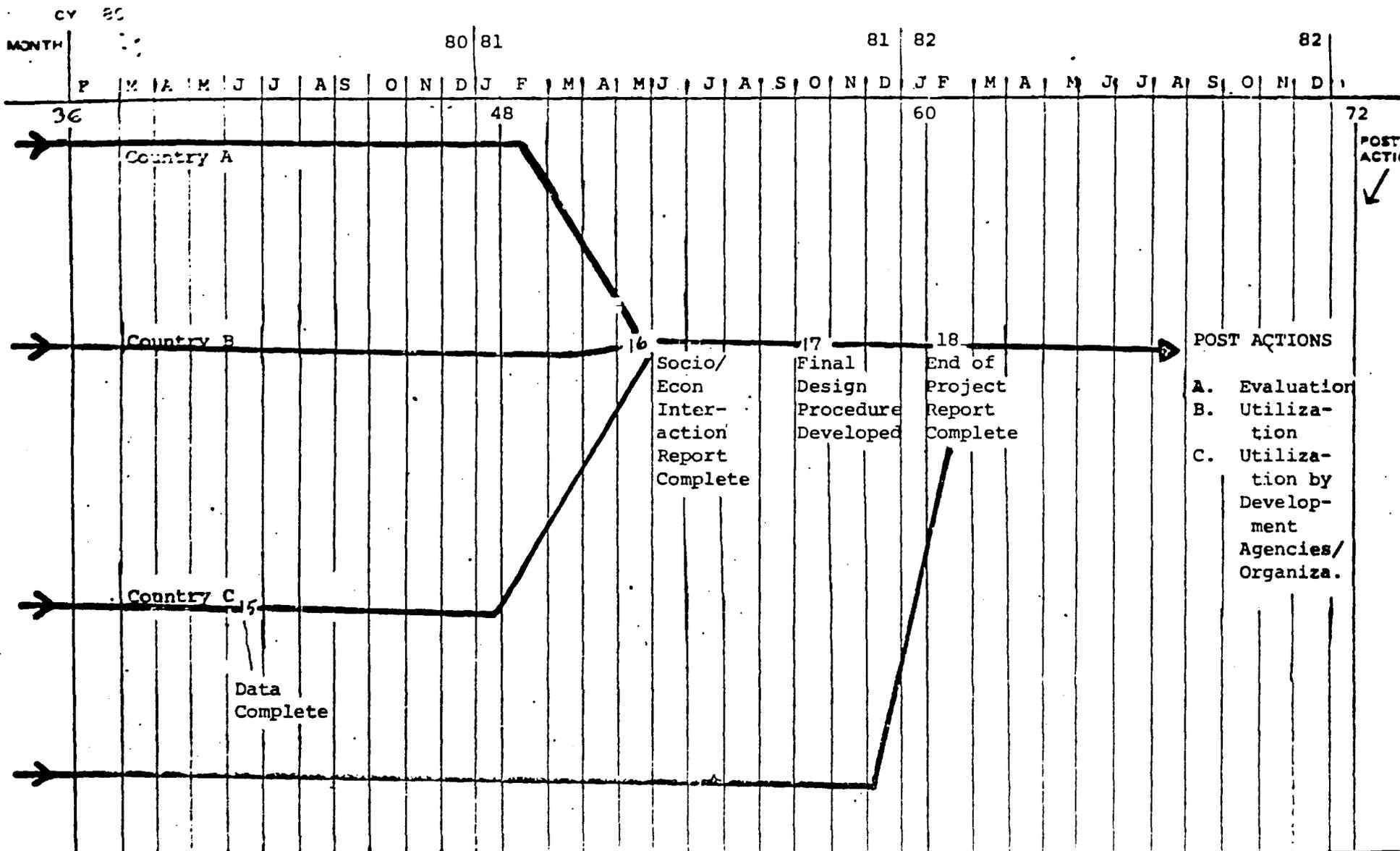
COUNTRY TA BUREAU	PROJECT NO. 921-1005	PROJECT TITLE DETERMINANTS OF IRRIGATION - CORNELL	DATE 11-15-76	<input checked="" type="checkbox"/> ORIGINAL <input type="checkbox"/> REVISION	APPROVED
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ANALYSIS SCHEDULE:
PROGRESS VS FINANCIAL

EVALUATION SCHEDULE

X



ANALYSIS SCHEDULE: PROGRESS VS FINANCIAL	
EVALUATION SCHEDULE	X

COUNTRY	PROJECT NO.	PROJECT TITLE	DATE	<input checked="" type="checkbox"/> ORIGINAL * <input type="checkbox"/> REVISION # _____	APPROVED
TA BUREAU	281-2005	DETERMINANTS OF IRRIGATION - CORNELL	11-15-76		
PROJECT PURPOSE (FROM PRP FACESHEET)					
To improve procedures for design and/or rehabilitation of irrigation systems incorporating explicit consideration of the interactions of critical socio-economic factors with the physical factors.					
<u>PRIOR ACTIONS</u>					
None					
<u>CPI DESCRIPTION</u>					
1.	02/77	Research contract signed (Cornell - AID/TA/AGR)	13.	11/79	Finalized Problem Identification Procedure established (Cornell)
2.	03/77	Revised CPI network completed (Cornell - AID/TA/AGR)	14.	01/80	Revised contract signed (AID/TA/AGR, PPU & SER/COM)
3.	07/77	Planning Workshop for Country A (Cornell)	15.	06/80	Field Data completed in Country C (Cornell)
4.	01/78	Planning Workshop for Country B (Cornell)	16.	05/81	Report on interactions of socio-economic, use, design & management completed (Cornell)
5.	08/78	Planning Workshop for Country C (Cornell)	17.	10/81	Finalized design procedures developed (Cornell)
6.	09/78	Comprehensive Evaluation completed (AID/TA/AGR)	18.	12/81	End of Project Report (Cornell)
7.	01/79	Field Data completed in Country A (Cornell)	<u>POST ACTION</u>		
8.	05/79	Preliminary Problem Identification Procedure developed (Cornell)	A. Final evaluation (AID/TA/AGR/SWM)		
9.	06/79	Revised PP submitted to PPU (AID/TA/AGR/SWM)	B. Utilization Plan for dissemination of procedures (AID/TA/AGR)		
10.	07/79	R&DC review of PP and recommendation for approval (AID/R&DC)	C. Utilization of design procedures by development organizations (AID/TA/AGR, AID Bureaus & Missions, relevant development organization & LDC's).		
11.	07/79	Field Data completed in Country B (Cornell)			
12.	09/79	RAC review of PP and recommendation for approval (AID/RAC)			

DEPARTMENT OF STATE
AGENCY FOR
INTERNATIONAL DEVELOPMENT

1. Cooperating Country
TA BUREAU

2. PIO/T No.

3177612

3. Original or
Amendment No. 1

PIO/T

PROJECT IMPLEMENTATION
ORDER/TECHNICAL
SERVICES

4. Project/Activity No. and Title

Determinants of Irrigation - Cornell
(#931-1005)

931005-9
PO-NAF-502

DISTRIBUTION

5. Appropriation Symbol

72-11x1023

6.A. Allotment Symbol and Charge

402-31-099-00-22-71

6.B. Funds Allotted to:

A.I.D./W Mission

7. Obligation Status

Administrative Reservation Implementing Document

8. Funding Period (Mo., Day, Yr.)

From 08/01/77 To 07/31/79 3p

9.A. Services to Start (Mo., Day, Yr.)

Between 07/01/77 and 09/01/77

9.B. Completion date of Services

(Mo., Day, Yr.) 07/31/80

10.A. Type of Action

A.I.D. Contract Cooperating Country Contract Participating Agency Service Agreement Other

10.B. Authorized Agent
AID/W

Estimated Financing		(1)	(2)	(3)	(4)
		Previous Total	Increase	Decrease	Total to Date
11. Maximum A.I.D. Financing	A. Dollars	\$185,000	\$30,000	-	\$215,000
	B. U.S.-Owned Local Currency				
12. Cooperating Country Contributions	A. Counterpart				
	B. Other				

FUNDS RESERVED BY
M. Hughes
POSTED 7/27/77
SER/ENR/CSD

13. Mission References

PIO/T #
931-1005-
3177612

14. Instructions to Authorized Agent

This PIO/T provides an additional \$30,000, for a total \$215,000, for the initial two-year funding period of the three-year contract on "Determinants of Irrigation" currently under negotiation with Cornell University. The three year funding level of the project is also hereby increased from \$285,000 to \$350,000. Funding of the third contract year will be made depending on the availability of funds. The revised budget is attached.

The reference PIO/T should be amended in section 19.C(5) to permit dependents to accompany technicians. Section 20.A. of the referenced

(cont'd on page 2)

15. Clearances - Show Office Syr. bol, Signature and Date for all Necessary Clearances.

A. The specifications in the scope of work are technically adequate

TA/AGR/SWM:GCorey Date: 6/15/77

TA/AGR/SWM:DPeterson Date: 6/13/77

C. The scope of work lies within the purview of the initiating and approved Agency Programs

TA/AGR:LHesser Date: 6-14-77

E. TA/AGR:GBaird Date: 6-14-77

TA/AGR:DClark Date: 6-14-77

B. Funds for the services requested are available

TA/PPU:CMolfetto Date: 6/29/77

TA/PPU:MMozynski Date:

D. Contract Review Sheet Signed 7/21/77

TA/RES:MRechigl Date: 6/24/77

F. SER/ENGR:JHowe Date: 6/16/77

ASIA/TR:CMartin Date: 6/16/77

16. For the Agency for International Development

TA/AGR/SWM:SEngberg Date: 6/13/77

Signature and date:

Title:

17. For the Agency for international Development

Signatures: Mr. Kenneth M. ...

Title: TA/PPU

18. Date of Signature

6/23/77

CONTINUATION SHEET

DEPARTMENT OF STATE
AGENCY FOR
INTERNATIONAL DEVELOPMENT

Worksheet Invoice

PAGE 2 OF 2 PAGES

1. Cooperating County
TA BUREAU

2.a. Code No.

2.b. Effective Date

2.c. Amendment
 Original OR No: 1

3. Project/Activity No. and Title
Determinants of Irrigation - Cornell
(#931-1005)

Indicate block numbers.

Use this form to complete the information required in any block of a PIO or PA/PR form.

14 (cont'd)

PIO/T should be amended to allow for the purchase of two (2) vehicles at an estimated cost of \$18,000 instead of one (1) vehicle at \$9,000 as previously specified. Section 21.D.(2) of the referenced PIO/T should also be amended by specifying that the subcontract with Rutger's University will be for the services of Dr. Les Small and not Dr. William Whyte as previously specified. All other conditions remain the same.

The authorized funding level for this three-year contract is \$350,000. The total amount of funds provided for this contract, including this PIO/T, is \$215,000.

"Article # Voucher Identification: In each instance of voucher (SF-1034) submission made by the contractor for payment hereunder, the following identification data will appear on the face of the voucher.

Contract: "To be specified by SER/CM/COD"
Project : 931-1005
Project Office: TAB/AGR/SWM

REVISED BUDGET

Determinant of Irrigation - Cornell
Project Number: 931-1005

<u>CATEGORY</u>	<u>Original</u>	<u>Amended</u>	<u>Total First 2 Yrs</u>	<u>3rd Contract Yr</u>	<u>TOTAL</u>
	<u>FY 77 Funding</u>	<u>FY 77 Funding</u>	<u>FY 77 Funding</u>	<u>FY 79 Funding</u>	<u>FUNDING</u>
	FR: 08-01-77	FR: 08-01-77	FR: 08-01-77	FR: 08-01-79	FR: 08-01-79
	TO: 07-31-79	TO: 07-31-79	TO: 07-31-79	TO: 07-31-80	TO: 07-31-80
1. Salaries and Wages	\$ 77,000	(minus)→\$21,400	\$ 55,600	45,000	\$100,600
2. Fringe Benefits	-	5,934	5,934	6,400	12,334
3. Allowances	-	11,700	11,700	6,100	17,800
4. Travel & Transportation	26,900	20,182	47,082	28,900	75,982
5. Equipment & Supplies	15,000	8,000	23,000	9,000	32,000
6. Research Operations	25,000	8,400	33,400	11,600	45,000
7. Other Direct Costs	12,760	(minus)→ 4,560	8,200	4,000	12,200
8. Overhead	<u>28,340</u>	<u>1,744</u>	<u>30,084</u>	<u>24,000</u>	<u>54,084</u>
TOTAL -	\$185,000	\$30,000	\$215,000	\$135,000	\$350,000

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PD-LAF-502

AGENCY FOR INTERNATIONAL DEVELOPMENT
RESEARCH ADVISORY COMMITTEE

100p

Minutes of the Fifty-fifth Meeting
October 12-13, 1976

Dr. Ralph Smuckler, Chairman, called the meeting to order at 9 a.m. He welcomed Dr. Erven J. Long back as an active participant following his illness and recovery from whiplash effects. Dr. Long extended a welcome to new members, Dr. Clanton C. Black, Department of Botany, University of Georgia, and Dr. Dale N. Moss, Department of Agronomy and Plant Genetics, University of Minnesota. Mr. Curtis Farnham, AAV/TA, commented on the Congressional situation as being quiet with the FY 77 appropriation bill having been signed by President Ford on October 1 at 5:30. There will now be pressures to get things underway and a significant work load ahead. Dr. Schweigert offered his congratulations to Dr. Carter as the recently appointed Chairman of his department at Tulane. Dr. Maurice L. Peterson was also cited as the recently appointed head of the Department of Agronomy and Range Science at the University of California at Davis.

Scheduling for future meetings of the RAC was discussed and agreed upon as follows:

December 10, 1976

February 3-4, 1977

April 25-26, 1977

Minutes of the May 24-25, 1976 RAC meeting, as corrected following their circulation to the members, were approved unanimously.

**The Determinants of Developing Country Irrigation
Project Problems: A Multi-Factor Analysis for Improved
Systems Operation and Performance - Cornell University**

Dr. D. Peterson, Chairman of the Subcommittee composed of Dr. Heady, Dr. M. Peterson, and Mr. Wittnebert, reported as follows. (Dr. Thorbecke absented himself from the project review.)

This project was reviewed in detail at the last meeting of the RAC, and that discussion will not be repeated. One of the problems of irrigation all over the world is that the physical system which delivers water to the farmer's fields does not seem to respond to the economic and social considerations which constrain and influence the farmer's decisions. This project proposed to address this interaction in a multidisciplinary way utilizing specific sites, first, in the Philippines, and then, later, in two southeast Asian countries. If successful, Cornell University, the contractor, may then attempt to extend this methodology to other regions.

While the physical measurements and methodologies were quite well pinned down, the methodologies in the social sciences were less clear. In fairness, the physical characteristics are fairly visible and readily apparent. The relevant social variables are more obscure, and their identification is obviously part of the research question. Nevertheless, the Subcommittee felt that A.I.D. and the contractor might be able to articulate this part of the methodology somewhat more thoroughly.

is has now been done, and the Subcommittee is more comfortable with the present proposal. One question raised concerns the reality of whether the research results can be applied as a function of political

difficulties. Another question concerns the lack of a quantifiable model. However, we believe that the researchers are experienced and that we can expect the appropriate methodology to be sorted out. Not enough is now known about the system to do much prior specification of the nature of the products.

In summary, A.I.D. and the contractor have been responsive to the RAC requests. The Subcommittee is now ready to recommend approval.

Dr. Heady urged that the 18 month review of this project should particularly review the methodology. The budget is long on graduate students, and there is need for more social science emphasis.

Dr. M. Peterson stated that the problem is crucial. He commented on the reference to the Iranian project which failed to substitute a local structure which was acceptable to the farmers. Politics defeated use of the results. He favors this type of project, but doubts the development of any real effects.

Mr. Wittnebert favored endorsement.

Dr. Moss asked whether the requested three years of support would provide sufficient useful data in the conduct of what is presented as a five year proposal?

Dr. Weller pointed out the lack of a health component which he felt should be part of the work.

Dr. Gilbert L. Corey, TA/AGR, responded to questions raised. The 18 month review will be inclusive of methodology as a basis for planning the future support of the full project. Dr. Coward, the Rural Sociologist, will be the Project Leader, not Dr. Levine, the Agricultural Engineer, as shown on the Project Statement. Water efficiency depends

on the comprehensiveness of measurements. This includes attention to wastage and greater emphasis on field data. The third year products are not clear at this time. The matter of health and irrigation is a good question, but there will be no attempt to make this a systematic health study.

Dr. Montgomery added that he personally knows the project staff, and he considers this to be a good team for cooperative work.

Dr. Weller was still disturbed by the lack of a health focus, and suggested that the project would need the services of a medical entomologist and a medical mycologist for adequate insights into health problems. Dr. M. Peterson urged that A.I.D. enter discussion with Cornell on the disease implications of this work or as a future project.

Extended discussion concerned the selection and number of sites to be studied. There was agreement, summarized by Dr. D. Peterson, and agreed to by Dr. Corey, that in this project the work would be limited to three countries; if systematizable results are obtained, then expanded work could be proposed. Dr. Long pointed out that the RAC agrees to no expansion beyond three years without further review.

Motion: That the proposal be approved with the provision that an 18-month review be conducted including an evaluation of methodology and of site selection.

Moved by D. Peterson; seconded by Heady.

Voice vote; Aye - majority; nay - several. Motion approved.

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Recommendation: That the project extension for three years at the requested funding be approved.

It was the general consensus of RAC that the physiological studies could be strengthened by techniques developed by various other research laboratories and that additional scientific talent at Nebraska as well as advice from physiologists elsewhere would be useful in these studies.

The same recommendation was made as on the previous project regarding the conduct of a field review of all related sorghum research projects by the same team.

4. The Determinants of Developing Country Irrigation Project Problems: A Multifactor Analysis for Improved Systems Operation and Performance (New) - Cornell University. Duration of project, 3 years; estimated cost, \$280,000. D. Peterson, Heady, M. Peterson, Wittnebert.

Recommendation: That the proposal be approved with the provision that an 18-month review be conducted including an evaluation of methodology and of site selection.

5. Poor Rural Households, Technical Change and Income Distribution in LDC's (New) - Cornell, Purdue and Michigan State Universities. Duration of project, 3 years; estimated cost, \$763,802. Heady, Montgomery, D. Peterson, Tanter.

Recommendation: That the project be approved subject to the full acceptance of the revised project plan by the three universities and allocation of sufficient manpower by A.I.D. to assure implementation.

Note: Phase I of this project was approved by RAC at its March 22-23, 1976 meeting.

6. Sterilization by Endometrial Ablation (Extension) - University of Colorado. Duration of extension, 2 years; estimated additional cost, \$245,480. Connell, Montgomery, D. Peterson, Tanter.

Recommendation: That the project extension be funded as proposed with the single proviso that the issue of the remodeling costs for the ambulatory surgery unit be reassessed in regard to sharing of the expense incurred.

7. Cultivation of Human Malaria (Plasmodium falciparum) and the Use of the Culture for Experimental Immunizations of Monkeys (Expansion and Extension) - Rockefeller University. Duration of extension, 3 years; estimated additional cost, \$563,000. Wishik, Carter, Schweigert, Weller.

Recommendation: That the proposal be approved.

The RAC should consider how it can contribute to this process. Should we invite in researchers to update knowledge in a seminar format as previously discussed by RAC? Dr. Montgomery suggested a subcommittee might approach problems of specified target groups that could be addressed by intermediate technologies. Dr. M. Peterson stressed the importance of problem definition and the importance of the entry point. Dr. Long commented on Dr. Montgomery's point that the needs are not given as a basis for matching technologies. He recognized the difficulties of working under the developing country conditions, and the uncertainty issue of massive change versus multiple small changes. Dr. Black commented on historical solutions not in use today as in the case of specific power sources. Dr. D. Peterson commented on the mis-identification of problems as a function of culture and the state of the knowledge available.

Dr. Smuckler summarized the RAC consensus: (1) the discussion has served a purpose, and may be presented orally to Mr. Parker; (2) additional inputs from the RAC should be submitted to Dr. Long or Dr. Smuckler; and (3) no formal development of a paper is planned.

**The Determinants of Developing Country Irrigation
Project Problems: A Multi-Factor Analysis for Improved
Systems Operation and Performance - Cornell University**

Dr. D. Peterson, Chairman of the Subcommittee composed of Dr. Heady, Dr. M. Peterson, and Mr. Wittnebert, reported as follows. (Dr. Thorbecke absented himself from the project review.)

This project was reviewed in detail at the last meeting of the RAC, and that discussion will not be repeated. One of the problems of irrigation all over the world is that the physical system which delivers water to the farmer's fields does not seem to respond to the economic and social considerations which constrain and influence the farmer's decisions. This project proposed to address this interaction in a multidisciplinary way utilizing specific sites, first, in the Philippines, and then, later, in two southeast Asian countries. If successful, Cornell University, the contractor, may then attempt to extend this methodology to other regions.

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difficulties. Another question concerns the lack of a quantifiable model. However, we believe that the researchers are experienced and that we can expect the appropriate methodology to be sorted out. Not enough is now known about the system to do much prior specification of the nature of the products.

In summary, A.I.D. and the contractor have been responsive to the RAC requests. The Subcommittee is now ready to recommend approval.

Dr. Heady urged that the 18 month review of this project should particularly review the methodology. The budget is long on graduate students, and there is need for more social science emphasis.

Dr. M. Peterson stated that the problem is crucial. He commented on the reference to the Iranian project which failed to substitute a local structure which was acceptable to the farmers. Politics defeated use of the results. He favors this type of project, but doubts the development of any real effects.

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Extended discussion concerned the selection and number of sites to be studied. There was agreement, summarized by Dr. D. Peterson, and agreed to by Dr. Corey, that in this project the work would be limited to three countries; if systematizable results are obtained, then expanded work could be proposed. Dr. Long pointed out that the RAC agrees to no expansion beyond three years without further review.

Motion: That the proposal be approved with the provision that an 18-month review be conducted including an evaluation of methodology and of site selection.

Moved by D. Peterson; seconded by Heady.

Voice vote; Aye - majority; nay - several. Motion approved.

The Determinants of Developing Country Irrigation Project
Problems: A Multifactor Analysis for Improved System
Operation and Performance - Cornell University

Dr. Thorbecke, Cornell University, absented himself from the meeting to avoid any possible conflict of interest.

Dr. Peterson, Chairman of the Subcommittee composed of Dr. Heady, Dr. M. Peterson, and Mr. Wittnebert reviewed the project as follows. As background Dr. D. Peterson pointed out that Asia, with more than half of the world's population, has only about 20% of the arable land resources which is 80 to 90% utilized. Much of this comes under the influence of the tropical monsoon with distinct wet and dry seasons. They must, through irrigation, insure against drought to avoid famine. Reasonably successful indigenous irrigation systems have evolved. However, the large, externally designed systems have a rather poor record of achievement. There are many reasons beyond the physical characteristics of the systems for this poor performance. Since there is no way to meet the agricultural requirements of these heavily populated areas without increased irrigation, this proposal addresses a very important matter.

This project proposes to deal with the socio-economic factors and their interactions with the physical characteristics at the project level. The research objectives are to 1) describe, analyze, and explain the complex interactions among these components; 2) develop analytical tools for identifying critical systems interactions; 3) identify system

design and operation implications; and 4) identify planning policy implications.

A planning workshop including host country participation will insure a workable methodology. Following this analytical stage further planning with host countries will refine the procedures. The investigators appear well qualified, and there is also an impressive list of consultants representing important disciplines.

The stated goal is to increase water use efficiency, but this may, or may not be fully congruent with more basic goals, e.g., improving the income of individual farmers. Significant questions are: to what extent will constraints external to the projects, such as national policy, be considered and how far can one move into these? Will the Asian Development Bank and the Agricultural Development Council be involved in these considerations?

The Subcommittee is generally favorable to the project, but believes it could be improved. Suggestions for discussion include confining the project to monsoon Asia, clarifying the socio-economic methodology, and including political science expertise on the team.

Mr. Wittnebert said the consumer oriented objectives of the project were very good and that the efforts of staff and contractor were apparent in the quality of the proposal.

Although he was quite favorable to the project Dr. Heady suggested that a more complete definition of the socio-economic methodology should be given as there are many reasons for inefficient water distribution and use. The heavy use of research assistants should be re-evaluated, and perhaps more social science emphasis given in the leadership.

Dr. M. Peterson pointed out that one can manipulate the variables and data input to provide whatever conclusion desirable on irrigation economics. He referenced an earlier example in the western U.S. to illustrate traps to be avoided.

Dr. Montgomery said that in the socio-economic methodology it is important to get the political analyst to attach social content analysis to decision analysis. He indicated his belief that the Cornell political science consultants mentioned in the proposal are qualified to work on that problem if they are given access to that phase of the study.

Dr. Adams expressed his reservation whether this task could be done within the estimated budget. He also expressed concern that host countries often want the money but do not want projects evaluated. Therefore, he believed this would be a high risk activity with little chance for success.

Dr. Swanson expressed concern that examples of the quoted critical indicators were not given and that there was no performance indicator which dealt with equity distribution. He asked if third country testing would be included. Dr. Ehrenreich endorsed the systems approach and thought this expertise could be successfully incorporated into such an analysis. Dr. Smuckler pointed out that Cornell has political scientists who have worked in this area, and he would encourage their involvement if the project moves forward.

Dr. D. Peterson acknowledged that the budget is modest, but since this is pioneering work it may be best to begin modestly. It is necessary to develop a critical mass.

Dr. Corey, TA/AGR, pointed out that a significant point of the project is that it will look at systems as they exist, and there is not to be any juggling of inputs. He emphasized that this will be the first project of it's kind in the world and will be a systems rather than a bottle-neck approach. He expressed agreement with the comments on methodology. A significant key to success of the effort is involvement of local people because foreigners cannot successfully go in and get the necessary data - this is why the workshops are necessary. Validity of the project rests upon reliability of the data. Restriction to the Asian monsoon area is desirable. Too often irrigation systems merely dispose of water. Not enough attention is given to getting the water from the delivery system to the crop. This project will look into the reasons for this inadequacy. The project aims to see if certain interventions do carry over to other systems. The investigators believe it will take time more than money to do this task. Commenting on the involvement of research assistants he said these would be top level advanced graduate students and employed wisely in the Cornell tradition. Before the project would be implemented he said top consideration would be given to host country locations. He reported the Asia Bureau is favorable to the proposal.

Dr. D. Peterson asked if there should be more clarification of methodology prior to approval and how a delay until October would affect the project plan. Dr. Hesser, TA/AGR, indicated it would be possible to sharpen the methodology with greater political science involvement and re-evaluation of the budget for review in October without disrupting

the planning horizon. The consensus of the subcommittee was that Dr. Hesser's suggestion be adopted.

Motion: That AID staff consider suggestions of the RAC and present a revised proposal at the October (RAC) meeting.

Vote: Carried with 10 aye and 5 nay votes.

The Chairman made clear that the negative votes should be interpreted as a desire to approve the project without further referral, therefore the project goes forth with a strong affirmation for acceptance with the suggested considerations. Dr. D. Peterson said he wanted to emphasize the consensus of the subcommittee for this project and to compliment AID staff on its development. Dr. Long complimented the RAC on their review and action on the project.

Improvement of Winter Wheat for Developing Countries,
Based on Hybridization of Spring and Winter Forms -
Oregon State University

Dr. Maurice Peterson, Chairman of the Subcommittee composed of Mr. Ludington, Dr. D. Peterson, and Dr. Whitney reviewed the project as follows. Dr. Peterson commented first on the relationship between AID plant breeding research projects and those of the International Centers. He noted that this project has a general objective similar to the Nebraska project. The program is proposed for three years with an estimated cost of \$943,000, but it is recognized that it will require 6 to 10 years to accomplish the objectives as envisioned. The proposal is to carry out hybridization between winter and spring wheats, which can be done effectively, in order to transfer desirable plant, disease, and seed characteristics between the two gene pools for the improvement of both. Four issues should be considered.

1) The project describes an activity focused on improved varieties without giving specific goals. The procedure is not new as essentially every important winter wheat variety in the U. S. includes spring wheat germ plasma. There is no disagreement that wheat breeders should cross the two types, but this activity alone is a questionable basis for a major project of this magnitude. 2) The underdeveloped countries have very limited acreage of winter wheats, thus there is a significant question as to who will primarily benefit from the project. 3) There is a question of alternative support. AID is providing operational support to CIMMYT and is supporting the Nebraska wheat project. The USDA is supporting wheat research in Oregon

UNITED STATES GOVERNMENT

Memorandum

TO : AA/TA, Ms. Marjorie Belcher

DATE: June 28, 1977

FROM : TA/PPU, Mr. John N. Gunning

SUBJECT: Determinants of Irrigation Project - Cornell

Attached is an action memorandum from TA/AGR dated June 14, 1977 which requests an upward adjustment in the authorization of the subject project from \$285,000 to \$466,000. Also attached is a memorandum from TA/AGR dated June 24, 1977 which elaborates on the additional budget requirement. Please note that, although the level of effort is increased in the third year, the original project and authorization anticipate a fourth and fifth year subject to successful results. Given this increase, however, the original estimate of \$200,000 for the projected extension will almost certainly be found to be understated as well.

The RDA 4 notification already submitted to Congress covers this additional budget requirement.

TA/PPU recommends signature of the attached PAF amendment.

Attachments: a/s

cc: TA/AGR



UNITED STATES GOVERNMENT

Memorandum

TO : TA/PPU, Mr. Charles Molfetto

DATE: June 24, 1977

FROM : TA/AGR, Gilbert L. Corey 

SUBJECT: Proposed Budget, Determinants of Irrigation - Cornell

The estimated budget for this proposed contract is not straight-lined. In fact, the 3rd year estimate is larger than the first two year total. This merely reflects the fact that the contract will produce products most of which will be forthcoming during the 3rd year.

The project involves working in LDCs. It will start in one. It will grow into two and finally three. Each location adds to the cost and since we have suggested getting firmly settled into one location before starting the next, the budget is smaller in the initial year. And of course as research locations increase, all other costs incidental to doing the research are increased.

Also, dissemination of results through seminars and workshops is more costly in the 3rd year simply because at the outset there are no results to disseminate.

Careful examination of the proposal will indicate that during the 3rd year one of the principal investigators will be stationed in an LDC, while prior to that the field work will be accomplished by graduate students. Senior university staff are paid considerably more than graduate students and therefore the 3rd year salary costs are considerably higher than in years 1 or 2.

When one adds all of these factors, the 3rd year estimate is something more than the total for the first 2 years. Actually, it reflects a program of which is planned out in a logical manner, taking into consideration the reality of doing research in an LDC environment.



UNITED STATES GOVERNMENT

Memorandum

TO : AA/TA, Dr. Erven Long

DATE: July 19, 1977

FROM : TA/AGR, Leon F. Hesser *LH*

SUBJECT: "Determinants of Irrigation Project - Cornell"

After your discussion with Dr. Baird and Len Otto concerning the subject project, we contacted Cornell regarding the problem of the large funding increase especially in the third year. Mr. Darvin, CM/COD/TAB, had suggested that we do this. The project leaders, after lengthy discussions, decided that they could change their method of managing the project without changing the scope of work. They would do this by reducing the non-professional campus staff and by not placing a principal investigator overseas during the third year. These changes, according to them, would reduce the third year budget to approximately \$135,000, thus making the total three-year budget \$350,000.

We realize that this is still appreciably more than the currently authorized \$280,000, however, it does represent the minimum the contractor needs to produce the outputs of the approved project using the approved methodology. Anything less would mean a reduced scope of work and that reduction would have to be evaluated to determine whether the project was worth doing at all.

Please reconsider this increased "Project Authorization" in light of the reduced third year funding. The funding figures have been changed on all pertinent attached documents to reflect this reduced amount.

If you have any further questions on this matter please contact me or the project manager, Dr. Gilbert Corey (Tel# 235-8878).

I concur in the project as redesigned and rebudgeted.

Erven J. Long
for Erven J. Long



UNITED STATES GOVERNMENT

Memorandum

(4) 1005

TO : AA/TA, Ms. Marjorie Belcher

DATE: January 4, 1977

FROM : TA/AGR/SWM, Gilbert L. Corey. *GLC*

SUBJECT: "Determinants of Irrigation Project Problems"

If this project is not extended beyond a three year period, the specific outputs will be:

1. A complete description of two Asian irrigation systems. It will include an analysis of the interactions between the physical, economic and organizational dimensions of the systems.
2. A methodology to identify and analyze the critical system interactions which impinge on improvement. The methodology will be based on one set of system data and refined as it is applied to a second one.
3. A preliminary analysis of irrigation system design and operation implications which derive explicitly from socio-economic factors.

As planned the 4th and 5th year would provide refinement of the methodology as applied to a third system; a comprehensive analysis of design and management implications resulting from social and institutional factors; and planning implications and suggestions resulting from the study.

The RAC raised an issue regarding the health aspects of irrigation. It is beyond the purview of this project to specifically analyze interactions between irrigation and disease incidence. AID is heavily involved in environmental assessments, many of which (especially in the Sahel) will define the interactions between irrigation systems as disease vectors and waterborne diseases. It is common knowledge that improving irrigation water control reduces disease incidence. This project is designed to study irrigation project design and operation with special emphasis on social and economic constraints which are usually ignored. The project expectation is to derive better planning, design, and operational procedures based on attention to these aspects. The general conclusion at the RAC meeting was that to include the health aspect in this project might detract from the intended purpose.



5010-110

Buy U.S. Savings Bonds Regularly on the Payroll Savings Plan

SUMMARY OF RAC RECOMMENDATIONS TO A.I.D.

PROPOSALS REVIEWED AT THE MAY 24-25, 1976 MEETING

PROJ
#1005

1. Effect of Protein-Calorie Interventions on Human Growth Retardation and Mortality Rates (New) - Institute of Nutrition of Central America and Panama (INCAP). Duration of project, 5 years; estimated cost, \$2,288,020; authorization requested for 3 years, \$1,500,000. Schweigert, Carter, Linder, Montgomery.*

Recommendation: That Phase I of the Project be approved for a period of 18 months in an amount approximating \$650,000 with the provision that RAC suggestions concerning design, food sources, data analysis, etc., be considered. It is understood that AID staff will utilize advice from RAC member consultation during Phase I, and any proposed extension will require RAC review and action.

2. The Determinants of Developing Country Irrigation Project Problems: A Multifactor Analysis for Improved System Operation and Performance (New) - Cornell University. Duration of project, 3 years; estimated cost, \$280,000. D. Peterson, Heady, M. Peterson, Wittnebert.

4-612

Recommendation: That AID staff consider suggestions of the RAC and present a revised proposal at the October (RAC) meeting.

3. Improvement of Winter Wheat for Developing Countries, Based on Hybridization of Spring and Winter Forms (New) - Oregon State University. Duration of project, 3 years; estimated cost, \$943,000. M. Peterson, Ludington, D. Peterson, Whitney.

Recommendation: That the project be approved with the provisions that (a) objectives be identified more specifically and (b) AID staff review the budget request for appropriate reductions in the total funding.

* RAC review subcommittee; chairman underscored.

4. **Research on Hemoprotozoal Diseases of Food Producing Livestock in LDCs (Augmentation) - Texas A&M University.** Duration of project, 3 years; approved May 1975 at an estimated cost of \$1,185,000; estimated additional cost, \$75,000. Schweigert, Adams, Connell, Wishik.

Recommendation: That the project augmentation be approved as requested.

5. **World Fertility Survey (Extension) - International Statistical Institute.** Duration of extension, 3 years, 3 months; estimated additional cost, \$7,500,000. Montgomery, Anderson, Connell, Wishik.

Recommendation: That the project extension be approved for support as proposed.

6. **Enhancement of Lactational Infertility and Infant Nutrition (New) - Johns Hopkins University.** Duration of project, 3 years; estimated cost, \$986,164. Wishik, Carter, Connell, Linder.

Recommendation:

1. Studies in Phase I in Baltimore be approved with particular focus on thyroid-related side effects encompassing (a) a new immunobiossay test for TRH in human milk, (b) testing for TRH and T4 in blood of women receiving OTRH, (c) testing for elevation of basal prolactin level, (d) assessing ovarian steroid hormone activity, (e) measurement of spontaneous TRH and T4 levels among lactating women, and (f) standarization of laboratory procedures for field trials; and exclusion of nutrition and metabolism studies with corresponding reduction in budget.
2. Budgetary provision be made for possible later field phase in Bangladesh, but not in Chile, including attention to the thyroid question among undernourished women.
3. Prior to initiation of Phase II a revised proposal and budget be prepared on the basis of Phase I results and reviewed by RAC.
4. AID obtain independent consultation on estimation of the potential demographic impact of the proposed method under different levels of effectiveness and practice, and try to obtain results for reporting at the time of RAC review of the Phase II proposal.

7. **Socio-Economic Analysis of Environmental Health Problems (New)**
- Resources for the Future. Duration of project, 18 months;
estimated cost, \$128,042. Heady, Adams, Carter, D. Peterson.

Recommendation: That AID (a) provide limited funds for Dr. Rosenfield to continue her schistosomiasis transmission simulation model applications to data available through WHO in Geneva, and (b) request Resources for the Future to develop a more comprehensive project proposal including complete cost-benefit analyses of schistosomiasis transmission simulation models.

8. **The Relationship Between Trade Strategies and Employment Growth (Expansion)** - National Bureau of Economic Research. Duration of extension, 15 months; estimated additional cost, \$93,169. Heady, Anderson, Montgomery, Wittnebert.

Recommendation: That the budget and time period be extended as requested.

UNITED STATES GOVERNMENT

Memorandum

TO : SER/CM, Mr. Hugh L. Dwelley

DATE: December 16, 1976

FROM : AA/TA, Curtis Farrar

MSB/CF

SUBJECT: Determination of Unsolicited Research Proposal for "The Determinants of Developing Country Irrigation Project Problems" - Cornell University

Pursuant to 7-3.101.80(d)(1) and 7-4.5301(e) of 41 CFR Chapter 7, I hereby determine that the unsolicited research proposal for "The Determinants of Developing Country Irrigation Project Problems" submitted by the proposers - Milton L. Barnett, E. Walter Coward and Gilbert Levine of Cornell University and Leslie E. Small of Rutgers University is the product of original thinking, has significant scientific and technical merit and contributes to AID's research program objectives sufficiently to warrant negotiation with the proposers without the requirement to seek competition from other sources formally or informally.

Expanded irrigation has been identified as a major factor in the development of the LDC's. Its critical role relative to world hunger problems was recently stressed at the World Food Conference. USAID alone has invested over 100 million dollars in water-related projects. Notwithstanding the long history of irrigation, increased understanding of the basic engineering and agricultural sciences and massive investments, many modern irrigation projects encounter major problems. Some of the problems relate to the physical components of the systems, but the most serious ones occur in management and utilization. These are especially serious where the systems are supposed to meet small-holder needs. The problems encountered have been serious enough on many projects that they have altered the course of future governmental policies. It is the thesis of the proposed research that the causes of these failures are an inadequate recognition of the critical importance of the interactions of the socio-economic factors with the physical aspects of the systems and a lack of understanding of these interactions. The research proposers for this project will first, describe and analyze these critical interactions; second, identify those interactions that are critical to system success; and third, identify the implications for policy, design and operation. It is anticipated that this increased understanding will be incorporated into a set of analytical and operational procedures designed for use by planning, design and operations organizations. The results will be accomplished by detailed study and analysis of existing systems. The important rice producing systems of Asia will be the target systems. The research must be done by an interdisciplinary team and the research proposers have demonstrated strong abilities in this regard. The



Mr. Hugh L. Dwelley

four principal researchers represent the critical disciplines associated with the problem. All have had extensive experience in irrigation related work in Asia; two have had significant additional experience in Latin America. The researchers have worked together previously and have established the relationships necessary for effective multidisciplinary research.

MEMORANDUM TO: AA/TA, Curtis Farrar

DATE: December 10, 1976

FROM : TA/PPU, John Gunning

SUBJECT : Determinants of Irrigation

Attached PP on Determinants of Irrigation research activity with Cornell University is being submitted for your approval. The proposal was favorably reviewed by the R&DC in March 1976.

The A/AID's approval for transmitting the proposal to RAC also constituted approval authority for the project subject to RAC recommendations.

In October 1976, RAC recommended approval of the proposal with the caveat that it be reviewed after 18 months of operation.

PPU has reviewed the attached and recommends your approval of PAF, Part II and the Environment Threshold Decision. Also, your signature on a memorandum to SER/CM regarding unsolicited proposal.

AGENCY FOR INTERNATIONAL DEVELOPMENT PROJECT PAPER FACESHEET TO BE COMPLETED BY ORIGINATING OFFICE		1. TRANSACTION CODE ("X" appropriate box) <input checked="" type="checkbox"/> Original <input type="checkbox"/> Change <input type="checkbox"/> Add <input type="checkbox"/> Delete	PP DOCUMENT CODE 3
2. COUNTRY/ENTITY <u>TA/AGER</u> <u>KDA#7</u> <u>Research</u>		3. DOCUMENT REVISION NUMBER - (original)	
4. PROJECT NUMBER 931-1005	5. BUREAU a. Symbol <u>TAB</u> b. Code <u>6</u>	6. ESTIMATED FY OF PROJECT COMPLETION FY <u>80</u> *	
7. PROJECT TITLE - SHORT (stay within brackets) <div style="border: 1px solid black; padding: 2px; display: inline-block;">Determinants of Irrigation - Cornell</div>		8. ESTIMATED FY OF AUTHORIZATION/OBLIGATION a. INITIAL <u>2/77</u> b. FINAL FY <u>7/9</u> *	

9. ESTIMATED TOTAL COST (\$000 or equivalent, \$1 =)						
a. FUNDING SOURCE	FIRST YEAR FY <u>77</u>			ALL YEARS		
	b. FX	c. L/C	d. Total	e. FX	f. L/C	g. Total
AID APPROPRIATED TOTAL	-	-	\$185	-	-	\$285 *
(Grant)	-	-	(\$185)	-	-	(\$285)
(Loan)	-	-	-	-	-	-
Other 1.						
U.S. 2.						
HOST GOVERNMENT						
OTHER DONOR(S)						
TOTALS	-	-	\$185	-	-	\$285 *

10. ESTIMATED COSTS/AID APPROPRIATED FUNDS (\$000)											
a. Agency Fraction (of the \$000)	b. Policy Purpose	c. Primary Year	FY <u>77</u>		FY <u>78</u>		FY <u>79</u>		ALL YEARS		
			d. Grant	e. Loan	f. Grant	g. Loan	h. Grant	i. Loan	j. Grant	k. Loan	
FN	121	1973	\$185	-	-	-	\$100	-	\$285	-	
TOTALS			\$185	-	-	-	\$100	-	\$285*	-	
11. ESTIMATED EXPENDITURES			\$ 45	-	\$96	-	\$100	-	\$285*	-	

12. PROJECT PURPOSE(S) (stay within brackets) Check if different from PID/PRP

To improve procedures for design and/or rehabilitation of irrigation systems incorporating explicit consideration of the interactions of critical socio-economic factors with the physical factors.

13. WERE CHANGES MADE IN BLOCKS 12, 13, 14, or 15 OF THE PID FACESHEET? IF YES, ATTACH CHANGED PID FACESHEET.

Yes No

14. ORIGINATING OFFICE CLEARANCE		15. Date Received in AID/W, or For AID/W Documents, Date of Distribution mo. day yr.
Signature Leon F. Hesser	Date Signed mo. day yr. <u>12</u> - <u>03</u> - <u>76</u> *	
Title Director, Office of Agriculture, TAB		

AID 1330-4 (7-75) *Note: This is currently scheduled to be a three (3) year project with a total cost of \$285,000 as submitted to RAC and hence receiving RAC endorsement. It is anticipated that the project will be extended for two (2) additional years and will require approximately \$200,000 in additional funds after review of project progress in the first year.

FINAL

AGENCY FOR INTERNATIONAL DEVELOPMENT
RESEARCH ADVISORY COMMITTEE

Minutes of the Fifty-fourth Meeting
May 24-25, 1976

Dr. Ralph Smuckler, Chairman, called the meeting to order at 9 a.m. He first called attention to the revised agenda which had been distributed to the members. He then introduced Mr. Curtis Farrar, Assistant Administrator for Technical Assistance, who welcomed the new members and briefly reviewed the status of congressional and executive action on Foreign Assistance funding. In response to a question about the status of Title XII of the Foreign Assistance Act, he said there were no legal problems with its implementation and that the next step was appointment of the Board which was awaiting Presidential approval.

Dr. Erven Long, AA/TA, introduced the five new members on the RAC. He announced with regret that Dr. Adams was leaving the RAC following this meeting due to his assuming a new position in Environmental Affairs with the North Carolina State government and that Dr. Merrill had resigned following the last meeting. He also noted that Administrator Parker was today appearing before the House Subcommittee on Budget and was rescheduled to visit with RAC on Tuesday morning.

Scheduling for future meetings was discussed and agreed upon as follows:

- Fall: October 12-13, 1976, definite,
- Winter: November 22-23, 1976, tentative.

Scheduling problems, other than those discussed, which might arise and create serious conflict, are to be called to attention of the Research Office as soon as possible so the Fall meeting dates can be confirmed.

The Determinants of Developing Country Irrigation Project
Problems: A Multifactor Analysis for Improved System
Operation and Performance - Cornell University

Dr. Thorbecke, Cornell University, absented himself from the meeting to avoid any possible conflict of interest.

Dr. Peterson, Chairman of the Subcommittee composed of Dr. Heady, Dr. M. Peterson, and Mr. Wittnebert reviewed the project as follows. As background Dr. D. Peterson pointed out that Asia, with more than half of the world's population, has only about 20% of the arable land resources which is 80 to 90% utilized. Much of this comes under the influence of the tropical monsoon with distinct wet and dry seasons. They must, through irrigation, insure against drought to avoid famine. Reasonably successful indigenous irrigation systems have evolved. However, the large, externally designed systems have a rather poor record of achievement. There are many reasons beyond the physical characteristics of the systems for this poor performance. Since there is no way to meet the agricultural requirements of these heavily populated areas without increased irrigation, this proposal addresses a very important matter.

This project proposes to deal with the socio-economic factors and their interactions with the physical characteristics at the project level. The research objectives are to 1) describe, analyze, and explain the complex interactions among these components; 2) develop analytical tools for identifying critical systems interactions; 3) identify system

design and operation implications; and 4) identify planning policy implications.

A planning workshop including host country participation will insure a workable methodology. Following this analytical stage further planning with host countries will refine the procedures. The investigators appear well qualified, and there is also an impressive list of consultants representing important disciplines.

The stated goal is to increase water use efficiency, but this may, or may not be fully congruent with more basic goals, e.g., improving the income of individual farmers. Significant questions are: to what extent will constraints external to the projects, such as national policy, be considered and how far can one move into these? Will the Asian Development Bank and the Agricultural Development Council be involved in these considerations?

The Subcommittee is generally favorable to the project, but believes it could be improved. Suggestions for discussion include confining the project to monsoon Asia, clarifying the socio-economic methodology, and including political science expertise on the team.

Mr. Wittnebert said the consumer oriented objectives of the project were very good and that the efforts of staff and contractor were apparent in the quality of the proposal.

Although he was quite favorable to the project Dr. Heady suggested that a more complete definition of the socio-economic methodology should be given as there are many reasons for inefficient water distribution and use. The heavy use of research assistants should be re-evaluated, and perhaps more social science emphasis given in the leadership.

Dr. M. Peterson pointed out that one can manipulate the variables and data input to provide whatever conclusion desirable on irrigation economics. He referenced an earlier example in the western U.S. to illustrate traps to be avoided.

Dr. Montgomery said that in the socio-economic methodology it is important to get the political analyst to attach social content analysis to decision analysis. He indicated his belief that the Cornell political science consultants mentioned in the proposal are qualified to work on that problem if they are given access to that phase of the study.

Dr. Adams expressed his reservation whether this task could be done within the estimated budget. He also expressed concern that host countries often want the money but do not want projects evaluated. Therefore, he believed this would be a high risk activity with little chance for success.

Dr. Swanson expressed concern that examples of the quoted critical indicators were not given and that there was no performance indicator which dealt with equity distribution. He asked if third country testing would be included. Dr. Ehrenreich endorsed the systems approach and thought this expertise could be successfully incorporated into such an analysis. Dr. Smuckler pointed out that Cornell has political scientists who have worked in this area, and he would encourage their involvement if the project moves forward.

Dr. D. Peterson acknowledged that the budget is modest, but since this is pioneering work it may be best to begin modestly. It is necessary to develop a critical mass.

Dr. Corey, TA/AGR, pointed out that a significant point of the project is that it will look at systems as they exist, and there is not to be any juggling of inputs. He emphasized that this will be the first project of it's kind in the world and will be a systems rather than a bottle-neck approach. He expressed agreement with the comments on methodology. A significant key to success of the effort is involvement of local people because foreigners cannot successfully go in and get the necessary data - this is why the workshops are necessary. Validity of the project rests upon reliability of the data. Restriction to the Asian monsoon area is desirable. Too often irrigation systems merely dispose of water. Not enough attention is given to getting the water from the delivery system to the crop. This project will look into the reasons for this inadequacy. The project aims to see if certain interventions do carry over to other systems. The investigators believe it will take time more than money to do this task. Commenting on the involvement of research assistants he said these would be top level advanced graduate students and employed wisely in the Cornell tradition. Before the project would be implemented he said top consideration would be given to host country locations. He reported the Asia Bureau is favorable to the proposal.

Dr. D. Peterson asked if there should be more clarification of methodology prior to approval and how a delay until October would affect the project plan. Dr. Hesser, TA/AGR, indicated it would be possible to sharpen the methodology with greater political science involvement and re-evaluation of the budget for review in October without disrupting

the planning horizon. The consensus of the subcommittee was that

Dr. Hesser's suggestion be adopted.

Motion: That AID staff consider suggestions of the RAC
and present a revised proposal at the October
(RAC) meeting.

Vote: Carried with 10 aye and 5 nay votes.

The Chairman made clear that the negative votes should be interpreted as a desire to approve the project without further referral, therefore the project goes forth with a strong affirmation for acceptance with the suggested considerations. Dr. D. Peterson said he wanted to emphasize the concensus of the subcommittee for this project and to compliment AID staff on its development. Dr. Long complimented the RAC on their review and action on the project.

ACTION MEMORANDUM FOR THE ADMINISTRATOR

MAY 6 1976

THRU: KS

FROM: AA/TA, Curtis Ferrar 

Problem: Your approval is requested for the transmittal of nine research proposals to the Research Advisory Committee (RAC) for review at its fifty-fourth scheduled meeting on May 24-25, 1976.

Discussion: Three proposals are for extension of ongoing activities. The other six - three in food and nutrition, and three in health and population - are new projects. Only in the case of the World Fertility Survey (International Statistical Institute) does the extension exceed five years. All of the research proposals have been reviewed and approved by the Research and Development Committee (R&DC), and project statements have been modified to incorporate R&DC recommendations.

A tenth project, in economics, is the subject of some sharp difference of review within the Agency. It will be submitted to you shortly for separate action. The project writeup is included in the book, but can easily be withdrawn from RAC review without awkwardness should you so decide.

We will follow our customary practice of implementing projects in order of priority need and feasibility within their FY 1976 and transitional quarter funding levels.

As in the past, in the case of ongoing projects, the pipeline will be closely analyzed before any funds are added. We shall adhere to the established Agency policy on the forward funding of technical assistance contracts.

Other Agenda Items: In addition to the review of the project proposals, the agenda includes one progress report on an ongoing project (utilization of secondary species for tropical forests). Your discussion of infusion of new technology into the foreign A.I.D. program has been scheduled for 2:30 p.m. on Monday, May 24, 1976.

Your approval to transmit the proposals listed in the enclosure constitutes the authorization to negotiate contracts for Development Research, as required by Sections 7-3.205 and 7-3.211 of the APR.

Approved: /s/ DP

Disapproved: _____

Date: MAY 6 1976

Attachment:
Summary Comments on
Proposals to be Reviewed

Clearance:
AA/TA:RJLong EJR Date 5/3/76
TA/PPU:CFritz CJ Date 4/28

GC/TPHA:ARichstein ARK Date 5/3/76

MHR
TA/RES:MRchcigl:lvv

GC:CLGladson A Date 5/3/76

The Determinants of Developing Country Irrigation Project Problems: A Multifactor Analysis for Improved System Operation and Performance (New) - Cornell University. Duration of project, 3 years; estimated cost, \$280,000

Irrigation systems worldwide operate at extremely low efficiencies and particularly in the LDC small farmer setting. In many systems not more than 20 percent of the water reaches the crop. Some of this problem is related to the engineering components of the systems, but the most serious losses result from inadequate recognition that irrigation systems are complex interactions of physical, economic, and social factors, and a lack of understanding of these interactions. This project will identify and define interactions which are critical to success and develop a set of design and operational procedures for more efficient water use. This information will be prepared for planners, designers, and systems operators.

This research involves active cooperation of LDC institution engineers and social scientists in the Philippines, Malaysia, Indonesia, and Thailand, where operating systems will be analyzed. The six western U.S. universities in the Consortium for International Development, the East-West Center, and the LDC scientists will participate as a working team in the development of detailed work plans, interpretation of results and development of policy recommendations.

The R&DC reviewed and approved this project on March 24, 1976.

Improvement of Winter Wheat for Developing Countries, Based on Hybridization of Spring and Winter Forms (New) - Oregon State University.
Duration of project, 3 years; estimated cost, \$943,000.

This project reinforces existing cooperative research on improving wheat varieties for LDCs where winter wheat is important. Hybridization of winter spring types will result in improvement of both types by expanding their genetic base. Such hybridization requires integration of field experimentation between winter wheat and spring wheat areas to allow for selection of appropriate characteristics.

This project, strongly supported by CIMMYT and built on AID and Rockefeller Foundation support of Oregon State work in Turkey and elsewhere, provides integration of winter and spring wheat zone breeding programs at Oregon and CIMMYT, respectively. It is tightly linked with the University of Nebraska wheat protein improvement project, and utilizes the International Winter/Spring Wheat Screening Nursery, which provides a working network with LDCs for exchange of breeding materials and research information.

The RSDC reviewed and approved this project on March 24, 1976.

RTDC - 3/24/76

(4)
612

RESEARCH PROJECT STATEMENT

The Determinants of Developing Country Irrigation Project Problems:
A Multifactor Analysis for Improved System Operation and Performance

Contractor: Cornell University

PART I - Matrix
PART II - Research Project Statement Narrative
PART III - Attachments

RESEARCH PROJECT STATEMENT

Proposal submitted
to the May 24 1977,
8776 RIK

I. SUMMARY

Title: The Determinants of Developing Country Irrigation Project Problems: A Multifactor Analysis for Improved System Operation and Performance

Contractor: Cornell University

Status: New

Duration: Three years. 1 January 1977--31 December 1979

Estimated Cost:

1st year	--	\$ 85,000
2nd year	--	100,000
3rd year	--	95,000
Total	--	\$280,000

Principal Investigators: Dr. Gilbert Levine, Agricultural Engineer, Leader;
Dr. M. L. Barnett, Rural Sociologist
Dr. E. W. Coward, Rural Sociologist
Dr. L. E. Small, Agricultural Economist--Rutgers Univ.

Project Manager: Dr. Gilbert L. Corey and Mr. Leo Mastrofini

Narrative:

Notwithstanding a long history of irrigation, increasing understanding of the basic engineering and agricultural sciences, and massive investments, many modern irrigation projects encounter major problems. Some of the problems relate to the physical components of the systems, but the most serious occur in management and utilization. These are especially serious where the systems are supposed to meet small farmer needs, and equity objectives.

The problems encountered have been serious enough on many projects that they have altered the course of future governmental policies, certainly in the area of investment and frequently to the detriment of small holders.

It is the thesis of the proposed research that the causes of these failures are an inadequate recognition of the critical importance of the interactions of the socio-economic factors with the physical aspects of the systems and a lack of understanding of these interactions. The research proposes first to describe and analyze the interrelationships of the technology of irrigation with the organizational, economic, social and cultural aspects of irrigation; second it will attempt to identify those interactions that are critical to system success; third, the implications for policy, design and operation will be identified. It is anticipated that this increased understanding will be incorporated into a set of analytical and operational procedures designed for use by LDC planning, design and operations organizations. The research procedure will be based upon detailed, interdisciplinary analysis of existing systems with a range of physical and socio-economic conditions. The studies will be comparative within country, between country, and between public and communal systems.

II. RESEARCH PURPOSE AND EXPECTED PRODUCTS

A. There is almost universal recognition that irrigation systems are "complex interactions of physical, economic and social factors." Yet, in planning, in design, and in operation many of these interactions, even critical ones, are either ignored or only considered intuitively.

It is the purpose of this proposed research to improve current methodology for the design of new irrigation systems, for the rehabilita-

tion of existing ones and, more generally, for system management and operation, within the context of the LDC's and especially where small-holder farming is practiced. This would be achieved through explicit consideration of the interactions of critical social and economic factors with the physical and biological factors.

While primarily aimed at the needs of the developing countries, especially those with severe economic and human resource constraints, it is anticipated that the results will have applicability on a wider scale. For example, the irrigation problems experienced at the Blackfeet Indian Reservation, in Montana, bear striking similarities to those experienced in the LDC's, and strongly reflect the interaction of the physical system and its management with the socio-economic condition in the project area. The Bureau of Indian Affairs has expressed concern about these problems and is actively looking for solutions.

The ultimate indicator of the achievement of this purpose is improved irrigation system performance. For the purposes of evaluation of this research project a more realistic ultimate indicator would be acceptance of the revised procedures by a significant number of the donor and LDC organizations responsible for the design and/or operation of irrigation systems. Intermediate indication of the achievement of the project purpose would be the successful application of the revised procedures to the redesign of at least a few existing systems. Both of these indicators require a relatively long time for utilization, given the

time span between design or redesign and system implementation, and between implementation and impact on project performance.

A preliminary indicator of the achievement of the stated purpose would be the utilization of the revised procedures by any of the organizations responsible for design and/or operation of irrigation systems.

B. The specific research objectives are:

1. To describe, analyze and explain the complex interactions between the physical, biological, economic and organizational dimensions of existing irrigation systems and the relationships of these factors to overall system performance.

2. To develop analytical tools and procedures for the identification and analysis of critical system interactions of the type indicated above. These tools and procedures are to be suitable for use by the practicing professionals in the design and operation activities in LDCs.

3. To identify and analyze system design and operation implications that derive from the explicit consideration of socio-economic factors and their interaction with physical and biological factors.

4. To identify the planning policy implications. These implications lie in the areas of:

- a. project scale
- b. choice of technology
- c. degree and forms of farmer participation
- d. equity considerations

III. SIGNIFICANCE AND RATIONALE FOR THE RESEARCH

A. Expanded irrigation has been identified as a major factor in the development of the LDC's, as evidenced in the UN Indicative World Plan. Its critical role relative to the world hunger problem was stressed in the PSAC report on the World Food Supply and more recently at the World Food Conference. Development of new irrigation projects do cause increases in production, especially since it usually allows for cropping during a dry season where nothing was previously grown. The major works (dams, canals, reservoirs and delivery system) all represent visible achievement and therefore carry a positive political connotation. Data world-wide, however, indicate that most irrigation systems and practically all in the LDC small farmer setting operate at unbelievably low efficiencies. Not more than 20 percent of the water reaches the crop in many systems. Governments continue to build systems in this same mold with encouragement from World Bank, AID, and other major donors.

How to provide good water management from the water source to the crop root zone in the LDC setting is neither known nor documented. This project is designed to address that problem by studying the social, economic, and technical aspects of existing systems (state-of-the-art). The objective is to provide a better mechanism for design and operation of irrigation systems.

This project is targeted directly at AID's Soil and Water Strategy (presently being developed). Improved irrigation system design and

operation is a key problem within that strategy. Practically all LDC governments are interested in improving their irrigation management; evidence the more than \$100 million directed at water resources management in AID's 1976 budget submission. Results of this project will be extremely useful to governments in designing new and renovating old irrigation systems.

B. The research literature abounds with studies of specific technical questions (relating to soils, plants, water, engineering concerns). There are a number of studies of project economics, and some of economic efficiency in relation to technological changes such as irrigation. Even in the social science literature there are significant numbers of studies relating to the social systems associated with irrigation, and a few that deal with specific physical components of the irrigation system itself. But to a very large extent these studies, while considering significant aspects of the complex interrelationships of developing country irrigation, were undertaken from a single disciplinary point of view. In a number of instances the sensitivity of the investigator to the related disciplines has permitted a broader view, with new insights.

Rarely, however, have interdisciplinary studies of irrigation project problems, especially those in the LDC context, been undertaken with representatives of the relevant disciplines collaborating closely. Neither have these studies been undertaken with a focus on identifying policy and operational implications. As a result, understanding of interactive effects and their implications for planning, design and operational pro-

cesses is woefully inadequate. This is especially true for understanding of sociological implications and their interactions with the physical aspects of the systems. These interactions are important both in terms of the anticipated operations of the systems and in terms of the anticipated consequences of project investment.

IV. PLANS TO COORDINATE TO LINK RESEARCH--INCLUDING NETWORKS

Since the emphasis is on real-world systems, active cooperation of the governmental agencies responsible for irrigation is essential. Working contact already exists between the proposed contractor and the National Irrigation Administration (NIA) in the Philippines, the Muda River Development Authority and the Division of Irrigation and Drainage in Malaysia and the Royal Irrigation Department in Thailand. Contacts have been made with relevant agencies in Indonesia, though working relationships have not been established. The proposed contract has close relationships with the staff of the Agro-Economic Survey of Indonesia.

Research coordination with these action agencies would facilitate the research project in a number of ways, including: the identification of systems for study, the provision of needed background information, collaboration in the collection of certain field data, discussion of preliminary findings and interpretations and collaboration in the development of workshops and other arrangements for the dissemination of research findings.

The contractor has established linkages with the academic institutions in these countries through previous research activities of the proponents.

In the Philippines, close relationships exist with faculty at the University of the Philippines, at Dilliman and Los Banos. Important among these is contact with Dr. Senen M. Miranda of the Department of Agricultural Economics, and advisor to the NIA and research leader in the area of water resources with the Philippine Council of Agricultural Research. Similar relationships exist with the Institute of Philippine Culture (IPC), a social science research unit of the Ateneo de Manila and the Social Science Research Unit of the Ateneo de Naga. The IPC is collaborating with the NIA on a survey of communal systems in the Philippines with support from the Ford Foundation.

In Malaysia working relationships exist with the Agricultural University at Serdang and the Science University of Malaya in Penang. In Thailand collaboration could be developed with Kasetsart University (both its engineering and social science departments) and several other universities including: Chulalongkorn, Thammasat, Kong Kaen and Chiang Mai.

Each of these institutions contain faculty and graduate students in the agricultural and social sciences relevant to the research project. Their collaboration would be sought for the purposes of exchanging information on current irrigation research in the area, to obtain peer review of proposed research designs and strategies, to participate in the collection of needed field data and to review findings and preliminary interpretations. Collaboration in the collection of field data may be

achieved through partial support from project funds for the work of local graduate students.

The International Rice Research Institute (IRRI) is expanding its research in the water management field and close working relationships exist between the proposed contractor and the research staff and administration at IRRI. Discussions have already been held with the Director of the Institute, Dr. N.C. Brady; with Dr. R. Barker of the Department of Agricultural Economics and with Dr. T. Wickham of the new Department of Water Management. Close collaboration is further assured both within the Philippines and other countries of the region as IRRI's water management research expands.

It is anticipated that this research will be related to the activities of the regional network on irrigation research supported by the Agricultural Development Council. This network represents an important group of Asian researchers and others concerned with the improved operation of irrigation systems.

Asian researchers represented in the network are an important source of information on irrigation research and a significant group for future research efforts on this topic. They will be used for purposes of reviewing research plans and strategies and as analyzed data becomes available as an important forum for the early presentation of findings and interpretations. Their ability to discuss the findings in the context of their broad collective research experience will be of great value in the final reporting of results.

Two important U.S. groups dealing with LDC irrigation issues are the Consortium for International Development and the Food Institute of the East-West Center. Faculty associated with CID can perform useful consulting roles regarding research methodologies, the final interpretation of results and the development of policy recommendations. Their participation in the development of the final international symposium will be very helpful. The Food Institute has considerable experience with presenting research findings to system managers and operators and useful collaboration with them for the purposes of translating research findings into instructional materials is envisioned.

Colorado State University in their AID supported research project in Pakistan has carefully delineated social and technical problems associated with the on-farm aspects of that irrigation system. CSU counsel will be sought in design of the detailed work plan and their data and collection techniques reviewed carefully and used where applicable.

V. PLANS TO FACILITATE UTILIZATION OF RESEARCH RESULTS

Four phases for facilitating the utilization of the results are anticipated: (a) irrigation department conferences; (b) planning and reporting workshops; (c) international symposium; and (d) other professional meetings dealing with problems of technology, food, and agricultural development.

A. Irrigation department conferences in LDC.

Experience has shown that periodic progress reports to the local irrigation department staff, both at the system level and at the top administrative level, provide motivation to remain actively cooperative and are very effective in getting the research results utilized rapidly. Feedback from the department staff is also very helpful in developing research directions which are most promising. Conferences will be held at three levels and modes. Frequent informal meetings would be held with the department personnel directly involved in the research sites. Periodic, usually twice per year, conferences will be held for a broader group of agency personnel, usually including system superintendents and Central staff designers. These meetings would include formal reports as well as opportunity for discussion. Direct reporting to the agency administrator is planned for at least once per year.

B. Planning and reporting workshops.

Research planning workshops are projected prior to the establishment of each research effort. These will provide the opportunity for effective input into the research planning by the host country collaborators, as well as for dissemination of the results of the previous research. An up-dated "state-of-the-art" report will form the initial basis for each workshop, from which specific emphases will be developed.

Following the field data collection phase of each project, a symposium will be held in the host country, to review the data and the projected analysis. Subsequent to the analysis, an expanded conference

to report the results is planned with participation of other agencies and groups concerned with irrigation development in the region.

C. International symposium.

Toward the latter stage of the research program, an international conference is projected. This conference will be specifically aimed at the planning and design community which, in practical terms, may be the most important group in influencing the utilization of this and other research results.

D. Other professional meetings.

The importance of irrigation in world food problems and in agricultural development in general is so widely recognized that various aspects frequently are considered within these contexts. This is evident in past AAAS meetings, at the World Food Conference, in a variety of professional society meetings, and most recently in deliberations of the International Food Policy Research Institute. It is the researchers involved in this project who will participate in a variety of those meetings and will have the opportunity to present the findings and conclusions.

VI. MANAGEMENT CONSIDERATIONS

It is proposed that this research be handled through a sole source contract. The work must be done by an interdisciplinary team and the suggested investigators have demonstrated strong abilities in this regard. The four principal investigators represent the critical

disciplines associated with the problem. All have had extensive experience in irrigation related work in Asia; two have had significant additional experience in Latin America. These experiences include field research, technical assistance, teaching, and policy level advising to government agencies and/or the major foundations. The investigators have worked together previously and have established the relationships necessary for effective multidisciplinary research. Note that because of special competencies and experience working as a team, two universities are proposed. The contract would however be with one, Cornell, who would sub-contract for the services from Rutgers.

A portion of the field work should ideally be conducted in Asia where the research team has considerable experience and linkages. It is assumed that concerned field missions will be interested and cooperative; however, before any field work or formal LDC linkages are made an inquiry will be made of all missions as to their interest in this research. Final selection of test sites will be made by the AID project managers and the contractor in consultation with Regional Bureaus only after receipt of suggestions from missions.

Great care will be taken during the preliminary stages of the project to ensure good linkages. The AID project managers will assist the contractor, in the field, with the development of formal linkages between the USAID mission, the host country institutions, and the centrally funded

contract. This will be accomplished through meetings, at the test sites, with all concerned parties.

The project management in AID will be handled jointly by TA/AGR and SER/ENGR Operations-Water Resources. Budgeting, reporting, and documentation will be processed through TAB; however, the project co-manager from SER/ENGR will be a necessary signatory to all official documents.

Semi-annual meetings will be held between the contractor and the technical representatives from AID. These meetings will serve to coordinate this project with other related AID financed research projects, to check progress, to plan future work and to anticipate and remove constraints which might impede progress. In certain instances these meetings may be held in LDCs to take advantage of mission and host country input.

Between 12 and 18 months after initiation the project will receive a rather thorough review. This review will assess the progress but more importantly it will analyze the linkages closely to determine whether the site selection was good or if it should be changed while there is sufficient time to develop reliable data elsewhere. At this point a decision will also be made as to the desirability of conducting the research in a third country.

VII. TECHNICAL REVIEW

Past research on irrigation has been highly disciplinary oriented. A considerable amount of research has been done exploring relationships between plant growth and water applications: much of it in research station settings. Similarly, significant research has been completed on the technology of irrigation. The work of social scientists on irrigation institutions and organizations has either been incidental to more focal sociological concerns or has largely ignored the significant nonsocial components of the systems.

Important new trends have occurred in the past few years. Water management research at IRRI has applied engineering and agronomic research in field settings and has combined an interest in management and organizational issues. Researchers at Colorado State University are conducting research at the turnout level in operational systems in Pakistan. Romana de los Reyes, a graduate student in Anthropology, is conducting a unique study of a communal irrigation system in the Philippines that will combine sociological analysis with data on the physical performance of the system.

Absent from the literature, at this point, are any systematic studies of the interaction of physical, biological, economic and organizational elements of irrigation based on a comprehensive program of research conducted in several field sites with comparative data. Thus, while numerous studies in the existing literature are suggestive of critical interactions related to system performance, they do not provide an adequate

basis for the enumeration of design and operations implications. What is needed is a program of research that will allow the careful identification of critical interactions and the interpretation of these findings into practical implications.

Undoubtedly the reason for the paucity of literature is in the fact that in developed countries the strong farmer organizations coupled with vast resources have overcome the need for careful integration of social, economic, and technical factors at the design stages of irrigation development. These interactions become apparent in the LDC environment because of the scarcity of resources to waste and the education level of the farmer, especially small farmer.

The proposed research utilizing the combined experience of several disciplines with a focused program of comparative research in several irrigation systems within the same country as well as systems in different countries is intended to help fill this significant gap.

VIII. RESEARCH PROJECT DESIGN AND METHODS

Two sets of milestones can be identified for this project, one internal to each set of country studies; a second, reflecting the combination of country studies to achieve the project purpose.

Within each country the research program will have four milestone completion points: (1) initiation of the field studies, following a pre-project planning workshop and development of cooperation specifics; (2) completion of field data collection and preliminary analyses; (3) com-

pletion of final analysis, reflected by a report document; and (4) information dissemination, characterized by final reporting meetings with LDC agency staff and administrators.

The project milestones can be characterized by five events: (1) initiation of studies in the initial three countries; (2) completion of the country studies; (3) completion of the between country comparisons; (4) completion of the critical workshops and preparation of the final reports; and (5) holding of the international symposium.

The anticipated time span for the total set of activities is five years. It is recognized that this project statement suggests a three year period, and therefore the full integration of the individual studies into the comparative framework, the critical workshops and the international symposium would not take place during the initial period. Completion of the two of the three country studies, and initiation of the third are anticipated within the three year time-frame.

Research objectives: A basic hypothesis underlying the research objectives is that specific variables within each of the component dimensions making up the irrigation system environment are critical for satisfactory system performance, not only by virtue of their direct effects but also because of their interaction effects. For example, in the physical dimension the importance of the magnitude of the available water supply in determining the area that can be served by the system is clearly recognized. The customary design procedure to relate these two variables

is to estimate the crop water requirements and the efficiencies in distributing and transporting the water thus arriving at a specified quantity necessary per unit area to be served. The efficiency selected presumably reflects objectives related to economic and resource use efficiency.

What is not generally recognized is that the combination of social attitudes toward water distribution coupled with factors such as profitability resulting from irrigation may have a critical impact on whether those efficiencies could in fact be achieved. As a specific example, the DEZ pilot irrigation project in Iran can be considered classic. The project, designed as a modern agricultural development effort based on irrigation, with the latest in irrigation technology, was designed with the expectation that water use efficiency would increase from the 25% found in the traditional systems to 55 or 66% with the modern improvements. Six years after the project was in operation actual water use efficiency was 11%. The modern system destroyed the role of the local villages in the water control process and failed to substitute an organizational structure that the local farmers were willing to accept.

Many more individual cases could be cited where failure to recognize critical interaction has resulted in failures to reach project objectives, partially or totally. However, there has not been rigorous research to identify these critical interactions.

Research Objective 1: To describe, analyze and explain the complex interactions between the physical, biological, economic and organizational

dimensions of existing irrigation systems and the relationships of these factors to overall system performance.

A. The complexity of the problems being addressed, the importance of understanding local situations, and the need for interaction with irrigation system personnel, require that the research be cooperative with host country research colleagues and government agencies. The basic approach is to conduct multi-disciplinary field studies of operating systems in each of three countries; initially the Philippines, then Malaysia or Thailand, and later in a Latin American or African country. The second and third country selections will be made in consultation with Regional Bureaus, Missions and TAB with the final selection dependent upon Mission and host country concurrence and a preliminary evaluation of irrigation systems within each country.

The first systems to be studied are located in the Philippines where there is strong governmental concern with many of the issues related to this proposed research and where many international agencies, including AID, are active in the irrigation development area.

Prior to collecting field data, a planning workshop will be held with host country input to identify specific sub-objectives, details for field work, and research procedures.

The field data will be collected by a mix of research techniques including at least the following:

1. physical measurements of water flow: to determine

actual amounts of water being delivered at different locations within the system and at different points in time.

2. farm surveys: to determine cropping patterns being followed, production inputs used, patterns of landholding, etc.

3. key informant interviews: to obtain information on the formal and informal roles and rules used to operate and maintain the system, procedures for selecting leaders, modifying roles of work time, etc.

4. participant observation: attendance at group meetings, involvement with work groups, observation of actual irrigation activities will be used both to corroborate information collected through other techniques and to identify new information.

5. sociometric techniques: to identify patterns of farmer interaction on water use and related activities such as joint land preparation or marketing activities.

6. examination of records: when possible, the examination of records such as minutes of meetings, formal statements of rules and procedures, financial records and other information will be used as information sources.

These are standard techniques for obtaining the needed information and the investigators have had long experience with them.

The focus of data collection initially will be on specific variables related to the physical, biological, economic and organizational elements. These efforts will be designed to answer such questions as: the nature of the engineering structures of the system, the types of

soils available, basic climatic conditions, available water supplies, the nature of cropping, informal water rights, patterns of communication and leadership, ect. As information is collected on each of these specialized topics and shared among the research staff, potential critical interactions will be identified. As these are identified, research procedures will be implemented to carefully investigate these leads. For example, if information on canal size suggests that water delivery at the time of land preparation will be significantly constrained, researchers working in the economic and organizational areas will be alerted to look for specific cropping patterns, rules for planting schedules or other techniques that the system users may have derived to cope with this problem.

The identification of guiding questions, as that of the test sites themselves, will be made during the project initiation phase of each country study. Development of the specifics of cooperative effort will take place at the same time. In addition to the LDC participation during the planning phase it is anticipated that some LDC researchers from the Institute for Philippine Culture, the University of the Philippines (Los Banos) and Central Luzon State University may be actively involved with aspects of the field work and data collection.

- B. The major activities associated with this objective are:
 - a. the planning workshops to be held in each country for the purpose of identifying test systems, specific study questions and details of host-country collaboration. These will be held at approximately six

month intervals and therefore will be completed in the 3rd country about 18 months after project initiation. This activity will produce the test procedure, questionnaires and detailed research plans for each case study.

b. the Philippine country studies including the collection of field data, analysis and reporting of results will be initiated approximately 6 mos. after project initiation and concluded with a 21 month period. Field data will include: water use by farming units, economic (farm budget) data at the farm level, details of water management practices at the various management levels within the irrigation system, and operational details of associated farmer organizations and social structures. This activity will be complete with the compilation of the data into a report.

c. the second Asian studies (Thailand or Malaysia) similar to Activity b will be initiated 12 months after project initiation and completed in the following 21 months. The data (same as a above) will be collected, compiled, and recorded in same manner as first case study.

d. the third Country studies similar to a and b above will be initiated 21 months after project initiation and completed at the end of the project period. Data and compilation as a and b above.

e. Integration of Country Studies would be initiated only if the project is extended beyond 3 years. This would involve an examination of individual country studies for conclusions which can be generalized across geographic and agricultural system regions.

C. The resource requirements include: (1) access to the overseas field sites; contacts with irrigation agency administrators in the countries specified insure this accessibility; (2) faculty and graduate students in the host country; the contractor has had continuing contact with faculty colleagues in the countries specified and has been assured of cooperative efforts. The IRRI has indicated the availability of scholars and trainees from the IRRI training program; (3) vehicles--depending upon the location of specific sites, one or two jeeps (or equivalent) plus a motorbike would be required, along with miscellaneous small equipment; e.g., rain gages, locally fabricated. No other special equipment needs are anticipated.

Total estimated cost for this objective is approximately \$180,000.

Research Objective 2: To develop analytical tools and procedures for the identification of critical system interactions suitable for use by the professional community involved in design and operation of irrigation systems in the developing countries.

As discussed under Research Objective 1, the number of possible interactions influencing system performance is extremely large. Research Objective 2 will build on the understanding gained through Objective 1 systematic analysis of the interrelationships identified and their effects on system performance is anticipated that scalar rankings of importance will be an outcome.

A. The major activities associated with this objective are:

a. development of preliminary analytical tools and procedures.

Quantitative and qualitative scaling techniques will be used to develop procedures to rate variable in terms of their impact. The data from the Philippine Case will be used to do this.

b. application of preliminary procedures to a similar environment; refinement of the tools and procedures.

The procedure developed in a above utilizing Philippine data will be applied to the irrigation system of the second Asian country. The results of this technique will then be compared to the data collected in that country. Discrepancies in critical variable resulting from the analytic procedure vs. the data collection will be evaluated and the procedure refined accordingly.

c. application of the procedures to a broader context; refinement of the tools and procedures.

The refined procedure will be evaluated for extrapolation to a wider cultural environment by testing it on the third country (Africa or Latin America) data.

d. adaptation of the procedures for use by the professional irrigation community.

Finalizing the procedure based on the testing procedures described in a, b, c above.

B. The milestone events will be the preparation of the local working papers, the holding of the agency workshops and preparation of the country study final reports.

C. No special equipment or facilities are required. Personnel needs include the senior investigators, along with host-country colleagues. Approximately \$55,000 is estimated for this objective.

Research Objective 3 and 4: To identify system design and operation implications that derive from the explicit consideration of socio-economic factors and their interaction with physical and biological factors; to identify the planning policy implications.

A. Two types of activities are anticipated for these objectives:

a. analysis using country studies are expected to reveal a set (or sets) of variables influencing system performance. The results of this synthesis will be a general application based on commonality of critical variables.

b. critical review and interaction with LDC irrigation agency design and operation personnel and with policy level planners.

B. Following achievement of objectives 1 and 2, data on selected systems in the Upper Pampanga River Project command area will be obtained, using the developed procedures. Analysis will be for the purpose of identifying the design and operation implications. The reporting of these analyses and implications will be the indicator of phase completion. Accuracy of the identification cannot be judged until implementation of the changes under the UPRP.

C. No special resource requirements other than the investigators and associated graduate students and collaborators. It is anticipated that \$45,000 will be used for this effort.

The general pattern of field data collection and preliminary analysis by the research teams followed by critical reaction from other researchers and end-product users, with final analysis and reporting has been used very successfully by researchers affiliated with the Cornell Rural Development Committee.

IX. ESTIMATED BUDGET

(See page 26)

IX. ESTIMATED BUDGET

	First		Second		Third		Total	
	Man Mos.	Est. Cost	Man Mos.	Est. Cost	Man Mos.	Est. Cost	Man Mos.	Est. Cost
Salaries--Professional		\$13,000		\$14,000		\$14,000		\$41,000
Salaries--Res. Assistants		18,000		23,000		23,000		64,000
2 Consultants		1,000		1,000		1,000		3,000
Fringe Benefits		3,000		4,000		4,000		11,000
Overhead		13,000		16,000		16,000		45,000
Travel & Transportation		13,000		14,000		14,000		41,000
Equipment Supplies		9,000		6,000		6,000		21,000
Publications				1,000		2,000		3,000
Field Research		10,000		18,000		12,000		40,000
Other Direct Costs		5,000		3,000		3,000		11,000
Total by Inputs		\$85,000		\$100,000		\$95,000		\$280,000
Outputs								
Research Objective # 1	23	\$75,000	30	\$60,000	30.5	\$45,000	83.5	\$180,000
Research Objective # 2	3.5	10,000	8	30,000	6.5	15,000	18.0	55,000
Research Objective # 3	3		3.5	8,000	4.5	22,000	11.0	30,000
Research Objective # 4	0.5		1.5	2,000	1.5	13,000	3.5	15,000
Total Outputs	30	85,000	43	\$100,000	43	\$95,000	116	\$280,000

X. WORK PLAN

Objective 1: To describe, analyze and explain the complex interactions between the physical, biological, economic and organizational dimensions of existing irrigation systems and the relationships of these factors to overall system performance.

Completion of the first of the three sets of country studies is anticipated by the end of the second year; completion of the second set is scheduled for mid-year three. Completion of the third set is anticipated early in year four. (It is recognized that this is a three year project and the decision to proceed with the third country set will be dependent upon review of the research progress during the second year.)

A. Activities

1. Planning workshops. In view of the major element of host-country cooperative effort required for this research, provision for host-country input at the planning stage is required. Prior to each set of country studies, a planning workshop will be held, to identify specific sub-objectives, details of field work, and research procedures for the particular system.

The International Rice Research Institute is planning research on the identification and implementation of relatively specific practices for the improvement of system operation in the Philippines and other countries of Asia. The IRRI will participate in the planning workshops for this project and will include appropriate data collection in its own studies to provide input into the comparative phase of this research.

2. Field data collection and preliminary analysis (Philippines).

Following the first planning workshop the field studies will take place. Intensive data collection will take place at a number of communal systems in the Philippines. Analysis of system specific interactions will take place.

3. Field data collection and preliminary analysis (Thailand or Malaysia). Same as for activity 2, except in second Asian country. (The selection of the second country is not specified at this time, pending a research needs workshop to be held in Asia during first 6 months of project.

4. Field data collection and preliminary analysis (third country)
Same as for activity 2; selection of appropriate country to be based upon consultations with AID and LDCs.

5. Integration of country studies into a data bank such that comparisons can readily be made.

B. Inputs

Principal investigators, primarily for Activity 1 and during initial and final stages of Activities 2, 3, 4.

Graduate students, U.S. and host-country, primarily in Activities 2, 3, and 4, though active in Activity 1. The budget estimates have been identified in detail by Fiscal Year (section IX, p. 26) with overall estimates by objective. For the first two years, for Objective 1, the total cost is estimated to be \$1,500,000.

C. Objectively verifiable progress and completion indicators

Activity a. Planning conference reports complete

Activity b. First country report data base, and associated publications

Activity c. Second country report and associated publications

Activity d. Third country report and associated publications

Activity e. International symposium and report.

Objective 2: To develop analytical tools and procedures for the identification of critical system interactions. The achievement of Objective 1 for the two Asian countries will permit the development of procedures appropriate to the Asian context.

This should be completed within the third year. Application to the Third Country case, and subsequent modification would take place in the fourth year.

A. Activities

1. Development of procedures for Philippine environment. Initial identification of critical variables and an identification procedure. Following this development, a workshop with host-country researchers and irrigation department representatives will be held to evaluate and refine the procedures.

2. Application of refinement of procedures. The procedures developed on the basis of the Philippine studies will be applied to the second Asian country; these will be modified to include the inputs from

the second set of studies. A local critical workshop will be held for agency reaction.

3. Application and refinement of procedures for Third country.

Similar to Activity 2; expected completion latter part of year 4.

4. Development of generalized procedures. A pattern similar to 2 and 3 though with the broader perspective, culminating in a general critical workshop and international symposium in the fifth year.

B. Inputs

Primarily principal investigator and host-country colleagues and agency personnel. Costs are primarily related to travel and partial salaries.

C. Objectively verifiable progress and completion indicators.

Activity a. Formal procedure document completed

Activity b. Revised procedure document for Asian context completed

Activity c. Generalized procedure document completed.

Activity d. Generalized procedure document symposium and report completed

Objective 3: To identify system design and operation implications that derive from explicit consideration of socio-economic factors and their interaction with physical and biologic factors. Most of the activity to achieve this objective will take place in the third, and subsequent years. Completion is anticipated for the fifth year, culminating in the presentations and discussions at the international symposium. The country specific

implications will be completed approximately six months after completion of Objective 1 in each country.

A. Activities

1. The analysis of results developed under Objective 1, as well as that obtained in studies by others.

2. Interaction with agency staff and administration. Formal reporting will be made through agency conferences. Emphasis will be upon local country implications. More general implications will be considered at the international symposium.

B. Inputs

Primarily principal investigators, host-country colleagues and agency personnel for the in-country activities. Budget items primarily related to travel, and meetings.

C. Objectively verifiable progress and completion indicators.

Reports of agency conferences, and associated documents.

Objective 4: To identify planning policy implications. This objective will receive only preliminary emphasis during the first two years of the project. Significant work will start in year three, with most emphasis during year 4 and 5.

A. Activities

1. Analysis of results to date, and identification of policy implications.

2. Critical review and reporting. Policy implications will be explored with individuals active in irrigation planning, in a workshop format. Refinement of the implications statements. The final statements will be explored at the international symposium.

B. Inputs

Primarily principal investigators, host-country colleagues, and planning personnel. Budget items primarily related to travel and meetings.

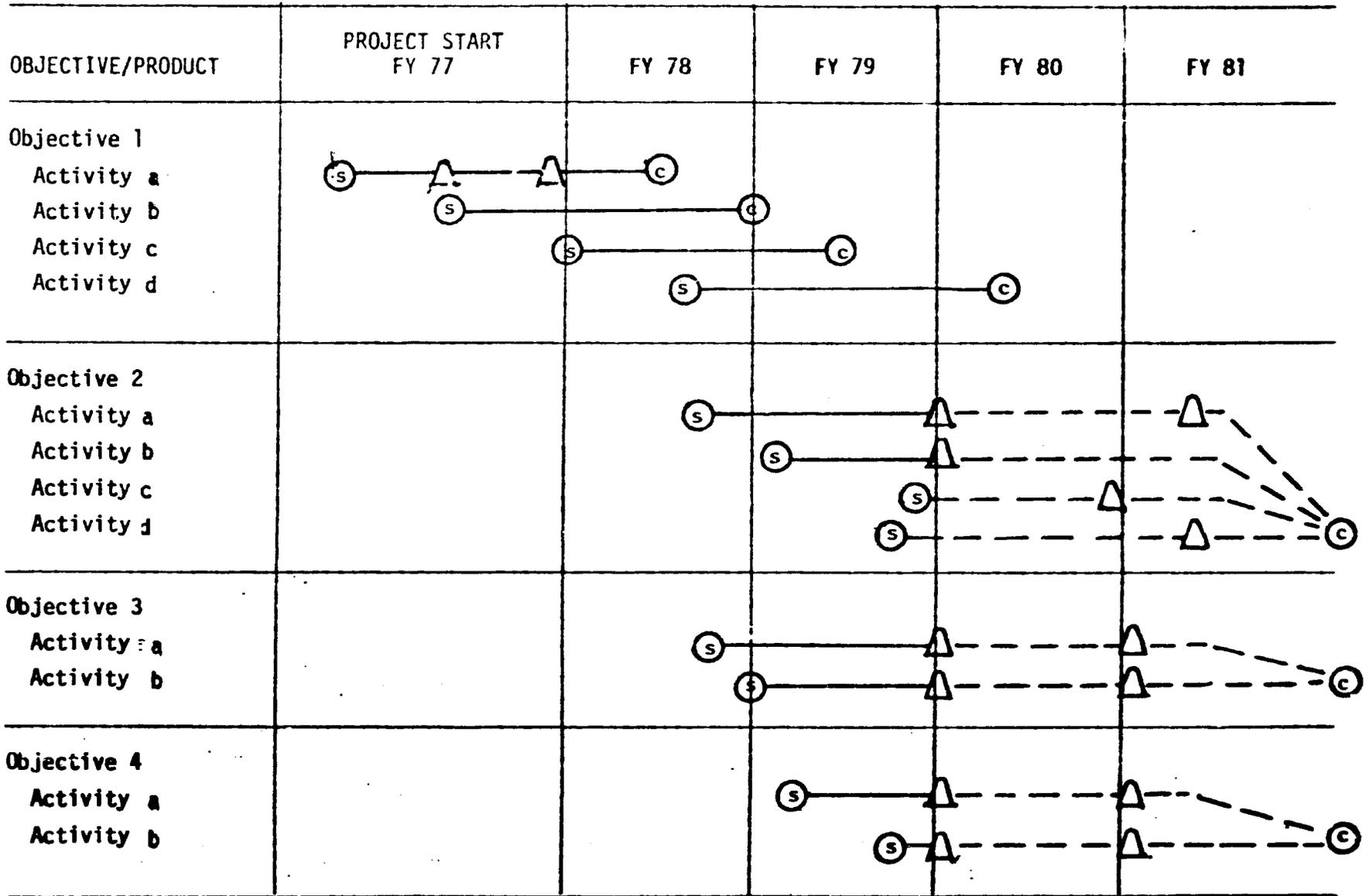
C. Objectively verifiable progress and completion indicators.

Report of policy implications. Professional and/or scientific journal articles.

XII. GENERAL APPRAISAL

The material attached to this project statement includes a copy of MILESTONE LIFE-OF-THE-PROJECT SCHEDULE; PID clearance, and all comments received relative to the review of that PID.

MILESTONE LIFE-OF-PROJECT SCHEDULE



LOGICAL FRAMEWORK MATRIX - PROP WORKSHEET

Summary	Objectively Verifiable Indicators	Important Assumptions
<p>A.1. Goal</p> <p>To improve the water use efficiency in irrigated agriculture and thereby increase production per unit of water.</p>	<p>A.2. Measurement of Goal Achievement</p> <ol style="list-style-type: none"> 1. Increased acreages per unit of irrigation water. 2. Decreased waterlogging and salinity problems. 3. Increased production per irrigation system. 	<p>A.3. (as related to goal)</p> <ol style="list-style-type: none"> 1. LDC's will actively attempt to improve irrigation system design. 2. Irrigated agriculture will continue to be essential to food production especially in highly populated areas of the developing world.
<p>B.1. Purpose</p> <p>To improve procedures for design and/or rehabilitation of irrigation systems incorporating explicit consideration of the interactions of critical socio-economic factors with the physical factors.</p>	<p>B.2. End of Project Status</p> <p>Preliminary - Utilization of revised procedures by an organization responsible for design and/or operation of irrigation systems.</p> <p>Intermediate - Successful application of revised procedures in at least a few existing systems.</p> <p>Ultimate - Successful utilization of the revised procedure by a significant number of LDC design and operational organizations.</p>	<p>B.3. (as related to purpose)</p> <ol style="list-style-type: none"> 1. Sufficient concern will exist in at least some design - operation agencies that there would be a willingness to try revised procedures. 2. The procedures would be such that available or reasonably attainable LDC skills would be required for utilization.
<p>C.1. Outputs</p> <ol style="list-style-type: none"> 1. Description, analysis, and explanation of complex interactions between physical, biological, economic and organizational dimensions of existing irrigation systems. 2. Analytical tools and procedures for the identification and analysis of critical system interactions. 3. Set of design parameters derived explicitly from the socio-economic dimension. 4. Identification of elements which relate to planning policies. 	<p>C.2. Output Indicators</p> <ol style="list-style-type: none"> 1. A set of propositions regarding interrelationships based on quantitative and qualitative data in form of written reports and workshop proceedings. 2. A research design procedure including measurement techniques. 3. Training workshops complete 4. A set of guidelines to be used by designees and project operators in reviewing the state of planned or existing systems. 5. An issues discussion and policy alternatives dealing with water resources and/or agricultural development as derived from the study. 	<p>C.3. (as related to outputs)</p> <ol style="list-style-type: none"> 1. Appropriate numbers of field sites can be identified and made accessible for detailed study. 2. Selected sites will represent a range of conditions appropriate for study objectives.
<p>D.1. Inputs</p> <ol style="list-style-type: none"> 1. Qualified contractor personnel with backstopping facility. 2. AID central funding and project guidance. 3. Participating personnel from LDC's and USAIDs in workshops to plan specific research strategies, data collection and analysis, and follow-up seminars to extend results. 	<p>D.2. Budget/Schedule</p> <p>Budget/Schedule</p> <p>See detailed budget.</p>	<p>D.3. (as related to inputs)</p> <ol style="list-style-type: none"> 1. Highly qualified contractor principal investigators will remain available. 2. LDC's will have personnel and resources to support this activity.

RESEARCH AND DEVELOPMENT COMMITTEE

Minutes of March 24, 1976 Meeting

Project: The Determinants of Developing Country Irrigation Project Problems: A Multifactor Analysis for Improved System Operation and Performance (New), 3 years, \$280,000.

Contractor: Cornell University

Project Manager: Gilbert Corey, TA/AGR

Discussion Highlights:

Discussion was initiated with Dr. Corey's, TA/AGR, review of the project purpose to improve water management. He indicated the strategy is to develop a process by which planners, designers and farmers can determine what needs to be done, and decide how to efficiently provide water and use it effectively on their fields. Many requests are being received for this kind of information.

For clarification Mr. Leake, AFR/DS, asked two questions: What will this project add to the present considerable knowledge on management of water distribution and use? Is it logical to do this study outside the "irrigation group" of Universities? Dr. Corey pointed out that actually little measurement has been made of what happens to water on the farm and farmers are still wasting water, even in the U. S. A. Other institutions could probably do this study, but he expressed confidence in Cornell's professional knowledge and especially in their interdisciplinary approach to the problem and proposed solution. The investigators have considerable experience in humid topics irrigation.

Two issues were questioned by Mr. Feldman, LA/DR. First, should the project be delayed until current state-of-the-art surveys are completed? Dr. Plunknett clarified that these are being done in special areas for the development of utilization manuals for farmers. This effort has identified on-farm use of water as an area needing specific attention. Secondly, what priority is this study relative to other problems? Dr. Long, AA/TA, interjected that it has the same general priority as water. Mr. Leake supported its being a rather high priority and referenced his own observation of inefficient irrigation utilization in Morocco. Mr. Birnberg, NE/DP, also expressed support.

Criteria for participating country selection and the choices proposed were queried by Mr. Birnberg. Dr. Corey speculated they were chosen on the basis of Cornell University's LDC experience and established linkages. He agreed this is an important consideration and proposed

that country selection be reviewed during the first phase of the project to insure full cooperation and workability. Egypt was suggested as an appropriate potential participant since they have proposed a water management study for FY-77. Dr. Long indicated it would be helpful to work through the Bureau on this matter. Dr. Corey agreed to query all missions prior to initiation of the project.

John Rixse, SER/ENG, suggested that the study be integrated with off-farm control activities in a total systems approach to the problem. Dr. Corey agreed and it was suggested that SER/ENG be involved with management of the project.

Motion: That the proposal be approved with the provisions that off-farm engineering factors will be integrated into the study and country missions will be canvassed for interest and cooperation.

Moved by John Rixse and seconded

Vote: Unanimous approval

UNITED STATES GOVERNMENT

Memorandum

DATE: December 11, 1975

TO : See Distribution List
THRU: LA/DR/RD, Mr. Daniel A. Chafj
FROM : LA/DR/RD, Charles A. Breitenbach

ca
Charles A. Breitenbach

SUBJECT: Comments on Four Project Identification Documents (P.I.D.s)
1) Soil and Water Inventory and Management
2) Determination of Irrigation Problems
3) State of the Art Studies - Water Management
4) Managing Planned Agricultural and Rural Development

1. Soil and Water Inventory and Management

LA/DR is favorably inclined towards this project. It is our contention that the field obtains its greatest benefit from service or outreach activities. This PID will facilitate expeditious action for short term technical assistance to Missions and LDCs in the water management area.

We agree that as AID accumulates information in the field of soil and water management it will be invaluable to bank this information in a computerized data bank so that it may be drawn upon by future activities as they may benefit from past experiences. \$300,000 a year for three years does not appear excessive for a project whose object is to provide expertise and data to the field on a continuing basis and in a manner in which prior experiences will have been recorded.

2. Determination of Irrigation Problems

LA/DR assigns a low priority on this project. We would recommend that it be postponed at least until PID No. 3 "State of the Art Studies - Water Management" has been completed. This would have the advantage that the major bottlenecks to water management will, we assume, have been identified by the SOIA study before the objectives to be researched are determined.

We wonder why the types of objectives this proposal is intended to achieve might not more properly be assigned as outputs of TAB's 211(d) grants with Utah State, Colorado State, and the University of Arizona.

LA/DR has no objection to the four broad objectives which this research program proposes to investigate, but we do believe the state of the art study very possibly will show others to be of more immediate need to the LDCs so that they would rank higher than the ones listed above on a priority list.



12/12/75

seem small in comparison with amount of funding. Mission first impression to this project is negative and until further details are known we find it difficult to improve on impression.

✓ II. Determinants of Irrigation Problems

Comment

As AIL/W well aware, USAID/Pakistan has been engaged with Government of Pakistan in joint efforts on irrigation problems for many years. We are contemplating a Water Management Loan in near future and feel the research information gleaned from this project will be beneficial to us as well as other LLC's. We also feel that USAID/Pakistan past, present and future studies on irrigation problems could benefit significantly from the results of this project. However, we question the relatively low funding of this type of project as well as the two year timeframe. Funding over past three years for irrigation projects in Pakistan has been above \$1,000,000. This includes CSU and USAID funding, but does not include Government of Pakistan resources. Our view is that if project is to be of only two years duration with \$200,000 funding to research four broad objectives described in the FID it would be better to allocate resources to a project with one or two specific objectives and a longer timeframe.

PIB for Combating Iron Deficiency Anemia not received. Comments on Development of LLC "Industrial Research Institute Effectiveness" will be forthcoming shortly.

Concluding Comments

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Mission feels on whole, all projects broad objectives are supportable. However, we found ourselves in a quandry as to TAB formulation of FID documents. In general most FID's did not have enough information in them to allow us to give more complete explanations of impressions. Mission also noted a possible lack of communication between TA offices on projects which are overlapping in nature. One other concern here is that projects proposed involve substantial amount of TA to recipient countries in form of advisors and concurrent research work in U.S. We wonder if it might not be better to concentrate less on U.S. experts visits and more on institutional building within the LLC's.

BYROAD

UNITED STATES GOVERNMENT

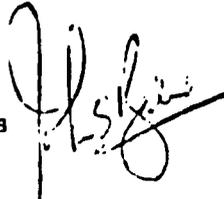
Memorandum

NOV 26 1975

TO : TA/AGR, Mr. Gil Corey

DATE: November 25, 1975

FROM : NE/TECH/APD, John S. Balis



SUBJECT: PID - Determinants of Irrigation Problems (Research KPA #4)

While agreeing that the subject matter is important one is somewhat reluctant to concur with the PID as the description of a project. None-the-less, I'm interested to see what this Cornell team can do with the problem. These men have established an interesting interactive approach and would be able to significantly advance understanding of this subject. I understand that they have an adequate idea of both their approach and scope so that a much sharper description of the project is possible in the PP.

cc:

TA/PPU:CFritz

NE/TECH:DSteinberg/JDalton



UNITED STATES GOVERNMENT

Memorandum

NOV 20 1975

TO : TA/AGR, Dr. Leon F. Hesser

DATE: November 18, 1975

FROM : SER/ENGR, John H. Rixse, Jr.

SUBJECT: Approved Project Identification Documents

Determinants of Irrigation Problems (Research KPA #4)

Soil and Water Inventory and Management (KPA #4)

State of the Art Studies-Water Management (KPA #4) 211 (d)

The PIDs covering the three projects listed above would seem to apply to on-farm application and as such there are no engineering questions. However, if this be the case, the titles and the statements of the projects should stress this aspect. The reason is that one could easily read the total irrigation system and water supply system into the projects.

It is suggested that TA/AGR collaborate closely with engineers in the Water Resources Branch of SER/ENGR, whose chief is Mr. Leo Mastrofini, in the further development of these projects and if approved their implementation.

Separately the PIDs are being provided to Mr. Mastrofini for consideration by his engineers. If they have any comments, I am asking them to give them directly to you. Meanwhile, I would suggest that the TA/AGR staff initiate technical liaison with Mr. Mastrofini.

cc:
TA/AGR, Mr. Corey
TA/PPU, Mr. Fritz
ENGR/OPNS/WR, Mr. Mastrofini



UNITED STATES GOVERNMENT

Memorandum

NOV 18 1975

TO : TA/AGR, Mr. G. Corey

DATE: Nov. 17, 1975

FROM : AFR/DP/PPA, Frank J. Moore *L.*

SUBJECT: PID - Determinants of Irrigation problems.

What this PID proposes is essentially a State of the Arts Study in a field where one would assume a considerable amount of both experience and relevant literature exist.

Under these circumstances, one would need considerable more detailed substantiation to justify an expenditure of close to a ~~greater~~ million dollars over a 3 year period for work that can, in all likelihood, be performed adequately by one or more senior graduate students with some guidance by members of the expert team listed in the penultimate paragraph.

It really strains the imagination that, as the proposed budget suggests, each of the eminent scientists listed would spend the equivalent of some 15-18 man/months fulltime to meet objectives which are all, in one way or another, rooted in a thorough search of available literature.

Before proceeding further one would, as minimum, wish to see a PID following the required format with special attention on a tentative work plan and a careful discussion of alternatives.

cc:

AFR/DS: Mr. Princeton Lyman
AFR/RA: Mr. Woodrow Leake
AFR/DP: Mr. Robert Huesmann
TA/PPU: Mr. Carl Fritz
LA/DP: Mr. P. Morris
NESA/DP: Mr. Richard Birnberg
EA/TD: Mr. Lane Holdcroft



PARIS - *du*
ph

Date: NOV 13 1975

MEMORANDUM FOR: Members of the Research and Development Committee

FROM: TA/PPU, Carl R. Fritz *CF*

SUBJECT: Approved Project Identification Document

Attached is a copy of a Project Identification Document (PID) which has been approved by the Assistant Administrator for Technical Assistance for project design and the drafting of a Project Paper (PP):

Project Title: Determinants of Irrigation Problems (Research KPA #4)

Project Number: 931-17-120-612

Initial FY: 77

Responsible Office: TA/AGR

If you have any comments, questions or issues which you would like to see addressed in the PP, please send them directly to the responsible office listed above with a copy to TA/PPU. They should be received by that office within ~~two weeks~~/one month so that the comments can be addressed by the drafter.

The draft PP will be submitted to the Research and Development Committee for review and comment. However, we encourage your comments as early in the design process as feasible so that the project can be responsive to Agency concerns.

Attachment: a/s

cc: TA Technical Office

PROJECT DOCUMENT ACTION FORM

1. TRANSACTION CODE

A

- A - Add
- C - Change
- D - Delete

PDAF

2. DOCUMENT CODE

4

3. COUNTRY/ENTITY

TA/AG - Research

4. DOCUMENT REVISION NUMBER

5. PROJECT NUMBER (7 digits)

+10-1005

6. BUREAU/OFFICE

A. Symbol TAB

B. Code 8

7. PROJECT TITLE (maximum 40 characters)

Determinants of Irrigation Problems

8. RELATED DOCUMENT CODE

1 - PID
 2 - PRP

9. PROJECT DOCUMENT ACTION

(ENTER COMMENT FOR ITEMS IN BLOCK 13)

ACTION TAKEN

- A - APPROVED
- CA - CONDITIONALLY APPROVED*
- D - DISAPPROVED*
- S - SUSPENDED*
- DD - DECISION DEFERRED*

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

A. APPROPRIATION	B. PRIMARY PURPOSE CODE	C. PRIMARY TECH. CODE		E. FIRST FY		LIFE OF PROJECT	
		D. GRANT	D. LOAN	F. GRANT	B. LOAN	H. GRANT	I. LOAN
(1) FN	121I	973					
(2)							
(3)							
(4)							
TOTALS							

11. PROPOSED PLANNING RESOURCES

- 1 - APPROVED
- 2 - DISAPPROVED
- 3 - APPROVED AS MODIFIED

12. PROPOSED NEXT DOCUMENT

- A. 2 - PRP
- 3 - PP

B. PROPOSED NEXT DOCUMENT DATE

MM YY

13. COMMENTS (maximum 240 characters)

[]

14. ACTION REFERENCE

A. AIRGRAMS A I D I T I O I A

TELEGRAMS S T A T I E

MEMORANDA

B. ACTION REFERENCE DATE

MM DD YY

15. CLEARANCES

	TYPED NAME	TITLE	DATE	INITIALS
A.	Leon Hessef	Director, TA/AG		
B.	Charles Molfetto	TA/PPU		
C.				
D.				
E.				
F.				

16. RESPONSIBLE BUREAU SIGNATURE

Mary Mozynski, Chief, TA/PPU/O

17. ACTION DATE

MM DD YY

MEMORANDUM

DATE: October 24, 1975

TO : AA/TA, Mr. Curtis Farrar

FROM : TA/PPU, John N. Cuming

SUBJECT: PID Clearance

Project Title: Determinants of Irrigation Problems (Research KPA #4)

Begins FY 197 7.

1. The PID complies with the following AA/TA instructions if the appropriate block is checked. Otherwise, comments are attached.

- a. Main points of Program Guidance #3 covered.
- b. AA/TA budget review comments have been incorporated or adequately appealed in the narrative.
- c. Proposed funding is within limits described in TA Bureau FY 76/77 Program Submission to PPC and/or as amended by current OYB.
- d. Dates of PP development, approval and project initiation are realistic and consistent with the Program Submission.

2. This PID has been in TA/PPU and staff work is incomplete because of TA/PPU work pressure, or Tech office work pressure. We recommend you return the PID for further review prior to your final decision.

3. We recommend the following action:

a. Approval

(1) subject to coordination with PPC which has a project related to this activity.

b. Disapproval or delay for reasons specified in attached.

4. AA/TA Action

Approved

Subject to _____

Disapproved

Curtis Farrar
Signature

10-30-75
Date

I. Summary of Problems and Proposed Response

Notwithstanding a long history of irrigation project development, massive investments of financial resources, and a variety of research efforts in many parts of the world, a significant number of such projects encounter problems which cause them to be much less effective than anticipated, and in some cases to be almost total failures. These problems include low levels of project utilization, poor yields, low efficiencies of water use, and dissatisfactions on the part of farmers, of system technical personnel and of governmental policy makers. The range of problems, and the variety of circumstances under which these occur suggest that it will not be possible to identify general solutions, but there are indications of the direction to approach the solutions, and to minimize problem occurrence. In addition, the evidence suggests that there are serious deficiencies in the current process of planning, design and implementation.

There is evidence though limited in extent, that the disproportionate consideration of the various types of factors associated with the operation and utilization of irrigation systems, and the failure to consider their interactive effects, are basic to the occurrence of the major problems in existing projects. There also is evidence to suggest that many projects currently being implemented will encounter similar difficulties, particularly where these projects are intended to serve low income farmers with small holdings.

That AID considers water resource development and irrigation water management an important factor in increasing food production is indicated by the Budget Submissions for 1976 which include approximately \$103 million proposed for water resource related loans and grants. Many other loans have a strong irrigation water management component.

Further evidence of emphasis on water development is apparent when 16 donor countries making up the Organization for Economic Cooperation and Development committed almost 20 percent of their agriculture development funds in 1973 and over 30 percent in 1974 to water development. This amounted to about \$360 million in 1973 and \$855 million in 1974.

The research program should have four broad objectives leading to the goal of improved design, operation and utility of irrigation systems. These are:

1. To describe, analyze and explain the complex interactions between the physical, biological, economic and organizational dimensions of existing irrigation systems and the relationships of these factors to overall performance.
2. To develop analytical tools and procedures for the identification and analysis of critical system interactions of the type indicated in (1).

3. To identify system design and operation implications that derive from the explicit consideration of socio-economic factors and their interaction with physical and biological factors.
4. To identify the planning policy implications.

The utility of the outputs will be in assisting planners in the design of irrigation systems. The project would be an important addition to the Colorado State University research effort in on-farm water management design.

II. Financial Requirements and Plans

The three year study is estimated to cost \$240,000 with equal increments of \$80,000 for each project year.

AID FN funds will be used.

The procedure for data collection precludes LDC financial support. Their cooperation in providing access, data, and information will be essential however.

III. Development of the Project

The research would be accomplished by a study of existing systems. The complexity of the problems being addressed, the importance of understanding local situations, and the need for interaction with irrigation system personnel require that the research be cooperative with host country research colleagues and government agencies.

Initial emphasis would be placed on systems in the tropics. It is anticipated that once methodologies are developed, the analyses could be extended to any irrigation system.

The research team of Dr. Gil Levine, Agricultural Engineer, M.L. Barnett, Rural Sociologist, E.W. Coward, Rural Sociologist, L.E. Small, Agricultural Economist all have considerable international experience and have been involved previously with irrigation system evaluation especially in Asia. They have been cooperating with Ford Foundation on a graduate training program where students do their research in LDCs. Their expertise will be invaluable in development of the PP. It is proposed to contract this research with Cornell Univ. which has submitted a proposal along the lines of this PID.

The draft PF will be submitted in January 1976 for FY 77 funding. It will be prepared by the Soil and Water Division and can be managed within their existing cadre of technicians.

DEPARTMENT OF STATE
AGENCY FOR
INTERNATIONAL DEVELOPMENT

1. Cooperating Country
TA BUREAU

2. PIO/T No.
931-1005-3177612

3. Original or
Amendment No. _____

PIO/T

PROJECT IMPLEMENTATION
ORDER/TECHNICAL
SERVICES

4. Project/Activity No. and Title
Determinants of Irrigation - Cornell
(#931-1005)

DISTRIBUTION

5. Appropriation Symbol
72-11X1023

6.A. Allotment Symbol and Charge
402-31-099-00-22-71

6.B. Funds Allotted to:
 A.I.D./W Mission

7. Obligation Status
 Administrative Reservation Implementing Document

8. Funding Period (Mo., Day, Yr.)
From 04/01/77 To 03/31/79

9.A. Services to Start (Mo., Day, Yr.)
Between 02/01/77 and 04/01/77

9.B. Completion date of Services
(Mo., Day, Yr.) 03/31/80

10.A. Type of Action
 A.I.D. Contract Cooperating Country Contract Participating Agency Service Agreement Other

10.B. Authorized Agent
AID/W

Estimated Financing		(1) Previous Total	(2) Increase	(3) Decrease	(4) Total to Date
\$1.00=					
11. Maximum A.I.D. Financing	A. Dollars		\$185,000		\$185,000
	B. U.S.-Owned Local Currency			FUNDS RESERVED BY	
12. Cooperating Country Contributions	A. Counterpart			ALLG	
	B. Other			POSED 2/24/77 SER/PM/CSD	

13. Mission
References

14. Instructions to Authorized Agent

This PIO/T authorizes the contract office to negotiate and execute a three (3) year contract with Cornell University for research on "The Determinants of Developing Country Irrigation Project Problems: A Multifactor Analysis for Improved System Operation and Performance" according to the scope of work described herein and according to the attached budget. This PIO/T provides funds totaling \$185,000 for the first two (2) years of the contract. Funding for the third contract year will be made depending on the availability of funds. Three year funding level of contract shall not exceed \$285,000.
The project (PP) and funding were approved and authorized by AA/TA in the PAF dated January 7, 1977. It is anticipated that the contract (cont'

15. Clearances - Show Office Symbol, Signature and Date for all Necessary Clearances.

A. The specifications in the scope of work are technically adequate TA/AGR/SWM:GCorey <i>GC</i> Date: 6 Jan 1977 SER/ENGR:JHowe <i>JH</i> Date: 1-10-77		B. Funds for the services requested are available TA/PPU:CMolfetto <i>CM</i> Date: 2/14/77	
C. The scope of work lies within the purview of the initiating and approved Agency Programs TA/AGR:LHesser <i>LH</i> Date: 1/9/77		D. TA/PPU:MMozynski <i>MM</i> Date: 2/14/77	
E. TA/AGR:GBaird <i>GB</i> Date: 1/18/77 TA/AGR:DClark <i>DC</i> Date: 1/19/77 TA/AGR/SWM:DPeterson <i>DP</i> Date: 6 Jan 77		F. ASIA/TR:Friggs <i>FR</i> Date: 1/27/77 TA/RES:MRechciol <i>MR</i> Date: 1/27/77	

16. For the Cooperating Country
TA/AGR/SWM:SEngberg *SE* Date: 1-10-77
Program Analyst
Signature and date:
Title:

17. For the Agency for International Development
Signature: *John Gunning*
Title: Chief, TA/PPU

18. Date of Signature
2/22/77

SCOPE OF WORK

19. Scope of Technical Services

A. Objective for which the Technical Services are to be Used

To develop analytical and operational procedures for the design and/or re-habilitation of irrigation systems incorporating explicit consideration of (cont'd

p. 6)

B. Description

In order to achieve the four specific research objective (above) the contractor-Cornell University-will conduct country studies in two LDC's and a possibly a third LDC depending on the results of an interim project evaluation and subsequent TA/AGR approval. The Philippines will be the location for the first country study. Country studies in the second and third countries will begin at approximately six (6) month intervals after the initiation of work in the Philippines. Each country study will begin with a research planning workshop to formalize research plans and detail a schedule for data collection. The workshop will be followed by data collection activities on 3 to 5 existing in-country irrigation systems. Then an in-country symposium will be held to review the collected data. The symposium will be followed by analyses of the data and will involve host country irrigation agencies/groups not directly involved in the project. The contractor will integrate all three country studies if (cont'd

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C. Technicians

(1) (a) Number	(b) Specialized Field	(c) Grade and/or Salary	(d) Duration of Assignment (Mon-Months)
1	Rural Sociologist (leader)	Assoc. Professor	4 MM
1	Rural Sociologist	Professor	4 MM
1	Agricultural Engineer	Professor	4 MM
1	Agricultural Economist	Asst. Professor	4 MM
4	Graduate Students	Research Associates	72 MM

(2) Duty Post and Duration of Technicians' Services

2 Research Associates - Philippines 36 MM (all others in U.S. at Cornell
2 Research Associates-2nd Country 36 MM or at Rutgers)

(3) Language requirements

N/A

(4) Access to Classified Information

N/A

(5) Dependents Will Will Not Be Permitted to Accompany Technician

D. Financing of Technical Services

(1) By AID - \$ 176,000

(2) By Cooperating Country - N/A

PIO/T

Project/Activity No. and Title

Determinants of Irrigation - Cornell (#931-1005)

22. Reports by Contractor or Participating Agency (Indicate type, content and format of reports required, including language to be used if other than English, frequency or timing of reports, and any special requirements)

- (a) Annual reports- within ninety (90) days after completion of each 12 months of project activities - 40 copies to be provided to AID/Washington - other copies to be distributed to International Ag. Research Centers and relevant researchers worldwide.
- (b) Other reports relating to the project as the contractor and/or AID project officer deem appropriate.
- (c) Other publications and symposia on research will be used to disseminate information as deemed appropriate by the contractor and/or the AID project officer.
- (d) Trip Reports - After completion of each TDY assignment a trip report will be prepared giving details of itinerary, work schedules, accomplishments, and suggestions resulting therefrom. Copies of the report should be sent by the contractor to TA/AGR, involved Missions, and host country cooperators.
- (e) The contractor shall submit three copies of all reports listed as being a product of the contract (administrative, progress, final and technical (cont'd on page 12)

23. Background Information (Additional information useful to Authorized Agent and Prospective Contractors or Participating Agency; if necessary cross reference Block 19.C(4) above.)

Expanded irrigation has been identified as a major factor in the development of the LDC's, as evidenced in the UN Indicative World Plan. Its critical role relative to the world hunger problems was stressed in the PSAC report on the World Food Supply and more recently at the World Food Conference. USAID, alone, has over 100 million dollars of current water-related projects, many of them irrigation oriented. Notwithstanding a long history of irrigation, increasing understanding of the basic engineering and agricultural sciences, and massive investments, many modern irrigation projects encounter major problems. Some of the problems relate to the physical components of the systems, but the most serious occur in management and utilization. These are especially serious where the systems are supposed to meet small-holder needs. The problems encountered have been serious enough on many projects that they have altered the course of

(cont'd on page 12)

24. Relationship of Contractor or Participating Agency to Cooperating Country and to AID

A. Relationships and Responsibilities

The AID Administrator through TA/AGR to Cornell

Contractor

~~By Contract~~ Liaison Official

Project Leader: Dr. E. W. Coward - Department of Rural Sociology, Cornell University (Tel# 607-256-3163)

Financial Affairs: Jane Youngers, Office of Academic Funding, Cornell University, (Tel: 607-256-5014)

C. AID Liaison Officials

TA/AGR/SWM, Leon F. Hesser

TA/AGR/SWM, Gilbert Corey, Project Manager

SER/ENGR, Joe Howe

PIO/T

Project Activity No. and Title
Determinants of Irrigation - Cornell (#931-1005)

LOGISTIC SUPPORT

25. Provisions for Logistic Support A. Specific Items (Insert "X" in applicable column at right. If entry needs qualification, insert asterisk and explain below in C. "Comments")	In Kind Supplied By		From Local Currency Supplied By	
	AID	Cooperating Country	AID	Cooperating Country
(1) Office Space	N/A			
(2) Office Equipment	N/A			
(3) Housing and Utilities	N/A			
(4) Furniture	N/A			
(5) Household Equipment (Stoves, Refrig., etc.)	N/A			
(6) Transportation in Cooperating Country	N/A			
(7) Interpreter Services	N/A			
Other: (8)				
(Specify) (9)				
(10)				
(11)				
(12)				
(13)				
(14)				
(15)				

B. Additional Facilities Available From Other Sources

N/A

C. Comments

N/A

CONTINUATION
SHEET

FORM SYMBOL

DEPARTMENT OF STATE
AGENCY FOR
INTERNATIONAL DEVELOPMENT

TITLE OF FORM

 Worksheet IssuancePAGE 6 OF 13 PAGES1. Cooperating Country
TA BUREAU

2.a. Code No.

2.b. Effective Date

2.c.
 Original OR Amendment
No: _____

3. Project/Activity No. and Title

Determinants of Irrigation - Cornell
(#931-1005)Indicate block
numbers.

Use this form to complete the information required in any block of a PIO or PA/PR form.

14

will be extended for an additional two years with \$200,000 (approx) in additional funds after completion of an interim project evaluation and subsequent authorization and approval of the extension. The three-year contract should therefore include an option clause for a two-year extension subject to AID authorization and approval based upon an interim project evaluation and dependent on the availability of funds.

19A

the interaction of critical socio-economic factors with physical factors. This will involve the following specific research objectives:

1. To describe, analyze and explain the complex interactions between the physical, biological, economic and organizational dimensions of existing irrigation systems and the relationships of these factors to overall system performance.
2. To develop analytical tools and procedures for the identification and analysis of critical system interactions of the type indicated above.
3. To identify system design and operation implications that derive from the explicit consideration of socio-economic factors and their interaction with physical and biological factors.
4. To identify the planning and policy implications which lie in the areas of project scale, choice of technology, degree and forms of farmer participation and equity considerations.

19B

the contract is extended beyond three years. On the basis of the Philippines data, the contractor will develop preliminary analytical tools and procedures which will be applied to the irrigation systems surveyed in the second country. The contractor will test these tools and procedures with collected data from the third country and then finalize these design tools and procedures. Using the data in the two (or three) country studies, the contractor will identify system design and operation implications derived from the interaction of all surveyed factors (socio, economic, physical and biological) and also identify planning policy implications. An International Symposium will be held during the fifth year of the project to review the projects outputs and their future utilization and application. The specific work to be performed by the contractor, based on the general activities outlined above, is as follows:

Specifics of Work to be Performed

1. First Research Objective: To describe, analyze and explain the complex interactions between the physical, biological, economic and organizational dimensions of existing irrigation systems and the relationships of these factors to overall system performance.

<input checked="" type="checkbox"/> Worksheet	<input type="checkbox"/> Finance	PAGE 7 OF 13 PAGES
1. Cooperating Country TA BUREAU	2.a. Code No.	
2.b. Effective Date	2.c. <input checked="" type="checkbox"/> Original OR Amendment No: _____	
3. Project/Activity No. and Title Determinants of Irrigation - Cornell (#931-1005)		

Indicate block numbers.
19B

Use this form to complete the information required in any block of a PIO or PA/PR form.

a. Selection of Countries and Irrigation Systems for Study

- (1) The contractor will initiate the first country study on irrigation systems in Central Luzon of the Philippines. The systems will be selected with inputs from host country colleagues including that of the Institute of Philippines Culture (IPC) survey of communal systems. The systems will represent some which have been successful in meeting the water needs of small land holders and others which have been judged unsuccessful. From three (3) to five (5) operational irrigation systems will be selected in the Philippines.
- (2) Final selection of the second country, and third country if it is approved, and test sites irrigation systems for the projected country studies will be made by the AID project manager and the contractor in consultation with the appropriate AID Regional Bureaus and then only after receipt of suggestions from the Mission. Three (3) to five (5) operational irrigation systems will be selected for study in both the second and third countries.
- (3) Inquiries will be made of all AID missions as to their interest in the planned project research activities.

b. Country Study Activities

- (1) Research planning workshops will be held in each country for the purpose of identifying test systems, specific study questions and establishing host country collaboration. The workshops will produce test procedures, questionnaires and detailed research plans for each irrigation system case study. An update state-of-the-art report will form the initial basis for each workshop.
- (2) Data collection and observations will be conducted on each of the selected irrigation systems to be studied and will last for approximately 18 months per site thus permitting observation of system operation through both wet and dry seasons. In addition to on-site data collection other information on each system will be acquired from existing records and information from informants about the recent past history. Standard techniques will be used for obtaining the required data which will include:

FORM SYMBOL

TITLE OF FORM

1. Cooperating Country TA BUREAU	2.a. Code No.
2.b. Effective Date	2.c. <input checked="" type="checkbox"/> Original OR <input type="checkbox"/> Amendment No: _____
3. Project/Activity No. and Title Determinants of Irrigation - Cornell (#931-1005)	

Indicate block numbers.

Use this form to complete the information required in any block of a PIO or PA/PR form.

19B

- (a) Physical measurements of water flow to determine actual amounts of water being delivered at different locations within the system and at different points in time.
- (b) Farm surveys to determine cropping patterns being followed, production inputs used, patterns of landholding, etc.
- (c) Key informant interviews to obtain information on the formal and informal roles and rules used to operate and maintain the system, procedures for selecting leaders, modifying roles of work time, etc.
- (d) Participant observation by attendance at group meetings, involvement with work groups and observation of actual irrigation activities, will be used to collaborate information collected through other techniques and to identify new information.
- (e) Sociometric techniques to identify patterns of farmer interaction on water use and related activities such as joint land preparation or marketing activities.
- (f) Examination of records, when possible, (such as minutes of meetings, formal statements of rules and procedures, financial records and other information) will be used as information sources.

The focus of data collection initially will be on specific variables related to the physical, biological, economic and organizational elements. These efforts will be designed to answer such questions as: the nature of the engineering structures of the system; the types of soils available; basic climatic conditions; available water supplies; the nature of cropping; informal water rights; patterns of communication; and, leadership. As information is collected on each of these specialized topics and shared among the research staff, potential critical interactions will be identified. As these are identified, research procedures will be implemented to carefully investigate these leads. Host country researchers will be encouraged to be actively involved with the field work and data collection.

- (3) An In-Country Symposium will be held in each country to review the collected data and to discuss its future analysis.

FORM SYMBOL

TITLE OF FORM

1. Cooperating Country
TA BUREAU

2.a. Code No.

2.b. Effective Date

2.c. Amendment
 Original OR No: _____

3. Project/Activity No. and Title
Determinants of Irrigation - Cornell
(#931-1005)

Indicate block numbers.
19B

Use this form to complete the information required in any block of a PIO or PA/PR form.

(4) Data Analysis will be conducted initially to examine, individually, the field data for each field site. Hypotheses regarding critical interactions will be tested with a variety of statistical tools appropriate to the particular empirical measures available. These techniques may range from non-parametric tests such as chi-square through parametric tests such as partial and multiple correlation. In each case, the choice of techniques will be determined by the properties of the empirical measurements available and the conceptual thrust to identify and test interactions. As analysis is completed on the data from individual field sites, cross-sites comparisons will be undertaken. This will allow the further testing of interactions deduced or induced from specific field sites.

c. Integration of Country Studies

The contractor will integrate the country studies only if the project is extended beyond three years. This will involve an examination of individual country studies for conclusions which can be generalized across geographic and agricultural system regions.

2. Second Research Objective: To develop analytical tools and procedures for identification of critical system interactions suitable for use by the professional community involved in design and operation of irrigation systems in the developing countries.

a. Preliminary Analytical Tools and Procedures

The contractor will develop procedures to rate variables in terms of their impact by using quantitative and qualitative scaling techniques applied to data collected from the Philippines country study. A workshop with host-country researchers and AID representatives will then be held to evaluate and initially refine these procedures.

b. Refined Analytical Tools and Procedures

The contractor will use the preliminary procedures (developed above) and apply them to the irrigation systems selected in the second country. The results of this technique will then be compared to the data collected in the second country. Discrepancies in critical variables resulting from the analytic procedure vs. the data collection will be evaluated

FORM SYMBOL

TITLE OF FORM

1. Cooperating Country
TA BUREAU

2.a. Code No.

2.b. Effective Date

2.c. Original OR Amendment No.

3. Project/Activity No. and Title
Determinants of Irrigation - Cornell
(#931-1005)

Indicate block numbers.

Use this form to complete the information required in any block of a PIO or PA/PR form.

19B

and the procedure modified and refined accordingly. A local workshop will be held to review the refined procedures.

c. Applied Analytical Tools and Procedures

The contractor will, if country studies are approved by AID for a third country, test the refined procedures (developed above) by applying them to the country study activities in the third country. This will occur in the fourth year of the project if this three year contract is eventually extended for two additional years. A local workshop will be held to review the applied procedures. The procedures will be evaluated for extrapolation to a wider cultural environment by means of the test in the third country.

d. Final Analytical Tools and Procedures

The contractor will finalize the applied procedures (developed above) based on testing procedures (used above) into final analytical tools and procedures for use by the professional irrigation community. These final procedures will be reviewed in the fifth project year at a critical workshop and an international symposium.

3. Third Research Objective: To identify system design and operation implications that derive from the explicit consideration of socio-economic factors and their interaction with physical and biological factors.

a. Country Specific Design and Operation Implications

The contractor will identify country-specific design and operation implications for each country by analyzing the results obtain in the two (or three) country studies as developed under the First Research Objective and from studies conducted by others not part of this contract. The identification, which will use the analyses of the country studies, is expected to reveal a set (or sets) of variables influencing system performance. The results of this synthesis will be a general application based on commonality of critical variables. Country-specific implications are to be completed for each country within approximately six months after completion of each country study. Host country colleagues and AID personnel will be consulted in deriving these implications.

1. Cooperating Country
TA BUREAU

2.a. Code No.

2.b. Effective Date

2.c. Amendment No:
 Original OR

FORM SYMBOL

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Determinants of Irrigation - Cornell
(#931-1005)

Indicate block numbers.

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b. General Design and Operation Implications

The contractor will derive from the Country Specific Implications a set of General Design and Operation Implications which will be reviewed at an international symposium in the project's fifth year.

4. Fourth Research Objective:

To identify project findings which have planning and policy implications.

- a. Throughout the projects life, but especially during its fifth year, the contractor will identify those factors which affect policy and planning for irrigation on the basis of the contractor's previous data analyses, development of analytical tool and procedures, and identification of design and operation implications.
- b. The contractor will explore these policy and planning implications with individuals active in irrigation planning in a workshop format.
- c. The contractor will then refine these policy and planning implications and present them at the international symposium for discussion.

5. International Symposium

During the fifth year of the project, the contractor will organize an International Symposium which will be aimed specifically at the irrigation planning and design community. The International Symposium will review the projects outputs and discuss their future utilization and application.

21D

University, the contractor - Cornell University will sub-contract with Rutgers University for Dr. Whyte's services and services related thereto.

3. The investigators will work closely with the Colorado State University Research team in Pakistan (under contract AID/ta-C-1100) to utilize the Colorado State experiences and data on social, institutional and economic aspects.

to the fact?

FORM SYMBOL

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1. Cooperating Country
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(4) Annual work plans will be prepared in detail to avoid misunderstandings between the contractor, host governments, and AID regarding what will be attempted and how it is to be accomplished. The AID project manager will assist with preparation. Host government cooperators will be fully informed of these plans and they will be approved by SER/ENGR, TA/AGR, Missions and the contractor. They will be prepared approximately three months prior to the beginning of each contract year.

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reports containing R&D findings) to the Documentation Coordinator, TA/PPU/EUI, Technical Assistance Agency for International Development, Washington, D.C. 20523, or his designee. Such reports shall include a title page showing the title of the report, project title as set forth in this contract (or grant) and the contract number. One copy of each report shall be clearly typed or printed on white paper so that it may be photographed to produce a micro-film master. Technical reports shall be accompanied by an author-prepared abstract

(f) Within two months after the effective date of this contract the contractor, in coordination and agreement with the AID project manager, will have developed and submitted to AID/TA/AGR a finalized Critical Performance Indicator (CPI) Network which will be based on the preliminary pre-contract CPI Network already developed. The contractor will then report to the AID project manager on the status of each CPI during the month it occurs and will note whether the CPI will have been achieved or missed by the end of that month and the effect of any missed CPI on the project and corrective actions to be taken. The contractor should also report, in advance, on any CPI's which it anticipates will be missed in the future and planned actions to overcome such eventualities. Revised CPI networks will be developed by the contractor in agreement with the AID Project Manager as appropriate.

(g) Annual technical reports will be prepared covering the details of all experimentation, pertinent actions, reports, and communications related to the project. This is to be considered a working document for the contractor, its cooperators, and AID. Only limited distribution is anticipated. This will not replace the abbreviated annual report called for under (a) above and which receives wide distribution.

(h) All reports shall be approved by TA/AGR and SER/ENGR prior to publication.

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future governmental policies, certainly in the area of investment and frequently to the detriment of small holders.

CONTINUATION
SHEET

FORM SYMBOL

TITLE OF FORM

DEPARTMENT OF STATE
AGENCY FOR
INTERNATIONAL DEVELOPMENT Worksheet Issuance

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1. Cooperating County
TA BUREAU

2.a. Code No.

2.b. Effective Date

2.c. Original OR Amendment
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3. Project/Activity No. and Title

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numbers.

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It is the thesis of this research project that the causes of these failures are an inadequate recognition of the critical importance of the interactions of the socio-economic factors with the physical aspects of the systems and a lack of understanding of these interactions. The project will: first, describe and analyze critical interactions; second, it will attempt to identify those interactions that are critical to system success; third, it will identify the implications for policy, design and operations. It is anticipated that this increased understanding will be incorporated into a set of analytical and operational procedures designed for use by planning, design and operations organizations.

SPECIAL PROVISION

An 18 month review be conducted including an evaluation of methodology and of site selection.

PROPOSED BUDGET

Research Project: Determinants of Irrigation - Cornell
(Project No. 931-1005)

	<u>First (FY 77)</u> <u>Increment Funding</u> FR:04-01-77 <u>TO:03-31-79</u>	<u>Second (FY 79)</u> <u>Increment Funding</u> FR:04-01-79 <u>TO:03-31-80</u>	<u>TOTAL</u> <u>Project</u> <u>Funding</u> FR:04-01-77 <u>TO:03-31-80</u>
SALARIES AND WAGES			
Principal Investigators	\$ 27,000	\$ 12,000	\$ 39,000
Research Assistants	50,000	30,000	80,000
FIELD RESEARCH COSTS	25,000	15,000	40,000
TRAVEL AND MAINTENANCE	26,900	13,000	39,900
EQUIPMENT AND SUPPLIES	15,000	6,000	21,000
OTHER DIRECT COSTS	12,760	8,540	21,300
INDIRECT COSTS (36.8% of Salaries of wages)	<u>28,340</u>	<u>15,460</u>	<u>43,800</u>
TOTALS --	\$185,000	\$100,000	\$285,000