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CONSORTIUM FOR INTERNATIONAL DEVELOPMENT

WATER MANAGEMENT SYNTHESIS II

WORKPLAN FY 84

PD-AAS-251

Water Management Synthesis II: Workplan FY 84

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Presented by:

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Part I: Analysis of Program of Work

FY-84 WORKPLAN

WATER MANAGEMENT SYNTHESIS II PROJECT

Introduction

Improving irrigation water management as a means for increasing agricultural production throughout the world is the overall goal of the Water Management Synthesis II Project. Irrigated agriculture is of fundamental importance in many LDC's both in the production of required food supplies and in the creation of increased rural employment opportunities. While in the past emphasis has been on the physical construction of new irrigation works or on the rehabilitation of existing facilities, in recent years there has been increasing attention to the need to improve the actual performance of these systems--both old and new. This increased concern with irrigation system performance, often referred to as improving water management, focuses on the need to provide cultivators with a reliable, timely, and sufficient water supply and provide the inputs and services for an effective irrigated agriculture.

The Water Management Synthesis II Project is directly concerned with these issues of improving irrigation system performance and water management. The Project's overall goal is to help AID missions around the world to achieve their objectives of assisting irrigation-related institutions in the LDC's to enhance their capacity to deal with the complex issues of water management. The project views improving LDC capacity to plan and implement water management projects as a principal objective.

Improving the management and performance of irrigation systems requires attention to a broad range of factors--engineering, agronomic, economic, and organizational, at a minimum. That is to say, water management requires an approach that utilizes several different disciplinary perspectives--a strategy that is at the core of the project's approach to all of its activities. As can be seen in the detailed activity descriptions that follow, WMSII operates on the principle that technical assistance activities, training programs, and special studies in water management are best conducted by interdisciplinary teams focused on common problems.

Such interdisciplinary teams experienced in working with water management issues are relatively scarce. As a means of harnessing the existing professional expertise on this topic, as well as providing a means for expanding the pool of expertise, the Consortium for International Development (CID) has contracted to implement the Water Management Synthesis II Project. Two CID universities--Colorado State and Utah State--and Cornell University are the lead universities for this project. The project mobilizes resources and personnel to assist USAID Missions in developing programs to meet world needs through technical assistance, training and technology transfer, and special study

activities. In addition, the project often takes the lead in identifying LDC water management needs and articulating these to the missions.

In May 1983, the Science and Technology Bureau formally requested that USAID Missions prepare requests for assistance for the 1984 Fiscal Year. Requests for assistance were received from 20 missions totaling $4.0 million by September 1, 1983. These requests are one basis for the FY 84 Workplan. In addition, these and previous requests, as well as the past year's experience and lessons from the Water Management Synthesis I Project have suggested additional training and technology transfer, and special study activities in order to meet present and future water management needs throughout the world.

The workplan narrative (Part I) both indicates the focus of FY 84 Synthesis Project activities and presents the underlying philosophy which has guided the selection and conduct of individual activities. In addition, a summary analysis of the workplan budget is presented. This summary presents budgeted amounts by AID Bureau, source of funds, activities by country, activity category, and university responsibile for management. Part II presents a plan for each activity including a detailed budget. The plans are presented by AID Bureau and country. A schedule of person months for each country is also provided. A detailed description of worldwide activities is presented inn Part III including proposals for activities under the two project themes of Irrigation System Management and Community-Managed, Small-Scale Irrigation Systems.

Focus and Philosophy

The Water Management Synthesis II Project seeks to improve irrigation water management on a worldwide basis now and, at the same time, to generate new knowledge which will substantially improve water management in the future. In addition, the Project needs to capture and to institutionalize important "lessons learned" from each activity and to enhance the water management capacities of LDC institutions through professional development. This multiple function creates a dilemma: technical assistance, and training and technology transfer support activities must be broadly based, while special studies should be sharply focused on a single theme or research question.

Special Studies are essential for the generation of new knowledge which in turn will lead to improved technology and management. These studies, then, are the intellectual driving force of the Project. However, AID's substantive irrigation program is a present concern. Much irrigation development lags well behind state-of-the-art research, not only in engineering and agronomy, but even more so in the areas of organization, resource allocation, and farmer participation. Thus, the Project must provide the best possible advice and technological support available given current knowledge.

Linking the activities-New knowledge needs to be utilized effectively; it must flow into training and technology transfer and into

technical assistance activities. For example, the elements of irrigation distribution, water application, and agricultural production systems (e.g. open channel hydraulics, hydrology, and soil-water-crop fertilizer interactions) are well known, but are frequently not well-utilized. What is not well known is the behavior of these systems in a holistic sense. Thus, the centerpiece of the search for new knowledge is irrigation system behavior. One cannot study these systems in isolation; yet, the study of actual systems--particularly in overseas settings--is expensive. Thus, TA activities can be used to provide data for special studies. The synthesis concept is reflected in this two-way interaction between technical assistance and special study activities.

Lessons learned-Participants in project activities not only provide feedback to support special studies and technical assistance, but must also engage in a learning process. Learning about site- and region-specific variables, especially interdisciplinary ones, about different institutional arrangements, and about specific technological adaptations leads to new insights and sharpens the analytical and developmental assistance skills of those participating.

Increasing water management capabilities-Development assistance has a considerable history of experience and is emerging as an art--a profession in its own right. That support for development assistance is at least quasi-political and involves a bureaucratic process is not to be lamented, but recognized as an essential element of the process. Like any profession, development assistance has its own semantic base. To be most effective, WMS II Project participants need to understand the nature of important water management improvement strategies, concepts, and principles. Therefore, professional development programs are needed so that those participating in water management activities can benefit from the existing store of information and can gain a deeper understanding of development issues in order to be more effective in their water management efforts.

Integrating university programs-The WMS II Project is a joint venture by three universities, but it is also concerned with irrigation water management knowledge generally--within and outside of the university community. In this context, it is important that the efforts of the three universities add up to a coherent whole and that systematic involvement of other CID universities and other organizations be accomplished. The Project seeks to bring this about not simply through administrative coordination and negotiation, but also through shared scientific concepts and a common approach to the generation of new knowledge--an approach which is sharply focused, realistic about its objectives, and which addresses the important central issues of water management.

While the need for a integrated approach is paramount, the problem of unnecessary duplication of effort must be avoided. Therefore, each university will play a distinct role in the Project. CSU will use an interdisciplinary team to focus on farm water

management, while USU will focus on the water conveyance and delivery subsystem. Integration of the first two components into a solid conceptual base is the assignment of a task force chaired by Jack Keller of USU. Involvement of CSU personnel in USU studies and vice versa will integrate these distinct emphases. Cornell will continue to concentrate on small-scale, community-managed irrigation systems and on the related issues of local organization and farmer participation. Individuals from USU and CSU will continue to join Cornell personnel in these studies.

There are important linkages between these discrete themes. Many strategies for small-scale irrigation development, for example, may be applicable to larger systems at the farm or tertiary canal level. Because of the more diffuse focus of many technical assistance and of some training activities, these can serve to integrate the distinct themes treated in special studies.

In summary, Synthesis activities will be organized around several discrete, but interrelated themes. These themes will be the focus for special study and training activities. Mission requests for technical assistance and training and technology transfer activities will serve as a basis for the integration of these themes. In addition, the organization of two related task forces on irrigation system management and on small-scale, community-managed irrigation systems will facilitate interuniversity coordination and the emergence of a common conceptual approach to water management issues. Finally, cooperation between universities in the planning and execution of project activities and the interuniversity and interdisciplinary nature of project teams will allow the interaction required for the development of a coherent water management strategy.

Special Studies

WMS II special studies for FY 84 will be related to the Project's two major themes: irrigation system management, and small-scale, community-managed irrigation systems. Within the irrigation system management theme, emphasis at first will be on the development of conceptual and modelling capabilities and on the application of these capabilities to water management improvement efforts.

Special study activities at USU will focus on the irrigation conveyance and application systems because (1) the sociotechnical characteristics of irrigation conveyance systems and how they actually work are not well understood, (2) selection of irrigation technology does not usually take into account social, political or cultural factors, and (3) lessons from experience have not been effectively used to synthesize or to present better technological alternatives. These complex problems cannot be solved by the deductive approaches widely used in engineering and agronomy, but must be induced from real-life information. The conceptual model for the conveyance subsystem will not be exclusively physical, but will include human and social variables, although the physical model will be the first step.

Insights for conceptualization will be derived in part from examination of existing projects in conjunction with TA and diagnostic analysis activities. This will be done in diverse social and physical settings with special emphasis on Southeast Asia. This approach will also be used to test the model's validity for describing systems. Variability among projects will test sensitivity and predictive capability. Action research programs will also be used to test the model's usefulness as a development tool. (See Part II for more detailed activity description.)

- The complete conveyance system model must take into account on-farm water management. Special studies at CSU will build on Pakistan experience, recent developments in Egypt, and on knowledge generated by Water Management Synthesis I to study irrigation system management at the farm level and at the unit command level joining the farm level to the main system.

Physical and biological models for farm systems are available as are social and organizational models that integrate technical factors. CSU's special studies will seek to refine these models and to apply them by water management improvement strategies through diagnostic analysis and development of solution activities and through the implementation of these strategies in selected projects in India, Sri Lanka, the Philippines and Indonesia. Thus, CSU's special studies will build on previous experiences and TA efforts, be integrated into training activities, and will be oriented toward the improvement of water management in the field in an action research effort.

Cornell University special studies will focus primarily on community-managed irrigation systems, and secondarily on issues of local organization and farmer participation in general. The primary goal of the ongoing special study on small-scale, community-managed systems is the identification of critical engineering, economic, organizational, and administrative factors contributing to the successful design and implementation of those irrigation projects which are managed by farmers themselves. A literature review and site visits carried out during FY 83 are the bases for a concepts paper on small-scale development strategies now being drafted.

During FY 84, special studies in community-managed systems will be carried out in two phases. The first phase, scheduled for completion by the end of December 1983, will involve the preparation of a concepts paper draft for review at a workshop on small-scale, community-managed system development and the completion and publication of the final version of the paper. Phase 2 will be the initiation of new special studies generated by the concepts paper and by the recommendation of the interuniversity task force on community-managed irrigation systems organized and chaired by Walt Coward. It is expected that Project TA activities undertaken by all three universities will contribute to the

refinement of analytical tools or the implementation of improved development strategies for community-managed irrigation systems.

Also scheduled for completion during FY 84 is the Comparative Analysis of Farmer Participation special study. Dialogue between the participation and the community-managed system study groups has revealed many cross cutting issues and has contributed to the improvement of analytical frameworks for both special studies. While the participation special study continues to draw upon lessons from a diverse series of cases, its association with TA activities at Gal Oya in Sri Lanka has been particularly helpful in relating participation issues to the main system management theme.

It is expected that special studies at all three universities will continue to inform and to be informed by technical assistance and training and technology transfer activities. We also anticipate increasing interchange among the three universities with the participation of individuals from each in studies generated and carried out by the others.

Training and Technology Transfer

Professional development of the cadre of personnel engaged in water management programs is an urgent need. Training in WMS II is seen as two-way interaction. Input from participants, as well as instructors, is essential to the learning process. Project training efforts must be cumulative and integrated with related technical assistance, technology transfer, and special studies activities in particular countries providing a focal point. Improvement of irrigation management is a high priority in our professional development activities.

Professional development activities in the 1984 workplan include the following.

1) Responses to mission-requested activities in training.

2) Responses to the project objective of developing relevant workshops and seminars to improve water management.

3) Upgrading and improving short-term training courses in support of mission programs.

4) Increasing the capabilities of professionals to implement improved water management programs with special emphasis on farmer participation.

These activities tend to fall into two categories: 1) training programs in host countries which have as their primary objective the professional development of host country personnel while providing feedback about that country and its water management concerns to the

project personnel; and 2) training programs which have a primary purpose to increase the capacity of project personnel to provide more effective technical assistance, technology transfer or research.

Professional development must also be linked to institution building. Participants in our training programs cannot be expected to change complex organizations. Training programs must be viewed as one important means for providing a base for further project activities in host country irrigation systems. A sequence which might well be altered to fit specific host country and mission requirements would be to teach a Diagnostic Analysis Workshop for middle level personnel and then proceed to a Senior Officers Workshop which would utilize data and insights garnered during the field-oriented diagnostic analysis. Outcome of that initial sequence would then provide a base for a followup Search for Solutions Workshop. It might in turn be followed by a second Senior Officers Workshop to prepare the base for implementation of a package of solutions needing institutional support.

Training programs for FY 84 in host countries which have as their primary objective the professional development of host country personnel in host country contexts include the following.

1) Presentation of three Diagnostic Analysis Workshops and preparation for a fourth as requested by AID missions are planned.

2) Preparation of materials for both a Development of Solutions Workshop and a Senior Officers Workshop are scheduled.

3) Presentation a Senior Officials Workshop will be initiated as requested in five states in India. A Senior Officers Workshop will be given in Pakistan as requested.

4) A seminar on Experiences with Water User Associations will be given in India with participation from the lead universities, Indian researchers and AID staff.

Training activities for FY 84, which have a primary purpose of increasing the capacity of project personnel to understand key issues in water management or to conduct training programs more effectively, include the following:

1) workshop on the Design of Programs for Developing Small-Scale Community-Managed Irrigation Works;

2) workshop to review farmer participation and organizational issues;

3) seminar on current research in irrigation; and

4) Diagnostic Analysis Trainers Workshop.

Another key aspect of the project's training program is to provide opportunities for both project personnel and host country professionals to improve their capability in water management through such activities as participating in technical assistance teams, conducting Diagnostic Analysis Workshops, improving language skills, and participating in issue-related seminars. In addition, the project is developing a set of videotape modules which conceptualize physical water management fundamentals and techniques.

Technology transfer takes place in training activities as well as through other means. It is associated with social change and is generated through a change in human behavior. A number of materials will be developed during FY 84 to improve on-going training programs and to assist project personnel in supporting mission programs on farmer participation, irrigation structure design, and farmer training. Videotape modules on irrigation water management will also be prepared.

Technical Assistance

The operative language in the WMS II Project goal statement is "increased effectiveness with which irrigation water resources are being developed and used." This goal is shared by every AID irrigation project and by all AID Mission Strategies where irrigation is included in the portfolio. Thus, a substantial part of the project's activity is allocated to technical assistance.

The Project's purpose is not served by waiting until additional technology and information is available. Instead, the best state-of-the-art technologies should be implemented in the planning, design and implementation of irrigation development assistance programs. WMS I Project and other AID-sponsored irrigation water management studies have already developed new knowledge and information in the water management field. Of particular significance are interdisciplinary approaches which include human and social variables in analysis and design. Each of the three universities uses a formal or informal interdisciplinary management team for project planning and implementation. Interactions through seminars at each university, the Project Management Team, all-university task forces, the implementation teams and workshops explore current water management principles and synthesize new principles. While not always possible, at least one, but usually several members of each technical assistance team has WMSP experience or orientation, either directly or as an earlier WMSP team member. Thus, a water management synthesis focus is given to technical assistance activities.

To focus the scope of the TA activities to always be complimentary with special studies is not possible considering the diverse needs of Missions around the world. WMS II management attempts to optimize assignments by taking into account the particular experience and interest of each university, and current availability of personnel. Because of short lead-times, scheduling has been a problem and will doubtless

continue to be. Planning based on mission estimates of needs for FY 84 should help, but some planned activities will be cancelled and new, urgent short-term needs will arise. These changes will have to be dealt with as they occur.

Current requests for technical assistance mostly fall into the following categories:

1. Project design with preparation of project implementation documents and project papers (four countries, seven project designs)

2. Project implementation assistance in five countries including three with long-term assignments

3. Sector studies in four countries

In addition, there are numerous requests for specific kinds of other technical assistance. Project designs will permit the use of water management improvement strategies and state-of-the-art concepts and principles. Project implementation will allow the improvement of these strategies under field conditions. Synthesis of the "lessons learned" will be more effective in the continuing long-term implementation programs in India, Indonesia and Sri Lanka. These results should also facilitate both special studies and technology transfer.

There will doubtless continue to be some uncertainty in the timing of TA. This frequently leads to some degree of expediency. This will be kept to a minimum by expanding and diversifying our capability. WMS II management is expanding the project's information portfolio about qualified people both in universities and in the private sector. This should substantially increase the project's capability to field competent teams, although policy will continue to be that at least one and preferably more, team members on larger teams will be regular university faculty. WMS II is conscious of the urgency of mission needs and the importance that these are met with competent responses. The project will continue to make every reasonable effort to assist in meeting these needs. What is important is that TA personnel be well qualified, informed of current project technical output and that they input information back into the project system. Management will continue to stress this type of professional development. Besides the structural and time disorder inherent in bilateral development activities, there is a broad diversity of problems--which may be related--but are different for every country and project. The strategy has to be to improve the capability of the personnel for the project to provide effective TA.

Budget Summary Analysis

This section summarizes the major aspects of the workplan including activity category, source of funds, summary line item budget,

and a summary of activities managed by each university. The results will be used to present important aspects of the workplan.

Major activities are being implemented in Asia because of the importance of irrigation in Asia, the Asia Bureau buy-in of central funds, and the Mission buy-ins (Table 1). The other major emphasis is preparation of training materials, conducting of workshops, and special studies to synthesize knowledge and improve future efforts in water management on a Worldwide basis. In addition, Synthesis activities will be carried out in Latin America, Africa and the Near East.

A summary of activities by AID bureau, activity, country and source of funds is presented in Table 2. The results show that India, Indonesia and Sri Lanka are major countries for WMS II activities both in terms of central funds and mission funding. These three countries also are implementing water management projects with short and long-term WMS II assistance. India in particular is developing projects, providing training and implementating projects with major assistance from WMS II.

Budgeted activities by category and management responsibility are shown in Table 3. Results of interest include the percentages budgeted in each category of assistance and between universities as a total. The USU TA budget reflects mission buy-ins for long-term TA and other TA in India. The CSU budget in TR/TT reflects mission requests for DA workshops and preparation of related training activities.

Table 1. Summary of budgeted amounts by AID Bureau and Source of Funds.

Bureau	WMS II	Buy-Ins	Funding Total	Mission Contribution
Africa	$ 54,367	$ 39,681	$ 94,048	$ 24,375
Asia	1,265,511	1,140,866	2,406,377	355,792
Latin America	152,115	95,017	247,132	38,320
Near East	48,705	26,514	75,219	35,020
Worldwide	1,661,766	-0-	1,661,766	-0-
	$3,182,464	$1,302,078	$4,484,542	$453,507

Table 2. Summary of Budgeted Amounts for Activities by AID Bureau, Source of Funds, and Country

AFRICA BUREAU

Country	Activity	Code #	Univ.	WMS II	Buy-ins	Funding Total	Mission Contribution
KENYA	Irrigation Sector Study	1-04-002-84	CU	23,191	-0-	23,191	17,975
	Total			23,191	-0-	23,191	17,975
SENEGAL	Bakel Small Irrigated Perimeter	1-02-033-84	USU	17,000	39,681	56,681	6,400
	Total			17,000	39,681	56,681	6,400
AFRICA	Administration			14,176	-0-	14,176	-0-
	AFRICA TOTAL			54,367	39,681	94,048	24,375

Table 2. (Continued)

ASIA BUREAU

Country	Activity	Code #	Univ.	WMS II	Buy-ins	Funding Total	Mission Contribution
BANGLADESH	Water Mgmt. Systems Project Paper	1-02-072-84	CU	20,719	-0-	20,719	-0-
	Total			20,719	-0-	20,719	-0-
BURMA	Wakema Pump Scheme Study	1-02-036-84	CU	43,022	-0-	43,022	21,240
	Total			43,022	-0-	43,022	21,240
INDIA	DA Workshop Madhya Pradesh	2-02-031-84	CSU	135,470	-0-	135,470	24,300
	Hill Irrigation Project Prep - II	1-02-074-84	CU	-0-	61,218	61,218	-0-
	Irrigation Project Monitoring	3-04-020-84	USU	-0-	46,496	46,496	-0-
	Madhya Pradesh Minor Irrig.	1-02-023-84	USU	-0-	174,989	174,989	-0-
	Madhya Pradesh Socio-Tech	1-01-025-84	USU	-0-	226,229	226,229	-0-
	Maharashtra Irrig. T & M	1-01-021-84	USU	-0-	226,229	226,229	-0-
	Maharashtra Minor Irrig. Project	1-02-018-84	USU	152,960	-0-	152,960	-0-
	Rajasthan MIP	1-02-027-84	CSU	-0-	100,000	100,000	-0-
	Rajasthan MIP - CAD Modified PP	1-02-026-84	CSU	109,385	-0-	109,385	-0-
	Senior Officer's Workshop	2-04-053-84	USU	74,360	-0-	74,360	44,250
	Total			472,175	835,161	1,307,336	68,550
INDONESIA	DA Workshop	2-02-010-84	CSU	176,756	-0-	176,756	20,000
	Long Term Water Mgmt. Specialist	1-01-008-84	CSU	-0-	130,113	130,113	-0-
	Small Scale Irrig. & Mgmt. Project	1-02-011-84	CU	54,468	-0-	54,468	24,760
	Total			231,224	130,113	361,337	44,760
NEPAL	DA Workshop Planning	2-02-003-84	CSU	12,286	-0-	12,286	-0-
	Total			12,286	-0-	12,286	-0-
PAKISTAN	Senior Officer's Workshop	2-04-019-84	CSU	30,741	19,205	49,946	-0-
	Total			30,741	19,205	49,946	-0-
SRI LANKA	DA Workshop	2-02-006-84	CSU	-0-	75,582	75,582	71,242
	Farmer Organization Program	1-02-007-84	CU	64,466	-0-	64,466	150,000
	Water Mgmt. Central Support	1-01-022-84	CSU	58,984	80,805	139,789	-0-
	Total			123,450	156,387	279,837	221,242
ASIA	Administration			331,894	-0-	331,894	-0-
	ASIA TOTAL			1,265,511	1,140,866	2,406,377	355,792

Table 2. (Continued)

LATIN AMERICA BUREAU

Country	Activity	Code #	Univ.	WMS II	Buy-ins	Funding Total	Mission Contribution
ECUADOR	Finishing Orig. Training Modules	2-03-054-84	USU	80,088	-0-	80,088	-0-
	Instructional Manual	2-03-055-84	USU	-0-	23,788	23,788	-0-
	TOTAL			80,088	23,788	103,876	-0-
HAITI	Irrigation Sector Survey	1-04-017-84	USU	21,000	47,072	68,072	20,000
	TOTAL			21,000	47,072	68,072	20,000
PERU	Expansion of Irrigation System	1-02-035-84	USU	11,000	24,157	35,157	18,320
	TOTAL			11,000	24,157	35,157	18,320
LATIN AMERICA	Administration			40,027	-0-	40,027	-0-
	LATIN AMERICA TOTAL			152,115	95,017	247,132	38,320

Table 2. (Continued)

NEAR EAST BUREAU

Country	Activity	Code #	Univ.	WMS II	Buy-ins	Funding Total	Mission Contribution
JORDAN	Irrigation Sector Sruvey	1-04-013-84	USU	31,429	-0-	31,429	15,540
	Sr. On-Farm Water Mgmt. Advisor	1-02-014-84	USU	4,767	-0-	4,767	4,120
	Training Course	2-01-015-84	USU	-0-	26,514	26,514	15,360
	TOTAL			36,196	26,514	62,710	35,020
NEAR EAST	Administration			12,509	-0-	12,509	-0-
	NEAR EAST TOTAL			48,705	26,514	75,219	35,020

Table 2. (Continued)

WORLDWIDE

Country	Activity	Code #	Univ.	WMS II	Buy-ins	Funding Total	Mission Contribution
WORLDWIDE	AID / FAO Expert Consul. in WM	2-14-067-84	CU	9,228	-0-	9,228	-0-
	Analysis of Farmer Participation	3-04-070-84	CU	-0-	-0-	-0-	-0-
	Brochures; Newsletters; Pub.	2-12-044-84	CSU	39,976	-0-	39,976	-0-
	Conference	2-14-058-84	USU	18,623	-0-	18,623	-0-
	Current Research Seminar	2-14-075-84	CU	44,831	-0-	44,831	-0-
	DA Trainers Workshop	2-08-040-84	CSU	29,736	-0-	29,736	-0-
	Farmer Participation Workshop	2-14-066-84	CU	36,193	-0-	36,193	-0-
	French Language Training	2-11-059-84	USU	10,650	-0-	10,650	-0-
	Increasing WM Capabilities	2-11-081-84	OVERALL	20,847	-0-	20,847	-0-
		2-11-039-84	CSU	9,288	-0-	9,288	-0-
	Instructors Guide for DA Workshop	2-13-042-84	CSU	24,881	-0-	24,881	-0-
	Interdisp. Irr. System Selection	3-04-062-84	USU	62,430	-0-	62,430	-0-
	Interfacing Farm & Mgmt. Systems	3-04-045-84	CSU	223,239	-0-	223,239	-0-
	Irrig. Sys. Mgmt. Task Force	2-14-060-84	USU	44,284	-0-	44,284	-0-
	Main System Design, Mgmt., Rehab.	3-04-061-84	USU	221,424	-0-	221,424	-0-
	Main System Mgmt. Task Force	2-06-077-84	CU	7,552	-0-	7,552	-0-
	Microcomputer Applications	2-10-051-84	CSU	62,615	-0-	62,615	-0-
	Professional Visitors	2-11-068-84	CU	9,673	-0-	9,673	-0-
	Projected Special Studies	3-04-071-84	CU	187,312	-0-	187,312	-0-
	Small Scale Irrig. Task Force	2-14-065-84	CU	20,741	-0-	20,741	-0-
	Small Scale Irrigation	3-04-069-84	CU	23,404	-0-	23,404	-0-
	Survey and Strategy for Training	2-09-049-84	CSU	27,379	-0-	27,379	-0-
	Workshop (Tech. & Soc. Aspects)	2-04-050-84	CSU	45,000	-0-	45,000	-0-
	Workshop on Design of Small Scale	2-14-064-84	CU	47,163	-0-	47,163	-0-
WORLDWIDE	Administration			435,297	-0-	435,297	-0-
	WORLDWIDE TOTAL			1,661,766	-0-	1,661,766	-0-
	PROJECT TOTAL			3,182,464	1,302,078	4,484,542	453,507

Table 3.

	Technical Assistance			Training & Tech. Transfer			Special Studies			Total		
	WMS II	BUY-IN	TOTAL	WMS II	BUY-IN	TOTAL	WMS II	BUY-IN	TOTAL	WMS II	BUY-IN	TOTAL
CSU	287,178	310,918	598,096	665,413	94,787	760,200	270,763	-0-	270,763	1,223,354	405,705	1,629,059
Percent	24%	77%	37%	54%	23%	47%	22%	-0-	16%	100%	100%	100%
CU	306,501	61,218	367,719	235,762	-0-	235,762	250,970	-0-	250,970	793,233	61,218	854,451
Percent	39%	100%	43%	30%	-0-	28%	31%	-0-	29%	100%	100%	100%
USU	353,612	738,357	1,091,969	297,278	50,302	347,580	330,036	46,496	376,532	980,926	835,155	1,816,081
Percent	36%	88%	60%	30%	6%	19%	34%	6%	21%	100%	100%	100%
OVERALL	82,052	-0-	82,052	70,078	-0-	70,078	32,821	-0-	32,821	184,951	-0-	184,951
Percent	44%	-0-	44%	38%	-0-	38%	18%	-0-	18%	100%	-0-	100%
TOTAL	1,029,343	1,110,493	2,139,836	1,268,531	145,089	1,413,620	884,590	46,496	931,086	3,182,464	1,302,078	4,484,542
Percent	32%	85%	48%	40%11%	32%	28%	4%	20%	100%	100%	100%	

The source of funds for the various budget activity categories (Table 4) indicates that mission buy-ins and contributions represent 43 percent of the total budget and are concentrated in TA (74%) and TR/TT (26%). The TR/TT are mostly training programs with the DA workshops a major effort. Mission support for WMS II activities is substantial and requested activities represent an estimated 57 percent of the total budget. In addition, $625,000 in requests were not budgeted because of insufficient funds.

Table 5 summarizes the budgeted activities by responsibility for management and activity category. The results provide the totals and percentages for each activity category as distributed across management responsibility. Nearly 50% of the budget supports mission requested activities in technical assistance. Mission requested assistance often requires preparation. Major requests could not be provided in FY 83 and are delayed in 1984 because of insufficient funds to provide for preparation.

Table 6 summarizes each university's activities by category, country and source of funds. A line item budget for each management unit is presented in Table 7. Table 8 presents a summary of special activities presently scheduled for FY 84 and to be funded from FY 83 carryover funds.

Table 4. Summary of budgeted activities by category and source of funds.

	TA	TR/TT	SS	Total
WMS II	$1,029,343	$1,268,531	$884,590	$3,182,464
Percent	32%	40%	28%	100%
Buy-In	1,110,493	145,089	46,496	1,302,078
Percent	74%	24%	4%	100%
Total Funding	2,139,836	1,413,620	931,086	4,484,542
Percent	48%	32%	20%	100%
Contribution	278,355	175,152	-0-	453,507
Percent	61%	39%		100%
Total	$2,418,191	$1,588,772	$931,086	$4,938,049
Percent	49%	32%	19%	100%

Table 5. Summary of budgeted activities by responsibilities for management and activity category.

	CSU	CU	USU	Overall	Total
Technical Assistance					
WMSII	$ 287,178	$ 306,501	$ 353,612	$ 82,052	$1,029,343
Percent	23%	20%	54%	3%	100%
Buy-In	310,918	61,218	738,357	-0-	1,110,493
Percent	28%	6%	66%	-0-	100%
Total	598,096	367,719	1,091,969	82,052	2,139,836
	28%	17%	51%	4%	100%
Training & Tech. Trans.					
WMSII	665,413	235,762	297,278	70,078	1,268,531
Percent	52%	19%	23%	6%	100%
Buy-In	94,787	-0-	50,302	-0-	145,089
Percent	65%	-0-	35%	-0-	100%
Total	760,200	235,762	347,580	70,078	1,413,620
Percent	54%	17%	24%	5%	100%
Special Studies					
WMSII	270,763	250,970	330,036	32,821	884,590
Percent	31%	28%	37%	4%	100%
Buy-In	-0-	-0-	46,496	-0-	46,496
Percent	-0-	-0-	100%	-0-	100%
Total	270,763	250,970	376,532	32,821	931,086
Percent	-0-	-0-	-0-	-0-	100%
Total					
WMSII	$1,223,354	$ 793,233	$ 980,926	$184,951	$3,182,464
Percent	38%	25%	31%	6%	100%
Buy-In	405,705	61,218	835,155	-0-	1,302,078
Percent	31%	5%	64%	-0-	100%
Total	1,629,059	854,451	1,816,081	184,951	4,484,542
Percent	36%	19%	41%	4%	100%

Table 6a. Colorado State University Activities by Category, Country, and Source of Funds

TECHNICAL ASSISTANCE

Country	Activity	Code #	WMS II	Buy-ins	Funding Total	Mission Contribution
INDIA	Rajasthan MIP	1-02-027-84	-0-	100,000	100,000	-0-
	Rajasthan MIP - CAD Modified PP	1-02-026-84	109,385	-0-	109,385	-0-
INDONESIA	Long Term Water Mgmt. Specialist	1-01-008-84	-0-	130,113	130,113	-0-
SRI LANKA	Water Mgmt. Central Support	1-01-022-84	58,984	80,805	139,789	-0-
	Technical Assistance Admin.		118,809	-0-	118,809	-0-
	TOTAL		287,178	310,918	598,096	-0-

TRAINING AND TECHNOLOGY TRANSFER

Country	Activity	Code #	WMS II	Buy-ins	Funding Total	Mission Contribution
INDIA	DA Workshop Madhya Pradesh	2-02-031-84	135,470	-0-	135,470	24,300
INDONESIA	DA Workshop	2-02-010-84	176,756	-0-	176,756	20,000
NEPAL	DA Workshop Planning	2-02-003-84	12,286	-0-	12,286	-0-
PAKISTAN	Senior Officer's Workshop	2-04-019-84	30,741	19,205	49,946	-0-
SRI LANKA	DA Workshop	2-02-006-84	-0-	75,582	75,582	71,242
WORLDWIDE	Brochures; Newsletters: Pubs.	2-12-044-84	39,976	-0-	39,976	-0-
	DA Trainers Workshop	2-08-040-84	29,736	-0-	29,736	-0-
	Increasing WM Capabilities	2-11-039-84	9,288	-0-	9,288	-0-
	Instructors Guide for DA Workshop	2-13-042-84	24,881	-0-	24,881	-0-
	Microcomputer Applications	2-10-051-84	62,615	-0-	62,615	-0-
	Survey and Strategy for Training	2-09-049-84	27,379	-0-	27,379	-0-
	Workshop (Tech. & Soc. Aspects)	2-04-050-84	45,000	-0-	45,000	-0-
	Training & Tech. Tran. Admin.		71,285	-0-	71,285	-0-
	TOTAL		665,413	94,787	760,200	115,542

CSU SPECIAL STUDIES

Country	Activity	Code #	WMS II	Buy-ins	Funding Total	Mission Contribution
WORLDWIDE	Interfacing Farm and Mgmt. Systems	3-04-045-84	223,239	-0-	223,239	-0-
	Special Studies Administration		47,524	-0-	47,524	-0-
	TOTAL		270,763	-0-	270,763	-0-
	CSU TOTAL		1,223,354	405,705	1,629,059	115,542

Table 6b. Cornell University Activities by Category, Country, and Source of Funds

TECHNICAL ASSISTANCE

Country	Activity	Code #	WMS II	Buy-ins	Funding Total	Mission Contribution
BANGLADESH	Water Mgmt. Systems Project Paper	1-02-072-84	20,719	-0-	20,719	-0-
BURMA	Wakema Pump Scheme Study	1-02-036-84	43,022	-0-	43,022	21,240
INDIA	Hill Irrigation Project Prep. - II	1-02-074-84	-0-	61,218	61,218	-0-
INDONESIA	Small Scale Irrig. & Mgmt. Project	1-02-011-84	54,468	-0-	54,468	24,760
KENYA	Irrigation Sector Study	1-04-002-84	23,191	-0-	23,191	17,975
SRI LANKA	Farmer Organization Program	1-02-007-84	64,466	-0-	64,466	150,000
	Technical Assistance Administration		100,635	-0-	100,635	-0-
	TOTAL		306,501	61,218	367,719	213,975

TRAINING AND TECHNOLOGY TRANSFER

Country	Activity	Code #	WMS II	Buy-ins	Funding Total	Mission Contribution
WORLDWIDE	AID / FAO Expert Consul. In WM.	2-14-067-84	9,228	-0-	9,228	-0-
	Current Research Seminar	2-14-075-84	44,831	-0-	44,831	-0-
	Farmer Participation Workshop	2-14-066-84	36,193	-0-	36,193	-0-
	Main System Mgmt. Task Force	2-06-077-84	7,552	-0-	7,552	-0-
	Professional Visitors	2-11-068-84	9,673	-0-	9,673	-0-
	Small Scale Irrig. Task Force	2-14-065-84	20,741	-0-	20,741	-0-
	Workshop on Design of Small Scale	2-14-064-84	47,163	-0-	47,163	-0-
	Training & Tech. Tran. Admin.		60,381	-0-	60,381	-0-
	TOTAL		235,762	-0-	235,762	-0-

SPECIAL STUDIES

Country	Activity	Code #	WMS II	Buy-ins	Funding Total	Mission Contribution
WORLDWIDE	Analysis of Farmer Participation	3-04-070-84	-0-	-0-	-0-	-0-
	Projected Special Studies	3-04-071-84	187,312	-0-	187,312	-0-
	Small Scale Irrigation	3-04-069-84	23,404	-0-	23,404	-0-
	Special Studies Administration		40,254	-0-	40,254	-0-
	TOTAL		250,970	-0-	250,970	-0-
	CU TOTAL		793,233	61,218	854,451	213,975

Table 6c. Utah State University Activities by Category, Country, and Source of Funds

TECHNICAL ASSISTANCE

Country	Activity	Code #	WMS II	Buy-ins	Funding Total	Mission Contribution
HAITI	Irrigation Sector Survey	1-04-017-84	21,000	47,072	68,072	20,000
INDIA	Madhya Pradesh Minor Irrigation	1-02-023-84	-0-	174,989	174,989	-0-
	Madhya Pradesh Socio-Tech	1-01-025-84	-0-	226,229	226,229	-0-
	Maharashtra Irrigation T & M	1-01-021-84	-0-	226,229	226,229	-0-
	Maharashtra Minor Irrigation Project	1-02-018-84	152,960	-0-	152,960	-0-
JORDAN	Irrigation Sector Survey	1-04-013-84	31,429	-0-	31,429	15,540
	Senior On-Farm WM Advisor	1-02-014-84	4,767	-0-	4,767	4,120
PERU	Expansion of Irrigation System	1-02-035-84	11,000	24,157	35,157	18,320
SENEGAL	Bakel Small Irrigated Perimeter	1-02-033-84	17,000	39,681	56,681	6,400
	Technical Assistance Admin.		115,456	-0-	115,456	-0-
	TOTAL		353,612	738,357	1,091,969	64,380

TRAINING AND TECHNOLOGY TRANSFER

Country	Activity	Code #	WMS II	Buy-ins	Funding Total	Mission Contribution
ECUADOR	Finishing Orig. Training Modules	2-03-054-84	80,088	-0-	80,088	-0-
	Instructional Manual	2-03-055-84	-0-	23,788	23,788	-0-
INDIA	Senior Officer's Workshop	2-04-053-84	74,360	-0-	74,360	44,250
JORDAN	Training Course	2-01-015-84	-0-	26,514	26,514	15,360
WORLDWIDE	Conference	2-14-058-84	18,623	-0-	18,623	-0-
	French Language Training	2-11-059-84	10,650	-0-	10,650	-0-
	Irrigation System Mgt. Task Force	2-14-060-84	44,284	-0-	44,284	-0-
	Training & Tech. Tran. Admin.		69,273	-0-	69,273	-0-
	TOTAL		297,278	50,302	347,580	59,610

SPECIAL STUDIES

Country	Activity	Code #	WMS II	Buy-ins	Funding Total	Mission Contribution
INDIA	Irrigation Project Monitoring	3-04-020-84	-0-	46,496	46,496	-0-
WORLDWIDE	Interdisciplinary Irr. System Selection	3-04-062-84	62,430	-0-	62,430	-0-
	Main System Design, Management, Rehab.	3-04-061-84	221,424	-0-	221,424	-0-
	Special Studies Admin.		46,182	-0-	46,182	-0-
	TOTAL		330,036	46,496	376,532	-0-
	USU TOTAL		980,926	835,155	1,816,081	123,990

Table 6d. Summary Budget for Overall Administration

TECHNICAL ASSISTANCE

Country	Activity	Code #	WMS II	Buy-ins	Funding Total	Mission Contribution
WORLDWIDE	Technical Assistance Administration	0-01-999-84	82,052	-0-	82,052	-0-
	TOTAL		82,052	-0-	82,052	-0-

TRAINING AND TECHNOLOGY TRANSFER

Country	Activity	Code #	WMS II	Buy-ins	Funding Total	Mission Contribution
WORLDWIDE	Increasing WM Capabilities	2-11-081-84	20,847	-0-	20,847	-0-
WORLDWIDE	Training & Tech. Tran. Admin.	0-01-999-84	49,231	-0-	49,231	-0-
	TOTAL		70,078	-0-	70,078	-0-

SPECIAL STUDIES

Country	Activity	Code #	WMS II	Buy-ins	Funding Total	Mission Contribution
WORLDWIDE	Administration	0-01-999-84	32,821	-0-	32,821	-0-
	TOTAL		32,821	-0-	32,821	-0-
	OVERALL TOTAL		184,951	-0-	184,951	-0-

Table 7. Line Item Budget

	CSU	CU	USU	Overall	Total
Salaries & Benefits	$ 690,381	$ 330,426	$ 760,139	$103,708	$1,884,654
Travel	199,436	129,340	347,600	16,645	693,021
Consultants	-0-	49,952	118,276	-0-	168,228
Other Direct	323,795	33,057	62,676	6,843	426,371
Equipment	-0-	5,300	20,000	-0-	25,300
Indirect costs	299,234	252,640	375,983	44,982	972,839
Institution Costs	1,512,846	800,715	1,613,509	172,178	4,099,248
CID G&A & DBA	116,231	53,736	131,407	12,773	314,147
Total	$1,629,059	$ 854,451	$1,816,081	$184,951	$4,484,542

Table 8. Activities to be Funded through CID from FY 83 Carryover Funds

CID TRAINING & TECHNOLOGY TRANSFER

Country	Activity	Code #	WMS II	Buy-ins	Funding Total	Mission Cost Sharing
WORLDWIDE	DA Review (Consultants)	2-02-079-84	47,305	-0-	47,305	-0-
	DA Review (CSU)	2-02-080-84	54,103	-0-	54,103	-0-
	FAO Workshop Farmer Participation	2-14-078-84	26,000	-0-	26,000	-0-
	Inc. Water Mgmt. Cap. - Intern #1	2-11-037-84	52,422	-0-	52,422	-0-
	Inc. Water Mgmt. Cap. - Intern #2	2-11-038-84	55,922	-0-	55,922	-0-
	TOTAL CID TRAINING & TECHNOLOGY TRANSFER		235,752	-0-	235,752	-0-

Part II: Activity Plans with Budgets

Africa Bureau

Technical Assistance

CHAD

Activity Title: Bongor Irrigation Project

Code #1-02-004-84

Description: Assistance will be provided through a team which would coordinate with the World Bank the development of project design activities as well as an irrigation sector study. Specific focus will be given to the Bongor Irrigaton Project. Approval for a six-day work week and holiday pay is requested for all short term TDY under this activity.

DELETED

Technical Assistance

KENYA

Activity Title: Irrigation Sector Study

Code # 1-04-002-84

Description: Broad review of irrigation sector to assess current situation, to identify possible project intervention options and associated problems in order to recommend specific project/program activities.

Institutions: Managing: CORNELL Cooperating _____ Participating _____

Activity Coordinator: Phone:

PERSONNEL BY DISCIPLINE	FY 1984												
	1983			1984									
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	TOTAL
Irr. Engineer										1--	---	---	1
Agr.Economist										1--	---	---	1
Rural Sociologist										1--	---	---	1
											TOTAL		3

Project costs

Item		WMS-II FUNDING	MISSION CONTRIBUTION
Direct Costs			
Salaries & Benefits			
Professional Personnel	3 PPM at $4,766	14,298	
Travel - USA to Nairobi	3 trips at $3,000		9,000
internal	3 trips at 500		1,500
Per Diem	93 days at $ 75		6,975
DBA		345	
Other Direct Costs			500
TOTAL DIRECT COSTS		$14,643	17,975
Indirect Costs			
University Overhead (60%)		7,098	
CID G&A		1,450	
TOTAL INDIRECT COSTS		$ 8,548	
TOTAL COST OF ACTIVITY		$23,191	17,975

Mission Buy-In Funding..... $ 0

WMS-II Core Funding..... $23,191

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UNIVERSITY: OVERALL

COUNTRY: Kenya

PERSONNEL BY DISCIPLINE	FY 1984												
	1983			1984									
Discipline	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
Ag. Economist										1.00			1.00
Irrigation Engineer										1.00			1.00
Rural Sociologist										1.00			1.00
													0.00
													0.00
													3.00

Technical Assistance

SENEGAL

Activity Title: Water Users Manual

Code #1-02-032-84

Description: Assistance would be provided to develop methodologies of transfer of irrigation technology to 24 villages in the Bakel area of the Senegal River Basin to enable increased agricultural production. Approval for a six-day work week and holiday pay is requested for all short term TDY under this activity.

DELETED

Technical Assistance

SENEGAL

Activity Title: Bakel Small Irrigated Perimeter Assistance

Code #1-02-033-84

Description: Assistance would be given to develop a three-year work plan for the maintenance and expansion of irrigated perimeters in the Bakel Area. Approval for a six-day work week and holiday pay is requested for all short term TDY under this activity.

Institutions: Managing USU Cooperating CU Participating _____

PERSONNEL BY DISCIPLINE	FY 1984												
	1983			1984									
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	TOTAL
Agri. Engineers									1.00	1.00	1.00		3.00
Ag. Economists									0.25	0.50	0.25		1.00
Institutional Exp.									1.00	0.50			1.50

TOTAL 5.50

Project Costs: Item				WMS II FUNDING	MISSION CONTRIBUTION
Professional Personnel	4.50 PPM (ts)	at	$6,000	$ 27,000	
Local Hire	1.00 PPM (nts)	at	2,000	2,000	
Travel	2 trips	at	2,500	5,000	
Per Diem	135 days	at	40	5,400	
	135 days	at	40		$ 5,400
Other Direct Costs					1,000
Consultants					
TOTAL DIRECT COSTS				$ 39,400	$ 6,400
Indirect Costs:					
University Overhead				12,608	
CID - DBA				733	
- G&A				3,940	
TOTAL INDIRECT COSTS				$ 17,281	
TOTAL COST OF ACTIVITY				$ 56,681	$ 6,400

Mission Buy-In Funding . . . . . $ 39,681

WMS II Core Funding . . . . . $ 17,000

UNIVERSITY: OVERALL

COUNTRY: Senegal

PERSONNEL BY DISCIPLINE	FY 1984												
	1983			1984									
Discipline	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
Ag. Economist									0.25	0.50	0.25		1.00
Agri. Engineer				1.00	1.00	0.50			1.00	1.00	1.00		5.50
Extension Specialist				1.00	1.00	0.50							2.50
Institutional Specialist									1.00	0.50			1.50
Sociologist				1.00	1.00	0.50							2.50
													13.00

Asia Bureau

Technical Assistance

BANGLADESH

Activity Title: Completion of Water Management Systems Project Paper 1-02-072-84

Description: Project will focus on development of manpower and institutional structures necessary for Bangladesh to deal with its water management problems effectively. Team to submit final version of project paper. Team leader will provide assistance to mission for water management activities and coordinate team data gathering and writing efforts (six day work weeks for short term consultants).

Institutions: Managing CORNELL Cooperating _____ Participating _____

Activity Coordinator: Hammond Murray-Rust Phone: c/o AID, Dhaka

PERSONNEL BY DISCIPLINE	FY 1984												
	1983			1984									
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	TOTAL
Agr. Engineer	1	1	.6										2.6

TOTAL 2.6

Project costs

Item		WMS-II FUNDING	MISSION CONTRIBUTION
Direct Costs			
Salaries & Benefits			
Professional Personnel		9,836	
Per Diem/living allowance	.6 months at $1,000	600	
	2 days at $ 100	200	
DBA		78	
Other Direct Costs			
Consultants			
Fee	3 days at $ 200	600	
Travel	2 trips at 250	500	
Other		1,800	
TOTAL DIRECT COSTS		$13,614	
Indirect Costs			
University Overhead (49.3%)		5,757	
CID G&A		1,348	
TOTAL INDIRECT COSTS		$ 7,105	
TOTAL COST OF ACTIVITY		$20,719	
Mission Buy-In Funding.....		$ 0	
WMS-II Core Funding.....		$20,719	

1-02-073-84

Technical Assistance

BANGLADESH

Activity Title: Technical support for Mission and Regional Water Management Activities

Description: Provision of technical support for mission water management activities between authorization of WMS project and actual implementation. Coordination between public and private sector agencies involved in irrigation development; development and oversight of action-research and data collection problems on existing water management activities and constraints; assistance to research and training institutions in training programs.

DELETED

Technical Assistance

BURMA

Activity Title: Wakema Pump Scheme Study

Code # 1-02-036-84

Description: Interdisciplinary study of cropping systems, farmer attitudes, and informal and formal organizational arrangements affecting implementation of Wakema electric pump irrigation scheme in the Irrawaddy delta; provide field training for extension personnel on organizing and training farmers to operate and maintain delivery network and on improved on-farm irrigation practices; complete interdisciplinary analysis of scheme for use by planners and recommendations for other schemes in region.

Institutions: Managing: CORNELL Cooperating: CSU Participating _____

Activity Coordinator: Milton Barnett Phone: (607) 256-4526

PERSONNEL BY DISCIPLINE	FY 1984												
	1983			1984									
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	TOTAL
Agronomist		1.5	---	---	---	---	---	---					1.5
Agr/Irr.Engineer		1.5	---	---	---	---	---	---					1.5
Agr.Economist		1.5	---	---	---	---	---	---					1.5
Rur Soc/Cul Anthrq		1.5	---	---	---	---	---	---					1.5
											TOTAL		6.0

Project costs

Item				WMS-II FUNDING	MISSION CONTRIBUTION
Direct Costs					
Salaries and Benefits					
Professional Personnel	3 PPM	at	$4,766	14,298	
Travel - USA to Rangoon	4 trips	at	$3,200		12,800
in Burma	4 trips	at	$ 500		2,000
Per Diem	8 days	at	$ 100		800
	120 days	at	$ 47		5,640
DBA				447	
Other Direct Costs				1,000	
Consultants Fees	54 days	at	$ 225	12,150	
TOTAL DIRECT COSTS				$27,895	$21,240
Indirect Costs				12,365	
University Overhead (49.3%)					
CID G&A				2,762	
TOTAL INDIRECT COSTS				$15,127	
TOTAL COST OF ACTIVITY				$43,022	$21,240

Mission Buy-In Funding..... $ 0

WMS-II Core Funding..... $43,022

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UNIVERSITY: OVERALL

COUNTRY: Burma

PERSONNEL BY DISCIPLINE	FY 1984												
	1983			1984									
Discipline	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
Ag. Economist	1.00												1.00
Agri./Irri. Engineer	1.00												1.00
Agronomist	1.00												1.00
Rural Sociologiest	1.00												1.00
													0.00
													4.00

Technical Assistance

INDIA

Activity Title: Maharashtra Minor Irrigation Project

Code #1-02-018-84

Description: Assist USAID/India in determining the scope and nature of AID assistance to the minor irrigation program in Maharashtra and prepare a report on feasibility as a basis for project paper. Special emphasis will be put on the development of an institutional analysis. Approval for a six-day work week and holiday pay is requested for all short term TDY under this activity.

Institutions: Managing USU Cooperating _____ Participating CU

PERSONNEL BY DISCIPLINE	FY 1984												
	1983			1984									
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	TOTAL
Coordinator		0.75	0.75	0.75		1.00	1.00						4.25
Agri. Engineer		0.75	0.75										1.50
Instit. Specialist	0.50	1.00											1.50
Agronomists		0.75	0.50										1.25
Sociologist		0.75	0.75										1.50
*Indian Ag. Engineer		0.75	0.75										1.50
*Indian Agronomist		0.75	0.75										1.50
*Indian Inst. Anal.	1.00	0.50											1.50
To be provided by USAID:													
Ag. Economist		(.75)	(.75)	(1.0)	(1.0)	(1.0)							(4.50)
WID Officer		(.75)	(.75)										(1.50)
Project Officer		(1.0)											(1.00)

* Local Consultants

TOTAL 14.50

Project Costs:

Item				WMS II FUNDING	MISSION CONTRIBUTION
U.S. Professional Personnel	10.0 PPM (ts)	at	$6,000	$ 60,000	
Indian Professional Personnel	4.5 PPM (nts)	at	2,000	9,000	
Travel - USA to India	- 7 trips	at	2,750	19,250 *	
Per Diem	280 days	at	90	25,200 *	
	21 days	at	100	2,100	
Other Direct Costs	15 trips	at	300	4,500 *	
Consultants				1,000	
TOTAL DIRECT COSTS				$121,050	
Indirect Costs:					
University Overhead				23,072	
CID - DBA				1,628	
- G&A				7,210	
TOTAL INDIRECT COSTS				$ 31,910	
TOTAL COST OF ACTIVITY				$152,960	
Mission Buy-In Funding				$ -0-	
WMS II Core Funding				$152,960	

* No indirect costs on these items because of direct AID funding.

Technical Assistance

INDIA

Activity Title: TA/Field Stu./TR - Maha Irr. T & M Proj. Code #1-01-021-04

Description: Provide long and short term technical assistance for conduct of proposed studies and training under the Maharashtra Irrigation Technology and Management Project. Long term assistance will begin December 1, 1983 and will continue for approximately three years. A full time resident specialist will be provided, shared one-half with the Madhya Pradesh Minor Irrigation Project. Approval for a six-day work week and holiday pay is requested for all short term TDY under this activity, but not for the long term resident specialist.

Institutions: Managing USU Cooperating _____ Participating _____

PERSONNEL BY DISCIPLINE	FY 1984												
	1983			1984									
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	TOTAL
Res. Spec. (Ag.Eng.)			0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	5.0
Tech.Sp.,US Unspec.				1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	9.0
Tech.Sp., Indian				0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	4.5
Admin.Asst., Indian				0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	4.5
Clerical, Indian				1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	9.0

TOTAL 32.0

Project Costs:

Item				WMS II FUNDING	MISSION CONTRIBUTION
US Professional Personnel	8.0 PPM (ts)	at	$6,000	$ 48,000	
US Professional Personnel	1.0 PPM (nts)	at	4,500	4,500	
Indian Professional Personnel	9.0 PPM (ts)	at	1,000	9,000	
Indian Clerical	9.0	at	222	2,000	
Travel - International	- 6 trips	at	2,750	16,500	
- In-Country	- 15 trips	at	300	4,500	
Per Diem - International	16 days	at	100	1,600	
- India	380 days	at	75	28,500	
Other Direct Costs				2,000	
Resident Specialist				44,818	
TOTAL DIRECT COSTS				$161,418	
Indirect Costs:					
University Overhead				47,367	
CID - DBA				1,302	
- G&A				16,142	
TOTAL INDIRECT COSTS				$ 64,811	
TOTAL COST OF ACTIVITY				$226,229	
Mission Buy-In Funding				$226,229	
WMS II Core Funding				$ -0-	

Resident Specialist:

Salary and Fringe, 10 months	$48,370
Housing and Post Differential	12,880
Transport of family, 1 mo. per diem	10,050
Shipment of household goods, car	17,336
Miscellaneous	1,000
	$89,636
One-half	$44,818

Technical Assistance

INDIA

Activity Title: Madhya Pradesh Minor Irr. Proj: Socio-Tech. Feas. Study Code #1-02-023-84

Description: Carry out an analysis for determining one feasibility of two control pilot projects, each consisting of a minor irrigation scheme to demonstrate the effectiveness of using high technology to develop irrigation systems that will respond to individual farmer demand. If feasible, develop scope of work for design and implementation by modern consulting firms. The feasibility study will be conducted in two phases: a two-person team will develop a scope of work during spring, and feasibility team will carry out study during third quarter, 1984. Approval for a six-day work week and holiday pay is requested for all short term TDY under this activity.

Institutions: Managing USU Cooperating _____ Participating CU

PERSONNEL BY DISCIPLINE	FY 1984												
	1983			1984									
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	TOTAL
Irrig. Engineer						0.75							0.75
Sociologist						0.75							0.75
*Unspec.5 persons,US								5.0	2.5				7.50
Indian Consultants							2.0	2.0	2.0				6.00

* Disciplines to be determined by scope-of-work. TOTAL 15.00

Project Costs:

Item		WMS II FUNDING	MISSION CONTRIBUTION
US Professional Personnel	9.0 PPM (ts) at $6,000	$ 54,000	
Indian Professional Personnel	6.0 PPM (nts) at 2,000	12,000	
Travel - International	- 7 trips at 2,750	19,250	
- In-Country	15 trips at 300	4,500	
Per Diem - International	21 days at 100	2,100	
- In-Country	315 days at 90	28,350	
Other Direct Costs		2,000	
Consultants			
TOTAL DIRECT COSTS		$122,200	
Indirect Costs:			
University Overhead		39,104	
CID - DBA		1,465	
- G&A		12,220	
TOTAL INDIRECT COSTS		$ 52,789	
TOTAL COST OF ACTIVITY		$174,989	

Mission Buy-In Funding $174,989

WMS II Core Funding . . . . . $ -0-

Technical Assistance

INDIA

Activity Title: TA/Field Stu./TR - Madhya Pr. Minor Irr. Code#1-01-025-84 (Buy-In)

Description: Provide long and short term technical assistance for conduct of training and proposed studies to be carried out under the Madhya Pradesh Minor Irrigation Project. Long term assistance will begin December 1, 1983 and will continue for approximately three years. A full time resident specialist will be provided, shared one-half with the Maharashtra Irrigation Technology and Management Project. Approval for a six-day work week and holiday pay is requested for all short term TDY under this activity, but not for the long term resident specialist.

Institutions: Managing USU Cooperating _____ Participating _____

PERSONNEL BY DISCIPLINE	FY 1984												
	1983			1984									
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	TOTAL
Res. Spec. (Ag.Eng.)			0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	5.0
Tech.Sp.,US Unspec.				1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	9.0
Tech.Sp., Indian				0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	4.5
Admin.Asst., Indian				0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	4.5
Clerical, Indian				1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	9.0

TOTAL 32.0

Project Costs:

Item				WMS II FUNDING	MISSION CONTRIBUTION
US Professional Personnel	8.0 PPM (ts)	at	$6,000	$ 48,000	
US Professional Personnel	1.0 PPM (nts)	at	4,500	4,500	
Indian Professional Personnel	9.0 PPM (ts)	at	1,000	9,000	
Indian Clerical	9.0	at	222	2,000	
Travel - International	- 6 trips	at	2,750	16,500	
- In-Country	- 15 trips	at	300	4,500	
Per Diem - International	16 days	at	100	1,600	
- India	380 days	at	75	28,500	
Other Direct Costs				2,000	
Resident Specialist				44,818	
TOTAL DIRECT COSTS				$161,418	
Indirect Costs:					
University Overhead				47,367	
CID - DBA				1,302	
- G&A				16,142	
TOTAL INDIRECT COSTS				$ 64,811	
TOTAL COST OF ACTIVITY				$226,229	

Mission Buy-In Funding $226,229

WMS II Core Funding . . . . . $ -0-

Resident Specialist:

Salary and Fringe, 10 months	$48,370
Housing and Post Differential	12,880
Transport of family, 1 mo. per diem	10,050
Shipment of household goods, car	17,336
Miscellaneous	1,000
	$89,636
One-half	$44,818

Technical Assistance

INDIA

Code #: 1-02-02b-84

Activity Title: Rajasthan MIP - CAD Modified PP Design

Description: Conduct performance analysis of CAD activities in two major projects in Rajasthan. Assist in the modification of existing Rajasthan Minor Irrigation Project Command Area Development Project Paper to integrate CAD activities in the existing plans. Sixth day pay will be paid. Activity is contingent on mission funding.

Institutions: Managing: CSU Cooperating Participating

Activity Coordinator: Dave Freeman Phone: (303) 491 - 6991

PERSONNEL BY DISCIPLINE	FY 1984												
	1983			1984									
Discipline	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
Agri. Engineer								0.50	0.50	1.00			2.00
Civil Engineer													0.00
Economist													0.00
Agronomist								0.50	0.50	1.00			2.00
Social Scientist								0.50	0.50	1.00			2.00
Coordinator		0.25			0.25			0.25					0.75
Institutional Spe								0.50	0.50	1.00			2.00

Project Costs: Item				WMS II FUNDING	8.75 MISSION CONTRIBUTION
Direct Costs					
Salaries & Benefits					
Professional	6.00 PPM (ts)	at	5,214	31,284	
Professional	2.75 PPM (nts)	at	3,851	10,590	
Travel - USA to	4 trips	at	2,950	11,800	
Per Diem	180 days	at	90	16,200	
Other Direct Costs					
Other:				13,250	
TOTAL DIRECT COSTS				$ 83,124	
Indirect Costs					
University Overhead				16,854	
CID - DBA				1,095	
- G & A				8,312	
TOTAL INDIRECT COSTS				$ 26,261	
TOTAL COST OF ACTIVITY				$ 109,385	
Mission Buy-in Funding				$ 0	
WMS II Core Funding				$ 109,385	

Technical Assistance

INDIA

Code #: 1-02-027-84

Activity Title: Rajasthan MIP

Description: Various TDY activities to assist GOR with MIP operations. These activities include the development and conducting of various irrigation workshops. Activity is mission funded. Sixth day pay will be paid.

Institutions: Managing: CSU Cooperating Participating

Activity Coordinator: Dan Sunada / Terry Podmore Phone: (303) 491 - 6991

PERSONNEL BY DISCIPLINE	FY 1984												
	1983			1984									
Discipline	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
Agri. Engineer													0.00
Civil Engineer													0.00
Economist													0.00
Agronomist													0.00
Social Scientist													0.00
Coordinator													0.00
													0.00
													0.00

Project Costs:

Item			WMS II FUNDING	MISSION CONTRIBUTION
Direct Costs				
Salaries & Benefits				
Travel - USA to	trips	at		
Per Diem	days	at		
Other Direct Costs			100,000	
TOTAL DIRECT COSTS			$ 100,000	
Indirect Costs				
University Overhead			0	
CID - DBA			0	
- G & A			0	
TOTAL INDIRECT COSTS			$ 0	
TOTAL COST OF ACTIVITY			$ 100,000	
Mission Buy-In Funding			$ 100,000	
WMS II Core Funding			$ 0	

Technical Assistance

INDIA

Code #: 1-02-074-84

Activity Title: Hill Irrigation Project Preparation--Phase II

Description: To provide assistance to Mission in preparation of project plan and documentation for assistance to small-scale irrigation development in State of Himachal Pradesh. Continuation of FY83 activity.

Institutions: Managing Cornell Cooperating USU Participating _____

Activity Coordinator: E. Walter Coward Phone: (607) 256 - 5495

PERSONNEL BY DISCIPLINE	1983			FY 1984 1984									
Discipline	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
Agri. Engineer	1.00												1.00
Civil Engineer													0.00
Economist													0.00
Agronomist													0.00
Social Scientist													0.00
Consultant	1.00	1.00	1.00										3.00
													0.00
													4.00

Project Costs: Item				WMS II FUNDING	MISSION CONTRIBUTION
Direct Costs					
Salaries & Benefits					
Professional	1 PPM (ts)	at	4,766	4,766	
Travel - USA to	1 trips	at	3,000	3,000	
Per Diem	31 days	at	100	3,100	
Other Direct Costs					
Consultants					
Fee	83 days	at	240.5	19,962	
Travel	1 trips	at	2,750	2,750	
Per Diem	92 days	at	85	7,820	
Other: DBA	4.5 days	at	100	450	
				263	
TOTAL DIRECT COSTS				$ 42,111	
Indirect Costs					
University Overhead				14,938	
CID - DBA				0	
- G & A				4,169	
TOTAL INDIRECT COSTS				$ 19,107	
TOTAL COST OF ACTIVITY				$ 61,218	
Mission Buy-In Funding				$ 0	
WMS II Core Funding				$ 61,218	

Training and Technology Transfer

INDIA

Code #: 2-13-030-84

Activity Title: Development of Handbooks

Description: Identify priorty subjects, and develop outlines, and write handbooks for use by field irrigation water management staff in India. Host country professionals will assist in planning and writing the handbooks.

DELETED

Training and Technology Transfer

INDIA

Code #: 2-02-031-84

Activity Title: DA Workshop Madya Pradesh

Description: Diagnostic Analysis Workshop to be held in Madhya Pradesh during January and February of 1984 to train Irrigation and Agriculture Department field officers in interdisciplinary water management. Sixth day pay will be paid. Mission to provide all travel and per diem costs.

Institutions: Managing: CSU Cooperating Participating

Activity Coordinator: Mohammed Haider Phone: (303) 491 - 6991

PERSONNEL BY DISCIPLINE	FY 1984												
	1983			1984									
Discipline	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
Agri. Engineer				0.50	1.00	1.00							2.50
Civil Engineer													0.00
Economist				0.50	1.00	1.00							2.50
Agronomist				0.50	1.00	1.00							2.50
Social Scientist				0.50	1.00	1.00							2.50
Coordinator	1.00			0.50	1.00	1.00							3.50
Editor							0.50	0.50					1.00
													14.50

Project Costs: Item				WMS II FUNDING	MISSION CONTRIBUTION
Direct Costs					
Salaries & Benefits					
Professional	8 PPM (ts)	at	5,214	41,712	
Professional	6.5 PPM (nts)	at	3,851	25,032	
Travel - USA to	5 trips	at	2,950	14,750 *	17,700
Per Diem	10 days	at	105	1,050 *	
	70 days	at	90	6,300 *	
	50 days	at	66	3,300 *	6,600
	12 days	at	90	1,080 *	
	2 days	at	105	210 *	
	150 days	at	50	7,500	
Other Direct Costs				1,184	
TOTAL DIRECT COSTS				$ 102,118	$ 24,300
Indirect Costs					
University Overhead				21,679	0
CID - DBA				1,460	0
- G & A				10,213	0
TOTAL INDIRECT COSTS				$ 33,352	$ 0
TOTAL COST OF ACTIVITY				$ 135,470	$ 24,300
Mission Buy-in Funding				$	
WMS II Core Funding				$ 135,470	

Training and Technology Transfer

INDIA

Activity Title: Senior Officer's Workshop

Code #2-04-053-84

Description: Six short workshops will be held, one at the Center and one in each of five States. A final roundup will be held at the Center. The purposes of the workshops are to provide orientation of high level government of Indian and State officials in principles of improved water management, purposes and implementation of USAID Water Management and Training Project and to explore and discuss policy and operational ways to realize improved irrigation water management as a national objective. Approval for a six-day work week and holiday pay is requested for all short term TDY under this activity.

Institutions: Managing USU Cooperating _____ Participating _____

Activity Coordinator: Dean F. Peterson Phone: (801) 750-1149

PERSONNEL BY DISCIPLINE	FY 1984												
	1983			1984									
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	TOTAL
US Leader (Ag.Eng.)	0.25		0.5	1.0									1.75
US Consul,Unspecif.			0.5	2.0									2.50
India Ldr.,Unspec.	1.00	0.75	1.0	1.0	0.50								4.25
India Consul,Unspec				1.0	0.25								1.25

TOTAL 9.75

Project Costs: Item		WMS II FUNDING	MISSION CONTRIBUTION
Professional Personnel - U.S.	4.25 PPM at $5,911	$25,125	
Professional Personnel - Indian	5.50 PPM at 3,545		$19,500
Travel - International	4 trips at 2,750	11,000 *	
- In India	33 trips at 300	9,900 *	
Per Diem - U.S.	30 days at 75		2,250
- India	190 days at 90	17,100 *	
Other Direct Costs			22,500
Consultants			
TOTAL DIRECT COSTS		$63,125	$44,250
Indirect Costs:			
University Overhead		8,040	
CID - DBA		682	
- G&A		2,513	
TOTAL INDIRECT COSTS		$11,235	
TOTAL COST OF ACTIVITY		$74,360	$44,250

Mission Buy-In Funding . . . . . $ -0-

WMS II Core Funding $74,360

* Since these costs are direct rupee payments through AID/Washington from the Mission, no overhead is charged.

Training and Technology Transfer

2-14-076-84

INDIA

Activity Title: Seminar to Review Indian Experiences with Water User Associations

Description: The purpose of this seminar is to acquaint Synthesis staff and other AID personnel with the current state of experience and thinking about farmer organization in India and water user groups. This interchange is needed because the Synthesis Project is becoming increasingly involved with assisting the AID/Delhi mission in designing and implementing activities related to farmer organization for water management (see TA activities in Himachal Pradesh and Maharastra. The new understandings gained from the seminar would serve as the basis for a systematic approach to designing special studies and other activities related to organization for water management in India. Participants would include key staff from Cornell, CSU, and USU, other selected academics with Indian rural organization experience, Indian researchers, and selected AID/W and AID/Delhi staff.

DELETED

Special Studies

INDIA

Activity Title: Irrigation Project Monitoring

Code #3-04-020-84

Description: This Mission requested activity will be done in conjunction with the Interdisciplinary Irrigation Systems Studies being conducted as a separate Special Study. If USAID India agrees, in preparation for this monitoring activity, a three-person team representing the three universities conveyance subsystem, application/production subsystem and small-scale (community-based) systems, will visit India to review potential candidate systems and develop a detailed scope of work. After arrangements are developed, the USU portion of the activity can be supported under the Special Study. The Water Resources Training Development Center, University of Roorkee has a well advanced systems study of the Salawa lateral of the Ganga Canal in Uttar Prastisle under Ford Foundations sponsorship. If arrangements can be made the team will visit Roorkee to discuss possible collaboration and review available collaborative arrangements, possibly the Indian Institutes of Management, and university resourses in the area.

Institutions: Managing USU Cooperating _____ Participating _____

Activity Coordinator: Dean F. Peterson Phone: (801) 750-1149

PERSONNEL BY DISCIPLINE	FY 1984												
	1983			1984									
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	TOTAL
Irrig. Engineer				1.0									1.0
Ag. Engineer				1.0									1.0
Sociologist				1.0									1.0

TOTAL 3.0

Project Costs:

Item				WMS II FUNDING	MISSION CONTRIBUTION
Professional Personnel	3.00 PPM (ts)	at	$6,000	$ 18,000	
Travel - USA to India	3 trips	at	2,750	8,250	
- In-Country Travel	9 trips	at	300	2,700	
Per Diem - International	9 days	at	100	900	
- India	30 days	at	75	2,250	
Other Direct Costs				300	
Consultants					
TOTAL DIRECT COSTS				$ 32,400	
Indirect Costs:					
University Overhead				10,368	
CID - DBA				488	
- G&A				3,240	
TOTAL INDIRECT COSTS				$ 14,096	
TOTAL COST OF ACTIVITY				$ 46,496	

Mission Buy-In Funding . . . . . $ 46,496

WMS II Core Funding . . . . . $ -0-

UNIVERSITY: OVERALL

COUNTRY: India

PERSONNEL BY DISCIPLINE	FY 1984												
	1983			1984									
Discipline	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
Adm. Asst. - Indian				1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	9.00
Agri. Engineer	1.00	0.75	1.25	1.00	1.50	1.50	1.00	0.50	0.50	1.00			10.00
Agri. Engineer - Indian		0.75	0.75										1.50
Agronomist	0.75	0.50		0.50	1.00	1.00		0.50	0.50	1.00			5.75
Agronomist - Indian		0.75	0.75										1.50
Clerical - Indian				2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	18.00
Civil Engineer				0.50		0.50	1.00						2.00
Consultant - Agri. Engr.			1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	10.00
Consultant - Indian				1.00	0.25		2.00	2.00	2.00				7.25
Consultant - US			0.50	2.00									2.50
Coordinator	1.00	4.00	0.75	1.25	1.25	2.00	1.00	0.25					11.50
Economist					0.50	1.00	1.00						2.50
Editor			0.50		0.50		1.00	0.50					2.50
Inst. Anal. - Indian	1.00	0.50											1.50
Institutional Specialist	0.50	1.00						0.50	0.50	1.00			3.50
Irrigation Engineer						0.75							0.75
Leader - Indian	1.00	0.75	1.00	1.00	0.50								4.25
Leader - US	0.25		0.50	1.00									1.75
Political Scientist				1.00									1.00
Rural Sociologist				0.50									0.50
Social Scientist				0.50	1.00	1.00	0.50	0.50	1.00				4.50
Sociologist		0.75	0.75			0.75							2.25
Tech. Sp. - Indian				1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	9.00
Technical Specialist				2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	18.00
Unspecified								5.00	2.50				7.50
													138.50

Technical Assistance

INDONESIA

Code #: 1-01-008-84

Activity Title: Long Term Water Management Specialist

Description: A long term Water Management Specialist is requested to participate in the management of "High Performance Sederhana Irrigation Systems" (HPSIS) project. Specialist will be largely responsible for collection and analysis of engineering data and for coordinating his analysis with the other kinds of research planned for HPSIS.

Specialist's administrative duties will require close work with the participating Indonesian Ministries of Agriculture, Public Works (Irrigation), and Home Affairs and other relevant academic institutions connected with the project work (Gajah Mada and regional universities). This activity is funded by the mission.

Institutions: Managing CSU Cooperating Participating

Activity Coordinator: Ramchand Oad

Phone: (303) 491 - 6991

PERSONNEL BY DISCIPLINE	FY 1984												
	1983			1984									
Discipline	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
Agri. Engineer			1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	10.00
Civil Engineer													0.00
Economist								1.00					1.00
Agronomist													0.00
Social Scientist								1.00					1.00
Coordinator													0.00
													0.00

Project Costs: Item				WMS II FUNDING	12.00 MISSION CONTRIBUTION
Direct Costs					
Salaries & Benefits					
Professional	12 PPM (ts)	at	3,970	45,504	
Professional	0 PPM (nts)	at	3,792	0	
Travel - USA to	8 trips	at	1,175	9,400	
Per Diem	14 days	at	90	1,260	
Other Direct Costs				41,520	
TOTAL DIRECT COSTS				$ 97,684	
Indirect Costs					
University Overhead				21,490	
CID - DBA				1,171	
- G & A				9,768	
TOTAL INDIRECT COSTS				$ 32,429	
TOTAL COST OF ACTIVITY				$ 130,113	
Mission Buy-in Funding				$ 130,113	
WMS II Core Funding				$ 0	

Technical Assistance

INDONESIA

Code #: 1-02-009-84

Activity Title: Short Term Water Management Specialist

Description: To assist with the early stages of the engineering data collection activity under the "High Performance Sederhana Irrigation Systems" (HPSIS) project. Duties to include calibrating flow measuring stations at selected HPSIS sites, examine existing data collection procedures, and check installation of water measuring instruments. Also suggest some guidelines for analyzing engineering data in combination with socio-economic data should be developed. Sixth day pay will be paid. This activity is funded by the mission.

DELETED

Technical Assistance

INDONESIA

Activity Title: Small-Scale Irrigation Operation and Maintenance Project 1-2-11-84

Description: Upgrading technical capacity of provincial irrigation services to design and construct small-scale systems; consolidation of O&M financing for small-scale systems; improving water users association; helping to design effective applied water management research programs

Institutions: Managing: CORNELL Cooperating: USU Participating _____

Activity Coordinator: E. Walter Coward Phone: (607) 256-5495

PERSONNEL BY DISCIPLINE	FY 1984												
	1983			1984									
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	TOTAL
Agr. Economists									1.5	---	---		1.5
Agri. Eng./Agron.				.5					1.5	---	---		2.0
Social Scientist				.5					2.0	---	---		2.5
											TOTAL		6.0

Project costs

Item		WMS-II FUNDING	MISSION CONTRIBUTION
Direct Costs			
Salaries & Benefits			
Professional Personnel	6 PPM at $4,766	28,596	
Travel - USA to Jakarta	2 trips at $3,200	6,400	
in Indonesia	3 trips at $3,200		9.600
	6 trips at 500		3,000
Per Diem	124 days at $ 90		11,160
DBA		459	
Other Direct Costs			1,000
TOTAL DIRECT COSTS		$35,455	$24,760
Indirect Costs			
University Overhead (51.975%)		15,503	
CID & G&A		3,510	
TOTAL INDIRECT COSTS		$19,013	
TOTAL COST OF ACTIVITY		$54,468	24,760

Mission Buy-In Funding..... $ 0

WMS-II Core Funding..... $54,468

Training and Technology Transfer

INDONESIA

Code #: 2-02-010-84

Activity Title: D A Workshop

Description: A training program for district level GOI officials involved with irrigation development. Trainees will be from Ministries of Agriculture, Public Works, and Home Affairs. Objectives of training are to familiarize trainees with techniques in monitoring the impacts of water users' participation on the performance of irrigation systems and to impart a comprehensive understanding of irrigation system management. The training program should be based on the "Diagnostic Analysis of Irrigation Systems" approach developed by WMSII. Sixth day day will be paid.

Institutions: Managing: CSU Cooperating: Participating:

Activity Coordinator: Terry Podmore / Dave Redgrave Phone: (303) 491 - 6991

PERSONNEL BY DISCIPLINE	FY 1984												
	1983			1984									
Discipline	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
Agri. Engineer								0.50	1.00	1.00			2.50
Civil Engineer								0.50	1.00	1.00			2.50
Economist								0.50	1.00	1.00			2.50
Agronomist								0.50	1.00	1.00			2.50
Social Scientist								0.50	1.00	1.00			2.50
Coordinator			0.50			0.50							1.00
Editor										1.00			1.00
													14.50

Project Costs:

Item				WMS II FUNDING	MISSION CONTRIBUTION
Direct Costs					
Salaries & Benefits					
Professional	8 PPM (ts)	at	5,214	41,712	
Professional	6.5 PPM (nts)	at	3,851	25,032	
Travel - USA to	11 trips	at	2,480	27,280	
Per Diem	70 days	at	88	6,160	
	150 days	at	42	6,300	
	10 days	at	105	1,050	
	12 days	at	88	1,056	
	2 days	at	105	210	
	150 days	at	50	7,500	
Other Direct Costs					
Other:				10,000	
TOTAL DIRECT COSTS				$ 126,300	
Indirect Costs					
University Overhead				36,366	
CID - DBA				1,460	
- G & A				12,630	
TOTAL INDIRECT COSTS				$ 50,456	
TOTAL COST OF ACTIVITY				$ 176,756	
Mission Buy-In Funding				$ 0	
WMS II Core Funding				$ 176,756	

$20,000

UNIVERSITY: OVERALL

COUNTRY: Indonesia

PERSONNEL BY DISCIPLINE	FY 1984												
	1983			1984									
Discipline	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
Ag. Economist									1.00				1.00
Agri. Engineer		0.75	1.75	1.00	1.00	1.00	1.00	1.50	2.00	2.00	1.00	1.00	14.00
Agri. Engineer/Agron.				0.50					1.00				1.50
Agronomist								0.50	1.00	1.00			2.50
Civil Engineer								0.50	1.00	1.00			2.50
Coordinator	0.25		0.50			0.50	0.25						1.50
Economist								1.50	1.00	1.00			3.50
Editor										1.00			1.00
Social Scientist				0.50				1.50	2.00	1.00			5.00
													32.50

Budget Catagory: Training and Technology Transfer

COUNTRY: Nepal

Code #: 2-02-003-84

Activity Title: DA Workshop Planning

Description: Planning for Diagnostic Analysis Workshop for 30 mid-level and junior staff from Department of Irrigation and Ministry of Panchayat and Local Development. To be conducted in early FY 1985.

Institutions: Managing CSU Cooperating: CU Participating

Activity Coordinator: Dave Redgrave / Robby Laitos Phone: (303) 491 - 6991

PERSONNEL BY DISCIPLINE	FY 1984												
	1983			1984									
Discipline	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
Agri. Engineer													0.00
Civil Engineer													0.00
Economist													0.00
Agronomist													0.00
Social Scientist													0.00
Coordinator						0.50	0.50						1.00
													0.00
													1.00

Project Costs: Item				WMS II FUNDING	MISSION CONTRIBUTION
Direct Costs					
Salaries & Benefits					
Professional	.5 PPM (ts)	at	5,214	2,607	
Professional	.5 PPM (nts)	at	3,851	1,926	
Travel - USA to	1 trips	at	2,950	2,950	
Per Diem	15 days	at	58	870	
TOTAL DIRECT COSTS				$ 8,353	
Indirect Costs					
University Overhead				3,007	
CID - DBA				91	
- G & A				835	
TOTAL INDIRECT COSTS				$ 3,933	
TOTAL COST OF ACTIVITY				$ 12,286	
Mission Buy-In Funding				$ 0	
WMS II Core Funding				$ 12,286	

UNIVERSITY: OVERALL

COUNTRY: Nepal

PERSONNEL BY DISCIPLINE	FY 1984												
	1983			1984									
Discipline	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
Agri. Engineer													0.00
Agronomist													0.00
Civil Engineer													0.00
Economist													0.00
Social Scientist													0.00
Coordinator						0.50	0.50						1.00
													0.00
													0.00
													0.00
													1.00

PAKISTAN Code #: 2-04-019-84

Activity Title: Senior Officer's Workshop/Seminar

Description: Seminar for senior officers to enhance appreciation of integrated approach to Improved system management. Sixth day pay is requested. Materials and curriculum will be prepared to familiarize senior officers with the fundamental principles and concepts of water management. The materials will be tested prior to the International Commission on Irrigation and Drainage.

Institutions: Managing: CSU Cooperating: Participating

Activity Coordinator: Ramchand Oad Phone: (303) 491 - 6991

PERSONNEL BY DISCIPLINE	FY 1984												
	1983			1984									
Discipline	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
Agri. Engineer										0.50	1.00		1.50
Civil Engineer													0.00
Economist											1.00		1.00
Agronomist													0.00
Social Scientist													0.00
Coordinator													0.00
													0.00
													2.50

Project Costs: Item				WMS II FUNDING	MISSION CONTRIBUTION
Direct Costs					
Salaries & Benefits					
Professional	2.00 PPM (ts)	at	5,214	10,428	
Professional	2.00 PPM (nts)	at	3,851	7,702	
Travel - USA to	2.00 trips	at	2,950	5,900	
Per Diem	60.00 days	at	68	4,080	
Other Direct Costs					
Other:				4,345	
TOTAL DIRECT COSTS				$ 32,455	
Indirect Costs					
University Overhead				13,880	
CID - DBA				365	
- G & A				3,246	
TOTAL INDIRECT COSTS				$ 17,491	
TOTAL COST OF ACTIVITY				$ 49,946	
Mission Buy-in Funding				$ 19,205	
WMS II Core Funding				$ 30,741	

UNIVERSITY: OVERALL

COUNTRY: Pakistan

PERSONNEL BY DISCIPLINE	FY 1984												
	1983			1984									
Discipline	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
Agri. Engineer										0.50	1.00		1.50
Agronomist													0.00
Civil Engineer													0.00
Economist											1.00		1.00
Social Scientist													0.00
													0.00
													0.00
													0.00
													0.00
													2.50

Technical Assistance

SRI LANKA

Activity Title: Farmer Organization Program 1-02-007-84

Description: Evaluation of models of farmer organization in terms of their applicability to major irrigation schemes throughout Sri Lanka

Institutions: Managing: CORNELL Cooperating _____ Participating _____

Activity Coordinator: Norman Uphoff Phone: (607) 256-6370

PERSONNEL BY DISCIPLINE	FY 1984												
	1983			1984									
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	TOTAL
Political Science	1.5	---	---	---	--	---	---	---	---	---	---	---	1.5
Economist.	.75	---	---	---	---	---	---	---	---	---	---	---	.75
Irri.Engineer	1.5	---	---	---	---	---	---	---	---	---	---	---	1.5
											TOTAL		3.75

Project costs

Item		WMS-II FUNDING	MISSION CONTRIBUTION
Direct Costs			
Salaries & Benefits			
Professional Personnel	3.75 PPM at $4,776	$17,873	
Travel - USA to Colombo	3 trips at $3,200	9,600	
Dhaka to Colombo	2 trips at $1,000	2,000	
Per Diem	6 days at $ 100	600	
DBA	112 days at $ 84	9,450	
		431	
Long term TA & Special Studies			150,000
Other Direct Costs		1,000	
TOTAL DIRECT COSTS		$40,954	
Indirect Costs			
University Overhead (51.975%)		$19,458	
CID G&A		4,054	
TOTAL INDIRECT COSTS		$23,512	
TOTAL COST OF ACTIVITY		64,466	
Mission Buy-In Funding.....		$ 0	
WMS-II Core Funding.....		$64,466	

Technical Assistance

COUNTRY: SRI LANKA

Code #: 1-01-022-84

Activity Title: Water Management Central Support

Description: One long term (23 months) adviser and short term TA totaling 4 PPM in FY84 to identify systems in need of rehabilitation, determine specific needs, and set up and operate a monitoring and evaluation system for schemes receiving improvement. Mission is providing cost of long-term person.

Institutions: Managing: CSU Cooperating Participating

Activity Coordinator: Larry Nelson / Dave Redgrave Phone: (303) 491 - 6991

PERSONNEL BY DISCIPLINE	FY 1984												
	1983			1984									
Discipline	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
Agri. Engineer						0.25	1.00	0.25					1.50
Civil Engineer													0.00
Economist						0.25	1.00	0.25					1.50
Agronomist				1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	9.00
Social Scientist						0.25	1.00	0.25					1.50
Coordinator			0.50										0.50
													0.00
													14.00

Project Costs: Item				WMS II FUNDING	MISSION CONTRIBUTION
Direct Costs					
Salaries & Benefits					
Professional	12.00 PPM (ts)	at	4,770	57,240	
Professional	2.00 PPM (nts)	at	3,851	7,702	
Travel - USA to	5.00 trips	at	2,890	14,450	
Per Diem	90.00 days	at	95	8,550	
Other Direct Costs					
Other: Supplies				18,750	
TOTAL DIRECT COSTS				$ 106,692	
Indirect Costs					
University Overhead				20,425	
CID - DBA				2,003	
- G & A				10,669	
TOTAL INDIRECT COSTS				$ 33,097	
TOTAL COST OF ACTIVITY				$ 139,789	
Mission Buy-in Funding				$ 80,805	
WMS II Core Funding				$ 58,984	

Training and Technology Transfer

Sri Lanka

Code #: 2-02-006-84

Activity Title: DA Workshop

Description: Third Diagnostic Analysis Workshop to be held in June and July 1984. Training site expected to be at Amparai using the Gal Oya project as study site and example of rehabilitation activities. In country report writing session with host country counterparts responsible for report. Participants will be expected to lead in future DA training activities. Sixth day pay will be paid. Activity contigent on mission funding.

Institutions: Managing CSU Cooperating Participating

Activity Coordinator: Larry Nelson / Dave Redgrave Phone: (303) 491 - 6991

PERSONNEL BY DISCIPLINE	FY 1984												
	1983			1984									
Discipline	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
Agri. Engineer									1.00	1.00	0.50		2.50
Civil Engineer													0.00
Economist									1.00	1.00	0.50		2.50
Agronomist									1.00	1.00	0.50		2.50
Social Scientist									1.00	1.00	0.50		2.50
Coordinator				0.50				0.50					1.00
													0.00

Project Costs: Item				WMS II FUNDING	11.00 MISSION CONTRIBUTION
Direct Costs					
Salaries & Benefits					
Professional	6 PPM (ts)	at	5,214	31,284	13,035
Professional	2.5 PPM (nts)	at	3,851	3,851	5,777
Travel - USA to Sri Lanka	4 trips	at	2,890	0	11,560
	1 trips	at	2,890	0	2,890
Per Diem	72 days	at	95	0	6,840
	180 days	at	63	0	11,340
	10 days	at	105	0	1,050
Other Direct Costs				18,750	18,750
TOTAL DIRECT COSTS				$ 53,885	71,242
Indirect Costs					
University Overhead				15,384	
CID - DBA				924	
- G & A				5,389	
TOTAL INDIRECT COSTS				$ 21,697	
TOTAL COST OF ACTIVITY				$ 75,582	$ 71,242
Mission Buy-in Funding				$ 75,582	
WMS II Core Funding				$ 0	

UNIVERSITY: CSU

COUNTRY: Sri Lanka

PERSONNEL BY DISCIPLINE	FY 1984												
	1983			1984									
Discipline	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
Agri. Engineer						0.25	1.00	0.25	1.00	1.00	0.50		4.00
Agronomist				1.00	1.00	1.00	1.00	1.00	2.00	2.00	1.50	1.00	11.50
Coordinator			0.50	0.50				0.50					1.50
Economist	0.75					0.25	1.00	0.25	1.00	1.00	0.50		4.75
Irrigation Engineer	1.50												1.50
Political Scientist	1.50												1.50
Social Scientist						0.25	1.00	0.25	1.00	1.00	0.50		4.00
													0.00
													0.00
													28.75

Latin America Bureau

Training and Technology Transfer

ECUADOR

Activity Title: Finishing Original Training Modules

Code #2-03-054-84

Description: Under the FY 83 work plan, work was begun on a two-year program to develop conceptual video training modules, in part in response to the request of the Ecuador Mission. The program is developing 45 video modules through the use of computer animation and graphics which will be used as training aids for courses for engineers, agronomists, and government officials in Ecuador who are involved in irrigation development. The program represents a pioneering effort in the development and application of computer graphics to irrigation training.

During FY 83 a mission buy-in financed the direct costs of the activity which should be completed by the end of calendar 1983. This budget is for the completion of the modules as originally agreed with the Misson. Please see the appendix for a detailed explanation of this activity.

Institutions: Managing USU Cooperating _____ Participating _____

Activity Coordinator: David Daines Phone: (801) 750-2792

PERSONNEL BY DISCIPLINE	FY 1984												
	1983			1984									
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
Manager	1.00	1.00	0.50										2.50
ITV Technician	1.00	1.00	0.50										2.50
Engineer	1.00	1.00											2.00
Graphics Supervisor	0.50	0.25	0.25										1.00
Coordinator	1.00	1.00	1.00										3.00
GPM - Inst. Media	0.50	0.50	0.50										1.50
GPM - Graphics	2.00	1.00											3.00
GPM - Script Reader	1.50	1.50	1.00										4.00
GPM - Translator	1.00	1.00											2.00
Secretary	0.50	0.50	0.50										1.50
Accountant	0.25	0.25	0.25										0.75

TOTAL 23.75

Project Costs:

Item			WMS II FUNDING	MISSION CONTRIBUTION
Professional Personnel	7.50 PPM (nts)	at $3,600	$ 27,000	
Technicians	3.50 PPM (nts)	at 2,200	7,700	
Graduate Students	10.50 GPM (nts)	at 1,200	12,600	
Support Staff	2.25 GPM (nts)	at 1,200	2,700	
Travel	trips	at		
Per Diem	days	at		
Other Direct Costs				
Consultants			6,400	
TOTAL DIRECT COSTS			$ 56,400	
Indirect Costs:				
University Overhead			18,048	
CID - DBA - G&A			5,640	
TOTAL INDIRECT COSTS			$ 23,688	
TOTAL COST OF ACTIVITY			$ 80,088	

Mission Buy-In Funding . . . . . $ -0-

WMS II Core Funding . . . . . $ 80,088

Training and Technology Transfer

ECUADOR

Activity Title: Instructional Manual

Code #2-03-055-84

Description: As part of the development of the video training modules for courses to train trainers, the Ecuador Mission and the USU Ecuavir team have come to see the importance of the development of an instructional manual to accompany the modules. The manual will include: (a) the teaching objectives of each module, (b) the script of each module, (c) field exercises which can be carried out to demonstrate the objectives of each module, (d) a series of questions to test the students' level of understanding of the principles being taught in the modules. The manual will contain graphics summarizing the technologies being taught. Please see the appendix for a detailed explanation of this activity.

Institutions: Managing USU Cooperating _____ Participating _____

Activity Coordinator: David Daines Phone: (801) 750-2792

PERSONNEL BY DISCIPLINE	FY 1984												
	1983			1984									
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
Tech. Supervisor	0.25						0.25						0.50
Technical Editor	1.00	1.00	1.00	1.00	0.50								4.50
GPM/Spanish Trans.					1.00	1.50	1.50						4.00
Secretary							1.00						1.00

TOTAL 10.00

Project Costs:

Item				WMS II FUNDING	MISSION CONTRIBUTION
Professional Personnel	0.50 PPM (nts)	at	$4,500	$ 2,250	
Technicians	4.50 PPM (nts)	at	1,667	7,502	
Graduate Students	4.00 GPM (nts)	at	1,200	4,800	
Support Staff	1.00 (nts)	at	1,200	1,200	
Travel	trips	at			
Per Diem	days	at			
Other Direct Costs					
Consultants				1,000	
TOTAL DIRECT COSTS				$ 16,752	
Indirect Costs:					
University Overhead				5,361	
CID - DBA - G&A				1,675	
TOTAL INDIRECT COSTS				$ 7,036	
TOTAL COST OF ACTIVITY				$ 23,788	

Mission Buy-In Funding . . . . . $ 23,788

WMS II Core Funding . . . . . $ -0-

Training and Technology Transfer

ECUADOR

Activity Title: Training and Evaluation

Code #2-03-056-84

Description: As part of the development of the training modules, it was contemplated that Title XII would fund an evaluation of the modules as the basis for revisions. The evaluation was to be carried out through realistic use--i.e. a training course which utilized the modules. The project was not funded, yet the Mission still feels that this is an important part of the final polishing of the modules. This activity would fund the costs of the training course and the revisions of the modules which would be made on the basis of the evaluation of the modules in the course. Please see the appendix for a detailed explanation of this activity. Approval for a six-day work week and holiday pay is requested for all short term TDY under this activity.

DELETED

Training and Technology Transfer

ECUADOR

Activity Title: Farmer Modules

Code #2-03-057-84

Description: The Ecuador Mission has requested that the training modules that have been developed under the Ecuavir program be used as the basis for the development of modules for training farmers through extension. Under this program a set of modules would be developed which would also use computer graphics to teach farmers various techniques and approaches to on-farm water management. This would be accomplished principally by modifying the modules which have been developed for trainers, which are appropriate for farmers, as well as through the development of new modules. It is contemplated that the program would develop from 10 to 20 farmer level modules. As part of the development, preliminary modules would be taken out into the field and shown to farmers in Ecuador to evaluate their effectiveness and the need for revisions.

The program would be an important and integral part of the community level focus of the WMS II program. It would take the technology that is being developed under the Ecuavir project and extend it to farmers directly. This offers the means of radically changing the cost of extension and the way farmers are taught. The use of video modules eliminates the necessity of an extension agent spending all of his time on a one-on-one basis with farmers which makes extension costs so high. Secondly, it allows a new technology to be employed to explain to illiterate farmers concepts which they cannot obtain through books and pamphlets. Lastly, it allows extension agents to visually explain concepts which are otherwise difficult to grasp through verbal explanations. Because of the world wide applicability of the modules, WMS II funding would be appropriate. Please see the appendix for a detailed explanation of this activity. Approval for a six-day work week and holiday pay is requested for all short term TDY under this activity.

DELETED

UNIVERSITY: OVERALL

COUNTRY: Ecuador

PERSONNEL BY DISCIPLINE	FY 1984												
	1983			1984									
Discipline	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
Accountant	0.25	0.25	0.25										0.75
Agri. Engineer					1.00								1.00
Coordinator	1.00	1.00	1.00	2.50	0.25	0.25							6.00
Editor - Technical	1.00	1.00	1.00	4.00	0.50								7.50
Engineer	1.00	1.00											2.00
Graphics Supervisor	0.50	0.25	0.25										1.00
Manager	1.00	1.00	0.50										2.50
Other				2.00									2.00
Secretary	0.50	0.50	0.50				1.00						2.50
Social Scientist					1.00								1.00
Technical Supervisor	0.25						0.25						0.50
Technician - Graphics				2.50									2.50
Technician - ITV	1.00	1.00	0.50										2.50
Technician - Video				4.00		1.00							5.00
													36.75

Technical Assistance

GUATEMALA

Activity Title: Baseline Survey

Code #1-02-052-84

Description: Provide assistance to USAID/Guatemala in conducting a baseline survey in order to measure the impact of irrigation components of mission agricultural projects. Approval for a six-day work week and holiday pay is requested for all short time TDY under this activity.

DELETED

UNIVERSITY: OVERALL

COUNTRY: Guatemala

PERSONNEL BY DISCIPLINE	FY 1984												
	1983			1984									
Discipline	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
Agri. Engineer				1.00									1.00
Agronomist				1.00									1.00
Economist				1.00									1.00
Sociologist				1.00									1.00
													4.00

Technical Assistance

HAITI

Activity Title: Irrigation Sector Survey

Code #1-04-017-84

Description: An evaluation is currently being carried out in Haiti of an integrated Rural Development Project which contains a large irrigation component. On the basis of this evaluation being carried out through the WMS-II Project, the team will determine the potential for irrigation development. If this determination is positive, then a team will be formed under the project to conduct an irrigation sector assessment in FY 84 to provide guidance to the Mission regarding development options and investment opportunities in irrigation in Haiti. Approval for a six-day work week and holiday pay is requested for all short term TDY under this activity.

Institutions: Managing USU Cooperating _____ Participating _____

PERSONNEL BY DISCIPLINE	FY 1984												
	1983			1984									
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	TOTAL
Agri. Engineers									0.5	1.0			1.5
Economists									0.5	1.0		-	1.5
Agronomists									0.5	1.0			1.5
Social Scientists									0.5	1.0			1.5
Institutional Exp.				1.0					0.5	1.0			2.5

TOTAL 8.5

Project Costs:

Item				WMS II FUNDING	MISSION CONTRIBUTION
Professional Personnel	6.00 PPM (ts)	at	$6,000	$ 36,000	
Professional Personnel	2.50 PPM (nts)	at	4,500	11,250	
Travel - USA to Haiti	- 6 trips	at	900		$ 5,400
Per Diem	150 days	at	84		12,600
Other Direct Costs					2,000
Consultants					
TOTAL DIRECT COSTS				$ 47,250	$ 20,000
Indirect Costs:					
University Overhead				15,120	
CID - DBA				977	
- G&A				4,725	
TOTAL INDIRECT COSTS				$ 20,822	
TOTAL COST OF ACTIVITY				$ 68,072	$ 20,000

Mission Buy-In Funding . . . . . $ 47,072

WMS II Core Funding . . . . . $ 21,000

UNIVERSITY: OVERALL

COUNTRY: Haiti

PERSONNEL BY DISCIPLINE	FY 1984												
	1983			1984									
Discipline	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
Agri. Engineer									0.50	1.00			1.50
Agronomist									0.50	1.00			1.50
Economist									0.50	1.00			1.50
Institutional Specialist				1.00					0.50	1.00			2.50
Social Scientist									0.50	1.00			1.50
													8.50

Technical Assistance

PERU

Activity Title: Expansion of Small and Medium Irrig. Systems. Code #1-02-035-84

Description: Technical assistance would be provided for the expansion of small and medium irrigation systems in the Sierra. Assistance would be focused in (a) on-farm water management, (b) system maintenance and community participation, and (c) design of research for identifying small farmer constraints to improved water use and management. Approval for a six-day work week and holiday pay is requested for all short term TDY under this activity.

Institutions: Managing USU Cooperating CU Participating _____

PERSONNEL BY DISCIPLINE	FY 1984												
	1983			1984									
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	TOTAL
Agri. Engineers		1.0		2.0	1.0								4.0

TOTAL 4.0

Project Costs:				WMS II FUNDING	MISSION CONTRIBUTION
Item					
Professional Personnel	4.00 PPM (ts)	at	$6,000	$ 24,000	
Professional Personnel	0.00 PPM (nts)	at			
Travel - USA to Peru	- 4 trips	at	2,000		$ 8,000
Per Diem	104 days	at	80		8,320
Other Direct Costs					2,000
Consultants					
TOTAL DIRECT COSTS				$ 24,300	$ 18,320
Indirect Costs:					
University Overhead				7,776	
CID - DBA				651	
- C&A				2,430	
TOTAL INDIRECT COSTS				$ 10,857	
TOTAL COST OF ACTIVITY				$ 35,157	$ 18,320

Mission Buy-In Funding . . . . . $ 24,157

WMS II Core Funding . . . . . $ 11,000

UNIVERSITY: OVERALL

COUNTRY: Peru

PERSONNEL BY DISCIPLINE	FY 1984												
	1983			1984									
Discipline	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
Agri. Engineer		1.00		2.00	1.00								4.00
													0.00
													0.00
													4.00

Near East Bureau

Technical Assistance

JORDAN

Activity Title: Irr. Sector Survey/Senior On-Farm Water Mgmt. Specialist Code #1-02-013-84

Description: An interdisciplinary team will prepare an irrigation sector survey which will examine irrigation development options and investment strategies for the sector. This sector assessment is a follow-up to a visit by Dr. Jack Keller in FY 83 who conducted a preliminary analysis of opportunities for irrigation develoment in Jordan and ascertained the level of interest of the Mission to increase its involvement in water management. Approval for a six-day work week and holiday pay is requested for all short term TDY under this activity.

Institutions: Managing USU Cooperating _____ Participating _____

PERSONNEL BY DISCIPLINE	FY 1984												
	1983			1984									
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	TOTAL
Agri. Engineers	0.75												0.75
Economists	0.75												0.75
Agronomists	0.75												0.75
Social Scientist	0.75												0.75
Institutional Exp.	1.00	0.50											1.50

TOTAL 4.50

Project Costs:

Item				WMS II FUNDING	MISSION CONTRIBUTION
Professional Personnel	2.25 PPM (ts)	at	$6,000	$ 13,500	
Professional Personnel	0.75 PPM (nts)	at	4,500	3,375	
Local Hire	1.50 PPM (nts)	at	2,000	3,000	
Travel - USA to Jordan	- 3 trips	at	3,000		$ 9,000
Per Diem	63 days	at	80		5,040
	30 days	at	50		1,500
Other Direct Costs				2,000	
Consultants					
TOTAL DIRECT COSTS				$ 21,875	$ 15,540
Indirect Costs					
University Overhead				7,000	
CID - DBA				366	
- G&A				2,188	
TOTAL INDIRECT COSTS				$ 9,554	
TOTAL COST OF ACTIVITY				$ 31,429	$ 15,540

Mission Buy-In Funding . . . . . $ -0-

WMS II Core Funding . . . . . $ 31,429

Technical Assistance

JORDAN

Activity Title: Senior On-Farm Water Management Advisor. Code #1-02-014-84

Description: A Senior On-Farm Water Management Advisor, Jack Keller, will provide periodic assistance in advising the University of Jordan on its irrigation curriculum and to review future projects involving water management activities of the Jordan Valley Authority. Also, analysis will be provided regarding progress of Mission irrigation activities, in evaluating research and teaching activities, and in advising on future directions. Approval for a six-day work week and holiday pay is requested for all short term TDY under this activity.

Institutions: Managing USU Cooperating _____ Participating _____

PERSONNEL BY DISCIPLINE	FY 1984												
	1983			1984									
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	TOTAL
Agri. Engineers	0.5								0.5				1.0

TOTAL 1.0

Project Costs:				WMS II FUNDING	MISSION CONTRIBUTION
Item					
Professional Personnel	1.00 PPM (ts)	at	$6,000	$ 3,000 *	
Travel - USA to Jordan	- 1 trip	at	3,000		$ 3,000
Per Diem	14 days	at	80		1,120
Other Direct Costs				300	
Consultants					
TOTAL DIRECT COSTS				$ 3,300	$ 4,120
Indirect Costs:					
University Overhead				1,056	
CID - DBA				81	
- G&A				330	
TOTAL INDIRECT COSTS				$ 1,467	
TOTAL COST OF ACTIVITY				$ 4,767	$ 4,120

Mission Buy-In Funding . . . . . $ -0-

WMS II Core Funding . . . . . $ 4,767

* The fall trip costs will be paid as part of the Irrigation Sector Survey.

Training and Technology Transfer

JORDAN

Activity Title: Training Course

Code #2-01-015-84

Description: In response to a Mission request for training assistance, the International Irrigation Center of USU will provide a two-week training course as part of its on-going responsibilities to train LDC officials in improved interdisciplinary practices and solutions to water management problems. Based on a reconnaissance visit and prior work by Dr. Jack Keller, the preliminary schedule includes training in: (a) on-farm water management, (b) management and allocation of water along distributory lines, and (c) main system scheduling, rotation and deliveries. Approval for a six-day work week and holiday pay is requested for all short term TDY under this activity.

Institutions: Managing USU Cooperating _____ Participating _____

Activity Coordinator: Humberto Yap/Jack Keller Phone: (801) 750-2801/750-2785

PERSONNEL BY DISCIPLINE	FY 1984												
	1983			1984									
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	TOTAL
Agri. Engineers							2.0	3.0					5.0

TOTAL 5.0

Project Costs:				WMS II FUNDING	MISSION CONTRIBUTION
Item					
Professional Personnel	1.50 PPM (ts)	at	$6,000	$ 9,000	
Professional Personnel	1.00 PPM (nts)	at	4,500	4,500	
Local Hire	2.5 PPM (ts)	at	2,000	5,000	
Travel - USA to Jordan	2 trips	at	3,000		$ 6,000
Per Diem	42 days	at	80		3,360
Other Direct Costs					6,000
Consultants					
TOTAL DIRECT COSTS				$ 18,500	$ 15,360
Indirect Costs:					
University Overhead				5,920	
CID - DBA				244	
- G&A				1,850	
TOTAL INDIRECT COSTS				$ 8,014	
TOTAL COST OF ACTIVITY				$ 26,514	$ 15,360

Mission Buy-In Funding . . . . . $ 26,514

WMS II Core Funding . . . . . $ -0-

UNIVERSITY: OVERALL

COUNTRY: Jordan

PERSONNEL BY DISCIPLINE	FY 1984												
	1983			1984									
Discipline	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
Agri. Engineer	1.25						2.00	3.00	0.50				6.75
Agronomist	0.75												0.75
Economist	0.75												0.75
Institutional Specialist	1.00	0.50											1.50
Social Scientist	0.75												0.75
													10.50

Worldwide

WORLD WIDE

Code #: 2-11-039-84

Activity Title: Increasing Water Management Capabilities

Description: To add a professional and/or graduate student to a DA workshop or an appropriate technical assistance activity in order to enhance their ability to participate in future water management activities.

Institutions: Managing: CSU Cooperating Participating

Activity Coordinator: Dan Lattimore Phone: (303) 491 - 6991

PERSONNEL BY DISCIPLINE	FY 1984												
	1983			1984									
Discipline	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
Agri. Engineer								1.00					1.00
Civil Engineer													0.00
Economist													0.00
Agronomist													0.00
Social Scientist													0.00
Coordinator													0.00
Graduate Students								1.00	0.50				1.50
													2.50

Project Costs: Item				WMS II FUNDING	MISSION CONTRIBUTION
Direct Costs					
Salaries & Benefits					
Professional	.25 PPM (nts)	at	3,851	963	
Graduate Students	1 GPM (ts)	at	1,500	1,500	
Graduate Students	.75 GPM (nts)	at	1,200	900	
Travel - USA to	1 trips	at	2,510	2,510	
	0 trips	at	500	0	
Per Diem	30 days	at	56	1,680	
	0 days	at	56	0	
TOTAL DIRECT COSTS				$ 7,553	
Indirect Costs					
University Overhead				1,923	
CID - DBA				53	
- G & A				755	
TOTAL INDIRECT COSTS				$ 2,731	
TOTAL COST OF ACTIVITY				$ 10,284	
Mission Buy-in Funding				$ 0	
WMS II Core Funding				$ 10,284	

Training and Technology Transfer

WORLD WIDE

Code #: 2-08-040-84

Activity Title: DA Trainers Workshop

Description: Weeklong workshop to train those interested in becoming trainers for future DA workshops. Participants should already be competent in discipline, but workshop will emphasize philosophy of irrigation water management as expressed by WMSII including interdisciplinary team approach, systems approach, and building institutional capacities. See appendices for more detail.

Institutions: Managing: CSU Cooperating Participating

Activity Coordinator: Larry Nelson / Mohammed Haider Phone: (303) 491 - 6991

PERSONNEL BY DISCIPLINE	FY 1984												
	1983			1984									
Discipline	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
Agri. Engineer			0.25	0.50									0.75
Civil Engineer			0.25	0.50									0.75
Economist			0.25	0.50									0.75
Agronomist			0.25	0.50									0.75
Social Scientist			0.25	0.50									0.75
Coordinator			0.50										0.50
													0.00
													4.25

Project Costs: Item				WMS II FUNDING	MISSION CONTRIBUTION
Direct Costs					
Salaries & Benefits					
Professional	4.25 PPM (nts)	at	3,851	16,367	
Travel	6 trips	at	500	3,000	
Other Direct Costs					
Other:				1,000	
TOTAL DIRECT COSTS				$ 20,367	
Indirect Costs					
University Overhead				7,332	
CID - DBA				0	
- G & A				2,037	
TOTAL INDIRECT COSTS				$ 9,369	
TOTAL COST OF ACTIVITY				$ 29,736	
Mission Buy-In Funding				$ 0	
WMS II Core Funding				$ 29,736	

Training and Technology Transfer

WORLD WIDE

Code #: 2-12-041-84

Activity Title: Training Materials

Description: Training materials for FY84 include a surface irrigation planning guide and instructor's materials for use with project videotapes.

DELETED

Training and Technology Transfer

WORLD WIDE

Code #: 2-13-042-84

Activity Title: Instructors Guide for DA Workshop

Description: A DA workshop teaching manual for coordinators and training staff will be prepared to assist new workshop trainers. Manual will provide suggested schedule, lesson plans and objectives, and printed and audio visual materials available. See appendices for more detail.

Institutions: Managing: CSU Cooperating Participating

Activity Coordinator: Larry Nelson Phone: (303) 491 - 6991

PERSONNEL BY DISCIPLINE	FY 1984												
	1983			1984									
Discipline	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
Agri. Engineer			0.50										0.50
Civil Engineer													0.00
Economist			0.50										0.50
Agronomist			1.00	1.00									2.00
Social Scientist			0.50										0.50
Editor			1.00										1.00
													0.00
													4.50

Project Costs: Item		WMS II FUNDING	MISSION CONTRIBUTION
Direct Costs			
Salaries & Benefits			
Professional	4 PPM (nts) at 3,170	14,042	
Other Direct Costs			
Other: (itemize, if large)		3,000	
TOTAL DIRECT COSTS		$ 17,042	
Indirect Costs			
University Overhead		6,135	
CID - DBA		0	
- G & A		1,704	
TOTAL INDIRECT COSTS		$ 7,839	
TOTAL COST OF ACTIVITY		$ 24,881	
Mission Buy-in Funding		$ 0	
WMS II Core Funding		$ 24,881	

Training and Technology Transfer

World Wide

Code #: 2-07-046-84

Activity Title: Materials for Development of Solutions Workshop

Description: This activity will develop a search for solutions workshop with related materials and supporting activities. Workshop will include formal training, field methodologies, and a mechanism for technical backstopping during the experimentation and analysis period following the workshop. See appendices for more detailed information on this activity.

DELETED

Training and Technology Transfer

WORLD WIDE

Code #: 2-04-048-84

Activity Title: Developing Materials for Senior Officers Workshop

Description: Developing of materials for a workshop to familiarize senior officers with the fundamental principles and concepts of irrigation water management. Requests from India, Pakistan, and Bangladesh indicate a strong need to develop capability for presenting such a workshop. Materials will be used and evaluated at International Commission on Irrigation and Drainage. See appendices for more detailed information.

DELETED

Training and Technology Transfer

WORLD WIDE

Code #: 2-09-049-84

Activity Title: Survey and Strategy for Training

Description: Survey of training programs will include directory of major training centers published, collection of training materials gathered and filed, and evaluation of training techniques and strategies made. For more detailed description see appendices.

Institutions: Managing: CSU Cooperating Participating

Activity Coordinator: Al Madsen

Phone: (303) 491 - 6991

PERSONNEL BY DISCIPLINE	FY 1984												
	1983			1984									
Discipline	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
Agri. Engineer													0.00
Civil Engineer													0.00
Economist	0.50	0.50	0.50	0.50	0.50	0.50							3.00
Agronomist													0.00
Social Scientist													0.00
Coordinator													0.00
Graduate Student	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	6.00
													9.00

Project Costs: Item				WMS II FUNDING	MISSION CONTRIBUTION
Direct Costs					
Salaries & Benefits					
Professional	3 PPM (nts)	at	3,851	11,553	
Graduate Students	6 GPM (nts)	at	1,200	7,200	
TOTAL DIRECT COSTS				$ 18,753	
Indirect Costs					
University Overhead				6,751	
CID - DBA				0	
- G & A				1,875	
TOTAL INDIRECT COSTS				$ 8,626	
TOTAL COST OF ACTIVITY				$ 27,379	
Mission Buy-In Funding				$ 0	
WMS II Core Funding				$ 27,379	

Training and Technology Transfer

WORLD WIDE

Code #: 2-04-050-84

Activity Title: Workshop (Tech. & Soc. Aspects)

Description: Interdisciplinary workshop for senior and mid-level irrigation officials to give them field experience providing integration of social and technical aspects of irrigation water management. See more detailed description in appendices.

Institutions: Managing: CSU Cooperating Participating

Activity Coordinator: Dave Freeman

Phone: (303) 491 - 6991

PERSONNEL BY DISCIPLINE	FY 1984												
	1983			1984									
Discipline	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
Agri. Engineer													0.00
Civil Engineer													0.00
Economist													0.00
Agronomist													0.00
Social Scientist													0.00
Coordinator													0.00
													0.00
													0.00

Project Costs:

Item	WMS II FUNDING	MISSION CONTRIBUTION
Direct Costs		
Other Direct Costs		
Other: Tuition 15 Students @ $3,000 ea.	45,000	
TOTAL DIRECT COSTS	$ 45,000	
Indirect Costs		
University Overhead	0	
CID - DBA	0	
- G & A	0	
TOTAL INDIRECT COSTS	$ 0	
TOTAL COST OF ACTIVITY	$ 45,000	
Mission Buy-in Funding	$ 0	
WMS II Core Funding	$ 45,000	

Training and Technology Transfer

WORLD WIDE

Code #: 2-12-044-84

. Activity Title: Brochures, Newsletters, Publications

Description: Three newsletters will be published per contract. Initial evaluations of present newsletter indicate preferences for expanded version to include more information on water management activities/issues along with project news items. Project information folder is proposed for FY84. News and magazine articles will be prepared as appropriate. Materials published under WMSI will be supplied/reprinted as necessary.

Institutions: Managing: CSU Cooperating Participating

Activity Coordinator: Mary Ann Moore Phone: (303) 491 - 6991

PERSONNEL BY DISCIPLINE	FY 1984												
	1983			1984									
Discipline	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
Agri. Engineer			0.50										0.50
Civil Engineer													0.00
Economist			0.50										0.50
Agronomist			0.50										0.50
Social Scientist			0.50										0.50
Writer/Editor	1.00	0.50			0.50				1.00	0.50			3.50
Graphics Tech.		1.00				0.50			1.00		0.50		3.00
													8.50

Project Costs: Item		WMS II FUNDING	MISSION CONTRIBUTION
Direct Costs			
Salaries & Benefits			
Professional	8.5 PPM (nts) at 3,170	23,881	
Other Direct Costs			
Other:		3,500	
TOTAL DIRECT COSTS		$ 27,381	
Indirect Costs			
University Overhead		9,857	
CID - DBA		0	
- G & A		2,738	
TOTAL INDIRECT COSTS		$ 12,595	
TOTAL COST OF ACTIVITY		$ 39,976	
Mission Buy-In Funding		$ 0	
WMS II Core Funding		$ 39,976	

WORLD WIDE

Code #: 2-10-051-84

Activity Title: Microcomputer Applications for DA Training

Description: Computer applications developed for simulation and design of irrigation systems to assist trainees in DA workshops to analyze data and simplify report writing, and for linking disciplinary activities.

Institutions: Managing: CSU Cooperating Participating

Activity Coordinator: Dan Sunada Phone: (303) 491 - 6991

PERSONNEL BY DISCIPLINE	FY 1984												
	1983			1984									
Discipline	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
Agri. Engineer													0.00
Civil Engineer	0.50	0.50	0.50	1.00	0.50	0.50	0.50	0.50	0.50	1.00	0.50	0.50	7.00
Economist													0.00
Agronomist													0.00
Social Scientist													0.00
													0.00
Graduate Student	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	6.00
													13.00

Project Costs: Item				WMS II FUNDING	MISSION CONTRIBUTION
Direct Costs					
Salaries & Benefits					
Professional	7 PPM (nts)	at	3,767	26,367	
Graduate Students	6 GPM (nts)	at	1,200	7,200	
Other Direct Costs					
Other: Mainframe computer time; leased equipment				12,370	
TOTAL DIRECT COSTS				$ 45,937	
Indirect Costs					
University Overhead				12,084	
CID - DBA				0	
- G & A				4,594	
TOTAL INDIRECT COSTS				$ 16,678	
TOTAL COST OF ACTIVITY				$ 62,615	
Mission Buy-in Funding				$ 0	
WMS II Core Funding				$ 62,615	

Training and Technology Transfer

WORLDWIDE

Activity Title: Conference

Code #2-14-058-84

Description: Utah State University will participate in an international conference on water management sponsored by the Inter-American Institute of Agricultural Cooperation in Santiago, Chile. Two papers will be presented by USU/WMS-II personnel in Spanish.

Institutions: Managing USU Cooperating _____ Participating _____

Activity Coordinator: Jack Keller Phone: (801) 750-2785

PERSONNEL BY DISCIPLINE	FY 1984												
	1983			1984									
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	TOTAL
Agri. Engineers		0.5											0.5
Agronomists		0.5											0.5

TOTAL 1.0

Project Costs:

Item				WMS II FUNDING	MISSION CONTRIBUTION
Professional Personnel	1.00 PPM (ts)	at	$6,000	$ 6,000	
Travel - USA to Santiago	2 trips	at	2,000	4,000	
Per Diem	30 days	at	100	3,000	
TOTAL DIRECT COSTS				$ 13,000	
Indirect Costs:					
University Overhead				4,160	
CID - DBA				163	
- G&A				1,300	
TOTAL INDIRECT COSTS				$ 5,623	
TOTAL COST OF ACTIVITY				$ 18,623	

Mission Buy-In Funding . . . . . $ -0-

WMS II Core Funding . . . . . $ 18,623

Training and Technology Transfer

WORLDWIDE

Activity Title: French Language Training

Code #2-11-059-84

Description: In order to enhance the French language capacity of USU's WMS-II core staff, language training will be given through a French speaking graduate student to J. Moris, W. Walker and B. Smith. This is a continuation of USU's efforts to increase its capacity to service mission requests, especially those involving French speaking Africa.

Institutions: Managing USU Cooperating _____ Participating _____

Activity Coordinator: Bryant Smith Phone: (801) 750-2786

PERSONNEL BY DISCIPLINE	FY 1984												
	1983			1984									
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	TOTAL
French Teacher	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	6.0

TOTAL 6.0

Project Costs:

Item				WMS II FUNDING	MISSION CONTRIBUTION
Professional Personnel	0.0 PPM (ts)	at			
Professional Personnel	0.0 PPM (nts)	at			
Graduate Students	6.0 GPM (nts)	at	$1,200	$ 7,200	
Travel - USA to	trips	at			
Per Diem	days	at			
Other Direct Costs				300	
Consultants					
TOTAL DIRECT COSTS				$ 7,500	
Indirect Costs:					
University Overhead				2,400	
CID - DBA				-0-	
- G&A				750	
TOTAL INDIRECT COSTS				$ 3,150	
TOTAL COST OF ACTIVITY				$ 10,650	

Mission Buy-In Funding . . . . . $ -0-

WMS II Core Funding . . . . . $ 10,650

Training and Technology Transfer

WORLDWIDE

Activity Title: Irrigation System Management Task Force Code #2-14-060-84

Description: This task force will provide intellectual guidance and administrative coordination of the Irrigation System Management focus of the WMS-II Project. It will review and advise the three lead universities regarding the substantive content of this special studies in irrigation system management to assure their technical work is integrated and properly focused on common issues and approaches. Likewise, it will monitor the studies of the universities to ensure proper coordination and communication. Approval for a six-day work week and holiday pay is requested for all short term TDY under this activity.

Institutions: Managing: None -- Inter-university

Activity Coordinator: Jack Keller Phone: (801) 750-2785

PERSONNEL BY DISCIPLINE	FY 1984												
	1983			1984									
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	TOTAL
Agri. Engineers	+ -	- -	- -	- -	2.0	- -	- -	- -	- -	- -	- -	- +	2.0
Social Scientist	+ -	- -	- -	- -	2.0	- -	- -	- -	- -	- -	- -	- +	2.0

TOTAL 4.0

Project Costs:				WMS II FUNDING	MISSION CONTRIBUTION
Item					
Professional Personnel	0.00 PPM (ts)	at			
Professional Personnel	2.00 PPM (nts)	at	$5,225	$ 10,449	
Other Direct Costs				4,000	
Consultants:					
Fee	48 days	at	242.50	11,640	
Travel - Overseas to USA	2 trips	at	1,500	3,000	
Per Diem	25 days	at	75	1,875	
TOTAL DIRECT COSTS				$ 30,964	
Indirect Costs:					
University Overhead				9,908	
CID - DBA				316	
- G&A				3,096	
TOTAL INDIRECT COSTS				$ 13,320	
TOTAL COST OF ACTIVITY				$ 44,284	

Mission Buy-In Funding . . . . . $ -0-

WMS II Core Funding . . . . . $ 44,284

Training and Technology Transfer

WORLDWIDE

Activity Title: Workshop to Review Farmer Participation and Organizational Issues 2-14-066-84

Description: The major objective of this meeting is to review cases and approaches that have been used to foster farmer participation and organization in water management with special attention to drawing from them their programmatic implications--staff needs, timing of activities, institutional changes required, etc. Workshop participants would include staff from each of the three lead universitieis as well as selected individuals who have particular field experience with this topic. In addition, participants from AID/W would be invited to attend. Overall size should be between 10 to 15 persons.

Institutions: Managing: CORNELL Cooperating _____ Participating _____

Activity Coordinator: Norman Uphoff Phone: (607) 256-6370

PERSONNEL BY DISCIPLINE	FY 1984												
	1983			1984									
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	TOTAL
Political Scientist	1.5	---	---	---	---	---	---	---	---	---	---	---	1.5
Rural Sociologist	.5	---	---	---	---	---	---	---	---	---	---	---	.5
Grad.Stud.Soc.Sci.	1	---	---	---	---	---	---	---	---	---	---	---	1
												TOTAL	3.0

Project costs

Item				WMS-II Funding	Mission Contribution
Direct Costs					
Salaries & Benefits					
Professional Personnel	2 PPM	at	$4,766	9,532	
Graduate Students	1 GPM	at	$1,133	1,133	
Travel - USA to Ithaca	10 trips	at	$ 800	8,000	
Per Diem	30 days	at	$ 55	1,650	
Other Direct Costs: Conference costs				1,500	
duplication, communication				750	
materials, supplies				750	
TOTAL DIRECT COSTS				$23,315	
Indirect Costs					
University Overhead (.493%)				10,570	
CID G&A				2,308	
TOTAL INDIRECT COSTS				$12,878	
TOTAL COST OF ACTIVITY				$36,193	

Mission Buy-In Funding..... $ 0

WMS-II Core Funding..... $36,193

Training and Technology Transfer 2-14-064-84

WORLDWIDE

Activity Title: Workshop on the Design of Programs for Developing Small-Scale Community-Managed Irrigation Works

Description: During FY-83 a team of researchers at Cornell has been reviewing the literature and conducting field visits to areas with active small-scale community-managed irrigation projects as background for preparing a concepts paper on small-scale irrigation, based on literature review and field visits. The draft version of this paper will be completed in the early portion of FY-84, and it will be presented for discussion at the workshop to be held in November. The workshop will assemble from both private and public sector experienced in designing, implementing, evaluating or studying programs of small-scale community-managed irrigation development and/or customary community-managed systems to discuss issues raised by the paper and to suggest modifications. The group in the workshop will be drawn from a broad spectrum of researchers and program designers and implementors--including those in both the public and private sectors. Limited participation from abroad also is planned.

Institutions: Managing: CORNELL Cooperating _____ Participating _____

Activity Coordinator: Jim Nickum, Barbara Lynch Phone: (607)256-5095; 256-8463

PERSONNEL BY DISCIPLINE	FY 1984												
	1983			1984									
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	TOTAL
Agr. Engineer	.5-	---											.5
Economist	1---	---											1
Rural Sociologist	1--	---											1
Editor	.8	---		-									.8
Grad.Stud.Rur.Soc.	1--	---											1
												TOTAL	4.3

Project costs

Item		WMS-II FUNDING	MISSION CONTRIBUTION
Direct Costs			
Salaries & Benefits			
Professional Personnel	2.5 PPM at $4,766	11,915	
Technicians	.8 PPM at $1,655	1,324	
Graduate Students	1 GPM at $1,133	1,133	
Travel (international)	4 trips at $2,500	8,000	
(domestic)	5 trips at $ 800	2,850	
Per Diem	30 days at $ 55	1,650	
Other Direct Costs:	materials & supplies	150	
	duplication, communication	1,000	
	conference costs	2,000	
TOTAL DIRECT COSTS		$30,022	
Indirect Costs			
University Overhead (49.3%)		14,169	
CID - G&A		2,972	
TOTAL INDIRECT COSTS		$17,141	
TOTAL COST OF ACTIVITY		$47,163	
Mission Buy-In Funding.....		$ ____	
WMS-II Core Funding.....		$47,163	

Training and Technology Transfer

2-14-065-84

WORLDWIDE

Activity Title: Organization of Task Force for Small-Scale, Community-Managed Irrigation Systems Issues

Description: Task force will include representatives from Cornell, CSU, and USU, as well as other selected participants. The task force will review ongoing and planning Synthesis activities related to this topic and will suggest new directions and activities for consideration. In particular, the task force will recommend activities that might be initiated during the second half of FY 84

Institutions: Managing: CORNELL Cooperating _____ Participating CSU, USU

Activity Coordinator: Walt Coward Phone: (607) 256-5495

PERSONNEL BY DISCIPLINE	FY 1984												
	1983			1984									
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	TOTAL
Rural Sociologist	.5	---	---										.5
											TOTAL		.5

Project costs

Item		WMS-II FUNDING	MISSION CONTRIBUTION
Direct Costs			
Salaries & Benefits			
Professional Personnel	.5 PPM at $4,766	2,383	
Travel - to Ithaca	6 trips at $ 900	5,400	
Per Diem	18 days at $ 70	1,260	
Other Direct Costs			
Consultants			
Fee	6 days at $ 200	1,200	
Travel	2 trips at $ 900	1,800	
Per Diem	6 days at $ 70	420	
Other		500	
TOTAL DIRECT COSTS		$12,963	
Indirect Costs			
University Overhead (51.975%)		6,494	
CID G&A		1,284	
TOTAL INDIRECT COSTS		$ 7,778	
TOTAL COST OF ACTIVITY		$20,741	
Mission Buy-In Funding.....		$ 0	
WMS-II Core Funding.....		$20,741	

Training and Technology Transfer

WORLDWIDE

Activity Title: AID/FAO Expert Consultation in Water Management Code # 2-14-067-84

Description: Presentation of results of Farmer Participation Special study and participation in Expert Consultation on Water Management meeting in Jakarta.

Institutions: Managing CORNELL Cooperating _____ Participating _____

Activity Coordinator: Norman Uphoff Phone: (607) 256-6370

PERSONNEL BY DISCIPLINE	FY 1984												
	1983			1984									
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	TOTAL
Agr. Economists										.25			.25
Political Scientist										.25			.25
											TOTAL		.50

Project costs

Item				WMS-II FUNDING	MISSION CONTRIBUTION
Direct Costs					
Salaries & Benefits					
Professional Personnel	.50 PPM	at	$1,192	$ 2,384	
Travel - USA to Jakarta	1 trip	at	2,000	2,000	
	1 trip	at	500	500	
Per Diem	10 days	at	100	1,000	
DBA				58	
TOTAL DIRECT COSTS				$ 5,942	
Indirect Costs					
University Overhead (60%)				$ 2,698	
CID G&A				588	
TOTAL INDIRECT COSTS				$ 3,286	
TOTAL COST OF ACTIVITY				$ 9,228	
Mission Buy-In Funding.....				$ 0	
WMS-II Core Funding.....				$ 9,228	

Training and Technology Transfer

WORLDWIDE

Activity Title: Professional Visitors

Code # 2-11-068-84

Description: This activity provides a small amount of resources for inviting to the Cornell campus individual junior and senior professionals to report on recent research or action projects and to exchange information and views with the Cornell group working on irrigation. This intellectual exchange serves to keep Cornell faculty and graduate students informed about current developments, to inform others about present activities and approaches being used in the project and to identify potential participants in technical assistance and other activities of the project.

Institutions: Managing: CORNELL Cooperating _____ Participating _____

Activity Coordinator: Barbara D. Lynch Phone: (607) 256-8463

PERSONNEL BY DISCIPLINE	FY 1984												
	1983			1984									
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	TOTAL
6-8 Professional Visitors	---	---	---	---	---	---	---	---	---	---	---	---	

TOTAL

Project costs

Item		WMS-II FUNDING	MISSION CONTRIBUTION
Direct Costs			
Travel - to Ithaca	5 trips at $ 800	4,000	
Per Diem	15 days at $ 65	975	
Other Direct Costs		1,000	
TOTAL DIRECT COSTS		$ 5,975	
Indirect Costs			
University Overhead (51.975%)		3,106	
CID G&A		592	
TOTAL INDIRECT COSTS		$ 3,698	
TOTAL COST OF ACTIVITY		$ 9,673	

Mission Buy-In Funding..... $ 0

WMS-II Core Funding..... $ 9,673

2-14-075-84

Training and Technology Transfer

WORLDWIDE

Activity Title: Seminar on Current Research in Irrigation

Description: The objectives of this seminar are (1) to inform irrigation consultants and academics regarding the broad range of Synthesis activities and (2) to glean from their work new approaches and insights regarding irrigation development. Participants--drawn largely from outside the Synthesis team--will be asked to prepare abstracts of papers reporting on their current work. These abstracts will be the basis for discussion with special attention to their implications for Synthesis activities in training, special studies, or project design and evaluation, as well as for programming implications for AID missions. Special consideration will be given to identifying participants whose work relates to the main themes with which Synthesis is concerned--but this will be interpreted broadly so as not to be restrictive. Approximately 20 to 25 participants will be invited.

Institutions: Managing CORNELL Cooperating _____ Participating _____

Activity Coordinator: Phone:

PERSONNEL BY DISCIPLINE	FY 1984												
	1983			1984									
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	TOTAL
Agr. Economists.	.5	---	---	---	---	---	---	---	---	---	---	---	.5
Rural Sociolotist.	.5	---	---	---	---	---	---	---	---	---	---	---	.5
											TOTAL		1.0

Project costs

Item		WMS-II FUNDING	MISSION CONTRIBUTION
Direct Costs			
Salaries & Benefits			
Professional Personnel	1 PYM at $4,766	4,766	
Travel - USA to Ithaca	22 Trips at $ 800	17,600	
Per Diem	66 days at $ 55	3,630	
Other Direct Costs: conference costs		2,000	
TOTAL DIRECT COSTS		$27,996	
Indirect Costs			
University Overhead (51.975%)		14,063	
CID G&A		2,772	
TOTAL INDIRECT COSTS		$16,834	
TOTAL COST OF ACTIVITY		$44,831	

Mission Buy-In Funding..... $ 0

WMS-II Core Funding..... $44,831

2-06-077-84

Training and Technology Transfer

WORLDWIDE

Activity Title: Participation in Main System Management Task Force Code #

Description: While Cornell is not carrying out special study activities related main system management, this theme is a component of several Cornell synthesis activities. In particular, the Gal Oya project in Sri Lanka looks at matters of farmer organization and the role of institutional organizers in the context of linkages between the main system and the water users. This work will be continuing during FY 84 as part of our technical assistance activities in Sri Lanka. The Cornell staff member who has worked most directly on this topic is Dr. Hammond Murray-Rust (presently with the Synthesis project in Bangladesh). We are tentatively planning for Dr. Murray-Rust to devote up to two months of his time contributing to main system management special studies on the basis of his previous fieldwork in Sri Lanka. Additionally, Professor Milton Barnett will be working with the Task Force on Main System Management during this budget year.

Institutions: Managing: USU Cooperating _____ Participating CORNELL, CSU

Activity Coordinator: Jack Keller Phone: (801) 750-2793

PERSONNEL BY DISCIPLINE	FY 1984												
	1983			1984									
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	TOTAL
Rural Sociologist							1--	---	---	---	---	---	1
											TOTAL		1

Project costs

Item			WMS-II FUNDING	MISSION CONTRIBUTION
Direct Costs				
Salaries & Benefits				
Professional Personnel	1 PPM	at $4,766	4,766	
Other: (itemize, if large)			200	
TOTAL DIRECT COSTS			$ 4,996	
Indirect Costs				
University Overhead (51.975%)			2,094	
CID - G&A			497	
TOTAL INDIRECT COSTS			$ 2,591	
TOTAL COST OF ACTIVITY			$ 7,557	

Mission Buy-In Funding..... $ 0

WMS-II Core Funding..... $ 7,557

WORLD WIDE Code #: 2-11-081-84

Activity Title: Increasing Water Management Capabilities

Description: Provide assistance to on-going activities, professional development for project staff, workshops to increase capability, adding team members to on-going activities, involving or assisting LDC professionals, or in other ways increasing capabilities in water management.

Institutions: Managing: Overall (CSU) Cooperating Participating

Activity Coordinator: Wayne Clyma Phone: (303) 491 - 6991

PERSONNEL BY DISCIPLINE	FY 1984												
	1983			1984									
Discipline	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
Agri. Engineer								1.00					1.00
Civil Engineer													0.00
Economist													0.00
Agronomist													0.00
Social Scientist													0.00
Coordinator													0.00
Graduate Students							0.50	1.00	0.50				2.00
													3.00

Project Costs: Item				WMS II FUNDING	MISSION CONTRIBUTION
Direct Costs					
Salaries & Benefits					
Professional	1 PPM (nts)	at	3,851	3,851	
Graduate Students	1 GPM (ts)	at	1,500	1,500	
Graduate Students	1 GPM (nts)	at	1,200	1,200	
Travel - USA to	1 trips	at	2,500	2,500	
	3 trips	at	500	1,500	
Per Diem	30 days	at	59	1,770	
	45 days	at	55	2,475	
TOTAL DIRECT COSTS				$ 14,796	
Indirect Costs					
University Overhead				4,518	
CID - DBA				53	
- G & A				1,480	
TOTAL INDIRECT COSTS				$ 6,051	
TOTAL COST OF ACTIVITY				$ 20,847	
Mission Buy-in Funding				$ 0	
WMS II Core Funding				$ 20,847	

Special Studies

WORLD WIDE

Code #: 3-04-045-84

Activity Title: Interfacing Farm and Management Systems

Description: Advance knowledge regarding means to manage local command area irrigation units as interfaces between farm and main system operations. See appendices for more detailed information about the special study.

Institutions: Managing: CSU Cooperating Participating

Activity Coordinator: Dave Freeman

Phone: (303) 491 - 6991

PERSONNEL BY DISCIPLINE	FY 1984												
	1983			1984									
Discipline	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
Agri. Engineer				1.00	1.00	1.00	1.00	1.00					5.00
Civil Engineer				1.00	1.00								2.00
Economist				1.00	1.00	1.00	1.00	1.00	1.00				6.00
Agronomist				1.00	1.00	1.00	1.00	1.00					5.00
Social Scientist				1.00	1.00	1.00	1.00	1.00					5.00
Coordinator				0.25	0.25	0.25	0.25						1.00
Graduate Students	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	1.00	1.00	1.00	1.00	20.00
													44.00

Project Costs:

Item				WMS II FUNDING	MISSION CONTRIBUTION
Direct Costs					
Salaries & Benefits					
Professional	4 PPM (ts)	at	5,214	20,856	
Professional	20 PPM (nts)	at	3,851	77,020	
Graduate Students	20 GPM (nts)	at	1,200	24,000	
Travel - USA to	8 trips	at	600	4,800	
	4 trips	at	3,000	12,000	
Per Diem	30 days	at	72	2,160	
	60 days	at	87	5,220	
	30 days	at	85	2,550	
	30 days	at	50	1,500	
Other Direct Costs				8,800	
TOTAL DIRECT COSTS				$ 158,906	
Indirect Costs					
University Overhead				47,712	
CID - DBA				730	
- G & A				15,891	
TOTAL INDIRECT COSTS				$ 64,333	
TOTAL COST OF ACTIVITY				$ 223,239	
Mission Buy-in Funding				$ 0	
WMS II Core Funding				$ 223,239	

WORLDWIDE

Activity Title: Main System Design, Management and Rehabilitation Code #3-04-061-84

Description: The main system design, management and rehabilitation subproject focuses on a central theme of the WMS II Project: irrigation system management. This activity specifically looks at the whole irrigation system from the perspective of the main or conveyance system to determine how it can be managed so as to be more responsive to farmers. The approach of the project is to examine the system in an interdisciplinary way, looking at both the conveyance system and needs of the farmer. The subproject will be coordinated and integrated with CSU whose activity will focus on the unit command area problems.

Date will be gathered from U. S. sites as well as from systems in AID assisted countries. Then on the basis of action research the model will be developed and tested in real situations in LDC's. During the FY 84 period, LDC sites will be selected, a workshop held to identify interdisciplinary issues, and data gathering and refinement of the model be carried out. Please see the appendix for a more detailed explanation of the activity. Approval for a six-day work week and holiday pay is requested for all short term TDY under this activity.

Institutions: Managing USU Cooperating CSU; CU Participating _____

Activity Coordinator: Wynn Walker Phone: (801) 750-2788

PERSONNEL BY DISCIPLINE	FY 1984												
	1983			1984									
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	TOTAL
Irrig. Engineers	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.25	0.25	0.50	0.50	5.50
Water Res. Engineer		0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25				2.00
Economists		0.50	0.50	0.25	0.25								1.50
Systems Analyst	0.50	0.50	0.25	0.25									1.50
Social Scientists		0.50	0.50	0.25	0.25	0.25	0.25						2.00

TOTAL 12.50

Project Costs:		WMS II FUNDING	MISSION CONTRIBUTION
Item			
Professional Personnel	4.50 PPM (ts) at $6,000	$ 27,000	
Professional Personnel	8.00 PPM (nts) at 4,500	36,000	
Graduate Students	1.00 GPM (ts) at 1,200	1,200	
Graduate Students	14.00 GPM (nts) at 1,200	16,800	
Travel	8 trips at 2,500	20,000	
- Within U.S.	4 trips at 625	2,500	
Per Diem -	155 days at 100	15,500	
-	20 days at 70	1,400	
Other Direct Costs		2,500	
* Workshop:			
15 participants x 5 days x $50		3,750	
15 airfare at $625		9,375	
Conference room and related expense		500	
Equipment		20,000	
Consultants			
Fee	20 days at $242.50	4,850	
TOTAL DIRECT COSTS		$161,375	
Indirect Costs:			
University Overhead		45,240	
CID - DBA		671	
- G&A		14,138	
TOTAL INDIRECT COSTS		$ 60,049	
TOTAL COST OF ACTIVITY		$221,424	

Mission Buy-In Funding . . . . . $ -0-

WMS II Core Funding $221,424

* See budget for detail

Special Studies

WORLDWIDE

Activity Title: Interdisc. Selection of Irr. Tech. Research/Seminar (June) Code #3-04-062-84

Description: The state-of-the-art of irrigation methods and technology selection in terms of inter-relationships of physical, economic and social parameters is poorly developed. USU has outstanding capability in the system design area and is developing a state-of-the-art interdisciplinary methodology of selecting appropriate irrigation technology. The selection methodology identifies integrated physical, economic and social descriptors in terms of their probable range of limits to production. The irrigation technologies being considered are confined to those related to collective and individual farmer management of irrigation water. Written instructional materials will be developed. This project will cover both FY 84 and FY 85 with the development and production of written materials being carried out in FY 84. Because of the slow start of this activity in FY 83, approximately 65% - 75% of the FY 84 budget is a carryover from the previous year. Please see the appendix for a detailed explanation of this activity. Approval for a six-day work week and holiday pay is requested for all short term TDY under this activity.

Institutions: Managing USU Cooperating _____ Participating _____

Activity Coordinator: Jon Moris Phone: (801) 750-1237

PERSONNEL BY DISCIPLINE	FY 1984												
	1983			1984									
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
Agri. Engineer	0.5 -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- ->	0.5
Economist	0.5 -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- ->	0.5
Social Scientist	0.5 -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- ->	0.75	0.25	1.5
Other - Graduates	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	1.0	1.0	1.00	1.00	8.0
Consultants									0.5				0.5

TOTAL 11.0

Project Costs:

Item				WMS II FUNDING	MISSION CONTRIBUTION
Professional Personnel	1.00 PPM (ts)	at	$6,000	$ 6,000	
Professional Personnel	2.00 PPM (nts)	at	4,500	9,000	
Graduate Students	1.00 GPM (ts)	at	1,200	1,200	
Graduate Students	7.00 GPM (nts)	at	1,200	8,400	
Travel - USA to misc.	10 trips	at	700	7,000	
- Mid East	2 trips	at	2,500	5,000	
Per Diem	25 USA	at	50	1,250	
	50 Foreign	at	100	5,000	
Other Direct Costs				1,000	
Consultants					
TOTAL DIRECT COSTS				$ 43,850	
Indirect Costs:					
University Overhead				14,032	
CID - DBA				163	
- G&A				4,385	
TOTAL INDIRECT COSTS				$ 18,580	
TOTAL COST OF ACTIVITY				$ 62,430	

Mission Buy-In Funding . . . . . $ -0-

WMS II Core Funding . . . . . $ 62,430

Special Studies

WORLDWIDE

Code #: 3-04-069-84

Activity Title: Small-Scale Irrigation Systems Special Study Completion

Description: Revision of small-scale irrigation concepts paper in light of summer field experiences in Sri Lank India, Bangladesh, Mexico, Peru, and Bolivia for November workshop (see training and technology transfer). Preparation of final version of paper based on workshop discussions. Recommendation for further study research.

Institutions: Managing Cornell Cooperating Participating

Activity Coordinator: Jim Nickum, Barbara Lynch

Phone: (607) 256 - 5095; (607) 256-8483

PERSONNEL BY DISCIPLINE	FY 1984												
	1983			1984									
Discipline	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
Agri. Engineer	0.50												0.50
Civil Engineer													0.00
Economist													0.00
Agronomist													0.00
Social Scientist													0.00
													0.00
													0.00
													0.00
													0.50

Project Costs:

Item				WMS II FUNDING	MISSION CONTRIBUTION
Direct Costs					
Salaries & Benefits					
Professional	.5 PPM (ts)	at	4,755	2,383	
Graduate Students	11 GPM (nts)	at	1,333	12,463	
TOTAL DIRECT COSTS				$ 14,846	
Indirect Costs					
University Overhead				7,088	
CID - DBA				0	
- G & A				1,470	
TOTAL INDIRECT COSTS				$ 8,558	
TOTAL COST OF ACTIVITY				$ 23,404	
Mission Buy-In Funding				$ 0	
WMS II Core Funding				$ 23,404	

Special Studies

3-04-071-84

WORLDWIDE

Activity Title: Projected special studies expenditures, second through fourth quarters, FY-84

Description: Based on task force recommendations made in fall, 1983, on the recommendations of completed small-scale and participation special studies, and on current core faculty research, Cornell expects to propose one or more special studies to be carried out in FY-84. Proposals and budgets will be submitted separately (see Appendix on Cornell Special Studies for some suggested topics).

Institutions: Managing: CORNELL Cooperating _____ Participating _____

Activity Coordinator: Phone:

PERSONNEL BY DISCIPLINE	FY 1984												
	1983			1984									
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	TOTAL
Agr. Economist				2--	---	---	---	---	---	---	---	---	2
Grad.Student				50	---	---	---	---	---	---	---	---	50
Other				5-	---	---	---	---	---	---	---	---	5
											TOTAL		57

Project costs

Item		WMS-II FUNDING	MISSION CONTRIBUTION
Direct Costs			
Salaries & Benefits			
Professional Personnel	7 PPM at $ 4,766	33.362	
Graduate Students	50 GPM at $ 1,133	56,560	
Travel - USA to Asia, Africa	6 trips at $ 3,000	18,000	
Per Diem	124 days at $ 75	9,300	
	6 days at $ 100	600	
TOTAL DIRECT COSTS		$117,822	
Indirect Costs			
University Overhead (51.975%)		57,826	
CID G&A		11,664	
Total Indirect Costs		$69,490	
TOTAL COST OF ACTIVITY		$187,312	

Mission Buy-In Funding..... $ 0

WMS-II Core Funding..... $187,312

Code #: 0-02-996-84

Administrative Costs

	Cost
Faculty Salaries for Administration (3.5 months)	$ 15,494
Support Staff Salaries and Benefits	
Associate Coordinator (9 months)	25,426
Secretarial (23 months)	32,166
Accountant (6 months)	12,349
Editorial assistance (4.2 months)	6,245
Total Salaries and Benefits	$ 91,680
Travel	
Travel to PMT meetings	5,000
Other administrative travel	4,350
Per Diem	
PMT meetings	1,750
Other	1,850
Total Travel and Per Diem	$ 12,950
Other Direct Costs	
Communications, duplication, materials and supplies	11,000
Office equipment rental	8,626
Total Other Direct Costs	$ 19,626
Equipment	
Personal computer and printer	1.600
1 modem	3,000
	700
Total Equipment	$ 5,300
TOTAL DIRECT COSTS	$ 129,556
Cornell Indirect Costs	
Endowed (factored at 58.35%)	11,670
Statutory (estimated at 51.975%)	47,743
CID G&A	12,301
TOTAL INDIRECT COSTS	$ 71,414
TOTAL SUPPORT COSTS	$ 201,270

Administration Code #0-02-997-84

	PERSON MONTHS	MONTHLY RATE	COST
ADMINISTRATION OF USU PROGRAM			
Jack Keller	4.0 (nts)		
Bryant Smith	9.0 (nts)		
Total	13.0 (nts)	$4,676	$ 60,788
Reserve Graduate Students	8.0 (nts)	1,200	9,600
Support Staff			
Secretary	12.0 (nts)		
Production Typist	12.0 (nts)		
Staff Assistant (Acctg.)	6.0 (nts)		
Total	30.0 (nts)	1,600	48,000
Consultant - Dean F. Peterson	1.5 (nts)	$242.50 x 30 days	7,275
Domestic Travel			
6 trips - Washington, D.C. at $1,000			6,000
4 trips - Cornell Univ. at 1,000			4,000
6 trips - Ft. Collins, CO at 500			3,000
Maintenance Contract for Word Processor			3,051
Office Supplies, Telephone, Misc.			20,900
TOTAL - ADMINISTRATION OF USU PROGRAM			$162,614
USU Overhead			52,036
CID - G & A			16,261
TOTAL			$230,911

WORLD WIDE

Code #: 0-02-998-84

Activity Title: CSU Administration

Description:

Institutions: Managing: CSU Cooperating Participating

Activity Coordinator: Dan Lattimore Phone: (303) 491 - 6991

PERSONNEL BY DISCIPLINE	FY 1984												
	1983			1984									
Discipline	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
Agri. Engineer	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.12	1.00
Civil Engineer	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.12	1.00
Economist	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.12	1.00
Agronomist	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.12	1.00
Social Scientist	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.12	1.00
Director	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	6.00
Secretaril & Supp	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	42.00
													53.00 MISSION CONTRIBUTION

Project Costs: Item				WMS II FUNDING
Direct Costs				
Salaries & Benefits				
Professional	53 PPM (nts)	at	2,180	115,526
Travel - USA to	7 trips	at	500	3,500
Per Diem	7 trips	at	200	1,400
Other Direct Costs				
Other: (Itemize, if large)				42,326
TOTAL DIRECT COSTS				$ 162,752
Indirect Costs				
University Overhead				58,591
CID - DBA				0
- G & A				16,275
TOTAL INDIRECT COSTS				$ 74,866
TOTAL COST OF ACTIVITY				$ 237,618
Mission Buy-in Funding				$ 0
WMS II Core Funding				$ 237,618

WORLDWIDE

Code #: 0-01-999-84

Activity Title: Overall Administration

Description: Overall management of project and contact for CID and AID in request for assistance, coordination of resource allocation decisions, increasing water management capability, coordination of synthesis, involvement of other universities and organizations, and coordination and communication with CID and AID.

Institutions: Managing: Overall (CSU) Cooperating Participating

Activity Coordinator: Wayne Clyma Phone: (303) 491 - 6991

PERSONNEL BY DISCIPLINE	FY 1984												
	1983			1984									
Discipline	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
Agri. Engineer	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.63	8.00
Civil Engineer													0.00
Economist													0.00
Agronomist													0.00
Social Scientist													0.00
Support Staff	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	18.00
Secretarial	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	9.00
													35.00

Project Costs: Item				WMS II FUNDING	MISSION CONTRIBUTION
Direct Costs					
Salaries & Benefits					
Professional	35 PPM (nts)	at	2,776	97,157	
Travel - USA to	12 trips	at	500	6,000	
Per Diem	40 days	at	60	2,400	
Other Direct Costs					
Other				6,843	
TOTAL DIRECT COSTS				$ 112,400	
Indirect Costs					
University Overhead				40,464	
CID - DBA				0	
- G & A				11,240	
TOTAL INDIRECT COSTS				$ 51,704	
TOTAL COST OF ACTIVITY				$ 164,104	
Mission Buy-in Funding				$ 0	
WMS II Core Funding				$ 164,104	

UNIVERSITY: OVERALL

COUNTRY: Worldwide

PERSONNEL BY DISCIPLINE	FY 1984												
	1983			1984									
Discipline	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
Agri. Economist	0.50			2.00						0.25			2.75
Agri. Engineer	2.33	0.83	2.58	4.83	5.83	4.33	2.83	3.33	1.83	0.83	0.83	0.87	31.25
Agronomist	0.33	0.08	1.83	3.08	2.58	2.58	1.08	1.08	0.08	0.08	0.08	0.12	13.00
Assistant Coordinator	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	9.00
Associate Coordinator	1.08	1.08	1.08	1.08	1.08	1.08	1.08	1.08	1.08	1.08	1.08	1.12	13.00
Civil Engineer	0.58	0.58	1.83	2.08	1.58	1.58	0.58	0.58	1.58	0.58	0.58	0.62	12.75
Consultant				0.50	1.00								1.50
Consultant - US	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.24	2.00
Coordinator			0.50	0.25	0.25	0.25	0.25						1.50
Director	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	6.00
Economist	2.08	1.08	2.33	2.33	2.33	2.58	1.08	1.08	1.08	0.08	0.08	0.12	16.25
Editor	2.30	1.00	1.50	1.00	1.00	1.00	1.00	0.50	1.50	0.50			11.30
French Teacher	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	6.00
Irrigation Engineer	0.50	0.50	1.00	1.00	1.00	0.50	0.50	0.50	0.50	0.50	0.50	0.50	7.50
Other				9.00									9.00
Political Scientist	0.50												0.50
Rural Sociologist	2.50						1.00						3.50
Secretary	1.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75	32.00
Social Scientist	0.58	0.58	1.83	1.83	3.83	2.33	1.33	1.08	0.08	0.08	0.83	0.37	14.75
Support Staff	9.60	9.60	9.60	9.60	9.60	9.60	9.60	9.60	9.60	9.60	9.60	9.60	115.20
System Analyst	0.50	0.50	0.25	0.25									1.50
Technician - Graphics		1.00				0.50			1.00		0.50		3.00
Technician - Video				0.50	0.50	0.50	0.50						2.00
Water Res. Engineer		0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25				2.00
													317.25

FY84 ACTIVITIES FUNDED FROM FY83 CARRYOVER

Training and Technology Transfer

WORLDWIDE

Code #: 2-11-037-84

Activity Title: Inc. WM Capabilities - Internship No. 1

Description: To provide internship for three semesters during a one-year period for the Science and Technology Bureau of AID.

Institutions: Managing: CID Cooperating Participating

Activity Coordinator: Wayne Clyma Phone: (303) 491 - 6991

PERSONNEL BY DISCIPLINE	FY 1984												
	1983			1984									
Discipline	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
Agri. Engineer													0.00
Civil Engineer													0.00
Economist													0.00
Agronomist													0.00
Social Scientist													0.00
Coordinator													0.00
Graduate Students		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	11.00
													11.00

Project Costs: Item				WMS II FUNDING	MISSION CONTRIBUTION
Direct Costs					
Salaries & Benefits					
Graduate Students	11 GPM (ts)	at	11	20,251	
Travel - USA to	3 trips	at	3,000	9,000	
	3 trips	at	600	1,800	
	1 trips	at	250	250	
Per Diem	105 days	at	75	7,875	
TOTAL DIRECT COSTS				$ 39,176	
Indirect Costs					
University Overhead				8,619	
CID - DBA				709	
- G & A				3,918	
TOTAL INDIRECT COSTS				$ 13,246	
TOTAL COST OF ACTIVITY				$ 52,422	
Mission Buy-In Funding				$ 0	
WMS II Core Funding				$ 52,422	

Training and Technology Transfer

WORLDWIDE

Code #: 2-11-038-84

Activity Title: Inc. WM Capabilities - Internship No. II

Description: To provide two internships for a one-year period for the Asia Bureau. *Salary level set for budgeting purposes only.

Institutions: Managing: CID Cooperating Participating

Activity Coordinator: Wayne Clyma Phone: (303) 491 - 6991

PERSONNEL BY DISCIPLINE	FY 1984												
	1983			1984									
Discipline	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
Agri. Engineer													0.00
Civil Engineer													0.00
Economist													0.00
Agronomist													0.00
Social Scientist													0.00
Coordinator													0.00
Graduate Students	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	12.00
													12.00

Project Costs: Item				WMS II FUNDING	MISSION CONTRIBUTION
Direct Costs					
Salaries & Benefits					
Graduate Students	12 GPM (ts)	at	12	30,000	
Travel - USA to	2 trips	at	3,000	6,000	
	2 trips	at	600	1,200	
	1 trips	at	170	170	
Per Diem	56 days	at	75	4,200	
TOTAL DIRECT COSTS				$ 41,570	
Indirect Costs					
University Overhead				9,145	
CID - DBA				1,050	
- G & A				4,157	
TOTAL INDIRECT COSTS				$ 14,352	
TOTAL COST OF ACTIVITY				$ 55,922	
Mission Buy-In Funding				$ 0	
WMS II Core Funding				$ 55,922	

Training and Technology Transfer

WORLDWIDE

Code #: 2-14-078-84

Activity Title: FAO Workshop Farmer Participation

Description: The meeting is designed to bring together irrigation decision makers from Asian and other countries and allow them to discuss issues related to farmer involvement in irrigation system planning, construction, operation and maintenance. Subject matter for the discussions will be provided by a series of 6 case studies focussing on current experience with efforts to evoke such participation in several Asian countries. The meeting will be sponsored with the FAO of the UN and is scheduled for 16 to 21 July 1984 in Yogjakarta, Indonesia. USAID and FAO will divide workshop costs.

Institutions: Managing: CID Cooperating Participating

Activity Coordinator: Mark Svendsen Phone: (202) 632 - 9102

PERSONNEL BY DISCIPLINE	FY 1984												
	1983			1984									
Discipline	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
Agri. Engineer													0.00
Civil Engineer													0.00
Economist													0.00
Agronomist													0.00
Social Scientist													0.00
													0.00
													0.00
													0.00

Project Costs: Item				WMS II FUNDING	MISSION CONTRIBUTION
Direct Costs					
Travel & Per Diem	10 trips	at	2,250	22,500	
Other Direct Costs					
Other				1,136	
TOTAL DIRECT COSTS				$ 23,636	
Indirect Costs					
University Overhead				0	
CID - DBA				0	
- G & A				2,364	
TOTAL INDIRECT COSTS				$ 2,364	
TOTAL COST OF ACTIVITY				$ 26,000	
Mission Buy-in Funding				$ 0	
WMS II Core Funding				$ 26,000	

* $30,000 from S & T Bureau funds transferred to CID in FY 83 carried over to fund this activity in FY 84. Total CID budget $56,000.

**$51,000 to be contributed by FAO for a total activity budget of $107,000.

Training and Technology Transfer

WORLDWIDE

Code #: 2-02-079-84

Activity Title: DA Review (Consultants)

Description: A review will be undertaken to assess our experience so far with "Diagnostic Analysis" DA training workshops which have been conducted by WMS II in India, Sri Lanka, and Bangladesh. Two outside experts in evaluation an experienced DA trainer and a water management technical specialist. The purepose of the review is to examine the evolution of the training course over time, to assess the changes it has brought in the professional roles of past participants, to examine current methodology for areas of potential improvement and to examine the congruence between training objectives and means.

Institutions: Managing: CID Cooperating Participating

Activity Coordinator: Mark Svendsen Phone: (202) 632 - 9102

PERSONNEL BY DISCIPLINE	FY 1984												
	1983			1984									
Discipline	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
Agri. Engineer													0.00
Civil Engineer													0.00
Economist													0.00
Agronomist													0.00
Social Scientist													0.00
													0.00
													0.00
													0.00
													0.00

Project Costs:

Item				WMS II FUNDING	MISSION CONTRIBUTION
Direct Costs					
Salaries & Benefits					
Professional	2 PPM (ts)	at	5,791	8,687	
Professional	1 PPM (nts)	at	3,132	1,566	
Travel - USA to	2 trips	at	4,200	8,400	
Per Diem	10 days	at	90	900	
	10 days	at	95	950	
	70 days	at	70	4,900	
Other Direct Costs					
Consultants Fee	45 days	at	150	6,750	
Other				1,770	
TOTAL DIRECT COSTS				$ 33,923	
Indirect Costs					
University Overhead				9,686	
CID - DBA				304	
- G & A				3,392	
TOTAL INDIRECT COSTS				$ 13,382	
TOTAL COST OF ACTIVITY				$ 47,305	
Mission Buy-In Funding				$ 0	
WMS II Core Funding				$ 47,305	

Training and Technology Transfer

WORLDWIDE

Code #: 2-02-080-84

Activity Title: DA Review (CSU)

Description: A review will be undertaken to assess our experience so far with "Diagnostic Analysis" (DA) training workshops which have been conducted by WMS II in India, Sri Lanka, and Bangladesh. Two outside experts in evaluation an experienced DA trainer and a water management technical specialist. The purpose of the review is to examine the evolution of the training course over time, to assess the changes it has brought in the professional roles of past participants, to examine current methodology for areas of potential improvement and to examine the congruence between training objectives and means.

Institutions: Managing: CID Cooperating Participating

Activity Coordinator: Mark Svendsen Phone: (202) 632 - 9102

PERSONNEL BY DISCIPLINE	FY 1984												
	1983			1984									
Discipline	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
Agri. Engineer				0.50	1.00	0.50							2.00
Civil Engineer													0.00
Economist													0.00
Agronomist	0.25			0.50	1.00	0.50							2.25
Social Scientist													0.00
													0.00
													0.00
													4.25

Project Costs: Item				WMS II FUNDING	MISSION CONTRIBUTION
Direct Costs					
Salaries & Benefits					
Professional	3 PPM (ts)	at	4,824	14,472	
Professional	1.25 PPM (nts)	at	3,655	4,569	
Travel - USA to	2 trips	at	4,000	8,000	
	2 trips	at	600	1,200	
Per Diem	90 days	at	90	8,100	
	28 days	at	100	2,800	
Other Direct Costs					
Other				500	
TOTAL DIRECT COSTS				$ 39,641	
Indirect Costs					
University Overhead				9,991	
CID - DBA				507	
- G & A				3,964	
TOTAL INDIRECT COSTS				$ 14,462	
TOTAL COST OF ACTIVITY				$ 54,103	
Mission Buy-in Funding				$ 0	
WMS II Core Funding				$ 54,103	

Part III: Concept Papers and Plans for Worldwide Activities

APPENDIX A

PROPOSED WORK PLAN FOR WMS-II SUBPROJECT: MAIN SYSTEM DESIGN, MANAGEMENT AND REHABILITATION

August 1983

PROPOSED WORK PLAN FOR WMS-II SUBPROJECT: MAIN SYSTEM DESIGN, MANAGEMENT AND REHABILITATION

by

Wynn R. Walker, Professor

Utah State University

STATEMENT OF PROBLEM AND ISSUES

Under the theme "irrigation system management," the WMS-II Project intends conducting research studies of various components and operational linkages within irrigation systems. As a part of this objective, an interdisciplinary, inter-university subproject is proposed to study the design, operation and maintenance of the irrigation conveyance system which collects water resources at the watershed and conveys them to the farmlands. This system is often divided into a "main" system operated by government agencies or structured user groups, and a secondary system serving a "unit command area" which is, in theory, constructed, operated and maintained by individuals or small non-agency groups. In practice, technical support and defined responsibility are too frequently missing in the command areas.

At the engineering level, conveyance hydrology is generally understood, although these principles may not be given sufficient emphasis in most civil or agricultural engineering curricula. Forexample, design procedures are often based on maximum steady state flow rates assuming a standard strategy for operating the system, a strategy which may or may not be valid. The hydraulic transients, introduced in some main system operations, which may be very important factors affecting irrigation practices on individual farms, are seldom taught at the baccalaureate level. Estimating seepage, operational losses and flow measurement errors requires practical experience, particularly since these factors change during the life of the project. Of an evenless defined nature are the multitude of important linkages between the main network and the water resource and water use systems at either end. These problems lead to a large variety of operational weaknesses which are often unfairly attributed to the engineers who may be responsible. Poor management is not the outcome of a "single-minded" discipline that is unwilling to recognize the array of social and institutional pressures acting within the system and incapable of system scale coordination of water delivery and use systems. The truth is that these individuals lack adequate training. The supporting computational tools which would allow a higher level of system management are not readily available, and the translation of social and institutional influences into hydraulic-hydrologic impacts is yet to be developed.

Thus, in addition to the need for more advanced and comprehensive computational tools and training, main system management must also begin

including a host of institutional issues. These include: (1) the institutional linkages in the water law system governing the development and use of water and the impact on the operation of the irrigation network; (2) policies which administratively define and extend the legal framework and set in motion procedures for financing, project selection, design and construction, operation, agricultural production supports, etc.; (3) the organizational arrangements between the public agencies responsible for water development, water conveyance and sometimes allocation; (4) the interactions between these agencies and the irrigators; (5) the effectiveness of the irrigators in organizing for the construction, operation, maintenance, equitable allocation and use of the irrigation water supplies based on the water demands for optimal crop production below the point of main system control; and (6) the impact of main system operations and maintenance on irrigation water use. Consequently, main system management shouldbe envisioned as an inter-disciplinary subject involving agronomists, irrigation engineers, economists, lawyers, sociologists and anthropologists.

This project addresses a well-documented problem of world-wide importance. It focuses on one component of the irrigation system at a level in which individual components and their interactions can be studied. Technical assistance and training programs will assume that main systems can be improved substantially with respect to conveyance efficiency, delivery reliability and management; and that improved on-farm irrigation practices, and therefore production, are also dependent on better main system operations. Under this project, a conceptual framework will be developed, tested and demonstrated to support the implementation of these programs.

DEFINITIONS AND SCOPE

The maximum benefit of irrigation cannot be derived unless the collection, storage, transmission and delivery of water are coordinated with the temporal and spatial characteristics of the water needs at the farm level. A necessary input to the evaluation of the main system, therefore, is the behavior of the area it serves. Similarly, the main system should not be considered independently of the catchment where it derives its water supply. None of these physical systems should be divorced conceptually from their associated social and institutional systems. Thus, three linked sub-systems are involved in this project -- the unit command area, the catchment and the main system itself. The following paragraphs define these subsystems and discuss some of the issues associated with each that should be factored into this project.

The Unit Command Area

The irrigation conveyance system is a channelized pathway from the water supply to each individual field. Near the downstream end of this system, water distribution changes from allocation between irrigated blocks, or commanded areas, to allocation between individually irrigated fields. This point is assumed to demarcate the main system from what is herein defined as a "unit command area" (abbreviated as UCA). This is a physical division point in the system and is generally a turnout or diversion structure. It may or may not be the point dividing the public and private sectors of the economy or the governmental and private institutional levels of administration.

The UCA is comprised of individual fields and the ditches linking them to the main system. As a system, it has not been investigated extensively. The effects of irrigation timing, frequency, duration and discharge on optimal cropping mixes and crop production need to be quantified since achieving higher levels of production is critically dependent upon having water on a timely basis with sufficient flow to operate the application systems efficiently. Conjunctive use of groundwater and surface water resources need to address questions regarding the irrigator's response to uncertainty of water availability and production inputs. Other issues needing increased attention include: (1) the priority of uses with the UCA; (2) formal and informal arrangements for operation and maintenance of the distribution network; (3) changes in the nature of irrigation from season to season or from year to year; and (4) effects on household subsistence and income, labor and environmental consequences, waterlogging, disease vectors, etc.

Models of the UCA must allow for technological improvements, both of cropping systems and of methods for applying water to cropland. The major weakness in previous research studies on main canal system management has been the use of UCA models in which irrigation efficiencies, directly assigned or implied in "duties," are unsupported and unrealistic. Even when efficiencies are reasonable, such models generally represent an "average" seasonal condition. The farmer must contend with wide variations in water requirements as well as major changes in advance and infiltration from one irrigation event to the next. The capability for modeling climatic effects and the hydraulics of surface irrigation has improved tremendously in the last few years.

The size of the unit command area is an important issue in the design of the main system, and this will be one variable to be studied under the project. Small command areas require more main system investment in structures and higher administrative operation and maintenance costs, but the main system can be more responsive to the UCA. Larger areas cost less to serve but are more difficult to serve effectively. The issue of where the interface occurs often reduces toa question of where public, directly subsidized support such as commonly provided for main systems ends and private (less subsidized) responsibility for unit commands begins. Large UCAs tend, therefore, to reduce public costs while increasing private financial commitments. In most countries, this interface may be set by policy and may be different than the optimal location for best system effectiveness.

Unit command areas seldom have formalized operating rules and the communicating link with the main system is often undefined. One must presuppose that main system operations would be somewhat reflected in the operation of the UCA and that UCA operations could therefore be influenced by changes in the main system. An important issue therefore is how might water management in the main system be modified to enhance water use in the UCA.

The organizational effectiveness of the farmers in the UCA for operating and maintaining their portion of the irrigation distribution network plays a significant role in the effective use of the water supplies for producing crops, both in terms of total production and the equity of this production between farmers at the head and tail of the

network. Again, this is a dynamic situation that changes between periods of plentiful and scarce water supplies during any season and from one season to the next. Also, the water losses in the system are significantly affected by the organizational capability for maintaining the water delivery and removal channels.

This subproject will treat the UCA as a modular subsystem and attempt to simulate its aggregate response. The efforts of Colorado State University are expected to evaluate the UCA in substantially moredetail, and those results will be used to refine the UCA aggregate response component of this work.

The Catchment Area

For purposes of this study, the catchment area is defined as the area of the watershed supplying water for irrigation to the main system. It would include the upland drainage feeding the stream where main system headworks are located, reservoirs and control structures operated in conjunction with the main system.

The nature of the catchment has an important bearing on irrigated systems. For instance, the size, shape, topography, soil and vegetative characteristics of the upland drainge area dictates the runoff hydrographs to the main system. These parameters may also effect sediment and debris in the flows which increase the need for maintenance and reduce system conveyance and storage capacities.

A few of the issues of concern with regard to the catchment area are: (1) integrated management of storage and control facilities; (2) supplementing direct flow diversions; (3) forecasting and monitoring runoff; (4) treatments of the watershed to control sediment and debris; and (5) flow augmentation.

Integrated Management. In many hydrologic systems, the major fraction of runoff from snowmelt or rainfall occurs prior to the peak consumptive use period of agricultural crops. An irrigated area may be small so that even the reduced flows are sufficient to satisfy crop demands during the critical maturation (and peak consumption) periods, regardless of the cropping pattern. Under many other systems, sufficient water is not generally available and cropping patterns are adjusted toward early maturing crops or drought resistant crops. It is not that the annual water supply is deficient, but that the temporal distribution of the supply is out of phase with crop demands. Reservoirs solve this problem and they make water available for hydro-electric power generation, recreation, fishing and urban or industrial needs. They also act to control flooding.

The operation of reservoir systems which supply irrigated agriculture is complex. Reasonably accurate methods have been developed to forecast crop water requirements and to predict crop yields which can be expected under various irrigation regimes. However, few if any reservoir system operators know the cropping pattern being serviced and would never know the moisture status on an individual field, nor the schedules of plantings, cultivations, pest

controls, etc., that also affect the scheduling of irrigations. Two general practices have evolved: either water is supplied on a rotation or continuous flow basis, or the reservoir responds to irrigator requests. Certainly, one issue of importance is the communication of main system and command area status to the catchment managers.

Agricultural diversions seldom conform to optimal hydro-electric, recreation or urban and industrial water requirements and are usually competitive with flood control objectives. Further, the water diverted into one main system may require coordindated operation of several storage and control facilities in the watershed. In order to manage water resources most effectively, the system of controls, conveyances and users should be operated under an integrated management policy. The specific nature of such a policy and the necessary infrastructure and training requirements needs to be addressed by a project such as this.

Direct Flow Diversions. Reservoirs are one of the most capital intensive investments that can be made in developing water resources. From an irrigation viewpoint, the question naturally arises as to whether or not a more cost-effective means of shifting the natural runoff distribution toward the agricultural demand distribution could be employed. For example, the catchment area could be modified to substantially retard surface runoff and increase subsurface flow (checks on small channels, infiltration galleries, water spreading, etc). A groundwater development scheme in the catchment itself might be implemented to augment runoff during low flow periods. Even where possible, water exchanges with neighboring reservoir systems or river basins (interbasin transfers) might provide a better, more reliable water supply for irrigation than reservoir systems. An important consideration at the catchment level is therefore the alternatives for stabilizing the water supply.

The subject of forecasting and monitoring will be covered in following paragraphs, but emphasis should be given here. The communication link between catchment, main system and command area is critically important under direct diversion systems since the opportunity interval is substantially shorter than under storage systems. The uncertainty of the supply is of much more concern and thus the tendency to have more limited cropping mixes and less flexible delivery schedules. The effect of stochastic variation in water supplies needs to be included in any evaluation of irrigation system management.

Forecasting and Monitoring. The uncertainty associated with the water supply may be as limiting a factor on agricultural productivity as any one might conceive, particularly during periods of shortage or as water resources approach full develoment. Catchment areas respond differently to the magnitude and frequency of precipitation as well as seasonal cycles in temperature, wind and radiation. Improved monitoring of these conditions, coupled with more accurate analysis (forecasting models) would give main system operators and irrigators a significantly better basis for planning and decision making.

Watershed Modification. Watersheds can be managed in a number of ways to enhance irrigated agriculture. Previously noted were alternatives to regulate runoff patterns. Sediment and debris can also

gradients. For example, check-drop structures provide the necessary elevation changes along a waterway while dissipating erosive energy under controlled conditions. Contour plantings, grazing regulations and grassed waterways contribute in essentially the same manner. Programs such as these may be significantly more cost-effective and easier to implement than sediment/debris control within the irrigation system itself.

Flow Augmentation. Several irrigation systems in the world utilize branch canals to reallocate water from one river or canal system to another. This practice has also been applied to the catchment areas, the concept of interbasin transfer of water. Other augmentation alternatives include weather modification, desalination, phreatophyte control and evaporation suppression. While these possibilities are generally inappropriate, they should not be routinely overlooked.

The catchment area for this subproject will be considered in a lumped parameter fashion as proposed for the command areas. It is not intended to examine the subsystem in more detail than is necessary to reflect important consequences to the main system and UCA.

The Main System

The primary conveyance and distribution network, or "main system," is the most deterministic of the irrigation system components, and as a result, a variety of operational strategies have emerged. These can be broadly classified as continuous flow, rotation and demand operation, but it should be noted that many systems will operate as a combination of these strategies. Most of the important issues related to main systems are associated with these operational strategies and their limitations.

Continuous Flow Systems. A relatively large number of main systems are operated on a continuous diversion, continuous delivery basis. Such systems can be designed to be largely self-operating, and in theory, provide each irrigator with his proportionate share of the water supply. The management is simple and the costs associated with construction and operation are minimal. Operating personnel need not be skilled, nor are they in a position to respond to influence in making decisions. On the other hand, continuous flow systems impose a rigid water spreading strategy, and major disadvantages stem from this inflexibility. Small continuous flows are difficult to use efficiently in surface irrigation systems, so irrigators modify delivery by combining and rotating streams within the UCA. Crop demands generally are distributed differently than deliveries. Early irrigations usually enjoy greater supplies than demands and apply far too much water, while peak season applications may be so inadequate as to substantially reduce yields. Finally, the burden of seepage and operational lossesand fluctuations in the main system are disproportinately borne by the end users.

Rotational Systems. There are also a fairly large number of main systems which rotate deliveries to individual UCAs on relatively fixed schedules and flow rates. This strategy is an extension of water management practices in the UCA and thereby offer substantial advantages over continuous flow regimes. Optimal flow rates necessary for efficient

be controlled in the catchment area by managing flow velocities and surface irrigation can be supplied, the administrative efficiency of main system operation can be maintained and the system losses tend to be more equitably distributed. However, the system costs more to construct and operate due to larger capacities. The difficulty in serving the temporal variations in crop demands remains a severe constraint to production. There is also more opportunity to exert individual influences on administrative decisions.

Demand Systems. Many irrigation projects operate with a decidedly downstream view because the irrigated lands may extend great distances from the main system headworks. This scenario assumes implicitly that the requirements of the irrigated sector can be anticipated one or more days in advance, depending on the lag time in the delivery network. The philosophy is to operate on the basis of irrigator demand, or in response to demand communicated to the system. Few if any demand systems which include long delivery networks are able to satisfy downstream demands all of the time. Some modern systems and most groundwater systems, in which the operation of the catchment and main facilities respond to the UCA, approach this ideal. Discharge capacities for both canals and pumps, and therefore capital costs, are higher for such systems. Operation and maintenance costs are also higher due to the need for more skilled mangers and increased maintenance due to periodic fluctuations of water levels of the canals. The physical management of main systems is more difficult because the hydraulic conditions are continuously changing. Demand systems present greatly increased opportunities for external influence in decision making. Main system functionaries yield tremendous power at times of high demand in responding to individual requests, so their good will is cultivated by most irrigators. This may be the most serious drawback to demand systems.

Summary. It is perhaps paradoxical that with the tremendous capital investments that have been made to construct or rehabilitate irrigation systems, yields in most areas are still well below the attainable. An enumeration of the reasons would be lengthy and site-specific, but in most cases a major contributor would be inadequate irrigation system performance. On balance, the need for water conservation and increased yield are outweighing administrative problems associated with more sophisticated systems. Newly constructed or rehabilitiated main systems tend to incorporate as much of a demand nature as possible and make the main system more responsive to the needs of irrigators. Farmers are becoming more involved in main system management and in evaluating the performances of their systems. Thus, important issues concern the methods of improving delivery flexibility at reasonable cost, how to modify existing institutional structures to accommodate desirable changes and the development of a trained personnel to implement the changes. Certainly, some of the primary benefits expected from this special research study are identifying legislative or policy changes that would improve system performance and organizational rearrangements and training programs that would provide the necessary skills for continually improving the planning, design operation and maintenance of irrigation systems.

Project Objectives

1. To develop a multidisciplinary model describing main conveyance and distribution subsystems within irrigation systems, including the physical and institutional linkages with the catchment and irrigated service areas. The model should simulate main systems generally and provide a means of optimizing objectives within particular system constituents;

2. To test the model using comprehensive field case study data to ensure its applicability to systems in the developing countries;

3. To apply the model under an action research progam to at least three diversified systems in areas of need in order to substantiate the practicality of the analysis and to provide the framework for transferring technology to other areas; and

4. To formulate guideines for the selection and development of appropriate technology including software and training materials needed for in-country and expatriate users, and hardware for the operation of main systems.

Conceptual Strategy

The catchment, main system and unit command area segments of an irrigation system are physically contiguous. These components may be administratively and operationally coordinated at some level, although effective coordination is requently deficient. Systems themselves may range in size from a few thousand hectares in aerial extent to millionsof hectares. They will invariably be complex. The question arises as to how the main system design, operation and maintenance be studied in detail without detailed study of catchment and UCA systems which provide inputs and impose constraints through strong linkages to the main system. There are also a number of logistical questions such as how to incorporate an optimizational capabiity to evaluate and rank options for improving management and system performance, how to integrate social and economic characteristics with physically based descriptions of the system and how to transfer the results of the study to personnel involved in actual main system operations.

In considering these questions and the nature of the irrigation systems, the strategy for investigating main system issues may be best founded on a management services orientation which is capable of integrating physical simulation with an optimization capability and including social-institutional considerations as constraints and boundary conditions. Because main systems are themselves networks with discrete control or decision points and flow pathways, it seems logical to base the approach on a network analysis structure. The main system model which emerges from applying hydraulic and administration principles must be linked with catchment and unit command area submodels in order to incorproate their inputs and constraints. This strategy allows the study to investigate main system issues without sacrificing the vital effects of other irrigation system components.

A modeling framework for problem definition and development of alternative solutions imposes some rather unique restrictions on an investigtion. Field data are needed to calibrate and verify the models, and are generally more exhaustive than data derived when simply defining problems and remedies. (The strategy is thus to evolve from the general to the specific.) These data need to be indicative of awide range of physical and operational conditions in order to provide the models with sufficient generality to be transferable. The data must therefore be collected from multiple case studies.

In addition to employing a strategy based primarily on modeling and detiled case study analysis, the results must be applied in a real time situation, i.e., close the loop in the study with an action research program. A signifiant refinement in most algorithms occurs when their use moves beyond the development and verification stages to their practical application. Methods of collecting and reducing data are often modified to streamline field use of the model, and generally, training others to use the product of a research project is best accomplished under familiar conditions.

DESCRIPTION OF ACTIVITIES

This special study involves the derivation and application of basically new concepts in both research and applied areas of irrigation. While the need for integrated main system design and management procedures is recognized, a detailed strategy for their development has yet to be formulated. Likewise, there has yet to be concentrated interdisciplinary thought applied. Remedying these two deficiencies should be the first task under this project. Several components of the model expected as primary outputs are fairly obvious and involve only modifications and adaptation of existing technologies, for example, the hydraulic simulation of canal flows, crop water demands, watershed runoff, etc. Their development can therefore proceed immediatey along with the collection of data to guide their formulation. Formulating an interdisciplinary strategy for study and initiating the physical modeling would comprise two of the principal parts of the 1982-84 fiscal period work plan.

The case study analysis needed to guide model development will begin during this work plan period and continue throughout the duration of the subproject. Because this research is intended to couple with planned or on-going USAID projects, the opportunity may also exist to provide an intermediate level of technical assistance and training to involved USAID and host-country personnel. Under this work plan, several potential case study projects need to be identified and visited by a reconnaissance level interdisciplinary team. Then, following the workshop to refine an overall subproject strategy, follow-up visits need to be made to case studies that can be initiated to accomplish a more detailed data inventory and evaluation of physical and operational problems. During the case study, data need to be collected to fill any gaps that may exist and that may be needed by the models. Afterwards, the results could be used to assess main system issues and serve as a more rigorous training experience.

1982-83 Activities

1. Several potential case study areas will be identified from which a broad range of system conditions can be extracted to provide generality to the analytical procedure.

2. Initial contacts via several channels will be made with USAID projects in countries like the Philippines, Thailand, India, Morocco, Sri Lanka and the Dominican Republic for assistancein these site selections. (This list of countries was developed from consideration of prior, ongoing or expected work on main system management, and the array of irrigation systems known to be in place.)

3. A more detailed identification will be made with respect to the assortment of physical and institutional parameters in at least one, and possibly two, countries where the likelihood of USAID Mission and host agency cooperation and contribution is best and where the most cost-effective opportunity for obtaining the required data can be found. A project team comprised of the project leader and two to three others from WMS institutions Colorado State University and Cornell University will visit these sites as possible over a four to six week period in August - September 1983 to examine alternative irrigation systems for use in this project.

4. Based on discussions during the site visits and inputs from colleagues at WMS institutions, a draft strategy statement will be prepared and circulated to a 15-20 member group of experts who will participate in a workshop during 1983-84 project period. The statement will delineate main system issues and needs; objectives and conceptual approaches; relationships with other USAID host-country, or other donor assistance projects; potential case study opportunities and an overall framework for main system evaluation.

5. Currently available simulation models of irrigation systemsfrom the farmlands to the catchment will be assembled. Work will begin on delineating their applicability to this problem and their input requirements. Modifications to some components will be initiated and initial sensitivity analyses will be performed. These models will include watershed precipitation-runoff programs, reservoir and canal operations models, conveyance system hydraulics, cropland water requirements and yield analyses, groundwater management models, etc. Assembly of these model will be accompanied by a thorough literature review of the individual technologies in order to identify the associated state-of-the-art.

6. Preparations will be made to generate a baseline data set to guide the model development efforts. Segments of two nearby irrigation systems, one in Southern Utah and one in Western Colorado, for which minimal operational data would have to be collected, have been located. The Government Highline Canal in the Grand Valley is a direct river diversion system in which a

significant amount of data are already available from years of salinity control investigation. The Consolidated Sevier Bridge Reservoir Company near Delta, Utah is a multi-reservoir demand system where excellent records are maintained.

7. A list of experts and their expertise will be developed for a main system workshop during the 1983-84 project year. The proposed participants will be considered by WMS directors and USAID program officers and then contacted for their indication of interest and scheduling.

1983-84 Activities

1. Activities (5) and (6) in the 1982-83 period will be continued and expanded. By the end of that 1984 project year, a main system operational model should be materializing and several of the components verified.

2. Early in the 1983-84 project year, possibly as early as December or January, and interdisciplinary main system management workshop will be held in Logan. The objectives of the workshop will be:

   a. To define the current state-of-the-art with respect to the main system;

   b. To outline the issues, both within disciplines and those requiring interdisciplinary efforts that should be addressed by the project;

   c. To formalize the structure of the interdisciplinary and inter-university cooperative effort; and

   d. To revise and finalize the Concept Strategy Paper.

3. Based on the results of the workshop, it should be possible to initiate the case study analyses. This will require formal site selection, approval and contribution by the USAID Mission(s) and host-countries and assistance from host-country agencies. The most probable scenario will involve evaluations being set up first in Maharashtra, India and Northeast Thailand and/or the Dominican Republic during FY 83-84. Additional case studies might follow in other countries like the Philippines, Morocco and Sri Lanka. The workshop strategy paper will enumerate the data needed and the methods of analyses.

OUTPUTS

Sept. 1983: (1) Initial contact with USAID Missions in the Philippines, India, Thailand, Dominican Republic, Morocco and Sri Lanka to inquire as to interest in participation and availability of projects.

(2) A site visit to at least one mission to evaluate a potential case study project that could be initiated in FY 83-84.

(3) Workshop participants contacted.

Nov. 1983 Draft Concept Strategy Paper distributed to workshop participants.

Jan. 1984 Host workshop on interdisciplinary main system design, management and rehabilitation.

Feb. 1984 (1) Publication of Strategy Concept Paper.

(2) Initiation of case study action research studies at least one international site.

Sept. 1984 Completion of first case study.

BUDGET: FY 1983

1. Professional Personnel (USU)

W. R. Walker	
20 days ts @ 192.02	3840.40
2.33 ppm nts @ 3775.45	8796.79
G. E. Stringham	
.5 ppm nts @ 3327.27	1663.63
T. C. Hughes	
2. ppm nts @ 3321.25	6642.50
J. R. Moris	
20 days ts @ 164.79	3295.80
.25 ppm nts @ 3295.80	823.95
total	25063.07

2. Professional Personnel (CU AND CSU)

G.V. Skogerboe	
20 days ts @ 242.50	4850.00
R.K.Sampath	
20 days ts @ 176.40	3528.00
total	8378.00

3. Graduate Student and Fellowships

A.A. Keller 4.5 pm nts @ 1000	4500.00
N. Haie 2.0 pm nts @ 800	1600.00
J.R. Busman 1 pm nts @ 125	125.00
total	6225.00

4. Employee Benefits

27.35% of (1)	6854.74
18.8% of (2)	1575.06
11.25% of (3)	700.31
total	9130.11

5. Consultants

G. V. Skogerboe 2 days nts @ 213.77	425.54
J. C. Loftis 15 days nts @ 142.05	2130.75
D. F. Peterson 10 days nts @ 242.50	2425.00
total	4981.29

6. Miscellaneous Direct Costs

Computer Services		4000.00
Telephone and Mailing		500.00
Printing and Photocopying		200.00
Office Supplies		300.00
Other		800.00
	total	5800.00

7. Travel

2 pt to Washington for system monitoring conference		3740.03
1 pt to CSU to coordinate work plan		555.39
3 pt to Washington to coordinate work plan		2766.00
4 pt to Thailand to develop action research		17600.00
	total	24661.42

8. TOTAL DIRECT COSTS

84238.89

BUDGET

PROFESSIONAL PERSONNEL:				
Irrigation Engineers	4.0 PPM (nts)	at $4,500	$ 18,000	
	2.0 PPM (ts)	at 6,000	12,000	
Water Resources Engineer	2.0 PPM (nts)	at 4,500	9,000	
Rural Sociologist/Anthropologist	1.0 PPM (nts)	at 4,500	4,500	
	1.0 PPM (ts)	at 6,000	6,000	
Agric. & Natural Res.	1.0 PPM (nts)	at 4,500	4,500	
Economists	0.5 PPM (ts)	at 6,000	3,000	
Systems Analyst	1.0 PPM (nts)	at 4,500	4,500	
	0.5 PPM (ts)	at 6,000	3,000	
Agricultural Engineer	1.0 PPM (nts)	at 4,500	4,500	
	0.5 PPM (ts)	at 6,000	3,000	
Subtotal				$ 72,000
NON-PROFESSIONAL PERSONNEL:				
Graduate Students	14.0 GPM (nts)	at $1,200	$ 16,800	
	1.0 GPM (ts)	at 1,200	1,200	
Subtotal				$ 18,000
CONSULTANTS:				
20 days at $242.50				$ 4,850
TRAVEL:				
8 trips to case study and action research sites		at 2,500	$ 20,000	
4 trips to coordinate within U.S.		at 625	2,500	
Subtotal				$ 22,500
PER DIEM:				
8 trips to case study and action research sites 171 days each at $100			$ 17,100	
4 trips to coordinate within U.S. - 5 at $70			1,400	
Subtotal				$ 18,500
CURRENT EXPENSE:				
Telephone, mailing, supplies				$ 2,500
WORKSHOP (LOGAN):				
15 participants x 5 days at $50			$ 3,750	
15 airfare at $625			9,375	
Conference room and related expense			500	
Subtotal				$ 13,625
EQUIPMENT:				
Computer				$ 20,000
INDIRECT COSTS:				
32% x 151,975				$ 48,632
GID - DBA (4% x 21,000)				$ 767
- G & A (10% x 151,975)				$ 15,198
TOTAL				$236,572

APPENDIX B

PROPOSED WORK PLAN FOR WMS-II SUBPROJECT: ECUAVIR

"ECUAVIR"

WORK PLAN

AND

COST ESTIMATES

for

AUDIO VIDEO MODULES

for

INERHI/SEDRI
ECUADOR

through

USAID/ECUADOR

WMS II
CID

by

INTERNATIONAL IRRIGATION CENTER (IIC)
AGRICULTURAL IRRIGATION ENGINEERING DEPARTMENT
UTAH STATE UNIVERSITY
LOGAN, UTAH

January 1983

I. INTRODUCTION

1. Justification as WMS II Activity. The goal of the WMS II project is to improve the technical efficiency, productivity, and economic performance of irrigated agriculture, by increasing the effectiveness with which increasingly scarce irrigation water resources are developed and used. Better water management is the crucial key element in achieving this increased efficiency. To achieve these goals in the context of improved water management, a number of activities are proposed which themselves have a variety of practical objectives. Two of these objectives are to: (1) increase the quality and expand the quantity of U.S. expertise in irrigation water management, and (2) develop training techniques and methodologies to disseminate improved water management knowledge.

Regarding the first point, the statement of work of the project specifically provides for a focus on:

> ...helping expand the core group and in preparing others to conduct the field work. This will include helping identify individuals to comprise the expanded core group and providing them with the required training and experience.

In addition to developing the level of expertise and pool of U.S. experts in water management, the second objective listed above has as its training purpose to disseminate water management technology to developing countries through the use of training materials appropriate for both in-country technicans and local water users. This will both improve the technical competence of LDC water managers and increase their capacity to train other managers as well as water users themselves. The project envisions the development of training techniques which greatly accelerate the capacity of LDC institutions to accomplish this.

The ECUAVIR audio video module activities fundamentally further both of these objectives. The project develops the capacity of water management experts in the use of computers to create graphic and antimated techniques and their integration with audio-video modules. Such skills and expertise are extremely scarce and their application to water management problems are practically non-existent. Thus the project achieves a significant strengthening of a unique area of water management expertise.

Likewise, the video modules themselves will make a significant contribution to the training capacities of WMS II training activities. The modules facilitate the transfer of relatively complex technological information in a way that can be readily understood. This represents the opportunity to jump the technological information gap; even where semi-literate people are involved. Not only are they useful for the

training of LDC water managers but also lower level extension personnel as well as water users at the farm level. Thus, the project addresses in a fundamental way the WMS II objectives of increasing the skills of U.S. experts as well as applying new training methodologies to upgrade the skills of LDC water managers and users.

2. Prior Documentation. The detailed project proposal and justification for this work is incorporated in a 12 page document entitled "Proposal for Audio Video Modules for Ecuador," dated June 1982. That proposal describes how the modules integrate into a comprehensive research and technology transfer program in Ecuador. The work plan and cost estimates contained in that proposal are superceded by this document as a result of the interim experience in methodology, costs and updated state of art production methods and equipment as later explained.

A. Work Completed to this Date:

1. Module Content Agreement. The IIC in cooperation and agreement with INERHI established a subject matter outline for the forty proposed practical conceptual modules and 18 field exercise previews.

2. Production of Demonstrative Module. The IIC produced a demonstrative AV module to establisn a common understanding as to the type, quality, subject matter depth, length and variety of production components to be incorporated into the whole program and an improved basis for estimating the total production costs. This module is a 15 minute module on Surge Flow. The concerened agencies have previewed this module, approve the general approach with the understanding that cultural live filming will be done in Ecuador.

3. Integrated Training. The IIC has elaborated a proposal detailing how the proposed modules fit into and form the basis for a comprehensive training program in irrigation for Ecuador.

4. Writing of Script. The writing of the script for the modules has commenced and is continuing.

5. Establishing Efficient Production Methodology. Strategies for production and obtaining the highest practical quality audio visual modules are continuing and are shifting rapidly due to dynamics of the computer graphics filming, editing equipment, costs and capabilities. The experience gained in the production of the Surge Flow Module have been invaluable in developing this work plan.

II. WORK PLAN

B. Development of Work Plan and Cost Estimates

Our earliest cost estimates contained in the Proposal were made without actual experience of the Surge Flow demonstrative module. Our estimates prior to our Surge Flow experience was calculated at slightly over $3,000 direct costs per average module plus 35% USU overhead and 10% CID administrative costs for a total of about $4,350 per module, totaling more specifically $185,335 for the 40 modules.

This work plan is based principally upon our projections resulting from our actual experience in production of the Surge Flow demonstrative module both in terms of methodology, time, equipment and total costs. We calculated our actual total costs in production of the Surge Flow module at $9,000 for 15 minutes. We have then considered our best projections by incorporating calculations for improved production methods, economies of scale, new state of art equipment for editing and art computer graphics, filming and production which were not available to us for Surge Flow but which are now or will soon be available. Our present estimate is calculated at a total cost of $6,060 per average module or a total cost of $263,241. The following cost estimate under AID format is our best rough calculation as to line items but because of the experimental nature and shifting state of art the IIC would have to have the right to shift between line items as reasonably necessary for execution of the work.

C. Module Organization for Work Plan

The modules are titled and organized as follows for purposes of this work plan.

1. Soil-Water-Weather-Plant-Fertility Relationships

MODULE PRODUCTION GROUPS

A

1.1. Overview of hydro-agriculture at the plant level.

*1.2. Soil water storage and availability to plants.

*1.3. The use of water by plants.

1.4. Critical water requirement periods of corn.

*1.5. Estimating potential evapotranspiration and the water requirements of crops.

*1.6. Determining when and how much to irrigate. this module will integrate or synthesize the knowledge gained in modules 2 through 5.

B

1.7. Corn production with various levels of irrigation and fertilizer applications to demonstrate the important interaction between water and fertility.

*1.8. Sub-soil conditions which restrict root and/or water penetration.

*1.9. The effects (on crop production) of high phreatic water levels in the soil and the need for drainage.

1.10. The causes of soil salinity and its effect on crop production.

C

1.11. General water requirements of other important crops and the timing of planting and the use of several crops to create a topping program which fits the availability of irrigation water (plus probable rainfall) throughout the year.

*1.12. The effects of various degrees of irrigation application uniformity on crop production.

1.13. The causes, bad effects and control of soil erosion.

*1.14. Water infiltration into soils and percolation through them.

2. Irrigation Techniques and User Aids

D

2.1. Basic irrigation concepts and system types.

2.2. Furrow irrigation on various slopes ranging from 0 to 10%.

*2.3. Furrow irrigation (using level furrows with curves) for fields with slopes up to 70%.

*2.4. Border irrigation with and without corrugations or furrows.

*2.5. Wild flooding on sloped land with and without corrugations.

*2.6. Innundation irrigation in small basins on sloped land and level basins on flat lands.

E

*2.7. Sprinkle irrigation on various slopes ranging from 0 to 30%.

*2.8. Sprinkle irrigation on steep slopes ranging up to 70%.

*2.9. Micro (drip or spray) irrigation on tree and row crops.

2.10. Sub-surface irrigation by regulating the phreatic water level on flat lands to supply water to plants.

*2.11. Selection of irrigation methods for various site conditions and crops. This module will integrate the knowledge gained in the 24 previous modules.

3. Evaluating the Economy of Water Use

F

3.1. Basic concepts and reasons for evaluation.

*3.2. Temporary water measurement devices and methods.

*3.3. Estimating main system water conveyance losses.

*3.4. Estimating accuracy of farm water delivery devices to determine whether farmers are receiving their proportional share of water.

*3.5. Estimating on-farm system conveyance losses.

G

*3.6. Uniformity and efficiency of furrow irrigation.

*3.7. Uniformity and efficiency of basin irrigation.

*3.8. Uniformity and efficiency of sprinkle irrigation.

*3.9. Uniformity and efficiency of micro-irrigation.

3.10. Actual overall efficiency of projects and on-farm systems in deliverying water from the source to the plants being irrigated. This module will integrate delivery and application system performance.

4. Management to Improve Irrigated Agricultural Performance

H

*4.1. Determining field water delivery requirements according to season, crop and growth stage, irrigation system efficiency, site conditions and farmer preferences.

*4.2. Practical vs design frequency of irrigation for various crops and crop mixes.

*4.3. Periodic and seasonal diversion and farm water delivery requirements for multiple cropping systems.

*4.4. Secondary canal water requirements and delivery scheduling.

*4.5. Managing rotational deliveries at the farm level.

*4.6. Managing system when there are and/or preceived water shortages or excesses.

D. Outline of Module Production Work

Phase I: Scripting and Story Boarding

1. Seminar on methodology with all authors.
2. Drafting script and story boarding.
3. Editing, integrating, coordinating.
4. Translation of script and story board to Spanish.
5. Forward to INERHI for review, localizing language and review and approval of live filing requirements from story board.
6. Return to IIC for final editing of script and story board.

Phase II: Computer Graphics

1. Access equipment and operator training.
2. Commence when computer graphics inputs clearly identified as to any module in Phase I. This phase could begin within 2 weeks of beginning of Phase I.

Phase III: Live Filming (Primarily in Ecuador)

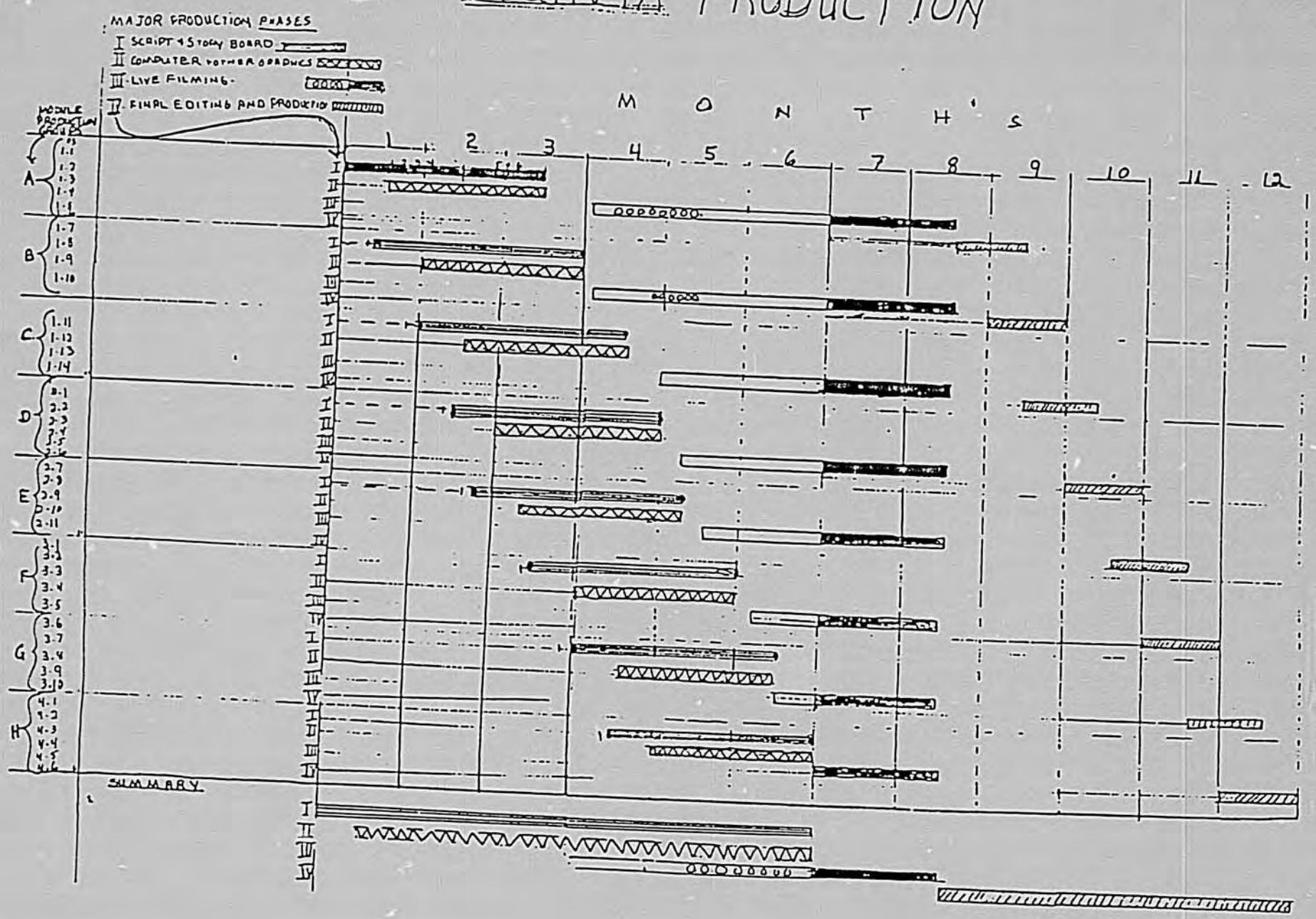
1. Identify non-cultural live filming such as laboratory or controlled stages of plant growth, etc. with no cultural implications.
2. After scripting and story boarding (Phase I) complete each production. Specific cultural filming scenes will be taken in Ecuador and suitable logistics for live filming in Ecuador will be developed by trial and error.
3. Appropriate site selections and preparations made by INERHI/USAID/ECUADOR/SEDRI/IIC. We will experiment with filming with personnel now in Ecuador.

Phase IV: Final Editing and Production

1. Could begin as to any module when all of components in story board are complete as to that module.
2. The final editing process involves an integration of all the audio video components into the final finished modules.
3. Delivery of final modules could be on a one by one basis as each is finished.
4. The modules could be incorporated into training programs on a chapter by chapter basis or accumulated until all are completed for delivery.

ECUADORIAN AUDIO VISUAL IRRIGATION PROGRAM

ECUAVIR PRODUCTION



III. COST ESTIMATES
ECUAVIR - WMS II
IIC Cost Estimate

	P.M.	Rate	FY 83	FY 84	Total
Salaries					
Manager	6	3,600	12,528	9,072	21,600
Script Story Board	2	3,600	4,176	3,024	7,200
Integ & Edit	2	3,600	4,176	3,024	7,200
Script Reading	1.5	3,600	3,132	2,268	5,400
ITV Production Tech.	6	2,200	7,656	5,544	13,200
Graphics Production	10	2,200	12,760	9,240	22,000
Secretary	12	1,000	6,960	5,040	12,000
Accountaint	3	1,200	2,088	1,512	3,600
Sub Total			53,476	38,724	92,200
Wages					
Graduate Assistant					
Integ & Edit	6	1,000	3,480	2,520	6,000
Translation	6	1,000	3,480	2,520	6,000
Sub Total			6,960	5,040	12,000
Staff Benefits					
Salaries					
(92,200 x 29.5)			15,775	11,424	27,199
(12,000 x 15%)			1,044	756	1,800
Sub Total			16,819	12,180	28,999
Travel					
RT Logan - Quito	3 trips	1,200	2,088	1,512	3,600
Domestic Travel			1,160	840	2,000
Sub Total			3,248	2,352	5,600
Per Diem					
Quito (30 days x $70)			1,218	882	2,100
Domestic (10 days x $70)			406	294	700
Sub Total			1,624	1,176	2,800

IIC Cost Estimate (continued)

	P.M.	Rate	FY 83	FY 84	Total
Direct Costs					
Telephone, Telegraph	200/mo.	12	1,392	1,008	2,400
Office Supplies	200/mo.	12	1,392	1,008	2,400
Video Tapes & Supplies	450/mo.	12	3,132	2,268	5,400
Equipment Rental					
Word Processor	604/mo.	12	4,228	3,020	7,248
Graphics Computer	700/mo.	12	4,900	3,500	8,400
Editing Equip.	700/mo.	12	4,900	3,500	8,400
Sub Total			19,944	14,304	34,248
Direct Cost Sub Total			102,071	73,776	175,847
Equipment					
Video Equipment (Title in Ecuador)			4,793	3,470	8,263
Overhead (35% x 175,847)			35,725	25,821	61,546
CID G+A (10% x 175,847)			10,207	7,378	17,585
GRAND TOTAL			152,796	110,445	263,241

Note 1: For reasons previously explained the IIC has flexibility among line items as is necessary to perform the work provided that the total is not exceeded.

Note 2: USAID/ECUADOR will provide funding for $127,000 which corresponds to the direct costs rough estimates prior to the Surge Flow module experience.

IV. ADDITIONAL CONSIDERATIONS

1. Copyrights: USU/IIC has to this date invested significant resources, skills and time in bringing the project to its present state of development as detailed in IIA above. This USU funded work includes development of a comprehensive program agreement, the production of the demonstrative Surge Flow Module, establishing production methodologies, script writing and story boarding all as detailed in IIA above. It is anticipated that this project in the future will also benefit significantly from a wide range of USU inputs and consultancies that will not be paid for by the project because of the high level of demonstrated interest that has been generated throughout the University in the project.

   The materials if not copyrighted would be subject to the indiscriminate and uncontrolled inexpensive duplication, alteration and use. This would not be in the best interests of the parties to this proposed program.

   Even with copyright, considering the hardware state-of-art in video recording and copyrighting, the copyright will not likely provide much protection but might curtail wholesale commercial pirating of a copyrightable production.

   For these reasons Utah State University will retain copyrights to all modules produced and will give to INERHI an exclusive permanent license for the use and dissemination for use of the modules in Ecuador. AID shall also have a license to use the modules in training courses provided in the U.S. or foreign countries when such courses are given under the WMS II contract divided by WMS II personnel. Use in country for follow-on courses in which WMS II personnel do not directly participate would be subject to USU copyright.

2. Ecuador Filming: USAID/ECUADOR has agreed to make available equipment and some personnel assistance in the Ecuadorian filming requirements. We will pursue experimentation with filming there with minimum travel requirements for IIC technicians and develop an acceptable quality Ecuadorian filming procedure.

"ECUAVIR"

END FY 1983 AMENDED WORK PLAN

AND

COST ESTIMATES

for

AUDIO VIDEO MODULES

for

INERHI/SEDRI

ECUADOR

through

USAID/ECUADOR

by

INTERNATIONAL IRRIGATION CENTER (IIC)
AGRICULTURAL IRRIGATION ENGINEERING DEPARTMENT
UTAH STATE UNIVERSITY
LOGAN, UTAH

September, 1983

INTRODUCTION

The workplan for Ecuavir dated January 1983 is incorporated into this document in its totality as the basis for this FY 84 work plan and cost estimate. The purpose of this FY 1983 year end review is to establish how our performance to this point coincides with the previous work plan and what adjustments will be required to complete and expand the scope of performance.

The Ecuavir project was designed as a result of discussions between USU personnel, SEDRI, INERHI, USAID/Ecuador and other concerned Ecuadorian agencies between January 1982 and August 1982.

The audio visual modules were designed to interface with a proposed Title XII Ecuadorian irrigation training and institution building program under which USU would have assisted INERHI in providing training in country including field testing the modules in Ecuadorian training programs and also developing complimentary written materials. This Title XII carry on program has not materialized as anticipated and it is now clear that even if it does develop the funding level will not permit field testing ad revisions of the Ecuavir modules as earlier anticipated nor will it permit the devlopment of the contemplated manuals or guides.

The target audience for the 45 Ecuavir irrigation training modules in those discussions are limited to technician level. The exclusion of farmer level modules was at the insistance of some of the Ecuadorian agencies. It has always been USU's expressed preference to include a farmer level set of modules. However, the scope and budget of Ecuavir was thus expressly limited to a technician level treatment.

END FY 1983 ANALYSIS OF ECUAVIR BUDGET

Attached is a budget expenditures sheet to the end of September 1983 showing a projected expenditure of $133,522.00 in direct costs as of that date. This compares with estimated direct cost expenditures of $132,000.00 per our budget of January 1983.

The following notes analyze the work plan and budget through FY 1983.

1. The cost of the work was highly speculative.
2. Flexibility between line items was necessary.
3. At the requets of USAID/ECUADOR the ICC experimented with low budget alternative of filming in Ecuador using Ecuadorian personnel. This alternative was quickly abondoned in favor of the higher budget alternative of USU sending its filming crew to Ecuador. No formal budget increase was ever formally approved to cover these additional costs. This filming is now going forward and because of seasonal requriements and other logistical reasons is essential to a timely completion of the work. The extra cost is approximately $10,000.00.

4. The budget and work plan was designed to interface with an Ecuadorian Title XII program which has not been funded and which, if funded, will not provide funding for review and evaluation of the Ecuavir modules. The Title XII project would also have developed the printed training guides. Both of these add-ons would enhance the value and effectiveness of the 45 technician level audio video modules and have been requested by the Ecuadorian agencies and AID according to our understanding.

5. We are actually very close to where we expected to be in terms of work plan completion on September 30. Story boarding is complete, filming will be complete and the electronic art will be substantially complete. It will be primarily a matter of editing that will be left for the balance but we may not have projected accurately the cost related to the remaining work of editing.

6. A request has been made for us to prepare a farmer level set of modules as previously discussed.

ECUAVIR BUDGET

	Expenditures Proj. Inception to 6/30/83	Obligations to 9/30/83	Total to 9/30/83
Salaries	28,563.07	27,937	56,500
Wages	8,678.50	8,800	17,479
Staff Benefits	7,678.63	9,334	16,858
Travel	2,300.73	8,868	11,169
Current Expense			
Telephone	69.26	600	669
Data Processing	1,268.67	1,800	3,069
Printing	353.23	600	953
Consultant	6,400.00		6,400
Ins (State)	34.54		35
Operating Supplies	15.05	4,000	4,015
Office Supplies	87.00	500	587
Rec & Guest	32.10		32
Exhibits/Disp/Awards	10,899.77	4,200	15,100
Other	156.00	500	656
	19,315.62	12,200	31,516
Indirect	23,233.54	23,499	46,733
	89,615.09	90,638	180,255
Total Direct Costs	133,522.00		
Indirect	46,733.00		
	180,255.00		

ECUAVIR OBLIGATIONS TO 9/30/83

	Obligation to 9/30/83	
Salaries		
David Daines	8,022	
Lyman Willardson	4,300	
Gary Merkley	6,000	
Tom Cronkite	3,900	
Ken Boutwell	4,212	
Liliane Francuz	1,509	
Brad Warnick	?	
		27,937
Wages		
Karl Smart	2,000	
Jose Forero	2,200	
Sergio Von Borries	1,000	
3 graphic technicians	3,600	
		8,800
Staff Benefits		
29% of 27,937	8,102	
14% x 8,800	1,232	
		9,334
Travel		
Gary Merkley & Ken Boutwell to Ecuador	8,063	
Other travel obligated	805	
		8,868
Miscellaneous		
Telephone	600	
Data Processing	1,800	
Printing	600	
Operating supplies	4,000	
Office Supplies	500	
Exhibits/Disp/Awards	4,200	
Other	500	
		12,200
Indirect		
35% x 67,139		23,499
		90,638

JUSTIFICATION FOR ADD-ONS

The payoff on technology transfer is rational agricultural production increases at the farm level. There is substantial evidence to support our concluion that many of the more limiting traditional communication barriers that have prevented adoption of improved agricultural technology by the farmer may be overcome by the transfer mediums inherent in Ecuavir. SEDRI has also become convinced. The worldwide implications of this visual simulated reality based mode of technolgy transfer deserves another extensive documentary treatment.

We considered the feasibility of estimating additional costs related to the farmer level production. Reasonably accurate estimates were deemed to be infeasible until Ecuavir is complete at the technician level. The best ball park figure that seemed to come out of discussions on the team which had been working on the 45 modules was that the cost for the farmer level would be about one-half of the cost of the production costs for the 45 modules.

APPENDIX C

PROPOSED WORK PLAN FOR WMS-II SUBPROJECT: INTERDISCIPLINARY ON-FARM SYSTEM SELECTION

WORK PLAN FOR WMS-II SUBPROJECT:

INTERDISCIPLINARY SELECTION OF IRRIGATION TECHNOLOGY

STATEMENT OF PROBLEM AND ISSUES

Irrigation development projects differ from other development programs in that the developers (governments, donor agencies, etc.) make decisions that must be accepted by the farmers who must accept the risks involved to implement the decisions for successful development. For the most part farmers' perspectives have been ignored in development programs, which has resulted in the failure of such projects to meet objectives necessary to justify their existence. Large amounts of money are spent on irrigation development in the work to increase food production and feed hungry nations. The hungry people are mostly those in the rural areas of the third world. Third world farmers are poor, usually uneducated and are in no position to take risks. Yet in many development projects they are expected to accept alien programs with which they have practically no input and implement technological practices which are to their knowledge and understanding. This results in farmer skepticism and/or distrust. The farmer is asked to change his practices to improve productivity. He views these changes as win or lose situations in which productivity could be less than subsistence and the risk involved outweighs the potential benefits.

DEFINITION AND SCOPE

Recently it has been recognized that a single disciplinary approach to irrigation development oversimplifies the complexity of project implementation. While an economic analysis may indicate a project is feasible, physical and/or social constraints may make the project objectives unobtainable. The engineering design often neglects socio-economic factors which will render the system inoperable under the local household, community and/or institutional framework.

The recognition of the need for a multidisciplinary approach to irrigation project development has brought together engineers, economics, agronomists, sociologists and political scientists for their respective individual inputs. These sciences must be integrated to understand their combined effect on the pragmatic problem of irrigation development. There still is a lack of understanding of the interrelationships of the various disciplinary aspects that affect a project's actual output. However, such an understanding is necessary to set realistic objectives and to refine estimates of project feasibility, the risk involved and resulting impacts after development.

Objectives

The choice of irrigation technologies and their relative impact at the farm level is limited by the physical, social and economic environment of the project area. It is from the physical environment that

irrigation technologies have developed, so their interrelationships and their effects on productivity are relatively well understood. What are not known very well are the equity, production and economic implications of these different irrigation technologies under different social and institutional settings. The objective of this activity is to develop an interdisciplinary methodology of selecting appropriate irrigation technologies at the farm level in an attempt to maximize crop production under various social, institutional, physical and economic settings. Technologies involving the distribution system will be confined in this study to those relevant to the management of irrigation water by individual and collective groups of farmers.

Approach

The typical engineering approach for selecting an irrigation technology is to attempt to get the most productivity with the least amount of water at the least cost per unit of potential production. This approach strives to economically maximize productivity, and therefore could be called the "theoretical efficiency approach." The problem with this approach is that technologies with the highest theoretical efficiency tend to be selected when other technologies would be more effective. Reasons for the differences in effectiveness could result from social constraints, farmer response to uncertainty, insufficient farmer training, labor restraints or insufficient availability of HYV inputs and markets to make the selected technology practical.

The effectiveness of an irrigation technology may be evaluated by comparing the actual crop production output to that assumed in planning and design. To estimate the effectiveness of a technology during the planning stages requires an interdisciplinary identification and evaluation of criteria that affects system performance, and therefore, productivity. Objective and subjective criteria must be evaluated in order to determine their interrelated effects on productivity. These criteria are being defined under three major headings:

1. Environmental, physical factors;
2. Economic factors; and
3. Social, institutional, organization factors.

Once the criteria identification is completed, each must be evaluated for their potential effects on productivity including a probable range of effects. This would refine our ability to estimate risks involved in each criterion. The result would be a better understanding of potentials and risks of using various irrigation technologies for obtaining particular project objectives.

DESCRIPTION OF ACTIVITIES

The physical criteria are the easiest to identify and evaluate in terms of the choice of technology and productivity. Irrigation research has concentrated efforts in this area for some time. Soil-water-plant-weather relationships are relatively well understood with respect to

productivity. However, these relationships still need to be identified along with other physical features, such as the geologic setting and the topography in order to describe their limitations on the various technology choices and resulting production.

The physical criteria are being divided into two sub-headings: non-site-specific and site-specific. Non-site-specific physical criteria identify that part of the physical work that may be described without consideration of location; for example, open channel hydraulics. Site-specific physical criteria are those that require site-specific information to describe them; for example, plant water use, which is a function of several on-site conditions such as weather, soil moisture, crop, growth stage, etc. The site transferability mechanisms of site-specific criteria are equations empirically and rationally derived from extensive research and data collection. Transfer mechanisms for physical criteria of irrigation have been researched extensively and provide relatively good links of physical criteria and production effects.

The most difficult and least researched criteria to identify and evaluate in terms of technology and productivity are the socio-economic and institutional criteria. The social science literature on general technology choices has grown in the last ten years, but it is difficult to extract quantitative information in terms of choosing irrigation technologies and the resulting anticipated productivity. Past experiences and documented case studies of the socio-economic and institutional aspects of irrigation development need to be researched in order to quantify agricultural productivity in a probabilistic manner relative to irrigation technologies and water supply reliability.

The economic evaluation of technology choices should incorporate risk factors that describe the potential to meet project objectives. A range of probabilities describing possible outcomes would certainly be more valuable than a single number describing a system's potential output. There is also a need to research past experiences in irrigation development to identify major factors that have inhibited attainment of production objectives, and to attempt to determine their effects.

Activity Schedule

Sept '83	Physical/Environmental factors identified and interrelated in terms of productivity and technology selection.
Oct '83	Written material of Physical and Environmental factors finalized and completed. Forward to potential senior participants for review and feedback.
Jan '84	Economic factors identified and interrelated as to technology choice incorporating sensitivity/risk analysis showing probable ranges of outcomes. Update of Physical/Evironmental factors including feedback.

Feb '84	Written material of project progress to date. Forward to potential senior participants for review and feedback.
May '84	Social/Institutional aspects of irrigation technology choice identified as related to productivity. Written material completed, updated and forwarded to potential senior participants for June seminar review and discussion.
June '84	Seminar: State-of-the-art of Interdisciplinary Selection of Irrigation Technology - 3 days; document and review seminar outcome (see attached seminar details).
Aug '84	Four week trip to various country projects to field evaluate methodology developed to date.
FY '84	Final report including a risk analysis of economically evaluating factor interrelatedness for selection of "most effective" irrigation technology. This will include incorporation of field data from Interdisciplinary Irrigation System Management action research studies.

SEMINAR

State-of-the-art of Interdisciplinary

Selection of Irrigation Technology

The purpose of the Seminar is to call together the various disciplinary experts for a combined final review and test of the proposed interdisciplinary selection methodology. Participants will have had prior individual review of developed materials with some input to material development. The Seminar will take place in June 1984 and will last no longer than three working days.

Potential Participants	Status for Cost Estimating
1. Ed Norm, Engineer	Travel
2. Wynn Walker, Engineer	*
3. Jack Keller, "	*
4. Charles Burt, "	Travel and Honorarium
5. Glenn Dobbs, "	*
6. Dave James, Agronomist	*
7. Wayne Clyma, Engineer	Travel
8. Tom Weaver, Economist	*
9. Gil Levine, Randy Barber or Milton Barnett, Econ/ Sociologist, Cornell	Travel
10. Dave Freeman Sociologist, CSU	Travel
11. Jon Moris, Sociologist	*
12. Unknown, Sociologist	Travel and Honorarium
13. Unknown, WID (Women in Development)	Travel and Honorarium

APPENDIX D

INCREASING WATER MANAGEMENT CAPABILITIES

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9/83

INCREASING WATER MANAGEMENT CAPABILITIES

Technical assistance, training and technology transfer, and special study activities all contribute to the enlargement of the pool of water management talent both in this country and abroad. This Project mandate is carried out through the introduction of an interdisciplinary approach to water management issues to LDC irrigation professionals and bureaucrats, to US professionals and academics, and to graduate students at the three lead universities.

The following activities are designed to increase water management capabilities:

1. Professional seminars and workshops. These university-initiated workshops are designed to introduce water management professionals and academics to concepts and analytical approaches developed by the WMS II team. In addition, they are designed to expose this group to ideas generated by others working in the irrigation development community. Examples of this type of interchange are the Cornell-initiated Workshop on the Design of Programs for Developing Small-Scale, Community Managed Irrigation Works, the Workshop to Review Farmer Participation and Organizational Issues, the Seminar on Current Research in Irrigation, and the Seminar to Review Indian Experiences with Water User Associations. At CSU, the workshop for DA trainers is especially designed to enhance capability among water management professionals to teach and direct activities in the Diagnostic Analysis Workshop. At Utah State, Professional development in language capability will be undertaken this year.

2. Mission intiated training activities. Another good opportunity to enhance water management capability is to include either graduate students or more senior professionals as part of the various training courses scheduled this year including the Diagnostic Analysis workshops and the Senior Officer's workshops.

3. Special Studies Activities. The inclusion of graduate students in university special studies activities serves as an orientation to interdisciplinary water management for graduate students in agricultural engineering, agronomy, and the social sciences.

4. Technical assistance activities. The participation of professionals on interdisciplinary TA teams exposes them to different disciplinary approaches to water management issues and enables them to look at these issues from a more holistic point of view. In addition, the inclusion of junior scholars on TA teams as interns contributes to the enlargement of the pool of talent available for water management development activities.

5. Professional visitors. The provision for a number of informal visits by water management academics and professionals to the lead universities provides an experience similar to that provided by workshops and seminars, but at a more informal, and often more intense level.

Not only is the Project charged with increasing the available pool of water management talent, it is obligated to identify professionals capable of applying concepts and approaches developed by WMS II to irrigation development activities. To this end, CSU has developed a professional roster. The roster serves to identify candidates for the various technical assistance, training and other activities needed by the project.

APPENDIX E

INTERFACING ON-FARM MANAGEMENT WITH MAIN SYSTEMS MANAGEMENT THROUGH LOCAL COMMAND AREA MANAGEMENT

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INTERFACING ON-FARM MANAGEMENT WITH MAIN SYSTEMS MANAGEMENT THROUGH LOCAL COMMAND AREA MANAGEMENT

By
David M. Freeman
In Collaboration With The CSU Irrigation
Systems Management Team

I. General Objectives

It is the purpose of this statement to establish a plan of work which will:

A. Integrate several on-going and proposed CSU special studies activities into a mutually supporting program which will increase the capacity of WMS II to serve project needs in the areas of training, technical assistance, and technology transfer;

B. promote constructive collaboration with special studies activities undertaken by colleagues at Cornell and Utah State University; and

C. advance state of the art knowledge regarding means to build and manage local command area irrigation units as interfaces between on-farm and main system operations. This necessarily entails advancing state of the art knowledge regarding on-farm and main system management.

II. The Problem

Water control on farm, the capacity to apply the proper quantity and quality of water at the optimum time to the crop root zone to meet crop needs and soil leaching requirements, is a most fundamental yardstick against which to measure effectiveness of irrigation systems. Irrigation water management, in large scale surface systems at least, involves the capture and control of water in central irrigation works, passing it on to local command area units which divide and control it further and, in turn, pass it on to the farmer who must control it on farm and in particular fields to place it in crop root zones (see figure 1).

The extent to which water supply on-farm can be applied in accordance with biological requirements of crops is a function of the socio-technical operations at the three levels--main system, unit command area, and on-farm. Farmers in irrigation systems around the world are faced with the common task of hitting a moving target--a crop root zone moisture deficit--in a technically dynamic and socially tumultuous environment within an irrigation system which all too often has been

designed by remote engineers, administrators, and politicians whose professional responsibilities were to do little more than aim a quantity of water in the general direction of farms within local unit commands. In most large scale systems, especially in Asia where the preponderance of global irrigation occurs, the upstream main systems were designed with little regard to problems faced by farmers in securing local water control for the purpose of effective water management. Furthermore, the original design criteria have become, in many instances, inappropriate to new crop technologies and new irrigation management objectives.

- Quantitative expansion of irrigation works, the major focus of irrigation works, and the major focus of irrigation policy during the last century, has been recently shifting strongly to a focus on qualitative improvement as a means of increasing production. Hopes rest heavily on the knowledge that existing large scale irrigation systems tend to operate at low efficiencies due to widespread failure to productively organize the three levels in Figure 1 to yield highest possible precision water control to the farmer so as to make improved on-farm management possible. This newer focus on qualitative improvement of inefficient irrigation systems must require analysis of both physical "hardware" (tools) and social organizational "software" (rules) in interdisciplinary fashion. It is the central premise of the proposed work that the design of the middle level social-technical (i.e., tools and rules) interfaces is a most strategic determinant of farmer water control, and thereby, productivity of irrigation systems. The proposed work, therefore, is of three types:

1) work below the unit command area interface which establishes on-farm irrigation requirements and needs which the interface must serve (see discussion under IV);

2) work above the unit command area interface which established constraints upon interface mechanisms (see discussion under IV);

3) work in the unit command are a interface to determine which kinds of "rules" and "tools" can best serve on-farm water control requirements under varying conditions in the main and on-farm systems (see discussion under IV).

III. Defining The Units

Figure 1 presents a crude set of concepts and distinctions which can be employed to define main, command area, and on-farm systems. However, a few observations are in order.

First, the interests of people at different levels of the irrigation system are typically not the same:

A. At the central main system level, good water management must focus heavily on keeping the flow of water in large

volumes within key parameters such that the main system functions effectively. The emphasis is on aggregating the many requirements of diverse unit command systems and dealing with them as aggregates by dealing with average needs and behaviors.

1. Central main system water managers are not rewarded or punished according to the on-farm productivity of the water.

2. Main system water managers can depend heavily upon the processed disciplinary knowledge of engineering, public administration, sociology, economics, and the like without knowing specific local details of unit command area and on-farm operations.

3. Main system water managers work to attain their fundamental objective--main system operational smoothness.

B. At the farm level, good water management must focus heavily on getting relatively small volumes of water to particular crop root zones. The farmer cannot focus on average behavior in the over-all main system or even the command area, but must focus on the particular condition of particular fields and crops.

1. Farmers are rewarded and punished according to the on-farm productivity of the water.

2. Farmers cannot depend heavily upon general tendencies yielded by the several disciplines except as they are adjusted to his or her particular and unique situation.

3. Farmers work to attain their fundamental objective--rapid adaptation to fast changing field conditions which can vary widely within fields, among fields on the same farm, among farms, and among unit commands.

C. At the unit command level which interfaces main systems with on-farm systems, good water management must focus heavily on ways to break down the large main system water volumes into volumes appropriate to on-farm application. The task must be to turn large volumes of main system water into small volumes of on-farm water under terms such that the farmer can employ it productively by virtue of his or her capacity to control it and thereby be willing to pay for it. Farmers cannot be expected to pay costs of main system unit command area management unless these systems provide him with at least minimally acceptable control over their water. Farmers are understandably reluctant to pay for water which

comes too soon, too late, too much, too little, or in poor quality.

1. Managers at the unit command level can be rewarded and punished on the main system format or by local farmer representatives who exercise at least some control over the unit command area operation.

2. Unit command area management must disaggregate the central supply tendencies of the main system into the specific requirements of the multiple and diverse farm systems within the command.

3. Unit command area management must develop some combination of hardware and software which will allow divergent objectives of main system management and local farmers to productively and equitably mesh.

It is the overall objective, then, to conduct a program of mutually supportive and integrated special studies which will produce greater capacity to interface farm sub-systems with main sub-systems through improved unit command area organization and management. This is an inherently interdisciplinary task and the specific components discussed below each possess that interdisciplinary orientation. The discussion turns, now, to a discussion of the specific special studies components organized around the three fold division--farm, unit command area interface, and main system.

IV. Proposed Program Of Irrigation System Special Studies

A. Farm Component

1. Farmer Irrigation Decision Criteria For Field Event Management.

Task Leader: Wayne Clyma

Doctoral dissertation research effort by Paul Wattenburger under the supervision of Wayne Clyma. This work, initiated under the FY 83 workplan, is designed to synthesize literature about field irrigation practices, especially regarding basin irrigation, and test hypotheses employing data gathered in several diagnostic analysis training efforts. This work will advance our understanding of farm and field requirements which Unit Command area interfaces must serve. Alternative interface designs can then be compared and evaluated against farm requirements.

2. Market, Non-Market, and Technical Assessment of Proposed Irrigation Improvement technologies.

Task Leaders: Freeman, Clyma, and Sparling.

Such technologies (e.g., tubewells, watercourses, land-leveling) may be employed by farmers individually or collectively in larger unit command area organizations. They must be assessed against multiple criteria and with a focus on their farm impacts because only the farmer can assemble the several factors of production and produce food and fiber. This work will bring to bear the social non-market, economic market, and technical criteria which can be employed in assessing the uses and limits of proposed irrigation improvement options.

B. Unit Command Aea Interface Component

1. Unit Command Area Organization (Rules and Tools) For Interfacing Main and Farm Sub-Systems.

Task Leaders: Freeman, Mohammed, Nayman, Young

A comparative study of the means of interfacing main, unit command area, and farm sub-systems by examining the functioning of three different unit command areas:

a. Type A--heavily dependent on reservoirs;

b. Type B--heavily dependent on the run of the river;

c. Type C--smaller scale more informal sub-system in which many farmers share common outlets.

The several aspects of this study are as follows:

a. Technical water measurement and monitoring from the farm headgates through the unit command area to the main system will be accomplished by Bob Mohammed as part of doctoral dissertation effort under the supervision of Wayne Clyma.

b. Study of water distribution rules within the Unit Command Area on farm production and incomes will be undertaken by Robert Young.

c. Study of organizational attributes (e.g., patterns of recruitment, reward, water distribution rules) on water control and productivity will be undertaken by David Freeman and Robby Laitos.

d. Study of communication flows between farm, unit command areas, and main system managers will be undertaken by Oguz Nayman.

2. Bangladesh Action-Research On the Interfacing of Deep Community Tubewells to The Farm

Task Leaders: Haider, Oad, Reddy, and Laitos

This study is designed to build on the experience gained in the 1983 Diagnostic Analysis conducted on deep tubewell irrigation in Bangladesh. The research will focus on the problem of appropriately organizing rules and tools to interface deep community tubewells to farm operations. The potential of the tubewells is substantially unfulfilled to inadequate installation and poor organizational interfacing arrangements. This study provides a highly valued opportunity to examine the problems of interfacing pump irrigation to farm operations.

3. Interfacing Main System Management to Farm Systems Through Unit Command Area Organizations (Rules and Tools) in the Philippines.

Task Leader: Early

This proposed special studies will assess the uses and limits of approaches employed for linking NIA main system management to farm operations.

4. Interfacing Main System Management to Farm Systems--A Study of Pump Irrigation Systems in Thailand.

Task Leaders: Rogers and Freeman

Ms. Kanda Paranakian, a GRA at CSU and employing data available through the University of Minnesota, has initiated doctoral dissertation research which focuses on patterns of existing unit command area organization for linking sample Thai farmers to irrigation authorities.

C. Main System Management Component

Task Leader: Reddy

Employing the Amarocha simulation model as an initial starting point, this study will examine main system management by examining the impacts of variable inflow rates, seepage, rates, and outlet characteristics on the organizational rules and tools for operating the unit command area which interfaces the main system with the farm component. This effort establishes the constraints upstream of the unit command area interfaces which affect the design, organization, and operation of unit command area interfaces.

APPENDIX F

SPECIAL STUDIES ACTIVITIES AT CORNELL

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APPENDIX

Special Studies Activities at Cornell

During FY 83, Cornell's special study activities were focused on two topics: 1) the design of programs for development and improvement of community-managed irrigation systems and 2) the analysis of experiences with farmer participation in, and organization for water management. Work on these activities began sometime after the first of the year so that only approximately nine months of time has elapsed since initiation. Also, during this first year of project life, the special studies have been heavily oriented toward activities such as literature reviews, interviews with knowledgeable practitioners and researchers, and several reconnaissance visits to developing countries in Asia, Africa, and Latin America. As will be noted below, while this approach was useful, and to some extent necessary during the start-up period, it is not expected to be the dominant mode of procedure during FY-84 or subsequent years.

The major objectives of our special studies work during FY-84 will be to complete the preliminary activities initiated this past year and to move toward more project-based and/or action research-oriented special studies during FY-84 and beyond. At this time there appear to be a number of mission activities that would provide opportunities to do just that; the continuing activities in Sri Lanka, as well as planned or possible activities in Himachal Pradesh, Bangladesh, Indonesia, Thailand, the Philippines, and Burma.

The actual selection among these several opportunities obviously will depend upon developments with regard to the specific projects involved but will also be influenced by ideas and recommendations arising from the two Task Force groups that will be examining the themes of developing community irrigation systems and improving the management of large-scale agency-based systems. Thus, an important sub-objective of our special study activities will be increasing inter-university exchanges for the purpose of identifying critical research needs and strategic opportunities in each of the broad thematic areas. Specific goals and projected activities for each of our special study topics are discussed below.

I. Analysis of Programs for the Development and Improvement of Small-Scale, Community-Managed Irrigation Systems.

The overarching objectives of this special study are to develop a capacity both in the United States and in host countries for planning, implementing, and evaluating small-scale irrigation projects and to sensitize irrigation agencies to critical issues and effective strategies for the creation of a sustained capacity for farmers to obtain water in a timely, useful, and equitable manner. In order to achieve these objectives, the small-scale special study has been focused on the critical engineering, economic, organizational, and administrative factors that influence the successful design and implementation of small irrigation schemes, usually managed by farmers themselves. The large number of current projects dealing with such systems and the likelihood of increased attention to these types of irrigation development in the future justify careful consideration of these matters.

During FY-83, an interdisciplinary team of faculty and graduate students at Cornell has been examining the intervention strategies of international agencies (including USAID and international lending institutions), private

voluntary organizations, and host country irrigation agencies in order to identify replicable components of successful assistance efforts. Initially, the team devoted attention to the gathering of data and establishing contracts in a range of geographical areas, including West Africa, South Asia, and Latin America.

During May and June, 1983, five background papers built upon a working typology of strategies for state and agency intervention in small-scale systems and projects. These four papers were devoted to specific components of intervention strategies: investment, design and engineering, local organization and control, and the role of development agencies. These papers identify the issues which each strategy component must address in order to promote system resilience and a sustained capacity to deliver water to users.

In addition, during the summer of 1983, a number of field visits —largely of a reconnaissance nature—have been completed. These field visits, carried out in collaboration with AID missions have included trips to Bangladesh, Sri Lanka, India, Peru, Bolivia, Mali, and Niger. Field activities included visits to small-scale irrigation projects and traditional small-scale systems. These projects and systems include gravity-fed diversion systems, small and large tanks, tubewells, and pump systems. Team members conducted interviews with irrigation professionals working within AID and in government irrigation agencies, as well as with local irrigation officials at the small-scale system level. In addition, individual graduate students affiliated with the small-scale group have conducted research on small-scale systems in Mexico and Nigeria.

Special study activities carried out during September, 1983 include the writing of trip reports on summer field activities and preparations for a workshop to be held at Cornell in November, 1983. Reports have been completed in draft form and will be circulated. The workshop on the design of programs for developing small-scale, community-managed irrigation works has been tentatively scheduled for late November, 1983. The purpose of the workshop will be to assemble a group of individuals experienced in designing, implementing, evaluating, or studying programs of small-scale, community-managed irrigation development in order to review, critique, and suggest modifications for the concepts paper draft prepared by the small-scale systems research group. The group is currently selecting and contacting potential participants and drawing up a program for the workshop.

It is expected that the small-scale, community-managed irrigation systems special study will be completed by the end of the first quarter of FY-84. Activities scheduled for this period include the following:

a) Drafting of a single concepts paper based on the four background papers prepared during FY-83 and on field research carried out during the summer of FY-83. The concepts paper will define more clearly the concepts of small-scale and community-managed and outline key issues in small-scale project development. These include, but are not limited to the mobilization of such local resources as labor, materials, information, and cultural and institutional resources; the problems posed by project development in the absence of traditional irrigation or agricultural systems; the relationship of design features to the ability of a

community to carry out operation and maintenance tasks; the role of the catalyst or community organizer in ensuring the success of small-scale projects; and the components of an adequate preliminary study for a small-scale project.

The paper will include chapters on investment, design, local organization and control, and agency involvement in community-managed systems. These chapters will build both on the literature review and country studies carried out in FY-83. In addition, appendices for each country visited highlighting major issues and development strategy components will be written. Finally, the paper will set forth recommendations for training irrigation professionals and sensitizing them to the special problems of community-managed systems; it will suggest areas for action research; and it will suggest areas for future special studies on small-scale project development.

) Informal seminars on small-scale, community-managed irrigation systems will be held biweekly throughout the quarter. The purposes of these sessions are to introduce other members of the Cornell community (especially those studying rural development) to the work of the small-scale activity, to familiarize the research team with small-scale irrigation in different regional settings, and to offer others at Cornell with academic or professional backgrounds in small-scale irrigation the chance to interact with the group.

:) The Workshop on the Design of Programs for Developing Small-Scale, Community-Managed Irrigation Works will bring to Cornell academics and professionals from the United States and host countries in order to review the small-scale concepts paper in draft form. In addition, it is expected that participants will have an opportunity to learn more about the Synthesis approach to water management issues and to share with the small-scale group their concerns about and recommendations for small-scale irrigation development in their regions.

l) On the basis of recommendations made at the workshop, the small-scale group will prepare a final version of the concepts paper for publication so that it can be circulated within AID and among the various international, national, and private organizations engaged in the development of small-scale, community-managed projects. In FY-84, the small-scale systems research team will consist of the following members:

E. Walter Coward, Jr., Professor of Rural Sociology and Asian Studies, WMS-II Project Coordinator at Cornell. Research on irrigation and water management in Southeast Asia—Laos, Thailand, the Philippines, and Indonesia—with some involvement in Sri Lanka, Bangladesh, Pakistan, and India.

Barbara Lynch, Assistant Coordinator, Water Management Synthesis II Project, International Agriculture Program. Research on irrigation and land use issues in Latin America—Chile, Peru—and forest lands in the northeastern United States.

James Nickum, Associate Professor of Asian Studies. Research on small-scale irrigation systems in China.

Ray Norman, Graduate Student in Agricultural Engineering. Research for Susquehanna River Basin Commission on effects of irrigation on low flow in river. Long-term residence in Southern Nigeria and Ghana.

Susan Turnquist, Graduate Student in Rural Sociology. Research on small-scale irrigation in Bangladesh, land use in New York State, and rural development in South Korea. Has worked in South Korea as a Visiting Research Associate at Seoul National University Institute for Saemaul Undong Studies and as a Peace Corps volunteer.

Michael F. Walter, Associate Professor of Agricultural Engineering. Research on tropical water management, variable area hydrology, hydrologic watershed modelling, erosion, and sedimentation. Extension activities on rural water supply, agricultural water movement (drainage), irrigation water management.

Ed Martin, Graduate Student in Agricultural Economics. Long-term residence and extensive research experience on small-scale irrigation systems in highland Nepal.

Bob Yoder, Graduate Student in Agricultural Engineering. Long-term residence and extensive research experience on small-scale, community-managed irrigation systems in highland Nepal.

In addition, Professors Jon Moris (Anthropology) and Derek Thoms (Geography) have collaborated with Ray Norman on a study of small-scale irrigation and traditional irrigation systems in Mali and Niger. At Cornell, graduate students Luin Goldring, Ruth Meinzen-Dick, and Nancy St. Julien will continue to make contributions to the group's efforts. It is also anticipated that the small-scale group will continue to work closely with the group engaged in the special study on farmer participation and organization as they have in FY-83.

Completion of the concepts paper will mark the end of the first phase of special studies in small-scale, community-managed irrigation systems. While it is expected that recommendations set forth in the concepts paper will guide future AID small-scale project development efforts, it is also anticipated that this initial study will lead to the identification and development of one or more project-based special studies. This phase will continue in conjunction with the formation and implementation of the Task Force on Community-Managed Irrigation Systems (see Training and Technology Transfer) and further involvement with country projects through Technical Assistance activities. Specific special study proposals and related budgets will be developed and submitted during the budget year. We anticipate that because of the close fit between many of these special study activities and specific projects a large portion of the costs will be covered through mission buy-ins.

2. Farmer Participation and Organization in Water Management: The State-of-the-Art.

The purpose of this special study is to produce systematic comparative analysis of experiences with farmer participation and organization for water management. Common modes of participation and organization as well as ranges of observed experience will be identified from the available literature, as well as outcomes associated with different kinds and extents of farmer participation and organization.

The analysis will include the following approaches to cumulating state-of-the-art knowledge:

a) description of those experiences in farmer participation and organization in water management that can be documented from the literature on irrigation activities;

b) prediction of water management performance outcomes associated with various modes of participation and organization based on analysis of the descriptive materials. The extent to which quantitative methods can be appropriately used remains to be determined, but case study information is recorded in ways that could lend itself to at least some forms of such analysis; and

c) proposals of approaches that appear most likely to achieve desired improvements in water management through farmer participation and organization. This last stage will depend more heavily on the qualitative analysis of case material.

In FY-83 the following activities have been carried out:

January-May, 1983: Initial review of literature on farmer participation and organization, carried out by Nancy St. Julien, Ph.D. candidate in Regional Planning under the supervision of Professor Norman Uphoff. Uphoff previously directed a state-of-the-art analysis of local organization generally as it could contribute to rural development, and St. Julien was a member of the working group doing comparative case study analysis. The major product of this initial research phase was the development of an analytical framework for the special study, which would build on the more general work already done but be elaborated and amended as appropriate to deal specifically with the tasks of irrigation and water management. Other Cornell faculty and graduate students with experience in irrigation and water management commented on the framework to strengthen it, though they were not compensated as part of WMSP-II.

May-September, 1983: Case study analyses were begun by small team of research assistants, all having experience with farmer participation and organization in Asia. St. Julien has worked on this subject in Sri Lanka with the ARTI-Cornell activities in the Gal Oya water management project. She left the special study work for two months at the beginning of September to consult with ARTI on its efforts to institutionalize the farmer organization component of the Gal Oya project. Bryan Bruns, graduate student in Rural Sociology, with experience in Thailand, worked

on case studies during the summer through mid-August. He did not continue officially with the work in September because he had a foreign area language fellowship, but plans to continue in the analysis informally. Ruth Meinzen-Dick, graduate student in Rural Sociology, with experience in India, began in September as Bruns ended his work and as St. Julien was leaving.

Professor Uphoff continued consulting with this team during the summer when he was not on TDYs for WMSP in Asia. The initial analytical framework was revised and improved by Bruns and St. Julien as they got into more systematic analysis of cases. The accumulated water management files of Professors Walt Coward and Norman Uphoff were searched for case material, and more standard sources for referencing subject matters were also used. Emphasis was placed on getting a representative spread of irrigation systems by size and technology, with a secondary emphasis on geographic (regional) spread. The most important criterion for selection of cases was, however, adequacy of data so that a reasonably complete picture of the functioning of the irrigation system and of the operation of farmer participation and organization could be gained. In September, a working group of faculty and graduate students interested in this subject was organized for consideration of the conclusions being derived from the case materials.

The following activities will be carried out in FY-84:

October-December, 1983: The first quarter of the coming program year will be spent in three modes of activity: (a) continuing case study analysis by Meinzen-Dick and by St. Julien when she returns from Sri Lanka; (b) working group discussions headed by Professor Uphoff, involving twelve to fifteen faculty and graduate students, to consider and critique conclusions from the case materials, drawing on their own broad experience with farmer participation and organization in irrigation systems; and (c) drafting of the state-of-the-art paper by Professor Uphoff with the assistance of Meinzen-Dick, St. Julien, and others. A draft should be finished by the end of December 1983 for consideration by AID and WMSP staff. During the fall, Uphoff and others will consult with AID and FAO staff on the planning for the expert consultation in Jakarta in July 1984 on this subject, to assist in the formulation of materials and guidelines for that meeting.

January-June, 1984: During the next two quarters, based on feedback from AID and WMSP staff and from other professionals in water management to whom the draft would be sent for comment, the draft would be revised. Additional case studies and analysis would be done to fill in any identified empirical or analytical gaps. Interaction in support of the FAO/AID consultation in Jakarta would continue. One version of the state-of-the-art paper would be written for that consultation according to guidelines formulated by AID/WMSP project managers. The other version, for a more general audience, would also be written to be completed as a WMSP output by about June 1984. During this period, based on the conclusions and priorities indicated in the draft, discussions would be undertaken with AID and other WMSP participants on what follow-up special studies on this subject would be appropriate.

The special study on farmer participation will culminate in the preparation of a state-of-the-art analysis of farmer participation and organization for water management in the form of:

a. a specific product for FAO/AID expert consultation on water management, Jakarta, July 1984, and

b. a general analysis of farmer participation and organization for WMSP and community of water management professionals.

It will also provide for consultation on farmer participation and organization for water management:

a. Advisory inputs to planning of FAO/AID expert consultation on water management, Jakarta, July 1984,

b. Planning of more refined special studies on farmer participation and organization to contribute to WMSP objectives, to begin from second quarter FY-84.

c. Additional assistance in this subject area as may be requested by WMSP.

3. Projected Special Studies

In addition to these ongoing studies, there are several topics related to this theme that we believe should be considered for future action. It would be premature to assert their relevance at this time, prior to the formation and deliberation of the Task Force discussed below, but they are mentioned here for illustrative purposes.

Local Resource Mobilization—there is need to further understand the extent and processes of mobilization of local resources in support of irrigation development. And, the related matter of the appropriate role of government in inducing such mobilization.

Hill Irrigation Development—there is some evidence that the development of irrigated terraces in hill areas may have a positive impact on management of other hill resources such as forests and watersheds. More needs to be understood about these intercations and, again, means by which the State might support upland irrigation works.

Support for Customary Irrigation Groups and Facilities—irrigation development often proceeds with little attention to what local people may already be doing. In selected regions, creating the capacity to identify and understand local practices and design development programs sensitive to traditional forms is required.

APPENDIX

Cornell Initiated Workshops and Seminars

As detailed below, the workplan proposes four seminars-workshops to be organized during FY 84. Two of these derive directly from special study activities that were initiated during FY 83 and which will extend into the new budget year: the workshop on community-managed systems and the workshop on farmer participation and organization.

A third seminar, Current Research in Irrigation, is intended to provide a forum for exchange of experiences and ideas among a broad group of professionals engaged in work with irrigation and water management. This forum will provide an opportunity for testing ideas developed in the Synthesis work and also bringing in ideas and experiences from progessionals outside the project's activities.

A fourth meeting, the Seminar to Review Indian Experiences with Water User Associations, is proposed in recognition of the increasing Synthesis involvement in Indian projects—most of which have a farmer organization component. This seminar is intended both to acquaint Synthesis staff with present Indian work on this topic and provide a forum for the identification of principles and guidelines to direct Synthesis activities on this topic.

We see these seminars-workshops, individually and as a set, contributing to the objective of increasing professional capacity and expanding the pool of talent available to work on irrigation development.

1. Workshop on the Design of Programs for Developing Small-Scale Community-Managed Irrigation Works.

During FY-83 a team of researchers at Cornell has been reviewing the literature and conducting field visits to areas with active small-scale community-managed irrigation projects as background for preparing a concepts paper on this topic. The draft version of this paper will be completed in the early portion of FY-84 and it is planned to organize a workshop for its presentation during the first quarter of FY-84.

The purpose of this workshop will be to assemble a group of individuals experienced in designing, implementing, evaluating or studying programs of small-scale community-managed irrigation development and/or customary community-managed systems for the purpose of reviewing and discussing the paper and suggesting modifications therein.

Participants in the workshop will be from a broad spectrum of researchers and program designers and implementors—including those in both the public and private sectors. Limited participation from abroad also is planned.

2. Workshop to Review Farmer Participation and Organizational Issues.

It is clear that most planning for irrigation development will continue to give attention to the farmer participation and organization component. Nearly all of the project planning and design activities that the Synthesis project has been asked to assist include this item. In addition, at least one special study activity is

concerned with this matter, the Gal Oya Project in Sri Lanka, and farmer organization is an important part of the Diagnostic Analysis training activities. It also is the case that the approaches that have and are being taken toward fostering farmer participation and strengthening irrigator organization are diverse, not yet well codified, and in some cases known only to a small group of actors.

In view of the demands for the Synthesis project to assist with these important issues and the diversity of our experiences with designing and implementing activities to facilitate farmer involvement in irrigation development planning and implementation, we propose to organize a several-day workshop for the purpose of improving our understanding of past experiences and formulating broad guidelines for future work.

The primary participants in the workshop would be staff from each of the three lead universities as well as selected individuals who have particular field experience with this topic. In addition, participants from AID/W and a few AID field offices experienced with this matters would be invited to attend. Overall size should be between 15 to 20 persons.

The major objectives of this meeting would be to review cases and approaches that have been used to foster farmer participation and organization in water management with special attention to drawing from them their programmatic implications—staff needs, timing of activities, institutional changes required, etc. Specific outputs of the workshop would be copies of several papers prepared on the various participation experiences and a set of suggestions for both project design and future action research.

3. Seminar on Current Research in Irrigation.

There are a number of US academics and private consultants whose research and other activities are concerned with issues of irrigation development but who are not located at one of the three lead universities participating in the Synthesis project. While some of these individuals are associated with the Synthesis project for short-term assignments, there is a continuing need both to inform them regarding the broad range of Synthesis activities and to glean from their work new approaches and insights regarding irrigation development. One of the important objectives of the Synthesis project is to create an enlarged pool of talent to work on these matters, and one means for doing this is to create a lively intellectual community of researchers and activists dealing with these matters. This seminar would contribute to this process.

The seminar will be structured around invited participants largely, but not entirely, outside the Synthesis team. Participants will be asked to prepare abstracts of brief papers reporting on their current work. These abstracts will be the basis for discussion with special attention to their implications for Synthesis activities in training, special studies, or project design and evaluation, as well as for programming implications for AID missions.

Special consideration will be given to identifying participants whose work relates to the main themes with which Synthesis is concerned—but this will be interpreted broadly so as not to be restrictive. Approximately 20 to 25 participants will be invited.

4. Seminar to Review Indian Experiences with Water User Associations.

The Synthesis project is becoming increasingly involved with assisting the AID/Delhi mission in designing and implementing activities related to farmer organization for water management. Already planned activities, such as those in Madya Pradesh and Rajastan, call for various action research projects on this matter. Projects that are being planned in Himachal Pradesh and Maharastra are very likely to call for additional work with irrigation organization.

Thus, given the present and future requests to the Synthesis staff, the relatively little experience that any Synthesis staff have had with farmer organization in India, and the large number of studies of experiments with water user groups now underway by Indian researchers and agencies, there is need for a seminar aimed at acquainting Synthesis staff and others with the current state of experience and thinking on these matters. This understanding would serve as the basis for a systematic approach to designing special studies and other activities for experimenting with various approaches to farmer organization and developing Indian capacities to do so.

This seminar, held in India, would involve the participation of key staff from each of the lead universities, other selected academics with specific experience with Indian rural organization, Indian researchers who have been working on this topic, and selected AID/W and AID/Delhi staff.

APPENDIX

FY-84 Activities Using Carryover Funds from FY-88

Four Cornell University activities for FY-84 are continuations of activities initiated in FY-83. These include two technical assistance activities--India: Hill Irrigation Project Preparation and Bangladesh: Water Management Systems Project Paper--as well as the two special studies--Small-Scale Irrigation Systems Study and the Comparative Analysis of Farmer Participation. In all cases, these activities will continue at least into the first quarter of FY-84.

All but the Participation special study will require at least some additional funding in FY-84. In Part I of this workplan, budgets for the three activities requiring additional funding are presented. However, these budgets show only those FY-84 items which we anticipate will need additional funding. Items which in all likelihood will be covered by carryover from FY-83 have been omitted entirely. In addition, we have only shown professional person months covered by FY-84 funds, rather than the total picture of our time commitments for these activities.

In order to present a more complete picture of our projected expenditures and time commitments for FY-84, we include in this appendix budget sheets for the four activities listed above which show a single budget encompassing all anticipated activity expenses. These budget sheets also show anticipated carryover and mission buy-ins. It should be noted here that carryovers can only be estimated roughly pending the closing of FY-83 accounts.

Technical Assistance

BANGLADESH

Activity Title: Completion of Water Management Systems Project Paper

Description: Project will focus on development of manpower and institutional structures necessary for Bangladesh to deal with its water management problems effectively. Team to submit final version of project paper. Team leader will provide assistance to mission for water management activities and coordinate team data gathering and writing efforts (six day work weeks for short term consultants).

Institutions: Managing CORNELL Cooperating _____ Participating _____

Activity Coordinator: Hammond Murray-Rust Phone: c/o AID, Dhaka

PERSONNEL BY DISCIPLINE	FY 1984												
	1983			1984									
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	TOTAL
Agr. Engineer	1	1	1										3
Agri.Economist		.5	---										.5
Train.Specialist		1	---										1
Bus.Mgmt.Specialist	1	---	---										1
Pump Specialist		.5	---										.5
Insti.Specialist		.5	---										.5
												TOTAL	6.5

Project costs

Item		WMS-II FUNDING	MISSION CONTRIBUTION
Direct Costs			
Salaries & Benefits			
Professional Personnel	3 PPM at $4,528	13,584	
Travel - USA to Dhaka	1 trip at $3,000	3,000	
	5 trips at $ 200	1,000	
Per Diem/living allowance	3 months at $1,000	3,000	
	2 days at $ 100	200	
DBA		327	
Other Direct Costs			
Fee	80 days at $ 200	16,000	
Travel	2 trips at $3,000	6,000	
Per Diem	60 days at $ 75	4,500	
	22 days at $ 50	1,100	
Other		1,000	
TOTAL DIRECT COSTS		$49,711	
Indirect Costs			
University Overhead (49.3%)		23,188	
CID G&A		4,921	
TOTAL INDIRECT COSTS		$28,109	
TOTAL COST OF ACTIVITY		$77,820	
Mission Buy-In Funding.....		$ 0	
WMS-II Core Funding.....		$77,820	
Carryover from FY-83		$25,000	
FY-84 Core Funding		$52,820	

Technical Assistance Activity

INDIA

Activity Title: Hill Irrigation Project Preparation--Phase II

Description: To provide assistance to Mission in preparation of project plan and documentation for assistance to small-scale irrigation development in State of Himachal Pradesh. Continuation of FY 83 activity.

Institutions: Managing CORNELL Cooperating USU Participating _____

Activity Coordinator: E. Walter Coward Phone: (607) 256-5495

PERSONNEL BY DISCIPLINE	FY 1984												
	1983			1984									
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	TOTAL
Project Coordinator		3	---	---	---	---							3
Rural Sociologist	1	---											1
Agronomists	1	---											1
Agr. Engineer	1	---											1
												TOTAL	6

Project costs

Item		WMS-II FUNDING	MISSION CONTRIBUTION
Direct Costs			
Salaries & Benefits			
Professional Personnel	3 PPM at $4,766	14,298	
Travel - USA to Delhi	3 trips at $3,000	9,000	
Per Diem	93 days at $ 100	9,300	
DBA		788	
Other Direct Costs			
Consultants			
Fee	83 days at $240.50	19,962	
Travel	1 trip at $2,750	2,750	
	3 trips at $ 500	1,500	
Per Diem	92 days at $ 85	7,820	
	4.5 days at $ 100	450	
Other		3,000	
TOTAL DIRECT COSTS		$68,863	
Indirect Costs			
Cornell University Overhead (49.3%)		16,305	
Utah State University Overhead (32%)		10,554	
CID G&A		6,842	
TOTAL INDIRECT COSTS		$33,701	
TOTAL COST OF ACTIVITY		$102,569	

Mission Buy-In Funding..... $63,000

WMS-II Core Funding..... $39,569

Carryover from FY-83 $83,000

Special Studies

WORLDWIDE

Activity Title: Small-Scale Irrigation Systems Special Study Completion

Description: Revision of small-scale irrigation concepts paper in light of summer field experiences in Sri Lanka, India, Bangladesh, Mexico, Peru, and Bolivia for November workshop (see training and technology transfer). Preparation of final version of paper based on workshop discussions. Recommendations for further study research.

Institutions: Managing: CORNELL Cooperating _____ Participating USU

Activity Coordinator: Jim Nickum, Barbara Lynch Phone: (607) 256-5095; 607 256-8483

PERSONNEL BY DISCIPLINE	FY 1984												
	1983			1984									
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	TOTAL
Rural Sociologist	3	---	---										3
Agri.Engineer	.5	---	---										.5
Economist	1.5	---	---										1.5
Grad.Stu.Ag.Eng.	3	---	---										3
Grad.Stu.Rur.Soc	2	---	---										2
Grad.Stu.Ag.Econ.	6	---	---										6
												TOTAL	16.0

Item			WMS-II FUNDING	MISSION CONTRIBUTION
Direct Costs				
Salaries & Benefits				
Professional Personnel	5 PPM	at $4,766	23,830	
Graduate Students	11 GPM	at $1,133	12,463	
Other Direct Costs			1,000	
TOTAL DIRECT COSTS			$37,293	
Indirect Costs				
University Overhead (49.3%)			$16,074	
CID G&A			3,692	
Total Indirect Costs			$19,766	
TOTAL COST OF ACTIVITY			$57,059	

Mission Buy-In Funding.....	$ 0
WMS-II Core Funding.....	$57,059
Carryover from FY-83	$34,094
FY-84 Core Funding.....	$22,965

Special Studies

WORLDWIDE

Activity Title: Comparative Analysis of Farmer Participation Experience

Description: The overall goal of the special study on farmer participation and organization for water management is to produce a systematic analysis of reported materials on this topic with a focus on a) description of these experiences, b) prediction of water management performance outcomes associated with various modes of participation and forms of organization, and c) prescription of approaches that most likely to achieve desired improvements in water management. During FY 83 a small group of faculty and graduate students have developed an analytical schema for reviewing the literature. It is being used to review and catalog farmer participation cases. This review effort will continue in FY 84 and will be followed by a state-of-the-art paper reporting results and implications for the FAO/AID farmer participation workshop planned for Indonesia in July 1984. This report will also be reviewed in the proposed Workshop to Review Farmer Participation and Organization Issues (see Training & Technology Transfer).

Institutions: Managing: CORNELL Cooperating _____ Participating _____

Activity Coordinator: N. Uphoff Phone: (607) 256-6370

PERSONNEL BY DISCIPLINE	FY 1984												
	1983			1984									
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	TOTAL
Political Scientist	1-	---	---										1
Grad.Stu.Rur.Soc.	2--	---	---										2
Grad.Stu.Planning	2--	---	---										2
												TOTAL	5

Project Costs

Item		WMS-II FUNDING	MISSION CONTRIBUTION
Direct Costs			
Salaries & Benefits			
Professional Personnel	1 PPM at $4,766	4,766	
Graduate Students	4 GPM at $1,133	4,532	
Other: (itemize, if large) Publication costs		2,000	
TOTAL DIRECT COSTS		$11,298	
Indirect Costs			
University Overhead (49.3%		5,108	
CID - DBA		1,129	
TOTAL INDIRECT COSTS		$ 6,237	
TOTAL COST OF ACTIVITY		$17,535	

Mission Buy-In Funding	$ 0
WMS-II Core Funding	$17,535
Carryover from FY-83	$17,535
FY-84 Core Funding	$ 0

APPENDIX G

A STRATEGY FOR PROFESSIONAL DEVELOPMENT IN WATER MANAGEMENT

Draft
9/83

A STRATEGY FOR PROFESSIONAL DEVELOPMENT IN WATER MANAGEMENT

Problem and Purpose

Farmer requirements for rapid adaptation to crop needs necessitate the securing of control over irrigation water so that it may be placed in the crop root zone at the correct time, in the proper quantity, and acceptable quality, and in a context wherein any unconsumed applications will be drained away with minimum damage to present or future production. Constraints to adequate irrigation water control may be found at any of several levels in given irrigation systems--farm, local command area, and the main system. Much of the problem lies in fact that:

1) farmers are generally so poorly served by extension and other information services that they do not fully comprehend methods of optimum irrigation application; and

2) insofar as farmers do comprehend water requirements of their crops, they are constrained from applying their knowledge by attributes of their farms, local command areas, and main systems.

It is the purpose, therefore, of Synthesis II training programs to increase the capacity of irrigation organization management staffs to diagnose constraints upon the farm productivity of water at whatever level such constraints might be found, to search for solutions which will relax strategic constraints, and to implement the improved socio-technical packages within the particular irrigation system. In addition, it is a fundamental objective of Synthesis II training programs in host countries to provide a focal point around which Synthesis II activities in technical assistance, technology transfer, and special studies can be employed to construct programs of improved irrigation water management which will be cumulative in impact.

Synthesis II training programs serve farmers and irrigation system managers and authorities by improving the capacity of irrigation systems to:

1) deliver water with suitable control;

2) increase productivity of water for growth of food and fiber;

3) promote farmer involvement in management, especially at the unit command area level;

4) increase ecological stability of irrigation practice; and

5) increase returns to investment in irrigation infrastructure.

Training Program Components

Synthesis II training programs presently annd potentially offered by Colorado State University fall in two categories:*

A. Training programs in host countries which have as their primary objective the professional development of host country personnel in host country contexts.

1. Diagnostic Analysis Workshops (DA).
Format: Approximately five weeks in host country.
Function: An interdisciplinary program designed to train middle level managers in concepts and procedures employed the diagnostic analysis of, and mitigation of, constraints upon improved farm irrigation management.

2. Search for Solutions Workshops (SFS).
Format: Approximately six weeks in host country.
Function: To build upon work initiated in one or more Diagnostic Analysis Workshops by training participants in specific methods to assess proposals for relaxing constraints upon improved water management identified in preceding DA workshops.

3. Senior Officials Workshops (SO).
Format: Approximately one week in host country or third country.
Function: To sensitize senior irrigation officials to the concepts and procedures involved in the interdisciplinary analysis of irrigation systems, and to convey the significance of the research-development process as a method for improving irrigation system performance. These workshops may be employed either to prepare for subsequent training or technical assistance activities or they may follow upon DA or SFS workshops and employ information gathered during the course of such activities.

B. Training programs which have a primary purpose of increasing the capacity of CID and other universities to conduct training programs in host countries, and to perform training tasks most effectively accomplished in the United States.

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* Note: There is potentially a third category, namely that of degree and/or non-degree training on-campus for selected host country personnel whose training needs cannot otherwise be met. Currently no such training is funded.

APPENDIX H

CONCEPTUAL FRAMEWORK FOR IRRIGATION SYSTEM MANAGEMENT

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CONCEPTUAL FRAMEWORK FOR IRRIGATION SYSTEM MANAGEMENT

Introduction

The irrigation system management concepts as discussed in this paper* are considered general in nature and applicable to most large, publically owned irrigation systems regardless of the cropping patterns practiced. Irrigation system management concepts referred to herein are basically systematic approaches to improving the performance of existing irrigation systems. Irrigation system management per se does not include the planning, design, construction and rehabilitation of irrigation systems, but improvements in management and expansion of the base of knowledge on irrigation system management should naturally influence and enhance those efforts of irrigation agencies. The management of an irrigation system and the design of the structural components of the system are intimately interrelated. In many cases the choice of a particular type and intensity of structures (hardware: water measurement devices, headgates, checks, turnouts, size of turnout units, etc.) in an irrigation system design would require a particular type and intensity of management through farmer participation and by the agency personnel assigned to operate and maintain the system. Likewise the specification of the type and intensity of the management (software: procedures, farmer participation, skills and intensity of agency personnel assignment, etc.) that an irrigation system is to utilize determines the type and intensity of infrastructure that the system will require. This is to say that there are important tradeoffs between the structural (physical hardware) and management (human software) components of an irrigation system for given levels of performance. The ultimate choice of an appropriate management-structural mix for a given nation must be made by the public decision makers. The grounds for making such a decision are many--administrative feasibility, economic efficiency, national interest--but wise decisions can only be made with sufficient data on the nature of the tradeoffs.

Much knowledge based on experience, research and tradition is available on irrigated agriculture, structural design and irrigation practice, some of which predates recorded history. Irrigation agencies and international donors and lending agencies place great effort and tremendous investments in development of new, and rehabilitation of old, irrigation systems every year. The paradox is that despite all of the experience and knowledge available, tradition tends to reign and irrigation systems generally do not perform up to expected levels of performance established by feasibility studies and project designs. There also tends to be a considerable communication gap between system designers and system managers, such that major discrepancies occur between

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* This paper is necessarily a draft of September 1, 1983, since the concepts and strategies will evolve as the special study activity is developed.

expectations and performance of systems. The performance records of existing irrigation systems do not appear to have a major influence on the design of new systems or old system rehabilitations. Commonly observed problems in operating irrigation systems include:

1. projected cropping patterns that have not been adopted by farmers;

2. cropping intensity, yields and total crop output that occur far below expected levels;

3. operational procedures that fail to include necessary and appropriate involvement of farmers, which in turn leads to:

   a. systems with damaged or neglected facilities that require major rehabilitation before they are ten years in use,

   b. systems which lack sufficient maintenance for efficient operation,

   c. systems which have a serious maldistribution of water to farmers both in time and space, such that equity, reliability and adequacy of supply do not occur;

4. environmental conditions necessary for long term, stable agricultural production potential which have been drastically altered; and

5. system management personnel who are ill-equipped to understand the dynamics of the biological crop or the human organizational requirements for successful irrigation.

These and numerous other performance versus expectation discrepancies have generally been recognized by the irrigation community, including policy makers, administrators, managers and researchers. These recognitions form the basis for defining the opportunities for irrigation system management improvement and the establishment of a research and development process that can lead to better managed irrigation systems. This paper will attempt to communicate to irrigation professionals some essential concepts that can be used to systematically improve irrigation system management. First, a number of terms will be defined to provide a common basis for understanding. Second, irrigation system management needs will be discussed with respect to their apparent priorities. Third, a suggested process for irrigation system management improvement is presented in the light of current requirements and understanding of the problems in irrrigation systems. Fourth, information gaps in irrigation system management are enumerated in relation to the state of the art and recent action research results.

Irrigation Water Management Definitions

It is important for the terminology of irrigation water management to be well understood among the many professionals involved in research, training, administration, planning, design and management of irrigation systems. This common understanding enhances the quality of communication, whether spoken or written and makes the professional involvement more fulfilling and the accomplishment of objectives more efficient.

Irrigation is commonly defined as the science of supplying water to meet crop production needs in lieu of or as a supplement to rainfall. Irrigation is conducted in a social environment involving farmers, irrigation operation and maintenance personnel, managers of systems, irrigation agencies or departments, farmer organizations, irrigators' associations and numerous other individuals and institutions. Irrigation takes place in an economic environment where inputs have costs and outputs have values attached, investments require payment of principal and interest, commodities are grown for urban populations or to earn foreign exchange and some resources must be imported to support the national production enterprise. Irrigation involves a biological environment where the major output is the result of a biological growth process and numerous biological entities have life cycles and growth habits that impinge upon and determine the quality and quantity of the product.

Irrigation involves a physical environment including the soil, water on the earth, as well as in the atmospheric processes and the numerous structures that are used to control the water. Irrigation requires the application of social, economic, biological and physical principles focused on supplying water to grow a crop.

The irrigation system is defined as the entire set of interacting social, economic, biological and physical factors, objects and entities from the source of water through the conveyances to the farm and the land that is irrigated including the drainage network that removes water excesses from the boundary of the irrigation service area. This definition includes the irrigation agency, its personnel, the farmers and their organizations and all of the related institutions serving irrigated agriculture. Subsystems in the overall irrigation system would, for example, include the conveyance system, the distribution system, the farm system, or the drainage system. The use of the term system depends on the focus of attention at a particular point in time.

Management is defined as the act or art of controlling, conducting or supervising a process. As applied to water it would imply the judicious use of water to produce food or fiber. The word judicious means that management includes a concern for resource use and responsibility for the outcome of the process. Management is the major realm by which humans are brought into the production process. Management includes the rules and procedures that are used to guide the control of

the process. Management is practiced at many levels in the production system, from the decision making associated with allocation of water among competing uses, the control of the source of water, the diversion and conveyance of the water, distribution of the water to farmers who in turn convey, allocate and apply it and remove excesses when necessary. As was earlier defined in the introduction, management is conveniently categorized as the software component of irrigation, while the structural components are called hardware.

Irrigation water management then is the integration of all the contributing disciplines, primarily sociology, economics, agronomy and engineering, to the process of supplying, diverting, storing, allocating, conveying, distributing, applying and draining of water that is aimed at the production of a food or fiber output from a crop. Irrigation water management is conveniently divided into two major subcategories, which are interrelated and are used to guide program emphasis. First is irrigation system management, often referred to in context as system management. Second is farm water management, often referred to as water management. These two categories will be further defined and discussed below.

Irrigation system management is that portion of irrigation water management that attempts to integrate supervision and control of the irrigation system from the top of the system or from the source of water through the steps of diversion, storage, allocation, conveyance, and distribution to and including the point where individual farmers or groups of farmers take control to allocate, convey and apply the water for their cropping enterprize and continuing at the point where farm drainage collects and is removed in the drainage network. The irrigation system management process must by definition include the integration of the irrigation water requirements aggregated from the root zone of the crop, to the field, to the farm, to the turnout unit, to the headgates of laterals, to the diversion point on the main canal from the source such that water can be allocated and supplied in a sufficient quantity, with an adequate quality and on timely schedule to meet the needs of the crop in a manner convenient to the farmer. Irrigation system management deals with abstracting water from the source, allocation, conveyance, distribution and removal of excess mainly from the point of view of the central irrigation bureaucracy. The personnel of the central irrigation bureaucracy generally are looking up the system for their instructions, rewards and sanctions. Irrigation system management can be a joint irrigation agency and farmer organization activity where farmers collectively through an irrigators' assocation assume responsibility and authority over the irrigation water in a portion of the conveyance and distribution system perhaps at the lateral or distributary level. This is likely to be done much in the same way that farmers manage small scale private irrigation systems around the world.

Farm water management is the component of irrigation water management that deals with water in the hands of the individual farmer

as directly used in crop production or by a small community of irrigators who share an irrigation turnout and must in turn allocate, convey and apply the water to crops in a mutually beneficial and agreed upon manner. Most irrigation organization at this level is informal and accomplished without written rules or an organizational charter. The norms for taking water are generally well understood by all participants as are the sanctions imposed when the norms are exceeded. Informal arrangements are made for periodic individual or group maintenance work, for water sharing in time of water scarcity and for conflict management. Farm water management is a subset of overall farm management and has primary concern focused on storing water in the crop root zone with concern for productivity and exertion of the least amount of effort. How well this placement of water in the plant root zone is accomplished will largely determine the outcome of the cropping enterprise and the consequences will be borne by the individual farmer.

Water control is the direction and confinement of water in timing and quantity through the series of steps in the irrigation process from allocation, diversion, conveyance, distribution, application through removal of excesses that is accomplished by a combination of structural components and management efforts. The water control capacity in an irrigation system is largely determined by the installed structures and the capability of the system personnel to use those structures. Capacity alone does not provide water control. Coupled with the capacity is the element of utilization. If a system has an intensive infrastructure that is left unused, the water control exerted by the system is likely to be low. Likewise, if the irrigation personnel are assigned in large numbers to form an intensive human management network, but those people are not trained to effectively manage the system or their incentives for effective management are negligible or they are frequently absent from their duty station, the water control will also be low. The objective of water control is often the reduction of losses and increase in the reliability of the irrigation system such that a fixed water supply could be more equitably distributed over the length of the system, could more adequately meet the crop requirements, or could be used to serve a wider command area. Water control has an associated cost that increases at an accelerating rate. The intensity of water control that can be justified for a given situtation depends on the value of water in crop production, the cost of developing an alternative supply, the relative costs and tradeoffs between the hardware and software components of water control.

Irrigation System Management Needs and Priorities

The Basic Need

World food and fiber needs keep increasing as population pressures have continued unabated particularly in the third world. The expansion of the food and fiber supply from irrigated agriculture is taken as a given requirement for the world's poor to be fed and clothed. It is generally recognized that adding an irrigation capability to a

previously rainfed agriculture tends to increase the yield and total production of agriculture, makes farming more reliable and less susceptible to the vagaries of nature. It is not uncommon for yields of irrigated crops in farmers fields to be one and a half to two times those of nearby rainfed fields in the humid tropics. Irrigation provides an opportunity for a second crop in monsoon Asia where a single crop is the only possibility under alternate wet and dry seasonal conditions.

Disappointing Irrigation System Performance

As mentioned earlier irrigation systems have generally performed far below expectations. Nevertheless governments in the developing world continue to commit tremendous sums of their scarce capital into irrigation project development and into rehabilitation of existing systems. Some of the expectation versus performance discrepancy is due to the tendency for the feasibility reports and project plans to be overly optimistic both in terms of rate of adoption of new technologies that accompany irrigated cropping opportunities, as well as the assumed efficiencies that are built into the design and which ultimately determine the size of the service area when the water supply is fixed or limited. Optimistic project plans tend to be more attractive to both domestic and external funding sources and many irrigation agencies place a high value on the rapid generation of newly irrigated areas. An additional contributing tendency is the perhaps well intentioned influence that international donor and lending agencies tend to have in helping to establish design standards and causing so called "modern" designs to be transferred from foreign economic and cultural settings where water and work both have much different values than they do on the local scene. Another tendency that tends to widen the expectation-performance gap is the frequent inability for local irrigation system performance experience to be transferred and communicated from one branch to another within the same bureaucracy. The frequent lament of the system manager that "if only the persons who designed and constructed the project could be forced to stay and operate the system" is a manifestation of this problem of discrepancy between design and management.

Understanding the performance-expectation gap and the underlying causes represents the starting point for the identification of research and training needs and for the design of programs to bring about improved irrigation system management. The following section will provide a framework of priorities in the area of irrigation system management improvement.

Priority Research and Training Needs

The careful definition of realistic and attainable objectives of the irrigation project would appear to be the logical starting point, but with the project already having reached the operational stage as a system, this definition of the objectives has already been done. A

careful scrutiny of the objectives and adjustment in the area of realism would perhaps be in order. If the objectives of the irrigation system were defined as:

1) deliver water with suitable control,
2) build productivity in food and fiber,
3) promote farmer involvement in management,
4) establish resource conservation,and
5) return a payment on infrastructure investment.

there would be a certain amount of complementarity and conflict among the objectives. Clearly there has to be one primary objective and established order of priorities because all objectives can not be met at once. An added order of magnitude of complexity is added because even the simple objectives listed above could have different meanings to different people in various cultural contexts. If, for example, the objectives above were expanded into several alternative meanings under each objective, it becomes clear that there are more conflicts than there are elements of complementarity as below:

1) deliver water with suitable control to assure
   a) a reliable supply without interruption through the season
   b) an equitable supply throughout the system relative to needs
   c) an adequate supply for all crops in the cropping pattern

2) build productivity in food and fiber to provide
   a) employment and food for the rural poor
   b) food for the urban masses
   c) exportable commodities to earn foreign exchange
   d) domestic supply to avoid imports for national security

3) promote farmer involvement in management to accomplish
   a) the maintenance of irrigation canals and drainage ditches
   b) the implementation of a cropping calendar
   c) the collection of irrigation service fees
   d) the hiring of local level water and ditch tenders
   e) the turnover of some operational control over water delivery

4) establish resource conservation to maintain a
   a) stable water table and hydrologic balance
   b) stable soil salt balance favorable to crop production
   c) stable water supply from the watershed

d) stable employment opportunities for the rural poor

5) return a payment on infrastructure investment to provide for
   a) replacement or rehabilitation costs
   b) construction of addtional systems
   c) repayment of principal and interest on borrowed money

This emphasizes the urgent need to develop mechanisms perhaps in a workshop type of format in which it would be possible for administrators and managers of irrigation systems to reassess and perhaps redefine the irrigation system management objectives with appropriate ranking to make clear the order in which they are to be implemented or the level of budgetary or manpower support that they are to receive. The specification of objectives of the irrigation system management is thus the first priority need. A definition of procedures to accomplish this and actual experience with the process would be required.

Once the irrigation system management objectives are defined there is a need to define the problems and the major constraints that prevent the attainment of those priority objectives. A sufficient diagnosis of the state of the irrigation system requires the collection and analysis of field data but does not necessarily require a lengthy period of time. This state of the system problem and constraint report focused on the management elements of the system would be the second priority need. A redirection and refinement of existing diagnostic analysis procedures used in farm water management would be an appropriate approach to follow in irrigation system management.

With a statement of the problems in system operations relative to the priority objectives determined for the system management available, the next need would be for the development of a mechanism, perhaps as a workshop again with participation of both the management personnel and the farmer representatives, to define possible solutions to overcome the problems listed. This search for solutions workshop would also not require an extensive time period, but would require careful preparation and facilitation to achieve the desired outcome of a solution or set of alternative solutions available to apply in the field. The process for enhancing this type of outcome and the key criteria needed to guide the definition of realistic alternatives for field testing are the third priority need in irrigation system management.

The fourth priority need in the area of irrigation system management is the codification, enumeration, and expansion of the alternatives available to implement improved irrigation system managment. This would include the collection of written information on alternatives practiced in irrigation systems throughout the world, collection of information on systems where no known enumeration has

taken place and the search for alternatives in other applications of management. This is primarily a search for alternative strategies of management, an enumeration of those which seem appropriate or would have application to irrigation and the classification of the results into a logical user-oriented framework.

The fifth priority need is designating sites and providing alternatives for the field testing of alternatives. Detailed field research is required for the testing of some portion of the alternatives that appear to ve promise in meeting the criteria of technical practicality, economic availability, social acceptability, political feasibility and administrative implementability. In this testing of solutions care must be taken so that field conditions are representative, the site is large enough to be a realistic implementation and the pilot project syndrome is not encountered where resources are so concentrated as to prevent any chance of a negative outcome.

The sixth priority is the area of methodology development. Expansion and refinement of the alternative methods of measurement, analysis, monitoring and evaluation is urgently needed, as applied to irrigation system management. This includes the use of analytical and simulation tools that would allow the rapid testing and evaluation of management alternatives that would avoid full blown field testing of all alternatives, as well as the development of simple, but sophisticated, tools to put in the hands of irrigation system managers to increase their capacity to manage.

The last general priority need identified at this time is the development of training techniques, materials and devices that would support the above mentioned priority needs. Training is needed for policy makers, administrators, managers, researchers and farmers in support of improved irrigation system management. Lasting effects can only be attained when attitudinal and behavioral changes result from a training experience with duplication of the principles and follow-up by members of the training staff in the systems managed by the participant.

The priority needs for irrigation system management improvement can be summarized as refining objectives, diagnosing problems, developing solutions, expansion of alternatives, testing of alternatives, methodology development and training. Filling these priority needs will require special type of research and training process that is discussed in the following section.

A Process for Irrigation System Management Improvement

Background

The goal elaborated for Water Management Synthesis II is "to improve the technical efficiency and consequently the productivity and economic performance of irrigated agriculture by increasing the effectiveness with which increasingly scarce irrigation water resources are

developed and used." The objective is " helping bring about the adoption and use of improved water management practices, techniques and methods." The means for pursuing the objective is "strengthening of those institutions responsible for the various aspects of irrigation water management". The operational approach of "increasing LDC institutional capabilities means not only improving their abilities to plan and implement irrigation water management projects but also bringing about changed attitudes and behavior at all levels with regard to the need and importance of water management improvement." This means "encouraging a needed 'bureaucratic reorientation' within the various LDC agencies responsible, as well as better coordination among the several disciplines and functional areas involved (engineering, agronomy, economics, social science, extension, research, etc.) including training of their staffs in the concepts and processes of water management and equipping them with the knowledge and understanding of sound water management technologies and practices."

Action Research Thrust

"The conceptual framework of the project" indicates that "the process to be employed in bringing about improved irrigation water management" is "based on a systems approach, an interdisciplinary perspective, a farmer-client focus, an action-research thrust and a management orientation that calls for improved communication within the system, greater collaboration among the institutions and agencies involved and more farmer involvement.

Besides responding to the assistance needs of countries that have been enumerated and communicated by USAID missions, the project has an agenda of core activities that provides an operational framework to service assistance needs as well as to generate identified and needed new and improved technologies and practices through the conduct of field studies, diagnostic analysis and testing and the synthesis of these results along with information from any other source, into a cohesive program that can not only directly aid institution strengthening, but will also contribute to improved irrigation water management and more efficient irrigation system operation.

The field studies needed to fill information gaps requires a special type of action-research where the irrigation agency is a partner in the research and learns the process for further future application. The values or conducting action-research with an implementing agency besides the research outcome and the inservice training received by the personnel involved comes from several interrelated phenomena inherent to the phenomena:

1) The irrigation agency has an increased acceptance of research as a valid agency activity because of comeits investment of material and personnel to the process,

2) The organization finds the results credible because its own personnel were involved in collecting data, analyzing, and writing the reports resulting from the research, and

3) The agency learns from the experience and the learning process feeds the decision making process in the organization, such that a capability is internalized to solve future problems.

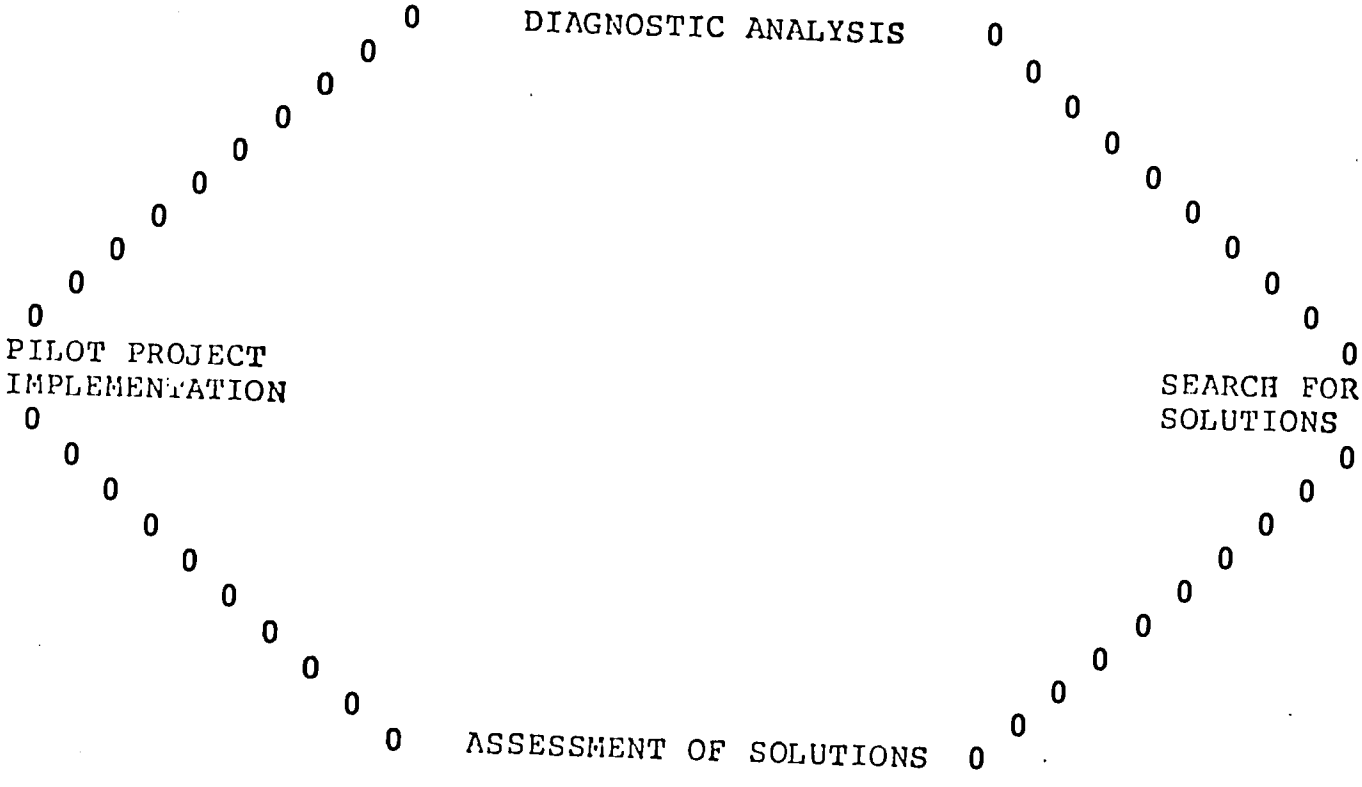
These results substantially contribute to the concept of institution building that is an important outcome from the whole assistance process.

This action-research thrust has an implied emphasis on participation as a key strategy in implementation. Participation is important both from the personnel involvement in planning and decision making. Farmers need to be asked about their problems in using and interfacing with the irrigation system and being asked to participate in decision making that involves matters of system operations, such as the determination of cropping calendars, water delivery and removal schedules, maintenance responsibilities and conflict management. Irrigation personnel, particularly at the field level need to be involved in planning, implementing and evaluating the outcomes of improved irrigation system management strategy. User and implementor participation are essential elements of the action research process.

The action-research thrust has the secondary benefits of building manpower enhancement and training as a necessary input to carry out the research activities and as an ongoing activity of the agency. This is another form of institution building as the capacity to train is formulated and exercised in the agency.

The Action-Research Process

The action-research process is suggested as an implementation strategy for the improvement of irrigation system management in developing nations. The action-research process has essentially four elements or stages that occur in a cyclical,recurring basis. These are diagnostic analysis, search for solutions, assessment of solutions and pilot project implementation as shown below:



Diagnostic analysis is the starting point in the process of improving irrigation system management. This is an activity that attempts to determine the state of the system in terms of resources available, problems in operations, efficiency of resource use, equity of benefits received from the irrigation system, productivity of crops grown in the system, the current levels and forms of communication and types of farmer and field personnel participation in management, among many others. The outcome of diagnostic analysis is a report that enumerates the major problems and constraints in the system that keep the performance from meeting the expectations set out in the feasibility report and the project design or as redefined by the management of the system.

The second element is the search for solutions. This determination is participatory with inputs needed from the point of view of farmers and system management personnel. This is a determination of the solutions in response to the problems enumerated in the diagnostic analysis. The solutions must simultaneously be technically possible and practical, economically viable, socially acceptable to the farmers and irrigation personnel involved, politically feasible for the bureaucracy and administratively implementable from the standpoint of the irrigation agency.

The third element and stage in the process is the testing of solutions in operating irrigation systems. This testing of solutions must involve the personnel of the irrigation system and as much as possible to minimize the influence of external forces to allow a fair test of the improvement imposed. This stage of the process is accompanied by a monitoring of activities often referred to as process documentation to provide the researchers and other professionals involved with important information about the problems and difficulties encountered in implementation. This is accompanied by evaluation and is culminated with a decision on the best solution for future more extensive testing in other systems and situations.

The fourth element is the pilot project implementation on a wider, perhaps system-wide scale with a minimal influence of outside researchers who might disrupt the continuity of operations of the system. This implementation represents the real testing of the improved irrigation system management techniques which are likely to include participatory elements for farmers, farmers' groups, project personnel, operating rules, and simple hardware improvements. This stage is more likely longer than the simple assessment of trial solutions and concluded with a detailed evaluation of the performance of the improvement technology relative to the objectives of operating the irrigation system.

The key concepts of this irrigation system management improvement process are that it uses the systems approach, follows an interdisciplinary research and training methodology, focusses on the clients of

irrigation to make the system more responsive to their needs, emphasizes the host-country capability building to solve problems, has an orientation to management and using the concepts of action-research. Essential elements include among others: involvement of the clients, improved communication, team building among disciplinary members, training to enhance manpower capabilities, building of agency capabilities to handle such activities in the future and institutionalized monitoring and evaluation as essential tools for management.

Information Gaps In Irrigation System Management

Major information gaps exist in the current state of the art of irrigation system management in four major areas. Without attempting to provide any emphasis on priority, the major information gaps are listed as questions for action research to answer as follows:

1) How can irrigation system management performance be enhanced by providing new technologies for personnel to make them more effective?

2) How can farmers and irrigators' associations roles in irrigation system management be enhanced to effectively participate with the management to improve irrigation system management?

3) How can the interface between irrigation system management and farmers through their irrigators' associations be structured and facilitated to improve the performance of irrigation systems?

4) What are the tradeoffs between the hardware (structural) and software (management) technologies to bring about improvement in the performance of irrigation systems and improved design of systems?

System Personnel Enhancement

The irrigaton system management personnel have interests and rewards for performance of their jobs that do not necessarily coincide with those of farmers needs. The field level personnel are generally looking up the system their instructions, rewards and sanctions. In large bureaucratic irrigation agencies they are generally not in close communication with the farmers and only rarely do they take orders from farmers. A review and refinement of job descriptions would allow adjustments to be made that would make irrigation more accountable to farmers. Increased accountability is hypothesized to be directly related to improved irrigation performance.

New irrigation technologies in the hands of irrigation personnel would make them more effective in their jobs. Technologies are in the form of rules and procedures for operating the system as well as in the

form of tools such as devices for measuring, controlling or accounting for water budgets. The introduced and evaluated technologies must be simple and low cost and be acceptable to the personnel who use them. There is a need to know what the system personnel require in order to be more effective in their management possibilities. There is also a need for a better, more finely tuned basis for management decisions on allocation, conveyance, distribution, application and drainage based on irrigation experience and realities within a given system or a region within a given country.

Farmer Participation in Management

In addition to the question of accountability of system personnel to the farmer-users of irrigation, the number of farmer managed irrigation systems in the world leads to the hypothesis that farmers and irrigators' associations in the LDC's if properly trained and prepared could assume greater responsibility for the management of perhaps the secondary, tertiary and quaternary portions of irrigation systems. What portion of the systems the farmers can effectively manage is determined by the size and complexity of the system, along with numerous other factors having to do with organizational effectiveness.

A number of irrigation agencies in Southeast Asia have begun experimenting with the participatory approach in order to enhance farmers organizational capacity to solve problems dealing with irrigation as well as to relieve the agency of some responsibilities. These initiatives in the community based and farmer managed irrigation systems in the Philippines and Indonesia have been hypothesized to have application to national, bureaucratically managed irrigation systems in those countries. There is an urgent need to know what portion of the system and what elements can be handled farmers. Likewise there is a need to know what rules and tools should be put in the hands of farmers, irrigation associations and irrigation officials providing technical assistance to groups of farmers involved in management.

The System-Farmer Interface

Regardless of the level of responsibility that is assumed by farmers in managing irrigation systems, the interface between the farmers or their organizations and the irrigation bureaucracy requires careful definition and development of flexible mechanisms for the system to work effectively. The further up the system that the interface occurs, the greater are the costs borne by farmers unless intervening authorities with independent taxing ability are created. The further down that the interface occurs, there is less flexibility open to farmers to control water to suit their needs. The key problem would be to determine for a given irrigation system where to establish interface. This would be a priority area for management research to explore, particularly since it is expected that the bureaucracy and the farmers are likely to have very different goals. Some of these goals are likely to

conflict with each other and require the development of mechanisms to reduce tension in the system.

The major hypothesis of the effort is that there will be principles of a general nature in providing the interfacing mechanisms for smooth system operations that require definition as well as specific requirements that are needed to fit the local organization on a case by case basis. This represents one of the most important and challenging frontiers of research in irrigation system management.

- Tradeoffs Between Hardware and Software Improvements

Improvements to irrigation systems can be made with a wide range of hardware and software combinations that can substantially improve the system performance. Water control can be accomplished with high degrees of structural intensity or with sophisticated structures. Likewise an intensive network of personnel or highly trained and efficient personnel could accomplish the same job. There is a hypothesized range of tradeoffs between structural and management solutions that can result in the acheivement of objectives established by the management of the system. Action research is needed to determine the particular tradeoff that is most economical or acceptable to the needs of irrigation systems in the developing nations.

This is an area where interdisciplinary team research efforts will be most profitable in improved irrigation system management. The definition of criteria and ranking of criteria for the decision of the type and mix of resources that are to be used to achieve the objectives of irrigation will require the participation of the administrators, planners and managers within irrigation agencies.

Summary

The conclusion of this conceptual paper is a call for action-research to fill the identified priority needs, using the identified process for improvement and involving the participation of both farmers and agency personnel to fill the information gaps discussed above. The integration of the contribution of the identified disciplines in the process and overall effort will be essential to the success of the program. The area of improving irrigation system management is without doubt one of the most challenging jobs facing the Water Management Synthesis Project, one of the most fulfilling to the professionals involved, and one of the most important improvements that irrigation agencies in the developing nations can implement even if only a portion of the potential for improvement is attained.