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**DRAFT FINAL REPORT**

**IN SEARCH OF SYNTHESIS**

**A Management Assessment of the  
WATER MANAGEMENT SYNTHESIS II PROJECT**

**Carried Out by**

**THE CONSORTIUM FOR INTERNATIONAL DEVELOPMENT**

**through**

**COLORADO STATE UNIVERSITY  
CORNELL UNIVERSITY  
UTAH STATE UNIVERSITY**

**Louis Berger International, Inc.  
1819 H Street, N.W.  
Washington, D.C.**

**May, 1988**

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LOUIS BERGER INTERNATIONAL, INC.



Architects • Engineers • Economists • Planners  
1819 H Street, NW • Suite 900 • Washington, D.C. 20006  
Telephone: (202) 331-7775  
Telex: 292079 LBI UR

May 10, 1988

Dr. Worth Fitzgerald  
Water Management Specialist  
Room 406-C  
SA-18  
S&T/AGR/RN  
Washington, D.C. 20523

Dear Dr. Fitzgerald:

I am pleased to submit herewith ten copies of our draft final report for the management assessment of WMS-II. We look forward to your comments.

Sincerely,

A handwritten signature in cursive script, appearing to read 'Harvey A. Lerner'.

Harvey A. Lerner  
Team Leader

## ABSTRACT

Water Management Synthesis II has been a fundamentally successful project whose shortcomings have been closely related to its strengths. The project engaged the creative energies and skilled personnel of three leading universities at a time when skills and insights they could offer were critically needed in AID's host countries. As a result of the combined efforts of these universities, Mission portfolios have been improved, the supply of knowledgeable practitioners has been expanded, and the orientation of a profession has been changed. However, the management structure established by CID and three independent universities lacked strength at the center and was not well suited for handling a large and complex AID contract. Costs of the project have been relatively high and production of tangible outputs has been relatively modest. Work planning and activity reporting has not measured up to conventional management standards. The project has been slow in reaching closure on key synthesis work products and frameworks needed to achieve substantive integration of substantive results. AID, the universities, and other organizations with interests in improving water management in developing countries should seek ways to sustain university contributions in the field of water management within more efficient administrative frameworks.

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Chapter One

INTRODUCTION

A. PURPOSE OF THIS MANAGEMENT ASSESSMENT

This report provides a managerial assessment of the Water Management Synthesis II (WMS-II) project carried out by the Consortium for International Development (CID) through three leading universities: Colorado State University (CSU), Cornell University (Cornell) and Utah State University (USU) from September, 1982 through the spring of 1988. The assessment, which focusses on issues of managerial efficiency and effectiveness, is intended to yield lessons which will be useful in the design of a successor project for Africa, Latin America and the Caribbean to become operational later in 1988. The management assessment was carried out by Harvey A. Lerner, Jan Stofkoper, and Carter Brandon of Louis Berger International, Inc. (LBII). A brief description of the qualifications of the assessment team is contained in Appendix A of this report.

The Scope of Work for this management assessment identifies some fourteen sets of issues pertaining to the WMS-II project. These issues are organized under five general headings:

- Overall Concept and Scope of the Project
- Program Planning
- Operational Planning
- Operational Management
- Progress and Achievement

The Scope of Work for this management assessment is reproduced in full in Appendix B.

B. ORGANIZATION AND COVERAGE OF THIS REPORT

This report is organized in seven chapters.

The present chapter (Chapter One) provides an introduction to the report, discussing its scope, organization, methodology, and approaches to special problems.

Chapter Two provides a review and interpretation of principal project documents: project papers, contract arrangements, project evaluations, and the like. In order provide a needed perspective, this chapter includes a review of the first Water Management Synthesis project (WMS-I), the predecessor to WMS-II.

Chapter Three focusses on the answers to two difficult questions posed by the Scope of Work for this management assessment:

-- Have management costs been reasonable, given the nature of the activities involved and the types of management structure required?

-- Are these costs in line with those of other projects of this nature?

The chapter starts with a comparative analysis of the overhead rates billed to AID by the CID and the three lead universities. It examines other factors bearing on the reasonableness of management costs, and concludes with an interpretive assessment.

Chapter Four is concerned with effectiveness. It compares numbers of activities forecasted for the project at its start with those actually completed. It looks at WMS-II's outputs of tangible products: documents, publications, brochures, slide shows, videos, working papers and the like. These are compared with outputs under WMS-I and with a combination of cost-effectiveness rules-of-thumb. The chapter also discusses available information on achievement of project objectives, both those contained in the contract Work Statement and those objectives which have been imputed to the project in one form or another. Chapter Four ends with a commentary on effectiveness issues.

Chapter Five discusses the WMS-II management structures and the project's work planning and reporting functions. It first reviews and provides an interpretive analysis of the management plans which defined the ways in which CID and the universities expected to operate under WMS-II. It then assesses the project's work plans and the project's activity tracking system. The Chapter ends with a consideration of a variety of explanations for the management problems experienced by the project.

Chapter Six presents the principal findings and recommendations of LBII's management assessment of the Water Management Synthesis II project. It sets forth fourteen findings, following the outline of issues in the Scope of Work for this management assessment. The Chapter also presents recommendations concerning completion of work on WMS-II for AID's consideration.

Chapter Seven identifies six alternatives for the Irrigation and Management Support and Research (IMSAR) project currently under preparation for Africa, Latin America, and the Caribbean. It then provides recommendations for AID's consideration in designing this project.

### C. METHODOLOGY

This management assessment is based entirely on a review of project documents, on interviews held in the Washington, D.C. area, and on follow-up telephone discussions. The assessment team met with members of the Contractor Management Team (the Contractor's Executive Project Director, the three University Project Directors, and a representative of the CID Executive Staff) in Washington during the course of their preparations for a Completion Briefing that was given to AID in February, 1988. Interviews with project personnel were carried out both individually and in group sessions. Interviews also were carried out with some twenty AID and former AID officials, including several who had utilized WMS-II services during field assignments. The assessment team made no visits to university campuses or to AID Missions in developing countries.

At LBII's request, the AID Project Manager provided an opportunity for the Contractor Management team to submit written comments on the fourteen sets of issues contained in the Scope of Work for this management assessment. No such written comments were received. In early March of 1988, LBII submitted a preliminary analysis of project overheads which was circulated to CID and the universities, and received comments on this analysis from the Executive Project Director, Dr. Richard McConnen. These comments are reproduced in Appendix G. Following completion of its main interviews in March, 1988 (but before preparation of the text of this report) LBII submitted a "Pro Forma Executive Summary" presenting its preliminary findings. Written comments, received from Dr. Jack Keller of USU, are reproduced in Appendix H. We commend the comments of Dr. McConnen and Dr. Keller to the reader's attention.

A variety of methods were used to analyze the costs and effectiveness of the WMS-II project. These methods are described in Chapter Three (Costs) and Chapter Four (Effectiveness). Details are provided in Appendix C (Cost Tables), Appendix D (Lists of Documents and Repeatable Presentations for WMS-I and WMS-II), and Appendix E (Assessment of Document Quality).

D. APPROACHES TO ASSESSMENT PROBLEMS

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Assessing the performance of WMS-II poses a number of special problems. The following paragraphs identify these problems and discuss our approach to dealing with them in this report.

Viewpoint

While WMS-II has been a generally well-regarded project, there has been considerable polarization of opinion concerning some of the difficulties which it has experienced. A Mid-Term Evaluation of the project was rather critical of AID's management style, referring to overly intrusive "input control" and "micro-management." An assessment of the WMS-II contained in the project paper for the follow-on project for Asia and the Near East (ISPAN) in turn was quite critical of the CID/university style, referring to a tendency for activities to become "possessions" of the lead universities responsible for them and arguing that the research component of the project had come to be regarded virtually as a university "entitlement."

The viewpoint reflected in the present assessment is essentially "structural". We see WMS-II as juxtaposing two sets of administrative arrangements-- one set on the AID side and another set on the CID/university side-- neither of which really was well set up for effective central management. That such structures, working together, would have encountered some difficulties in handling a very large and complex AID contract does not seem surprising.

We also see two very different kinds of institutions, and two very different sets of managers, each of which had strong motivations to be "in control." That there should have been disagreements as to who should call the tune during WMS-II also does not seem surprising.

Objectivity

No assessment of brief compass can hope to sort out controversial issues for a project of the magnitude of WMS-II in a way that all observers would agree was completely fair and objective. However, fact can be separated from opinion and we have sought to make this separation in this report. Portions of the report containing our opinions, commentaries, and interpretations are headed with an underlined chapter title, section heading, or caption. Thus, in the present chapter the paragraphs under the captions,

Viewpoint

Objectivity

Semantics of Synthesis

have been underlined. Since the entirety of Section C of this chapter, "Approaches to Assessment Problems" is interpretive, the title of this section has been underlined as well. The two final chapters of this report consist almost entirely of opinions, commentary, and interpretation. Hence the chapter section titles in these chapters have been underlined.

Semantics of Synthesis

From the earliest evaluation of WMS-I, outside observers have sought some form of answer to the question, "Where is the synthesis?" The Mid-Term Evaluation of WMS-II found lack of progress toward synthesis to be a significant project issue. WMS-I never had a final evaluation, but the present assessment finds that the first project fell short on the specific synthesis work products that it was supposed to provide (see Chapter Two of this report).

Some of the project documents reviewed in the present report have announced that synthesis has been or is about to be achieved. On occasion, project personnel have taken the position that a synthesis is any combination of parts to make a whole: baking a cake is a form of "synthesis." It also has been argued that the ultimate water management synthesis is impossible because knowledge is always partial, never complete.

The term "synthesis" has been applied to the WMS projects in many ways. It has been used to mean:

1. An interdisciplinary process of irrigation system diagnosis and problem-solving.
2. The repackaging of experience gained on long-term projects carried out in LDC's for application in short-term training programs and technical assistance assignments.
3. Specific sets of synthesis work products, such as worldwide program evaluations, taxonomies of irrigation methods, and manuals on state-of-the-art technology.
4. A well-conceived and documented strategy for WMS-II.

## Chapter Two

### REVIEW OF PRINCIPAL PROJECT DOCUMENTS

#### A. INTRODUCTION

This Chapter summarizes and analyzes the contents of pertinent project documents which contribute to an understanding of WMS-I (Section B) and WMS-II (Section C). We have gone back to WMS-I for three reasons. First, WMS-II had its roots in WMS-I, and was essentially an expansion of the earlier project. Second, WMS-II overlapped WMS-I for fifteen months and actually provided funds for some WMS-I activities. Third, some of the problems and successes experienced in WMS-II actually had their origins in WMS-I and can best be understood in the perspective of experience under the predecessor project.

We have included the ISPAN project paper in our review of WMS-II because it includes an assessment of WMS-II. ISPAN is explicitly identified as a follow-on of WMS-II, and its structure in part reflects AID's experience with WMS-II.

The project documents reviewed reflect a progressively widening range of perspectives. In some cases, their viewpoints are in conflict. We provide interpretative commentaries in Subsection B-6 and in Subsection C-6 at the end of their respective main sections.

#### B. WATER MANAGEMENT SYNTHESIS I DOCUMENTS

##### 1. WMS-I PROJECT PAPER (1978)

The Project Paper for the first Water Management Synthesis Project ("WMS-I") was prepared in April, 1978. Originally designed as a three year project, WMS-I initially was estimated to require 168 person months and to cost about \$1.1 million.

The "End of Project Status" shown at the "purpose level" of the WMS-I LogFrame was to be "a set of published materials which provides the development community with knowledge, information, training assistance, and guidelines on water management project development, implementation, and operation." As designed, the project did not have provision of TDY professional/technical guidance to Missions as a primary objective, although 10 person months of such assistance (less than 6% of the total level of effort) was projected during the course of the 3-year project period.

The Project Paper deals with the question of "synthesis" in terms of (1) findings and experience of AID projects; (2) training aids and handbooks; and (3) analytical descriptions of small farm water application systems. The project was seen as the first "cooperative coordinated effort to systematize findings and experience" from all AID projects "so that improvements can be made based on principles and procedures learned from each specific case." Training aids and handbooks synthesizing the best practices found throughout the developing world were regarded the "central" output of the project. A taxonomy and assessment of irrigation methods used on small farms in LDC's was to be provided "within a framework of energy requirements, management skills, system efficiencies, operational problems, financial requirements, resources required, environmental sensitivity, and institutional constraints."

## 2. CONTRACTUAL ARRANGEMENTS FOR WMS-I (1978-1983)

The WMS-I project was awarded to the Consortium for International Development on the basis of competitive bidding. Colorado State University and Utah State University served as lead universities, and the University of Idaho as a subcontractor. The contract was administered by Co-Coordinator from CSU and USU. The contract period in fact ran for more than five years (September, 1978-December, 1983) at a total cost of about \$2.8 million (an annual average of well under \$600,000 a year.) Requests for TDY assistance expanded significantly in the final years of the project, and in fact substantially changed the research/TDY balance during the second half of the project. Some of the TDY requests were in fact funded from WMS-II resources. The effective date of WMS-II was September 30, 1982, so that the two projects in fact overlapped for one year and three months.

## 3. FIRST MID-TERM EVALUATION OF WMS-I (JANUARY, 1980)

An evaluation of WMS-I was carried out by the Consortium for International Development at Colorado State during a single day, on January 15, 1980. The evaluation team consisted of Dr. David R. Daines, Deputy Director of the Consortium for International Development; Dr. W. Gerald Matlock (Chairman), Director of the Office of International Agriculture Programs at the University of Arizona; Dr. James R. Meiman, Dean of the Graduate School at Colorado State University; and Dr. Howard B. Peterson, Professor Emeritus of Agricultural and Irrigation Engineering at Utah State University. Nine persons from CSU and USU were interviewed during the course of the evaluation.

The Evaluation Committee found that the project was well planned, it had competent and highly motivated Project Co-Directors, it was based on the concept of synthesis of useful information, good working relationships had been established among team members, effective use of graduate students was being made, and that the project would provide timely and useful information in handbooks. The Evaluation Committee also identified 14 areas in which attention by project personnel, CID, or AID was thought to be advisable. Areas for improvement particularly pertinent to the present assessment are summarized below.

#### Integration of Elements

The project is making good progress on three basic thrusts: (1) reviewing past AID, FAO, and IBRD water management projects; (2) developing a six-week training course with supporting materials on problem identification; and (3) developing four handbooks on specific technical subject areas. However, integration of these elements is incomplete and would be improved by adding to the scope of work a General Guide to Planning, Developing, and Implementing Water Management Projects in Developing Countries.

#### Lack of Critical Reviews of AID Projects

Few, if any, critical reviews of AID water management projects have been made in the past. Had such reviews been available to project personnel, the results of the effort would be of much greater value. AID should strengthen its system of critical project completion reviews and develop procedures for making the reviews available to contractors responsible for implementing similar activities.

#### TDY Technical Assistance Assignments

The technical assistance component of the project appears to be a useful adjunct but could detract with from the effort needed to achieve the major objectives of the project. AID should use the IQC that CID now has with AID for TDY technical assistance activity. CID should be wary of including such conflicting activities in its contracts.

#### Incentives for Faculty/Staff Participation

CID should continue to search for ways to work with member universities to provide incentives which encourage participation in international programs.

#### 4. SECOND MID-TERM EVALUATION (DECEMBER, 1980)

An evaluation resulting in a "Review Report" was conducted in by Douglas Caton and Art Handley of AID and by Marvin Jensen of USDA in December, 1980. Apparently, no copy of this evaluation remains in the project files, and none has been reviewed by the LBII assessment team.

Attachment II of S&T's request for approval of a non-competitive procurement action (March 2, 1982) contains a summary of this review report. The summary indicates the following findings:

- a. In summary, the project is developing quality products and personnel are gaining valuable insights and exposure.
- b. The contractor has been very prudent with expenditures and AID is getting good service for funds expended.
- c. The project is making reasonable progress towards achieving its purpose. However, it is behind schedule for various legitimate reasons. It must be pointed out that, at this point in time, it appears that the quality of outputs is excellent.
- d. The review team believes the project leadership to be exceptionally well qualified.

#### 5. WMS-I COMPLETION REPORT (1984)

CID's Completion and Annual Report, was submitted in September, 1984. The "Completion" portion of the report covered the full project period from September 29, 1978 to December 28, 1983. It contained a summary of principal project accomplishments, which are digested below.

##### AID Document Review

The Completion Report indicated that a document review of 81 AID water management projects worldwide had been of "limited value." It stated:

This is because practically the only documents available are those dealing with the project design and expected output. Evaluation reports are practically non-existent! So this review could only deal with cataloging funding levels, types of interventions being tried, expected outcomes and the historical development of water management type assistance projects.

## Training Aids and Handbooks

The Completion Report describes a changed approach to the handbook activity.

The original concept of this activity was that detailed handbooks would be developed to provide professionals in water management with the necessary knowledge to implement successful water management improvement technologies. Further thought during the implementation of the project suggested that in many instances the constraints were not with professionals in water management but with the decision-makers who planned, designed, and improved irrigation projects. Thus the concepts behind the need for, the value of, and the methods to implement successful technologies was the more urgent need.

A Planning Guide was defined in which the essential concepts behind the use of successful technologies were articulated in a manner that decision-makers would and could use in the planning, design, and improvement of irrigation projects... After the decision was made to develop Planning Guides, Project Management realized that some new techniques did need the documentation of a Handbook...

## Technical Assistance

The report reports on the expansion of TDY technical assistance assignments with enthusiasm:

In the Spring of 1980 an existing opportunity for satisfying both the Systems Analysis and TA goals of the project developed-- the Asia Bureau requested help in identifying "irrigation development options and investment strategies. ...This resulted in the Project being invited to conduct interdisciplinary rapid appraisals in Bangladesh, India, Nepal, Pakistan, Sri Lanka and Thailand... In addition to the options and strategies study, most Missions asked the Team to evaluate their current and pending projects related to irrigated agriculture. There is positive evidence that the ...studies had an important impact on the USAID program in the Region....The fielding of study teams afforded the Project with an entry point to a number of Missions...The project gained a reputation for having capability in interdisciplinary rapid appraisal of irrigation projects and programs. Their reputation, along with that gained from the DA workshops, led to numerous requests for the Project's services and became the foundation for WMS-II.

## Concepts of Synthesis Achieved

The Completion Report identifies five areas in which the WMS-I achieved synthesis: (1) converting concepts learned on long term efforts (CSU's work in Pakistan and Egypt for USAID) into a short term training workshop under WMS-I; (2) the development of Handbooks and Planning Guides; (3) capturing and generalizing an approach to farmer training developed in the hill country of Peru; (4) formalizing lessons learned; and (5) refining an interdisciplinary approach to water management.

In addition, a review of the WMS-I Publications shows several entries on the subject of "Irrigation Development Options and Strategies for the '80's". Presumably these publications reflect some form of synthesis.

## Main Impacts of WMS-I

The Completion Report concludes that the initiation of Water Management Synthesis II by AID was perhaps the greatest impact of Water Management Synthesis I. The discussion of this impact focuses on organizational change and on an organic process of synthesis and application, as follows:

To formulate WMS-II, two offices in the Science and Technology Bureau and the Asia Bureau have joined to fund the project. This is equivalent to getting irrigation and agriculture departments in a LDC to formalize working relationships. In addition, three universities participate in leadership roles. This is equally difficult. The interdisciplinary approach has also impacted the universities in significant ways. These changes are continuing to evolve. The concept of synthesis and increasing capability in water management is slowly being more carefully defined and implemented. Missions and host countries are learning how both expertise and new knowledge can be effectively used. These changes are some of the greatest impacts of WMS-I.

## 6. COMMENTARY ON WMS-I DOCUMENTS

On their surface, the WMS-I project documents present a virtually unanimous chorus of affirmatives. Carefully read in context, however, a more complex picture emerges. In our view, WMS-I was a meritorious project which had its greatest success in its work with Missions and host country personnel in LDCs, but was less successful in other areas. WMS-I laid down a foundation from which sprung both the problems and achievements of WMS-II.

### De Facto Change in Project Priorities

WMS-I was a project which started with a research rationale (synthesis) and ended by placing its primary emphasis on applied theory and improved practice (diagnostic analysis workshops, project identification, irrigation system evaluation, and the like). In the end, the strength of WMS-I lay not in producing a comprehensive set of analytical or instructional documents but rather in the sound application of an interdisciplinary approach to water management problems to the circumstances of LDCs.

The contractor's performance of the specific "synthesis" tasks did not measure up to the expectations established in the project paper. Instead, the WMS-I contractor did an impressive job of converting the experience which CSU had gained on long-term technical assistance projects in Pakistan and Egypt for AID) into a form that was useful for short-term assignments.

The CID internal evaluation (January, 1980) in fact had warned that the technical assistance component of the project might detract with from "the effort needed to achieve the major objective of the project." That warning was prescient. A major objective of the project (specific synthesis products) did indeed suffer. At the same time, we think that the change that was made in the project's priorities was sound. If a choice had to be made between emphasizing synthesis assignments or focusing on field applications, contributing a new dimension to the understanding, identifying, and planning of water management systems in specific LDC's was the better use of the special talents of the WMS-I team in the early 1980's.

### Specific Synthesis Work Products

The account of results achieved with respect to specific synthesis work products in the CID Completion Report is not convincing. As explained below, the report redefines and/or deemphasizes specific work products on the basis of rationales that seem superficial.

The WMS-I Project Paper anticipated that the contractor would produce the first cooperative coordinated effort to systematize findings and experience from all AID projects "so that improvements can be made based on principles and procedures learned from each specific case." CID's Completion Report argues that lack of AID critical reviews of AID's water management projects made it virtually impossible for the CID contractor to turn out a work product of significant utility to AID. Earlier, the January, 1980 Mid-Term Evaluation had sounded the same theme.

AID/Washington's data base certainly was not in mint condition in the late 1970's and early 1980's, nor were the then-existing evaluations of the Agency's irrigation projects particularly exemplary. However, while the task envisioned in the WMS-I project paper was challenging, it was by no means impossible.

In 1979, working with a data base no more extensive than that available to the WMS-I contractor, Checchi and Company in fact performed a worldwide desktop study of small and medium-scale irrigation projects carried out by AID and the World Bank.<sup>1</sup> That study, which won the commendation from the Office of Evaluation in AID's Bureau of Policy and Program Coordination (PPC), systematized findings and experience from a limited number of AID irrigation projects and drew general lessons of general application from its analysis.

In 1983, AID's Center for Development Information and Evaluation published a program evaluation report, on AID's experience in irrigation<sup>2</sup> authored by three members of the PPC staff. That report wove together AID evaluation reports, current literature, and a recent international conference, again deriving lessons of general application. WMS Report 1 (February, 1981),<sup>3</sup> fell well short of the Checchi and PPC reports in method and substantive content, and, in our view, well short of the expectations concerning synthesis established in the project paper.

The idea of using training aids and handbooks as a central means of presenting a synthesis of the best water management practices found throughout the developing world was modified and apparently reduced in scope during WMS-I. The project resulted in five planning guides on the subjects of (1) land leveling, (2) farmer involvement, (3) irrigation pumping, (4) farm irrigation structures, and (5) small farm self-help irrigation projects.

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<sup>1</sup> Checchi and Company, Pattern Analysis of Small- and Medium Scale Irrigation Projects, (Washington, D.C., November, 1979, 3 Volumes).

<sup>2</sup> David I. Steinberg, Cynthia Clapp-Wincek, Allen G. Turner, Irrigation and AID's Experience: A Consideration Based on Evaluations (A.I.D. Program Evaluation Report No. 8, Washington, D.C.: August, 1983)

<sup>3</sup> P.S. Coolidge et al., Irrigation Projects Document Review (WMS Report 1, February, 1981).

WMS-I also produced four handbooks. These were concerned with (1) circular concrete irrigation turnout, (2) farm irrigation structures, (3) pumps and water lifters for irrigation, and (4) small farm, self help irrigation projects.

This activity was split so as to address two different audiences (planning guides for decision-makers, handbooks for practitioners), with some topics being repeated for both audiences. In the process, the objective of creating an integrated compendium of best irrigation practices appears to have been deferred if not significantly redefined.

The WMS-I Completion Report does not deal squarely with the taxonomy and assessment of LDC small farm irrigation methods called for by the WMS-I Project Paper. The Completion Report does, however, address the subject indirectly by referring to an expert workshop which found that:

...it is easier to capture specific lessons learned from site specific activities; but much more difficult to develop a methodology or taxonomy which could be used by multidisciplinary teams to guide them in the analysis...

...First, there is a great need to develop a rapid reconnaissance capability to respond to short-term technical requirements of donor agencies. Secondly, there is a need to capture lessons that are being learned, so that they can be transmitted to new professionals entering the management field.

None of the titles shown in the WMS-I Publications List in the Completion Report appear to deal with this subject. Presumably, WMS-I did not provide a classification and assessment of small farm irrigation methods as a synthesis output.

We have noted earlier our view that the de facto shift of WMS-I's priorities toward field activities (and away from synthesis) was eminently sound in the circumstances of the early 1980's. However, WMS-I well may have bequeathed a low key, flexible attitude toward synthesis to WMS-II, a project which, at the time of the present management assessment, still lacked a convincing unifying conceptual framework.

### Insufficient Evaluation

WMS-I had two mid-term evaluations, one at the beginning of 1980 and the other at the end of the same year. There was no end-of-project evaluation. The January, 1980 evaluation was an "inside" evaluation, performed by CID and university personnel without

benefit of AID or outside participation. The January evaluation was carried out in the span of a single day, a subject of complaint by the evaluation team. Insufficient information is available on the December, 1980 evaluation to judge its scope, depth, or merit.

Given their timing, the two mid-term evaluations could not adequately judge WMS-I's performance with respect to synthesis products. The expansion in TDY activity under WMS-I started in the Spring of 1980. In December, 1980, it may have been too early for evaluators to judge the likely impact of field priorities on synthesis work products. In any event, the project went through its final three years (1981, 1982, and 1983) without the benefit of either an inside or an outside review. An evaluation (preferably one conducted by outsiders) scheduled shortly before negotiations on the WMS-II contract in 1982 might have perceived and deflected some of the problems that were later to trouble WMS-II.

### C. WATER MANAGEMENT SYNTHESIS II DOCUMENTS

#### 1. WMS-II PROJECT PAPER (1982)

The Project Paper for WMS II makes clear that WMS-II is basically a continuation and expansion of WMS-I under S&T's Office of Agriculture. It also is presented as an extension of the work under the Rural Development Participation Project in S&T's Office of Rural Development and Development Administration.

WMS-II was to provide training and technical assistance to Missions and host countries, conduct special studies, and systematically transfer appropriate technology. An important objective of the project was to produce new attitudes and behaviors at all levels within host countries supportive of viable, progressive irrigation water management programs.

The Project Paper states that WMS-II will increase the quantity and quality of U.S. practitioners who provide technical assistance in developing countries, but the objective of increasing the supply of practitioners was not explicitly incorporated into the LogFrame.

The project goal in the LogFrame is increased food/agricultural production and higher levels of income for participating farmers. The subgoal is increased economic efficiency in water use. The project purpose is increased host country capabilities to plan and implement irrigation water management projects/programs.

The Project Paper presents two summary models. One describes a process for improving irrigation water management (diagnostic analysis, search for solutions, assessment of solutions, pilot project implementation)<sup>4</sup>. The other describes the mechanisms (training, technical assistance, technology transfer, and special studies) by which the project would affect its targeted audiences. Apart from briefly describing these two models and a reference to the lessons of the Pakistan On-Farm Water Management Project which were "synthesized and implemented under WMS-I," the body of the Project Paper does not address the subject of what kinds of "synthesis" its authors expected to come out of WMS-II.

The Project Paper's management analysis points out that WMS-II would be much larger than WMS-I and that the logistics of staffing, organizing, scheduling, and implementing many short-term overseas activities would take considerable administrative time. It argues that the technical professionals working on the project should not be required to handle these management-related activities, since this would be a very poor use of scarce resources.

## 2. CONTRACTUAL ARRANGEMENTS (1982-1988)

The contract with CID for WMS-II was signed on September 28, 1982 for just under \$20 million (an annual average of \$4 million in billings per year over a five year period). The award was based on approval of request for a non-competitive procurement action, based on predominant capability. The request was based on a combination of unique in-house personnel capabilities and on CID's capabilities to mobilize supplementary staff. The contract period was originally scheduled to end in September of 1987, but was subsequently extended into 1988.

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### <sup>4</sup> The WMS-II project paper states:

The conceptual framework and philosophy that undergird this project is shown in Figure 1 [The WMSP Process to Improving Irrigation Water Management] and described briefly in Annex VII.

The annex to which reference is made contains an article by Wayne Clyma, M.K. Lawdermilk, and Dan Lattimore of Colorado State University entitled, "On-Farm Water Management for Rural Development."

### 3. MID-TERM EVALUATION OF WMS-II (1984)

In August of 1984, a team of four consultants submitted a mid-term evaluation of WMS-II. The team consisted of Dr. Charles Busch (Consulting Engineer), Mr. Roger Earnst (Development Consultant), Mr. Raymond E. Kitchell (Development Management Consultant), and Dr. Donald A. Messerschmidt (Social Science/Development Consultant).

The evaluation concluded that the overall results of WMS-II had been "very commendable" and that the project's shortcomings related more to what had been left undone rather than to poor performance.

The evaluation characterized the performance of the "buy-in" portion of the contract as "outstanding"-- as evidenced by client satisfaction and increasing demand.

It found the products of the core-funded activity to be of "high quality," given the absence of an agreed-upon overall strategy. At the same time, it pronounced progress on two specific core funded activities (special studies and technology transfer) to be "less than optimal."

The evaluation concluded that the management of the project had encountered "serious difficulties," and that while considerable improvement had been made under a new management plan adopted in 1984, "there is room for further improvement."

In analyzing a series of issues posed for the evaluation, the report argues that two major problems transcended all others and, in effect, reinforced each other: "synthesis" and "project management."

The synthesis issue involved the absence of a fully developed conceptual framework for a systems approach, a tendency to divide up project activities rather than tying them together, and limited professional networking, publications, and pooling of professional expertise.

The management issues on the CID/University side involved:

- a. Initial amorphousness of CID's style and the changing nature of its role and function.
- b. The desire of the universities to manage operations and to be judged by results ("freedom and responsibility").

- c. Inherent university difficulties and constraints in providing result-oriented and multi-disciplinary managerial leadership.
- d. The inherent difficulties of management between two totally dissimilar structures (AID and CID/universities) and between themselves.
- e. A willingness of the universities to divide up the work, but a concomitant reluctance to work cooperatively on developing coordinated strategies and work plans for core-funded activities.

On the AID side, the management issue was found to involve:

- f. An outdated concept of the AID project manager's role resulting in the design and imposition of ineffective management systems.
- g. Need for an updated view of the roles to be played by CID and the universities and redistribution of appropriate responsibilities and authorities.
- h. A malalignment of functions by levels, offices, and bureaus with agency headquarters
- i. Inadequate administrative support in AID.

The evaluation was strongly critical of AID "micro-management" and "input control". It argued that AID should approve a multi-year work plan based on "management by results" and focus its future attention on major issues of project achievement.

#### 4. ASSESSMENT OF DIAGNOSTIC ANALYSIS WORKSHOPS

In April of 1985, Creative Associates presented an assessment of seven Diagnostic Analysis Workshops carried out by Colorado State University under WMS-I and WMS-II. The assessment was performed by David W. Kahler and John C. Pontious of Creative Associates with assistance from Bradley W. Perlin of Utah State University and John F. Comings of World Education, Inc.

The Diagnostic Analysis Workshops were carried out in India (1981, 1982, and 1984), Sri Lanka (1982, 1983, and 1984) and in Bangladesh (1983). The assessment was based on observation of the 1984 Sri Lanka Workshop, and analysis of questionnaire

responses of trainers and participants in current and past workshops.

The basic objectives of Diagnostic Analysis Workshops are to train management personnel:

to understand the operating irrigation system so as to recognize both its values (the good features or benefits) and its constraints (the problems or factors which restrict efficient operation); and

to order constraints to priority based on pre-determined criteria.

The workshops consisted of formal classroom presentations, preparation for detailed studies, and a detailed field study of which included the preparation of single-discipline and interdisciplinary reports. Most of the workshop participants were middle-level staff from a variety of water management organizations.

The conclusion of the assessment team was very favorable:

The Diagnostic Analysis Workshops provide a valuable means for delivering short-term training that encourages interdisciplinary inquiry into water management issues. The workshops also provide the participants with a program that is action-oriented and practical. The seven workshops conducted to date have engaged agronomists, engineers, economists, sociologists and women in a unique form of dialogue between disciplines. The influence of the DA workshops is readily observable in each of the countries where the workshops have been held-- Bangladesh, India, and Sri Lanka <sup>5</sup>

##### 5. IRRIGATION SUPPORT PROJECT FOR ASIA NEAR EAST (1987)

The Irrigation Support Project for Asia Near East (ISPAN) is the Asia Near East Bureau's stand-alone, follow-on project to WMS-II. The Project Paper is reviewed here because it contains an evaluative appraisal of WMS-II and because ISPAN itself

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<sup>5</sup> David W. Kahler et al., An Assessment of the Diagnostic Analysis Workshops (Creative Associates, Inc., April, 1985), page v. See also David W. Kahler and John Comings, Report on Diagnostic Analysis Workshop Participant and Trainer Responses to Mail-Out Survey (Creative Associates, Inc., 1984).

represents an a possible vehicle or model for irrigation support activities for Africa and Latin America. ISPAN's funding is set at a level of \$23 million, to be provided by the Asia Near East Bureau (\$10,773,000), Mission Buy-Ins (\$11,523,000), and by S&T's Energy Office (\$700,000) to be provided over a period of 7.5 years. A five year contract period was envisioned with an option to extend to seven years.

### Objectives

ISPAN will assist Missions to improve the quality and performance of existing and future irrigation portfolios. The key objective of the project is to assist Missions increase agricultural production, real farm income and distributional equity within the region by helping AID-assisted countries improve the efficiency, reliability, and equity of water delivery and use. ISPAN will work with regional support institutions to strengthen their capabilities in irrigation management and use their services in support of the region's subsector. Buy-ins constitute a more substantial proportion of the ISPAN (50%) than was the case under WMS-II (34%), and are to be integrated with other elements of the project through a process of synthesis and synergy.

### Review of Lessons Learned

The ISPAN Project Paper acknowledges that WMS-II has generally been regarded as a successful project. It cites a recent ANE/TR/ARD polling of Bureau Missions, which ranked WMS-II second among 35 centrally-funded agriculture projects and Collaborative Research Support Programs (CRSPs). It also concludes:

The WMS-II core premise, that irrigation management problems are multi-dimensional in nature and require multi-disciplinary teams for their solution, has been amply validated and this approach has contributed in large measure to the project's effectiveness. The continuity of personnel made possible through a standing contract has also been a very positive feature of WMS-II. Likewise combining technical assistance, training, and research activities in a single project executed through the same contractor has had powerful synergistic effects on both TA and the research sides.

The ISPAN Project Paper expresses the view that WMS-II was weak on management:

One of the important lessons learned from the WMS-II project has been the need to improve the often cumbersome and slow management and administrative mechanisms. The project has

yet to develop a timely and responsive management information system to track project activities and to report their progress to AID project management upon request. It also had difficulty in producing technical and, particularly, administrative reports in a timely way. The contractor has had difficulty in responding to Mission requests for high quality technical assistance on short notice. In addition, the amount of administrative and management support required from AID project managers to expedite Mission technical assistance requests has been quite high.

It also is critical of some aspects of university performance:

A strong motive of the Asia Bureau in developing WMS-II originally was to expand the limited pool of experts to provide technical support to Bureau irrigation projects. While the project has had some impact on this constraint, the impact has been limited. There has been, in some cases, an unfortunate tendency for activities to become "possessions" of the lead university responsible for it and a concomitant reluctance to draw expertise from outside the university. Another problem has been the parallel tendency to create an expanded standing in-house staff which then becomes a fixed-cost drain on project resources. Finally, the research component has come to be regarded virtually as an "entitlement" to the universities, not subject to effective control or scrutiny.

#### Administrative and Management Improvements

The ISPAN project paper treats the amount of time which the AID staff devoted to WMS-II as a serious problem and appears to be designed to avoid administrative problems which AID experienced under that project.

Under ISPAN, the project contractor is to "assume much of the administrative burden and technical management required to implement the project and will be responsible for providing technical services under the project in a timely and effective way."

Although ISPAN incorporates some of WMS-II's substantive features, it turns to the Water and Sanitation for Health (WASH) project for its administrative model, focused on (1) a strong ANE project officer, (2) a prime contractor/subcontractor operating a Technical Support Center, in close proximity to AID/Washington. The ANE project officer issues Orders of Technical Direction

(OTD's) directly to the contractor to activate and implement contract activities. Accountability is enhanced by an activity and accounting Management Information System based on micro computers which allows the retrieval of approval, expenditure and accounting information on demand.

6. COMMENTARY ON WMS-II DOCUMENTS

The 1985 review of the Diagnostic Analysis Workshop activities under WMS-I and WMS-II provided balanced and objective support for prior assessments of the quality of the work being performed by the universities. Yet, with the launching of WMS-II, distinct notes of dissonance began to appear in the chorus of acclaim which had previously surrounded the project.

Some commentaries on the project themselves became polarized. The assessment of WMS-II contained in the 1984 Mid-Term Evaluation acknowledged some CID/University deficiencies, but essentially concentrated its fire on the shortcomings of AID's management. The account of WMS-II experience contained in the ISPAN project paper did just the opposite.

The present assessment team found merit in some of the views expressed in the Mid-Term Evaluation and the ISPAN Project Paper and had reservations about others. Our opinions are set forth below.

Staff Expansion Blues

The assessment of WMS-II in the ISPAN Project Paper complained of a tendency on the part of the universities to create an expanded standing in-house staff which then became a fixed-cost drain on project resources.

The Mid-Term evaluation of WMS-II took quite another tack:

The universities find themselves in a paradox. As participants in institution-building programs (beginning with 211 (d) grants and continuing with Title XII strengthen grants and the current Memoranda of Understanding (MOU), BIFAD, Collaborative Research Support Programs (CRSPs), etc., all pursuant to authorities within the Foreign Assistance Act), they have significantly enlarged their international programs. These in turn have come to depend upon external support on a sustained basis. This reduces the university's flexibility to choose new projects and activities more in harmony with changing institutional needs or objectives and makes them more dependent... [Emphasis added]

From our perspective, the ISPAN view and the Mid-Term Evaluation view represent two contrasting and somewhat insular reactions to a fundamental problem in the WMS-II project design-- the failure to determine who would bear the risks associated with an expansion of technical staff to carry out WMS-II assignments.

The project design is premised on (1) a constrained supply of services (lack of experienced and properly oriented practitioners of technical assistance), and (2) a rapidly expanding, and necessarily fluctuating demand for services (WMS-II was more than six times the size of WMS-I. Mission buy-ins by themselves were more than double the amount of the WMS-I contract). AID pre-selected a consortium of non-profit institutions to handle the required staff expansion (including training of graduate students and young professionals in practitioners' arts), but the design did not address the question of who would absorb the risks of intermediating between the existing short supply and the rapidly increasing, fluctuating demand.

Four questions concerning staff build-up should have been squarely faced at the beginning:

(1) If a new cadre of technical assistance practitioners was to be trained/employed by the universities for use on quick response AID TDY assignments, was AID prepared to pay the expanded staff during periods when Mission buy-ins and other required project activities were insufficient to keep them busy?

(2) If the universities were to undertake the risks of underwriting the down-time of an expanded cadre of technical assistance personnel, how would the universities be compensated for taking those risks?

(3) If neither AID nor the universities were willing to accept down-time risks, could the required build up in capabilities realistically be accomplished by having the universities each follow a policy of taking on temporary staff who would themselves absorb the risks of down-time?

(4) If the lead universities had fundamentally different policies with respect to the risks of staff expansion, how could they realistically execute an integrated resource strategy as members of a consortium?

These questions were not forthrightly addressed in contract negotiations between AID and CID, nor, it would appear, in negotiations among CID and its subcontractors. AID apparently concluded that its universities assumed the downside risks

involved in increasing the supply of practitioners-- and was displeased at indications to the contrary.

On their part, the universities could point to precedent and to project rationales which implied that expanded capability would be built up at AID expense. The WMS-I Completion Report, for example, had listed various strategies that the project had used to expand the supply of technical assistance practitioners, e.g., involving graduate students and young professionals in the project activities on campus and in LDCs, adding host country professionals to project teams, and involving third country nationals in Diagnostic Analysis Workshops.

A similar theme had been sounded in the WMS-II project paper, which stated that:

Technically competent but inexperienced U.S. professionals will participate in many of the project activities to acquire hands-on field experience under the supervision of experienced, key project personnel...

The Project Paper also emphasized that WMS-II:

"..cannot, as WMS-I did much of the time, rely on a few key individuals to do most of the field work. Rather these key individuals will have to devote much of their time in helping to expand the core group and in preparing others to conduct the field work. This will include helping to identify individuals to comprise the expanded core group and providing them with required training and experience.

Nevertheless, neither the project documents nor the contract between AID and CID dealt squarely with the question of who was to absorb the downside risks of a rapid staff expansion. The fundamental entrepreneurial questions posed by project design essentially went unanswered.

Our view is that CID, as the contracting party directly charged with negotiation and contract execution, should have raised and resolved this question with AID and with its university subcontractors in 1982. However, in the final analysis, only the universities were in a position to assess the risks which they faced and determine their respective capacities to absorb these risks.

There was indeed a "paradox" in WMS-II. AID had designed-- and the CID/university side undertaken to perform-- a project that contained some significant risks. But there had been no real meeting of the minds on who really was to take these risks or how compensation for risk-taking would be paid.

University Risk Policy Profiles

CSU, USU, and Cornell had distinctly different policies with respect to building up project staff.

With few exceptions, Cornell did not hire special project staff. Instead, Cornell utilized its regular staff--mostly tenured teachers and graduate students whose compensation from regular university sources ("hard money") was assured. Cornell did not experience the staff expansion "paradox" described previously, but then neither did it absorb the brunt of the expanded TDY activity. Cornell could perhaps be more dispassionate, more objective, less "payroll-driven" than its sister institutions--but also it was taking fewer risks.

The largest share of the expansion burden fell on CSU, which built up a sizeable temporary staff whose principal source of funding was WMS-II. Some members of the staff combined teaching and non-project research with project activities. Some occasionally were used on projects carried out by other units at CSU. Ultimately, some members of WMS-II staff received tenured positions at CSU. Some members of the WMS-II project staff were informed that their employment was dependent on WMS-II assignments and funding. All this said, the pressures to maintain project staff billability were substantially greater at CSU than at other institutions for four reasons:

(1) CSU had the heaviest total involvement in WMS-II (roughly equal to the other two universities combined).

(2) Use of WMS-II staff on other projects was not easy to arrange at CSU.

(3) The WMS-II project unit had the direct use of only a limited share of the project overhead recovered by CSU.

(4) Relationships among units having project responsibilities sometimes made it difficult to rationalize the use of project staff.

USU was in a position that fell between the circumstances of CSU and Cornell. Over a number of years, USU had built up and maintained a "soft money staff" with skills closely related to those required by WMS-II. Relationships among USU departments were such that this staff could be used on WMS-II assignments and persons added to perform WMS-II assignments could expect to receive assignments on other projects. In addition, the university returned a substantial share of USU's overhead recovery to the operating unit.

The Mid-Term Evaluation, in our judgement, skirts these issues without facing them directly:

All of the universities are affected, some more adversely than others, by [AID's] propensity to manage at the short-term input-activity level. The impact is greater at CSU, and perhaps least so at CU. This problem is, in part, a function of the degree of university dependency on "soft money" (i.e., non-continuous funding)...

Each of the three universities has mechanisms to feed back overhead to the participating departments which is highly commendable. This provides incentives for further faculty participation in project activities and can contribute to building intellectual capacity within the university within each university...

We believe that the "soft money dependency" parameter of a \$20 million AID contract is (1) a large policy issue deserving of attention at high levels within the university and within AID and (2) an important question of contractual risk which should be addressed in negotiations. In our view, the soft money dependency issue is not a good illustration of AID's propensities for ill-conceived "input-control". Perhaps that issue could have been avoided had AID decided, as a matter of policy, not to question any of the universities' proposed assignments, staffing arrangements, or contract charges. But such a policy would have constituted concession of a large issue rather than representing a delegation of authority to handle a series of small ones. We did find some evidence of AID "micro-management," such as involvement in the details of travel arrangements and attempting to effect minor economies in TDY assignments, but the soft money issue does not fit this mold.

We agree with the Mid-Term Evaluation that the feeding back of overhead to participating departments for project-related purposes can be a necessary and salutary practice. The important questions are "when?" "how much?" and "for what?" In our view, there were significant differences in practices among the lead universities which affected their respective stances, and in turn effected the dynamics of the project. Policies with respect to the allocation of recovered overhead, along with techniques for rationalizing the use of university project staffs, are proper subjects for top-level consideration and action where universities involve themselves in very large AID contracts.

Calling the Tune

The ISPAN project paper speaks of a tendency for activities to become "possessions" of the lead university responsible for them. It argues that the research component has come to be regarded virtually as an "entitlement" to the universities, not subject to effective control or scrutiny. Conversely, there have been some concern on the university side that AID has at times attempted to use its administrative leverage to take over substantive leadership of the project.

The terms "possession" and "entitlement" seem pejorative to us. The universities indeed have had strong attachments portions of the subject matter of WMS-II, if not to the whole. In fact, it was precisely those attachments that have given the project much of its thrust. WMS-II drew on university departments and personnel had pre-existing heavy investments in specific areas of, and approaches to water management in developing countries-- investments which they are strongly motivated to protect and to expand. The principal achievements of the WMS-I and WMS-II projects tapped a rich vein of accumulated experience and wisdom which university personnel had built up over time-- in part at AID's expense, in part at the expense of others, and in part on their own. If there was a "multiplier" or synergistic element in WMS-II, it consisted of the recognition that this investment could be put at the service of AID's short-term needs and some state of the art advances could be achieved at the same time.

The university investments on which WMS-II drew were accumulated in institutions which give great weight to individual contributions to knowledge. It is not surprising that persons within the academic community should view AID funding in terms of opportunities to advance their own professional agendas and perhaps lack enthusiasm for those activities (however important to AID) which are not important to those agendas. Nor is it surprising that AID should insist its projects should respond to its needs, follow its procedures, and, produce a cohesive end product for which it rightfully can claim credit.

WMS-I and WMS-II were successful because the substantive content of the services which the chosen universities were willing and able to offer were highly pertinent to AID's requirements in the field. These projects fell short where the participating universities lacked strong in internal interest in particular subjects, work products, or activities (such irrigation system cost recovery, project reporting, and some types of "synthesis" important to AID).

If AID delegates the task of developing a project strategy or

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research agenda to universities (or indeed any other kind of institution) with pertinent subject matter interests and good prospects for participating in the activities recommended, the recommendations are likely to embody those interests-- whether or not they reflect AID priorities. If AID sets its own agenda and opens the field to wider competition, a higher degree of responsiveness may be attainable.



May 10, 1988

Dr. Worth Fitzgerald  
Water Management Specialist  
Room 406-C  
SA-18  
S&T/AGP/RN  
Washington, D.C. 20523

Dear Dr. Fitzgerald:

I am pleased to submit herewith ten copies of our draft final report for the management assessment of WMS-II. We look forward to your comments.

Sincerely,

Harvey A. Lerner  
Team Leader

## ABSTRACT

Water Management Synthesis II has been a fundamentally successful project whose shortcomings have been closely related to its strengths. The project engaged the creative energies and skilled personnel of three leading universities at a time when skills and insights they could offer were critically needed in AID's host countries. As a result of the combined efforts of these universities, Mission portfolios have been improved, the supply of knowledgeable practitioners has been expanded, and the orientation of a profession has been changed. However, the management structure established by CID and three independent universities lacked strength at the center and was not well suited for handling a large and complex AID contract. Costs of the project have been relatively high and production of tangible outputs has been relatively modest. Work planning and activity reporting has not measured up to conventional management standards. The project has been slow in reaching closure on key synthesis work products and frameworks needed to achieve substantive integration of substantive results. AID, the universities, and other organizations with interests in improving water management in developing countries should seek ways to sustain university contributions in the field of water management within more efficient administrative frameworks.

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- Appendix H**      **Comments of Dr. Jack Keller on LBII's "Pro Forma  
Executive Summary"**

Chapter One

INTRODUCTION

A. PURPOSE OF THIS MANAGEMENT ASSESSMENT

This report provides a managerial assessment of the Water Management Synthesis II (WMS-II) project carried out by the Consortium for International Development (CID) through three leading universities: Colorado State University (CSU), Cornell University (Cornell) and Utah State University (USU) from September, 1982 through the spring of 1988. The assessment, which focusses on issues of managerial efficiency and effectiveness, is intended to yield lessons which will be useful in the design of a successor project for Africa, Latin America and the Caribbean to become operational later in 1988. The management assessment was carried out by Harvey A. Lerner, Jan Stofkoper, and Carter Brandon of Louis Berger International, Inc. (LBII). A brief description of the qualifications of the assessment team is contained in Appendix A of this report.

The Scope of Work for this management assessment identifies some fourteen sets of issues pertaining to the WMS-II project. These issues are organized under five general headings:

- Overall Concept and Scope of the Project
- Program Planning
- Operational Planning
- Operational Management
- Progress and Achievement

The Scope of Work for this management assessment is reproduced in full in Appendix B.

B. ORGANIZATION AND COVERAGE OF THIS REPORT

This report is organized in seven chapters.

The present chapter (Chapter One) provides an introduction to the report, discussing its scope, organization, methodology, and approaches to special problems.

Chapter Two provides a review and interpretation of principal project documents: project papers, contract arrangements, project evaluations, and the like. In order provide a needed perspective, this chapter includes a review of the first Water Management Synthesis project (WMS-I), the predecessor to WMS-II.

Chapter Three focusses on the answers to two difficult questions posed by the Scope of Work for this management assessment:

-- Have management costs been reasonable, given the nature of the activities involved and the types of management structure required?

-- Are these costs in line with those of other projects of this nature?

The chapter starts with a comparative analysis of the overhead rates billed to AID by the CID and the three lead universities. It examines other factors bearing on the reasonableness of management costs, and concludes with an interpretive assessment.

Chapter Four is concerned with effectiveness. It compares numbers of activities forecasted for the project at its start with those actually completed. It looks at WMS-II's outputs of tangible products: documents, publications, brochures, slide shows, videos, working papers and the like. These are compared with outputs under WMS-I and with a combination of cost-effectiveness rules-of-thumb. The chapter also discusses available information on achievement of project objectives, both those contained in the contract Work Statement and those objectives which have been imputed to the project in one form or another. Chapter Four ends with a commentary on effectiveness issues.

Chapter Five discusses the WMS-II management structures and the project's work planning and reporting functions. It first reviews and provides an interpretative analysis of the management plans which defined the ways in which CID and the universities expected to operate under WMS-II. It then assesses the project's work plans and the project's activity tracking system. The Chapter ends with a consideration of a variety of explanations for the management problems experienced by the project.

Chapter Six presents the principal findings and recommendations of LBII's management assessment of the Water Management Synthesis II project. It sets forth fourteen findings, following the outline of issues in the Scope of Work for this management assessment. The Chapter also presents recommendations concerning completion of work on WMS-II for AID's consideration.

Chapter Seven identifies six alternatives for the Irrigation and Management Support and Research (IMSAR) project currently under preparation for Africa, Latin America, and the Caribbean. It then provides recommendations for AID's consideration in designing this project.

### C. METHODOLOGY

This management assessment is based entirely on a review of project documents, on interviews held in the Washington, D.C. area, and on follow-up telephone discussions. The assessment team met with members of the Contractor Management Team (the Contractor's Executive Project Director, the three University Project Directors, and a representative of the CID Executive Staff) in Washington during the course of their preparations for a Completion Briefing that was given to AID in February, 1988. Interviews with project personnel were carried out both individually and in group sessions. Interviews also were carried out with some twenty AID and former AID officials, including several who had utilized WMS-II services during field assignments. The assessment team made no visits to university campuses or to AID Missions in developing countries.

At LBII's request, the AID Project Manager provided an opportunity for the Contractor Management team to submit written comments on the fourteen sets of issues contained in the Scope of Work for this management assessment. No such written comments were received. In early March of 1988, LBII submitted a preliminary analysis of project overheads which was circulated to CID and the universities, and received comments on this analysis from the Executive Project Director, Dr. Richard McConnen. These comments are reproduced in Appendix G. Following completion of its main interviews in March, 1988 (but before preparation of the text of this report) LBII submitted a "Pro Forma Executive Summary" presenting its preliminary findings. Written comments, received from Dr. Jack Keller of USU, are reproduced in Appendix H. We commend the comments of Dr. McConnen and Dr. Keller to the reader's attention.

A variety of methods were used to analyze the costs and effectiveness of the WMS-II project. These methods are described in Chapter Three (Costs) and Chapter Four (Effectiveness). Details are provided in Appendix C (Cost Tables), Appendix D (Lists of Documents and Repeatable Presentations for WMS-I and WMS-II), and Appendix E (Assessment of Document Quality).

D. APPROACHES TO ASSESSMENT PROBLEMS

Assessing the performance of WMS-II poses a number of special problems. The following paragraphs identify these problems and discuss our approach to dealing with them in this report.

Viewpoint

While WMS-II has been a generally well-regarded project, there has been considerable polarization of opinion concerning some of the difficulties which it has experienced. A Mid-Term Evaluation of the project was rather critical of AID's management style, referring to overly intrusive "input control" and "micro-management." An assessment of the WMS-II contained in the project paper for the follow-on project for Asia and the Near East (ISPAN) in turn was quite critical of the CID/university style, referring to a tendency for activities to become "possessions" of the lead universities responsible for them and arguing that the research component of the project had come to be regarded virtually as a university "entitlement."

The viewpoint reflected in the present assessment is essentially "structural". We see WMS-II as juxtaposing two sets of administrative arrangements-- one set on the AID side and another set on the CID/university side-- neither of which really was well set up for effective central management. That such structures, working together, would have encountered some difficulties in handling a very large and complex AID contract does not seem surprising.

We also see two very different kinds of institutions, and two very different sets of managers, each of which had strong motivations to be "in control." That there should have been disagreements as to who should call the tune during WMS-II also does not seem surprising.

Objectivity

No assessment of brief compass can hope to sort out controversial issues for a project of the magnitude of WMS-II in a way that all observers would agree was completely fair and objective. However, fact can be separated from opinion and we have sought to make this separation in this report. Portions of the report containing our opinions, commentaries, and interpretations are headed with an underlined chapter title, section heading, or caption. Thus, in the present chapter the paragraphs under the captions,

Viewpoint

Objectivity

Semantics of Synthesis

have been underlined. Since the entirety of Section C of this chapter, "Approaches to Assessment Problems" is interpretive, the title of this section has been underlined as well. The two final chapters of this report consist almost entirely of opinions, commentary, and interpretation. Hence the chapter section titles in these chapters have been underlined.

Semantics of Synthesis

From the earliest evaluation of WMS-I, outside observers have sought some form of answer to the question, "Where is the synthesis?" The Mid-Term Evaluation of WMS-II found lack of progress toward synthesis to be a significant project issue. WMS-I never had a final evaluation, but the present assessment finds that the first project fell short on the specific synthesis work products that it was supposed to provide (see Chapter Two of this report).

Some of the project documents reviewed in the present report have announced that synthesis has been or is about to be achieved. On occasion, project personnel have taken the position that a synthesis is any combination of parts to make a whole: baking a cake is a form of "synthesis." It also has been argued that the ultimate water management synthesis is impossible because knowledge is always partial, never complete.

The term "synthesis" has been applied to the WMS projects in many ways. It has been used to mean:

1. An interdisciplinary process of irrigation system diagnosis and problem-solving.
2. The repackaging of experience gained on long-term projects carried out in LDC's for application in short-term training programs and technical assistance assignments.
3. Specific sets of synthesis work products, such as worldwide program evaluations, taxonomies of irrigation methods, and manuals on state-of-the-art technology.
4. A well-conceived and documented strategy for WMS-II.

5. A fully developed conceptual systems framework applicable to small scale irrigation, whether associated with large or isolated systems.

6. A synoptic review of current literature and professional practices concerning design of water management projects in LDCs.

7. A comprehensive statement of the state-of-the-art contributions made by WMS-I and WMS-II.

8. An encyclopedic summary of the substantive contents of all WMS-II activities.

9. A comprehensive statement of lessons learned from the project.

10. Formulation, for AID, of a comprehensive water management program for LDCs.

11. Development of interdisciplinary training curricula.

12. Development of understanding and consensus at universities and among scholars of differing disciplines.

13. Retrospective assessment of the effectiveness with which prescribed interdisciplinary methodologies have been applied.

14. Integration of two or more WMS-II studies or activities.

15. Any advance in knowledge or in the state-of-the-art.

As we see it, the essential "synthesis" question posed by WMS-II, is less complex than it may appear on the surface. It may be less a matter of agreement on definition as one of identifying which institutional interests have been served most directly by the project's substantive integration efforts. The universities have been strongly motivated to advance the state of knowledge in particular areas and to combine their efforts along particular fronts. They have been less amenable to the kinds of across-the-board summaries, strategies, and program formulations of interest to AID. Had the contractor devoted a greater proportion of its integration efforts to producing kinds of synthesis work products of particular concern to its client, one wonders if the project would have been bifurcated in its third generation.

## Chapter Two

### REVIEW OF PRINCIPAL PROJECT DOCUMENTS

#### A. INTRODUCTION

This Chapter summarizes and analyzes the contents of pertinent project documents which contribute to an understanding of WMS-I (Section B) and WMS-II (Section C). We have gone back to WMS-I for three reasons. First, WMS-II had its roots in WMS-I, and was essentially an expansion of the earlier project. Second, WMS-II overlapped WMS-I for fifteen months and actually provided funds for some WMS-I activities. Third, some of the problems and successes experienced in WMS-II actually had their origins in WMS-I and can best be understood in the perspective of experience under the predecessor project.

We have included the ISPAN project paper in our review of WMS-II because it includes an assessment of WMS-II. ISPAN is explicitly identified as a follow-on of WMS-II, and its structure in part reflects AID's experience with WMS-II.

The project documents reviewed reflect a progressively widening range of perspectives. In some cases, their viewpoints are in conflict. We provide interpretative commentaries in Subsection B-6 and in Subsection C-6 at the end of their respective main sections.

#### B. WATER MANAGEMENT SYNTHESIS I DOCUMENTS

##### 1. WMS-I PROJECT PAPER (1978)

The Project Paper for the first Water Management Synthesis Project ("WMS-I") was prepared in April, 1978. Originally designed as a three year project, WMS-I initially was estimated to require 168 person months and to cost about \$1.1 million.

The "End of Project Status" shown at the "purpose level" of the WMS-I LogFrame was to be "a set of published materials which provides the development community with knowledge, information, training assistance, and guidelines on water management project development, implementation, and operation." As designed, the project did not have provision of TDY professional/technical guidance to Missions as a primary objective, although 10 person months of such assistance (less than 6% of the total level of effort) was projected during the course of the 3-year project period.

The Project Paper deals with the question of "synthesis" in terms of (1) findings and experience of AID projects; (2) training aids and handbooks; and (3) analytical descriptions of small farm water application systems. The project was seen as the first "cooperative coordinated effort to systematize findings and experience" from all AID projects "so that improvements can be made based on principles and procedures learned from each specific case." Training aids and handbooks synthesizing the best practices found throughout the developing world were regarded the "central" output of the project. A taxonomy and assessment of irrigation methods used on small farms in LDC's was to be provided "within a framework of energy requirements, management skills, system efficiencies, operational problems, financial requirements, resources required, environmental sensitivity, and institutional constraints."

## 2. CONTRACTUAL ARRANGEMENTS FOR WMS-I (1978-1983)

The WMS-I project was awarded to the Consortium for International Development on the basis of competitive bidding. Colorado State University and Utah State University served as lead universities, and the University of Idaho as a subcontractor. The contract was administered by Co-Coordinator from CSU and USU. The contract period in fact ran for more than five years (September, 1978-December, 1983) at a total cost of about \$2.8 million (an annual average of well under \$600,000 a year.) Requests for TDY assistance expanded significantly in the final years of the project, and in fact substantially changed the research/TDY balance during the second half of the project. Some of the TDY requests were in fact funded from WMS-II resources. The effective date of WMS-II was September 30, 1982, so that the two projects in fact overlapped for one year and three months.

## 3. FIRST MID-TERM EVALUATION OF WMS-I (JANUARY, 1980)

An evaluation of WMS-I was carried out by the Consortium for International Development at Colorado State during a single day, on January 15, 1980. The evaluation team consisted of Dr. David R. Daines, Deputy Director of the Consortium for International Development; Dr. W. Gerald Matlock (Chairman), Director of the Office of International Agriculture Programs at the University of Arizona; Dr. James R. Meiman, Dean of the Graduate School at Colorado State University; and Dr. Howard B. Peterson, Professor Emeritus of Agricultural and Irrigation Engineering at Utah State University. Nine persons from CSU and USU were interviewed during the course of the evaluation.

The Evaluation Committee found that the project was well planned, it had competent and highly motivated Project Co-Directors, it was based on the concept of synthesis of useful information, good working relationships had been established among team members, effective use of graduate students was being made, and that the project would provide timely and useful information in handbooks. The Evaluation Committee also identified 14 areas in which attention by project personnel, CID, or AID was thought to be advisable. Areas for improvement particularly pertinent to the present assessment are summarized below.

### Integration of Elements

The project is making good progress on three basic thrusts: (1) reviewing past AID, FAO, and IBRD water management projects; (2) developing a six-week training course with supporting materials on problem identification; and (3) developing four handbooks on specific technical subject areas. However, integration of these elements is incomplete and would be improved by adding to the scope of work a General Guide to Planning, Developing, and Implementing Water Management Projects in Developing Countries.

### Lack of Critical Reviews of AID Projects

Few, if any, critical reviews of AID water management projects have been made in the past. Had such reviews been available to project personnel, the results of the effort would be of much greater value. AID should strengthen its system of critical project completion reviews and develop procedures for making the reviews available to contractors responsible for implementing similar activities.

### TDY Technical Assistance Assignments

The technical assistance component of the project appears to be a useful adjunct but could detract with from the effort needed to achieve the major objectives of the project. AID should use the IQC that CID now has with AID for TDY technical assistance activity. CID should be wary of including such conflicting activities in its contracts.

### Incentives for Faculty/Staff Participation

CID should continue to search for ways to work with member universities to provide incentives which encourage participation in international programs.

4. SECOND MID-TERM EVALUATION (DECEMBER, 1980)

An evaluation resulting in a "Review Report" was conducted in by Douglas Caton and Art Handley of AID and by Marvin Jensen of USDA in December, 1980. Apparently, no copy of this evaluation remains in the project files, and none has been reviewed by the LBII assessment team.

Attachment II of S&T's request for approval of a non-competitive procurement action (March 2, 1982) contains a summary of this review report. The summary indicates the following findings:

- a. In summary, the project is developing quality products and personnel are gaining valuable insights and exposure.
- b. The contractor has been very prudent with expenditures and AID is getting good service for funds expended.
- c. The project is making reasonable progress towards achieving its purpose. However, it is behind schedule for various legitimate reasons. It must be pointed out that, at this point in time, it appears that the quality of outputs is excellent.
- d. The review team believes the project leadership to be exceptionally well qualified.

5. WMS-I COMPLETION REPORT (1984)

CID's Completion and Annual Report, was submitted in September, 1984. The "Completion" portion of the report covered the full project period from September 29, 1978 to December 28, 1983. It contained a summary of principal project accomplishments, which are digested below.

AID Document Review

The Completion Report indicated that a document review of 81 AID water management projects worldwide had been of "limited value." It stated:

This is because practically the only documents available are those dealing with the project design and expected output. Evaluation reports are practically non-existent! So this review could only deal with cataloging funding levels, types of interventions being tried, expected outcomes and the historical development of water management type assistance projects.

## Training Aids and Handbooks

The Completion Report describes a changed approach to the handbook activity.

The original concept of this activity was that detailed handbooks would be developed to provide professionals in water management with the necessary knowledge to implement successful water management improvement technologies. Further thought during the implementation of the project suggested that in many instances the constraints were not with professionals in water management but with the decision-makers who planned, designed, and improved irrigation projects. Thus the concepts behind the need for, the value of, and the methods to implement successful technologies was the more urgent need.

A Planning Guide was defined in which the essential concepts behind the use of successful technologies were articulated in a manner that decision-makers would and could use in the planning, design, and improvement of irrigation projects... After the decision was made to develop Planning Guides, Project Management realized that some new techniques did need the documentation of a Handbook...

## Technical Assistance

The report reports on the expansion of TDY technical assistance assignments with enthusiasm:

In the Spring of 1980 an existing opportunity for satisfying both the Systems Analysis and TA goals of the project developed-- the Asia Bureau requested help in identifying "irrigation development options and investment strategies. ...This resulted in the Project being invited to conduct interdisciplinary rapid appraisals in Bangladesh, India, Nepal, Pakistan, Sri Lanka and Thailand... In addition to the options and strategies study, most Missions asked the Team to evaluate their current and pending projects related to irrigated agriculture. There is positive evidence that the ...studies had an important impact on the USAID program in the Region...The fielding of study teams afforded the Project with an entry point to a number of Missions...The project gained a reputation for having capability in interdisciplinary rapid appraisal of irrigation projects and programs. Their reputation, along with that gained from the DA workshops, led to numerous requests for the Project's services and became the foundation for WMS-II.

## Concepts of Synthesis Achieved

The Completion Report identifies five areas in which the WMS-I achieved synthesis: (1) converting concepts learned on long term efforts (CSU's work in Pakistan and Egypt for USAID) into a short term training workshop under WMS-I; (2) the development of Handbooks and Planning Guides; (3) capturing and generalizing an approach to farmer training developed in the hill country of Peru; (4) formalizing lessons learned; and (5) refining an interdisciplinary approach to water management.

In addition, a review of the WMS-I Publications shows several entries on the subject of "Irrigation Development Options and Strategies for the '80's". Presumably these publications reflect some form of synthesis.

## Main Impacts of WMS-I

The Completion Report concludes that the initiation of Water Management Synthesis II by AID was perhaps the greatest impact of Water Management Synthesis I. The discussion of this impact focuses on organizational change and on an organic process of synthesis and application, as follows:

To formulate WMS-II, two offices in the Science and Technology Bureau and the Asia Bureau have joined to fund the project. This is equivalent to getting irrigation and agriculture departments in a LDC to formalize working relationships. In addition, three universities participate in leadership roles. This is equally difficult. The interdisciplinary approach has also impacted the universities in significant ways. These changes are continuing to evolve. The concept of synthesis and increasing capability in water management is slowly being more carefully defined and implemented. Missions and host countries are learning how both expertise and new knowledge can be effectively used. These changes are some of the greatest impacts of WMS-I.

## 6. COMMENTARY ON WMS-I DOCUMENTS

On their surface, the WMS-I project documents present a virtually unanimous chorus of affirmatives. Carefully read in context, however, a more complex picture emerges. In our view, WMS-I was a meritorious project which had its greatest success in its work with Missions and host country personnel in LDCs, but was less successful in other areas. WMS-I laid down a foundation from which sprung both the problems and achievements of WMS-II.

De Facto Change in Project Priorities

WMS-I was a project which started with a research rationale (synthesis) and ended by placing its primary emphasis on applied theory and improved practice (diagnostic analysis workshops, project identification, irrigation system evaluation, and the like). In the end, the strength of WMS-I lay not in producing a comprehensive set of analytical or instructional documents but rather in the sound application of an interdisciplinary approach to water management problems to the circumstances of LDCs.

The contractor's performance of the specific "synthesis" tasks did not measure up to the expectations established in the project paper. Instead, the WMS-I contractor did an impressive job of converting the experience which CSU had gained on long-term technical assistance projects in Pakistan and Egypt for AID) into a form that was useful for short-term assignments.

The CID internal evaluation (January, 1980) in fact had warned that the technical assistance component of the project might detract with from "the effort needed to achieve the major objective of the project." That warning was prescient. A major objective of the project (specific synthesis products) did indeed suffer. At the same time, we think that the change that was made in the project's priorities was sound. If a choice had to be made between emphasizing synthesis assignments or focusing on field applications, contributing a new dimension to the understanding, identifying, and planning of water management systems in specific LDC's was the better use of the special talents of the WMS-I team in the early 1980's.

Specific Synthesis Work Products

The account of results achieved with respect to specific synthesis work products in the CID Completion Report is not convincing. As explained below, the report redefines and/or deemphasizes specific work products on the basis of rationales that seem superficial.

The WMS-I Project Paper anticipated that the contractor would produce the first cooperative coordinated effort to systematize findings and experience from all AID projects "so that improvements can be made based on principles and procedures learned from each specific case." CID's Completion Report argues that lack of AID critical reviews of AID's water management projects made it virtually impossible for the CID contractor to turn out a work product of significant utility to AID. Earlier, the January, 1980 Mid-Term Evaluation had sounded the same theme.

AID/Washington's data base certainly was not in mint condition in the late 1970's and early 1980's, nor were the then-existing evaluations of the Agency's irrigation projects particularly exemplary. However, while the task envisioned in the WMS-I project paper was challenging, it was by no means impossible.

In 1979, working with a data base no more extensive than that available to the WMS-I contractor, Checchi and Company in fact performed a worldwide desktop study of small and medium-scale irrigation projects carried out by AID and the World Bank.<sup>1</sup> That study, which won the commendation from the Office of Evaluation in AID's Bureau of Policy and Program Coordination (PPC), systematized findings and experience from a limited number of AID irrigation projects and drew general lessons of general application from its analysis.

In 1983, AID's Center for Development Information and Evaluation published a program evaluation report, on AID's experience in irrigation<sup>2</sup> authored by three members of the PPC staff. That report wove together AID evaluation reports, current literature, and a recent international conference, again deriving lessons of general application. WMS Report 1 (February, 1981),<sup>3</sup> fell well short of the Checchi and PPC reports in method and substantive content, and, in our view, well short of the expectations concerning synthesis established in the project paper.

The idea of using training aids and handbooks as a central means of presenting a synthesis of the best water management practices found throughout the developing world was modified and apparently reduced in scope during WMS-I. The project resulted in five planning guides on the subjects of (1) land leveling, (2) farmer involvement, (3) irrigation pumping, (4) farm irrigation structures, and (5) small farm self-help irrigation projects.

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<sup>1</sup> Checchi and Company, Pattern Analysis of Small- and Medium Scale Irrigation Projects, (Washington, D.C., November, 1979, 3 Volumes).

<sup>2</sup> David I. Steinberg, Cynthia Clapp-Wincek, Allen G. Turner, Irrigation and AID's Experience: A Consideration Based on Evaluations (A.I.D. Program Evaluation Report No. 8, Washington, D.C.: August, 1983)

<sup>3</sup> P.S. Coolidge et al., Irrigation Projects Document Review (WMS Report 1, February, 1981).

WMS-I also produced four handbooks. These were concerned with (1) circular concrete irrigation turnout, (2) farm irrigation structures, (3) pumps and water lifters for irrigation, and (4) small farm, self help irrigation projects.

This activity was split so as to address two different audiences (planning guides for decision-makers, handbooks for practitioners), with some topics being repeated for both audiences. In the process, the objective of creating an integrated compendium of best irrigation practices appears to have been deferred if not significantly redefined.

The WMS-I Completion Report does not deal squarely with the taxonomy and assessment of LDC small farm irrigation methods called for by the WMS-I Project Paper. The Completion Report does, however, address the subject indirectly by referring to an expert workshop which found that:

...it is easier to capture specific lessons learned from site specific activities; but much more difficult to develop a methodology or taxonomy which could be used by multidisciplinary teams to guide them in the analysis...

...First, there is a great need to develop a rapid reconnaissance capability to respond to short-term technical requirements of donor agencies. Secondly, there is a need to capture lessons that are being learned, so that they can be transmitted to new professionals entering the management field.

None of the titles shown in the WMS-I Publications List in the Completion Report appear to deal with this subject. Presumably, WMS-I did not provide a classification and assessment of small farm irrigation methods as a synthesis output.

We have noted earlier our view that the de facto shift of WMS-I's priorities toward field activities (and away from synthesis) was eminently sound in the circumstances of the early 1980's. However, WMS-I well may have bequeathed a low key, flexible attitude toward synthesis to WMS-II, a project which, at the time of the present management assessment, still lacked a convincing unifying conceptual framework.

### Insufficient Evaluation

WMS-I had two mid-term evaluations, one at the beginning of 1980 and the other at the end of the same year. There was no end-of-project evaluation. The January, 1980 evaluation was an "inside" evaluation, performed by CID and university personnel without

benefit of AID or outside participation. The January evaluation was carried out in the span of a single day, a subject of complaint by the evaluation team. Insufficient information is available on the December, 1980 evaluation to judge its scope, depth, or merit.

Given their timing, the two mid-term evaluations could not adequately judge WMS-I's performance with respect to synthesis products. The expansion in TDY activity under WMS-I started in the Spring of 1980. In December, 1980, it may have been too early for evaluators to judge the likely impact of field priorities on synthesis work products. In any event, the project went through its final three years (1981, 1982, and 1983) without the benefit of either an inside or an outside review. An evaluation (preferably one conducted by outsiders) scheduled shortly before negotiations on the WMS-II contract in 1982 might have perceived and deflected some of the problems that were later to trouble WMS-II.

### C. WATER MANAGEMENT SYNTHESIS II DOCUMENTS

#### 1. WMS-II PROJECT PAPER (1982)

The Project Paper for WMS II makes clear that WMS-II is basically a continuation and expansion of WMS-I under S&T's Office of Agriculture. It also is presented as an extension of the work under the Rural Development Participation Project in S&T's Office of Rural Development and Development Administration.

WMS-II was to provide training and technical assistance to Missions and host countries, conduct special studies, and systematically transfer appropriate technology. An important objective of the project was to produce new attitudes and behaviors at all levels within host countries supportive of viable, progressive irrigation water management programs.

The Project Paper states that WMS-II will increase the quantity and quality of U.S. practitioners who provide technical assistance in developing countries, but the objective of increasing the supply of practitioners was not explicitly incorporated into the LogFrame.

The project goal in the LogFrame is increased food/agricultural production and higher levels of income for participating farmers. The subgoal is increased economic efficiency in water use. The project purpose is increased host country capabilities to plan and implement irrigation water management projects/programs.

The Project Paper presents two summary models. One describes a process for improving irrigation water management (diagnostic analysis, search for solutions, assessment of solutions, pilot project implementation)<sup>4</sup>. The other describes the mechanisms (training, technical assistance, technology transfer, and special studies) by which the project would affect its targeted audiences. Apart from briefly describing these two models and a reference to the lessons of the Pakistan On-Farm Water Management Project which were "synthesized and implemented under WMS-I," the body of the Project Paper does not address the subject of what kinds of "synthesis" its authors expected to come out of WMS-II.

The Project Paper's management analysis points out that WMS-II would be much larger than WMS-I and that the logistics of staffing, organizing, scheduling, and implementing many short-term overseas activities would take considerable administrative time. It argues that the technical professionals working on the project should not be required to handle these management-related activities, since this would be a very poor use of scarce resources.

## 2. CONTRACTUAL ARRANGEMENTS (1982-1988)

The contract with CID for WMS-II was signed on September 28, 1982 for just under \$20 million (an annual average of \$4 million in billings per year over a five year period). The award was based on approval of request for a non-competitive procurement action, based on predominant capability. The request was based on a combination of unique in-house personnel capabilities and on CID's capabilities to mobilize supplementary staff. The contract period was originally scheduled to end in September of 1987, but was subsequently extended into 1988.

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<sup>4</sup> The WMS-II project paper states:

The conceptual framework and philosophy that undergird this project is shown in Figure 1 [The WMS-II Process to Improving Irrigation Water Management] and described briefly in Annex VII.

The annex to which reference is made contains an article by Wayne Clyma, M.K. Lawdermilk, and Dan Lattimore of Colorado State University entitled, "On-Farm Water Management for Rural Development."

### 3. MID-TERM EVALUATION OF WMS-II (1984)

In August of 1984, a team of four consultants submitted a mid-term evaluation of WMS-II. The team consisted of Dr. Charles Busch (Consulting Engineer), Mr. Roger Earnst (Development Consultant), Mr. Raymond E. Kitchell (Development Management Consultant), and Dr. Donald A. Messerschmidt (Social Science/Development Consultant).

The evaluation concluded that the overall results of WMS-II had been "very commendable" and that the project's shortcomings related more to what had been left undone rather than to poor performance.

The evaluation characterized the performance of the "buy-in" portion of the contract as "outstanding"-- as evidenced by client satisfaction and increasing demand.

It found the products of the core-funded activity to be of "high quality," given the absence of an agreed-upon overall strategy. At the same time, it pronounced progress on two specific core funded activities (special studies and technology transfer) to be "less than optimal."

The evaluation concluded that the management of the project had encountered "serious difficulties," and that while considerable improvement had been made under a new management plan adopted in 1984, "there is room for further improvement."

In analyzing a series of issues posed for the evaluation, the report argues that two major problems transcended all others and, in effect, reinforced each other: "synthesis" and "project management."

The synthesis issue involved the absence of a fully developed conceptual framework for a systems approach, a tendency to divide up project activities rather than tying them together, and limited professional networking, publications, and pooling of professional expertise.

The management issues on the CID/University side involved:

- a. Initial amorphousness of CID's style and the changing nature of its role and function.
- b. The desire of the universities to manage operations and to be judged by results ("freedom and responsibility").

- c. Inherent university difficulties and constraints in providing result-oriented and multi-disciplinary managerial leadership.
- d. The inherent difficulties of management between two totally dissimilar structures (AID and CID/universities) and between themselves.
- e. A willingness of the universities to divide up the work, but a concomitant reluctance to work cooperatively on developing coordinated strategies and work plans for core-funded activities.

On the AID side, the management issue was found to involve:

- f. An outdated concept of the AID project manager's role resulting in the design and imposition of ineffective management systems.
- g. Need for an updated view of the roles to be played by CID and the universities and redistribution of appropriate responsibilities and authorities.
- h. A malalignment of functions by levels, offices, and bureaus with agency headquarters
- i. Inadequate administrative support in AID.

The evaluation was strongly critical of AID "micro-management" and "input control". It argued that AID should approve a multi-year work plan based on "management by results" and focus its future attention on major issues of project achievement.

#### 4. ASSESSMENT OF DIAGNOSTIC ANALYSIS WORKSHOPS

In April of 1985, Creative Associates presented an assessment of seven Diagnostic Analysis Workshops carried out by Colorado State University under WMS-I and WMS-II. The assessment was performed by David W. Kahler and John C. Pontious of Creative Associates with assistance from Bradley W. Perlin of Utah State University and John F. Comings of World Education, Inc.

The Diagnostic Analysis Workshops were carried out in India (1981, 1982, and 1984), Sri Lanka (1982, 1983, and 1984) and in Bangladesh (1983). The assessment was based on observation of the 1984 Sri Lanka Workshop, and analysis of questionnaire

responses of trainers and participants in current and past workshops.

The basic objectives of Diagnostic Analysis Workshops are to train management personnel:

to understand the operating irrigation system so as to recognize both its values (the good features or benefits) and its constraints (the problems or factors which restrict efficient operation); and

to order constraints to priority based on pre-determined criteria.

The workshops consisted of formal classroom presentations, preparation for detailed studies, and a detailed field study of which included the preparation of single-discipline and interdisciplinary reports. Most of the workshop participants were middle-level staff from a variety of water management organizations.

The conclusion of the assessment team was very favorable:

The Diagnostic Analysis Workshops provide a valuable means for delivering short-term training that encourages interdisciplinary inquiry into water management issues. The workshops also provide the participants with a program that is action-oriented and practical. The seven workshops conducted to date have engaged agronomists, engineers, economists, sociologists and women in a unique form of dialogue between disciplines. The influence of the DA workshops is readily observable in each of the countries where the workshops have been held-- Bangladesh, India, and Sri Lanka <sup>5</sup>

##### 5. IRRIGATION SUPPORT PROJECT FOR ASIA NEAR EAST (1987)

The Irrigation Support Project for Asia Near East (ISPAN) is the Asia Near East Bureau's stand-alone, follow-on project to WMS-II. The Project Paper is reviewed here because it contains an evaluative appraisal of WMS-II and because ISPAN itself

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<sup>5</sup> David W. Kahler et al., An Assessment of the Diagnostic Analysis Workshops (Creative Associates, Inc., April, 1985), page v. See also David W. Kahler and John Comings, Report on Diagnostic Analysis Workshop Participant and Trainer Responses to Mail-Out Survey (Creative Associates, Inc., 1984).

represents an a possible vehicle or model for irrigation support activities for Africa and Latin America. ISPAN's funding is set at a level of \$23 million, to be provided by the Asia Near East Bureau (\$10,773,000), Mission Buy-Ins (\$11,523,000), and by S&T's Energy Office (\$700,000) to be provided over a period of 7.5 years. A five year contract period was envisioned with an option to extend to seven years.

### Objectives

ISPAN will assist Missions to improve the quality and performance of existing and future irrigation portfolios. The key objective of the project is to assist Missions increase agricultural production, real farm income and distributional equity within the region by helping AID-assisted countries improve the efficiency, reliability, and equity of water delivery and use. ISPAN will work with regional support institutions to strengthen their capabilities in irrigation management and use their services in support of the region's subsector. Buy-ins constitute a more substantial proportion of the ISPAN (50%) than was the case under WMS-II (34%), and are to be integrated with other elements of the project through a process of synthesis and synergy.

### Review of Lessons Learned

The ISPAN Project Paper acknowledges that WMS-II has generally been regarded as a successful project. It cites a recent ANE/TR/ARD polling of Bureau Missions, which ranked WMS-II second among 35 centrally-funded agriculture projects and Collaborative Research Support Programs (CRSPs). It also concludes:

The WMS-II core premise, that irrigation management problems are multi-dimensional in nature and require multi-disciplinary teams for their solution, has been amply validated and this approach has contributed in large measure to the project's effectiveness. The continuity of personnel made possible through a standing contract has also been a very positive feature of WMS-II. Likewise combining technical assistance, training, and research activities in a single project executed through the same contractor has had powerful synergistic effects on both TA and the research sides.

The ISPAN Project Paper expresses the view that WMS-II was weak on management:

One of the important lessons learned from the WMS-II project has been the need to improve the often cumbersome and slow management and administrative mechanisms. The project has

yet to develop a timely and responsive management information system to track project activities and to report their progress to AID project management upon request. It also had difficulty in producing technical and, particularly, administrative reports in a timely way. The contractor has had difficulty in responding to Mission requests for high quality technical assistance on short notice. In addition, the amount of administrative and management support required from AID project managers to expedite Mission technical assistance requests has been quite high.

It also is critical of some aspects of university performance:

A strong motive of the Asia Bureau in developing WMS-II originally was to expand the limited pool of experts to provide technical support to Bureau irrigation projects. While the project has had some impact on this constraint, the impact has been limited. There has been, in some cases, an unfortunate tendency for activities to become "possessions" of the lead university responsible for it and a concomitant reluctance to draw expertise from outside the university. Another problem has been the parallel tendency to create an expanded standing in-house staff which then becomes a fixed-cost drain on project resources. Finally, the research component has come to be regarded virtually as an "entitlement" to the universities, not subject to effective control or scrutiny.

#### Administrative and Management Improvements

The ISPAN project paper treats the amount of time which the AID staff devoted to WMS-II as a serious problem and appears to be designed to avoid administrative problems which AID experienced under that project.

Under ISPAN, the project contractor is to "assume much of the administrative burden and technical management required to implement the project and will be responsible for providing technical services under the project in a timely and effective way."

Although ISPAN incorporates some of WMS-II's substantive features, it turns to the Water and Sanitation for Health (WASH) project for its administrative model, focused on (1) a strong ANE project officer, (2) a prime contractor/subcontractor operating a Technical Support Center, in close proximity to AID/Washington. The ANE project officer issues Orders of Technical Direction

(OTD's) directly to the contractor to activate and implement contract activities. Accountability is enhanced by an activity and accounting Management Information System based on micro computers which allows the retrieval of approval, expenditure and accounting information on demand.

6. COMMENTARY ON WMS-II DOCUMENTS

The 1985 review of the Diagnostic Analysis Workshop activities under WMS-I and WMS-II provided balanced and objective support for prior assessments of the quality of the work being performed by the universities. Yet, with the launching of WMS-II, distinct notes of dissonance began to appear in the chorus of acclaim which had previously surrounded the project.

Some commentaries on the project themselves became polarized. The assessment of WMS-II contained in the 1984 Mid-Term Evaluation acknowledged some CID/University deficiencies, but essentially concentrated its fire on the shortcomings of AID's management. The account of WMS-II experience contained in the ISPAN project paper did just the opposite.

The present assessment team found merit in some of the views expressed in the Mid-Term Evaluation and the ISPAN Project Paper and had reservations about others. Our opinions are set forth below.

Staff Expansion Blues

The assessment of WMS-II in the ISPAN Project Paper complained of a tendency on the part of the universities to create an expanded standing in-house staff which then became a fixed-cost drain on project resources.

The Mid-Term evaluation of WMS-II took quite another tack:

The universities find themselves in a paradox. As participants in institution-building programs (beginning with 211 (d) grants and continuing with Title XII strengthen grants and the current Memoranda of Understanding (MOU), BIFAD, Collaborative Research Support Programs (CRSPs), etc., all pursuant to authorities within the Foreign Assistance Act), they have significantly enlarged their international programs. These in turn have come to depend upon external support on a sustained basis. This reduces the university's flexibility to choose new projects and activities more in harmony with changing institutional needs or objectives and makes them more dependent... [Emphasis added]

From our perspective, the ISPAN view and the Mid-Term Evaluation view represent two contrasting and somewhat insular reactions to a fundamental problem in the WMS-II project design-- the failure to determine who would bear the risks associated with an expansion of technical staff to carry out WMS-II assignments.

The project design is premised on (1) a constrained supply of services (lack of experienced and properly oriented practitioners of technical assistance), and (2) a rapidly expanding, and necessarily fluctuating demand for services (WMS-II was more than six times the size of WMS-I. Mission buy-ins by themselves were more than double the amount of the WMS-I contract). AID pre-selected a consortium of non-profit institutions to handle the required staff expansion (including training of graduate students and young professionals in practitioners' arts), but the design did not address the question of who would absorb the risks of intermediating between the existing short supply and the rapidly increasing, fluctuating demand.

Four questions concerning staff build-up should have been squarely faced at the beginning:

(1) If a new cadre of technical assistance practitioners was to be trained/employed by the universities for use on quick response AID TDY assignments, was AID prepared to pay the expanded staff during periods when Mission buy-ins and other required project activities were insufficient to keep them busy?

(2) If the universities were to undertake the risks of underwriting the down-time of an expanded cadre of technical assistance personnel, how would the universities be compensated for taking those risks?

(3) If neither AID nor the universities were willing to accept down-time risks, could the required build up in capabilities realistically be accomplished by having the universities each follow a policy of taking on temporary staff who would themselves absorb the risks of down-time?

(4) If the lead universities had fundamentally different policies with respect to the risks of staff expansion, how could they realistically execute an integrated resource strategy as members of a consortium?

These questions were not forthrightly addressed in contract negotiations between AID and CID, nor, it would appear, in negotiations among CID and its subcontractors. AID apparently concluded that its universities assumed the downside risks

involved in increasing the supply of practitioners-- and was displeased at indications to the contrary.

On their part, the universities could point to precedent and to project rationales which implied that expanded capability would be built up at AID expense. The WMS-I Completion Report, for example, had listed various strategies that the project had used to expand the supply of technical assistance practitioners, e.g., involving graduate students and young professionals in the project activities on campus and in LDCs, adding host country professionals to project teams, and involving third country nationals in Diagnostic Analysis Workshops.

A similar theme had been sounded in the WMS-II project paper, which stated that:

Technically competent but inexperienced U.S. professionals will participate in many of the project activities to acquire hands-on field experience under the supervision of experienced, key project personnel...

The Project Paper also emphasized that WMS-II:

"..cannot, as WMS-I did much of the time, rely on a few key individuals to do most of the field work. Rather these key individuals will have to devote much of their time in helping to expand the core group and in preparing others to conduct the field work. This will include helping to identify individuals to comprise the expanded core group and providing them with required training and experience.

Nevertheless, neither the project documents nor the contract between AID and CID dealt squarely with the question of who was to absorb the downside risks of a rapid staff expansion. The fundamental entrepreneurial questions posed by project design essentially went unanswered.

Our view is that CID, as the contracting party directly charged with negotiation and contract execution, should have raised and resolved this question with AID and with its university subcontractors in 1982. However, in the final analysis, only the universities were in a position to assess the risks which they faced and determine their respective capacities to absorb these risks.

There was indeed a "paradox" in WMS-II. AID had designed-- and the CID/university side undertaken to perform-- a project that contained some significant risks. But there had been no real meeting of the minds on who really was to take these risks or how compensation for risk-taking would be paid.

University Risk Policy Profiles

CSU, USU, and Cornell had distinctly different policies with respect to building up project staff.

With few exceptions, Cornell did not hire special project staff. Instead, Cornell utilized its regular staff--mostly tenured teachers and graduate students whose compensation from regular university sources ("hard money") was assured. Cornell did not experience the staff expansion "paradox" described previously, but then neither did it absorb the brunt of the expanded TDY activity. Cornell could perhaps be more dispassionate, more objective, less "payroll-driven" than its sister institutions--but also it was taking fewer risks.

The largest share of the expansion burden fell on CSU, which built up a sizeable temporary staff whose principal source of funding was WMS-II. Some members of the staff combined teaching and non-project research with project activities. Some occasionally were used on projects carried out by other units at CSU. Ultimately, some members of WMS-II staff received tenured positions at CSU. Some members of the WMS-II project staff were informed that their employment was dependent on WMS-II assignments and funding. All this said, the pressures to maintain project staff billability were substantially greater at CSU than at other institutions for four reasons:

- (1) CSU had the heaviest total involvement in WMS-II (roughly equal to the other two universities combined).
- (2) Use of WMS-II staff on other projects was not easy to arrange at CSU.
- (3) The WMS-II project unit had the direct use of only a limited share of the project overhead recovered by CSU.
- (4) Relationships among units having project responsibilities sometimes made it difficult to rationalize the use of project staff.

USU was in a position that fell between the circumstances of CSU and Cornell. Over a number of years, USU had built up and maintained a "soft money staff" with skills closely related to those required by WMS-II. Relationships among USU departments were such that this staff could be used on WMS-II assignments and persons added to perform WMS-II assignments could expect to receive assignments on other projects. In addition, the university returned a substantial share of USU's overhead recovery to the operating unit.

The Mid-Term Evaluation, in our judgement, skirts these issues without facing them directly:

All of the universities are affected, some more adversely than others, by [AID's] propensity to manage at the short-term input-activity level. The impact is greater at CSU, and perhaps least so at CU. This problem is, in part, a function of the degree of university dependency on "soft money" (i.e., non-continuous funding)...

Each of the three universities has mechanisms to feed back overhead to the participating departments which is highly commendable. This provides incentives for further faculty participation in project activities and can contribute to building intellectual capacity within the university within each university...

We believe that the "soft money dependency" parameter of a \$20 million AID contract is (1) a large policy issue deserving of attention at high levels within the university and within AID and (2) an important question of contractual risk which should be addressed in negotiations. In our view, the soft money dependency issue is not a good illustration of AID's propensities for ill-conceived "input-control". Perhaps that issue could have been avoided had AID decided, as a matter of policy, not to question any of the universities' proposed assignments, staffing arrangements, or contract charges. But such a policy would have constituted concession of a large issue rather than representing a delegation of authority to handle a series of small ones. We did find some evidence of AID "micro-management," such as involvement in the details of travel arrangements and attempting to effect minor economies in TDY assignments, but the soft money issue does not fit this mold.

We agree with the Mid-Term Evaluation that the feeding back of overhead to participating departments for project-related purposes can be a necessary and salutary practice. The important questions are "when?" "how much?" and "for what?" In our view, there were significant differences in practices among the lead universities which affected their respective stances, and in turn effected the dynamics of the project. Policies with respect to the allocation of recovered overhead, along with techniques for rationalizing the use of university project staffs, are proper subjects for top-level consideration and action where universities involve themselves in very large AID contracts.

Calling the Tune

The ISPAN project paper speaks of a tendency for activities to become "possessions" of the lead university responsible for them. It argues that the research component has come to be regarded virtually as an "entitlement" to the universities, not subject to effective control or scrutiny. Conversely, there have been some concern on the university side that AID has at times attempted to use its administrative leverage to take over substantive leadership of the project.

The terms "possession" and "entitlement" seem pejorative to us. The universities indeed have had strong attachments portions of the subject matter of WMS-II, if not to the whole. In fact, it was precisely those attachments that have given the project much of its thrust. WMS-II drew on university departments and personnel had pre-existing heavy investments in specific areas of, and approaches to water management in developing countries--investments which they are strongly motivated to protect and to expand. The principal achievements of the WMS-I and WMS-II projects tapped a rich vein of accumulated experience and wisdom which university personnel had built up over time-- in part at AID's expense, in part at the expense of others, and in part on their own. If there was a "multiplier" or synergistic element in WMS-II, it consisted of the recognition that this investment could be put at the service of AID's short-term needs and some state of the art advances could be achieved at the same time.

The university investments on which WMS-II drew were accumulated in institutions which give great weight to individual contributions to knowledge. It is not surprising that persons within the academic community should view AID funding in terms of opportunities to advance their own professional agendas and perhaps lack enthusiasm for those activities (however important to AID) which are not important to those agendas. Nor is it surprising that AID should insist its projects should respond to its needs, follow its procedures, and, produce a cohesive end product for which it rightfully can claim credit.

WMS-I and WMS-II were successful because the substantive content of the services which the chosen universities were willing and able to offer were highly pertinent to AID's requirements in the field. These projects fell short where the participating universities lacked strong in internal interest in particular subjects, work products, or activities (such irrigation system cost recovery, project reporting, and some types of "synthesis" important to AID).

If AID delegates the task of developing a project strategy or

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research agenda to universities (or indeed any other kind of institution) with pertinent subject matter interests and good prospects for participating in the activities recommended, the recommendations are likely to embody those interests-- whether or not they reflect AID priorities. If AID sets its own agenda and opens the field to wider competition, a higher degree of responsiveness may be attainable.

## Chapter Three

### COSTS

#### A. INTRODUCTION

The Scope of Work for the present assessment asks the following questions:

Have management costs been reasonable, given the nature of the activities involved and the types of management structure required?

Are these costs in line with those of other projects of this nature?

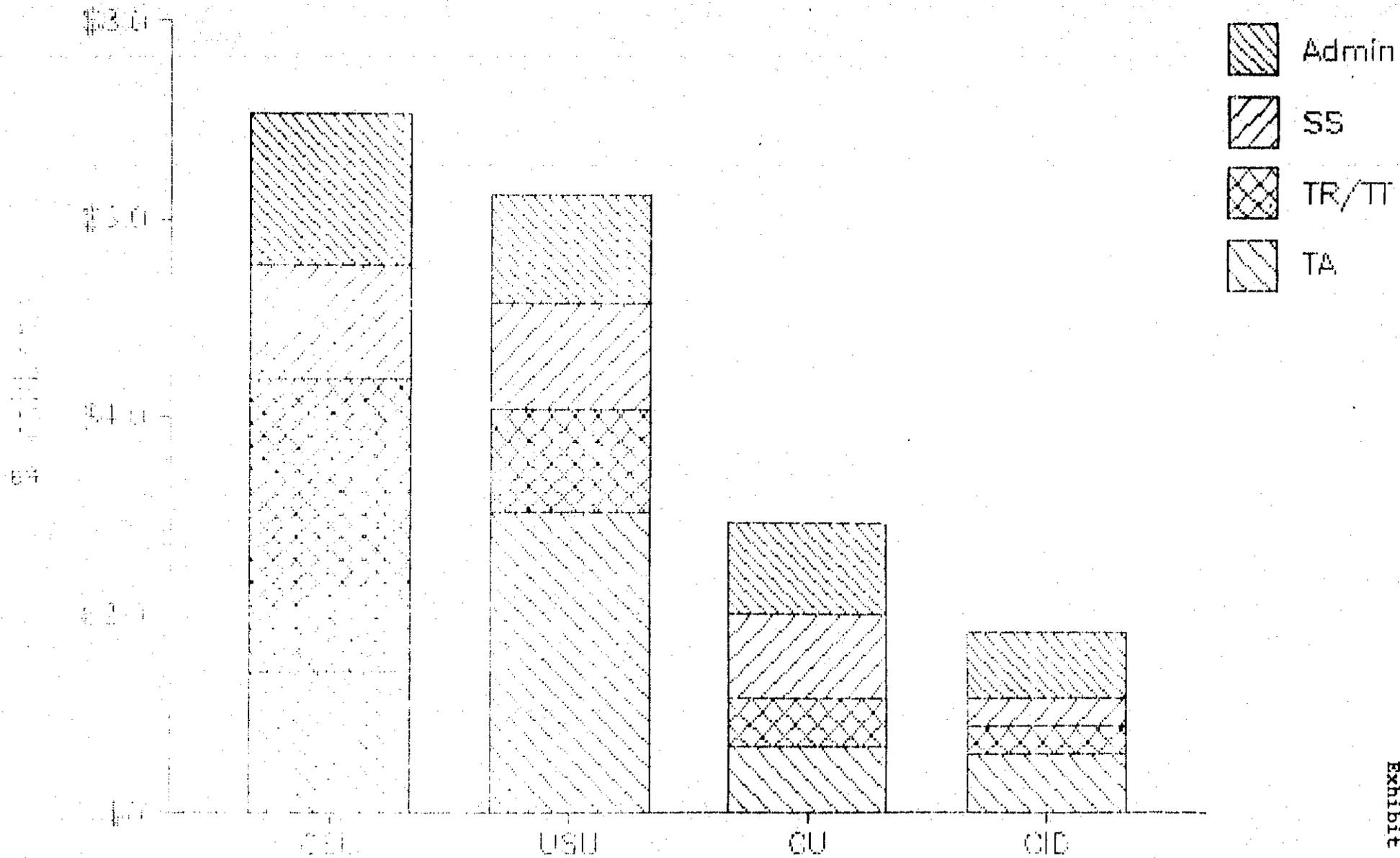
Exhibit I on the following page shows WMS-II project expenditures in graphic form. Expenditures are classified under the headings, Administration and Support (Admin), Special Studies (SS), Training and Technology Transfer (TR/TT) and Technical Assistance (TA). Note that each of the three university subcontractors individually had higher administrative and support costs than did CID (the prime contractor). Note also that CSU's activities were heavily oriented toward TR/TT, while USU concentrated on TA and Cornell (CU) had the most even balance among the three substantive activities.

For the project as a whole, "Administrative and Support" costs accounted for 23.4% of total expenditures on the WMS-II project. A rule-of-thumb for large development projects is that, on the average, such costs represent 12-15% of the total costs. However, individual project experience varies widely. Factors affecting management costs include (1) the nature, location, and quantitative distribution of long and short term assignments; (2) the number and location of collaborating entities (prime contractors, subcontractors, joint venture partners and the like); (3) the relationships among these entities and between the prime contractor and the client; and (4) the level and composition of overhead rates charged by the organizations providing the services.

For AID cost-type contracts, the last factor (level and composition of overhead rates) is the most complex and often the most important of the four. This chapter first analyzes CID/university overhead rates. It then addresses the other three factors.

# WMS--II Project Expenditures

## FY1983--FY1988



This chapter is organized in six sections including this introduction (Section A).

Section B describes the relationship of management costs to overhead in conceptual terms.

Section C deals with basic data and methodology for comparing university overhead rates with overhead rates charged by other non-profit organizations and by consulting firms.

Section D compares CID and university overheads with overheads of other kinds of organizations serving AID.

Section E provides a summary assessment of other factors bearing on management costs.

Section F provides an interpretative commentary on the impact of cost considerations on the administration of WMS-II.

Appendix C contains tables containing further details on costs.

#### B. RELATIONSHIP BETWEEN MANAGEMENT COSTS AND OVERHEAD

In general, the higher overhead an organization has, the lower the management and support costs it is likely to charge directly to AID cost-type contracts. This phenomenon results in part from differences in customary accounting practices (if a management cost is charged as a direct cost, it cannot at the same time be charged as an indirect cost) and in part to the effects of market competition (AID looks at the bottom line in making cost comparisons).

An organization charging some management and support cost directly to AID in fact has three sources from which it can recover the costs of management and support. These are as follows:

	Direct Costs	Overhead Costs
Administrative and Support Activities	(1)	(2)
Other Activities	Not Applicable	(3)

Usually overhead recovery from "Other Activities" (3) is substantially greater than amounts recovered from (1) or (2), and often much greater than (1) and (2) combined. In any event, the total effective amounts of overhead recovery provide a very important perspective for an analysis of administrative and support costs.

How do the overhead rates of CID and the universities engaged in WMS-II compare with the overhead rates of other organizations serving AID on cost-type contracts? When stated in terms of percentages alone, university overheads are generally "lower" than those of many other organizations, but they are usually applied to a larger cost base. Thus:

**FACTORS AFFECTING OVERHEAD RECOVERY: Overhead Rate and Cost Base**

	Percentage Rates x Cost Base =		Effective Recovery
Universities	Low	High	?
Most Others	High	Low	?

CID and the WMS-II universities base overhead on all direct costs, including salaries, fringe benefits, travel, per diem, and other direct costs. Most other organizations serving AID charge overhead primarily, and in many cases exclusively, on the basis of professional labor cost.

In order to address questions of comparative overhead recovery and management costs, we have sought to restate the overhead costs incurred under WMS-II in terms that are more comparable with the accounting practices of private and non-profit sector AID contractors. In this way, it is hoped that a new perspective on the cost performance of WMS-II can be achieved. However, by recalculating university overhead rates in terms of standard private and non-profit practices, we do not mean to imply that the organizations or their respective work products are necessarily interchangeable.

**C. METHODOLOGY AND BASIC DATA FOR COMPARING OVERHEAD RATES**

Costs of \$4.22 million (23.4% of total costs) had been billed directly for management and administration services under WMS-II as of the date of this analysis. The \$4.22 million is composed of the following costs:

Salaries/Fringes	(A) \$2.19 million
Travel/Per diem	(A) \$ .18 million
Other Direct Costs	(A) \$ .53 million
Equipment	(A) \$ .08 million
Overhead on sum of A's	(B) \$ .96 million
CID G&A on sum of A's + B	(C) \$ .28 million
<b>Total</b>	<b>\$4.22 million</b>

The salary/fringe benefit category included professional person months for the project Executive Project Director (EPD), University Project Directors (UPDs), and Assistant University Project Directors (not all full-time), as well as for support services (secretaries and accountants, again not all necessarily full-time).

Indirect cost billings were \$4.0 million dollars, excluding the indirect costs (overhead and CID G&A) applied to the support service direct costs broken down above. This amount is the sum of all university and CID indirect and G&A billings in the Technical Assistance, Training/Technology Transfer, and Special Studies categories of project activities.

Restating this data in terms of three sources from which CID and the Universities can recover the costs of management and support:

	Direct Costs	Overhead Costs
Administrative and Support Activities	(1) \$3.98 million	(2) \$1.24 million
Other Activities	Not Applicable	(3) \$4.0 million

In total, there was a recovery of \$8.22 million from which contributions to various kinds of management activities, in theory at least, could have been drawn. The \$3.98 million in direct costs recovered (Item 1 in the tabulation above) represents only administrative and support activities associated with the project. The overhead recoveries (items 2 and 3 in the tabulation above, amounting to a combined total of \$5.24 million) can represent quite a variety of costs, including facility cost, utility cost, and contribution to the costs of upper-level university management. Depending on the practices of the organization, overhead recoveries (Item 2) and (Item 3) also can reflect **some** project management and support.

The overhead rates applied by each university to the sum of all direct costs incurred on these activities is as follows:

Overhead

CID <sup>6</sup>	9.9%
CSU	39.9%
CU <sup>7</sup>	63.0%
USU	35.0%

For universities, overhead calculations typically use the total of all direct costs as the base for applying the percentage markup. In private and non-profit firms, it is typical for the overhead markup to be based primarily on the smaller base of direct labor costs.<sup>8</sup> Neither method is necessarily better, and both methods represent accepted conventions of average cost accounting that has been approved by government auditors. The difference between these two approaches, however, creates the need to recalculate the WMS-II overhead costs in terms comparable with the convention for private and non-profit firms, as a basis for further analysis and the application of market tests of appropriate levels of cost.

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<sup>6</sup> CID's "overhead rate" is in fact a G&A (general and administrative expense). It is applied to all costs incurred by its university subcontractors (including overhead) and to any direct costs which CID incurs itself.

<sup>7</sup> Cornell's actual fringe and overhead rates vary by domestic and overseas (longer than 6 weeks) location and by statutory versus endowed positions within the university. The numbers shown are considered average. Similarly, the other universities have slightly varying overhead rates that they use for different activities under AID contracts, but the figures shown here are accurate for the WMS-II project.

<sup>8</sup> The majority of AID contractors include fringe benefits in overhead, using direct salaries alone as the overhead base. The universities treat fringe benefits as a direct cost associated with labor cost, i.e., they apply their overhead rates to salary plus fringe benefits as well as to other direct costs. The university fringe benefit rates are as follows:

CID	17%
CSU	17%
CU	25-29%*
USU	29%

See footnote 2 above.

Three WMS-II data sets were used, which, combined, cover all expenditures incurred to date on the project. These were:

1. The costs incurred under all project activities that had been closed out by February 10, 1988. This includes some \$12.8 million in project activities, including administration.
2. Costs incurred on activities prior to the FY1988 work plan that are essentially completed but not yet administratively closed out. The costs incurred on these activities total only \$202,000.
3. The costs incurred as of February 10, 1988, on all FY88 work plan activities. This includes \$5.0 million in expenditures, or about 78% of the authorized level for these activities of \$6.5 million. The activities incorporated in the FY88 work include some that were begun as early as 1984.

These three data sets total \$18.0 million in expenditures, or 91% of the amount authorized in the original contract.

The breakdown over the life of the project, between universities and among activities, appears in Table D-1 in Appendix D. In total, 39% of expenditures were by CSU, 34% by USU, 16% by Cornell, and 10% by CID. Similarly, 31.5% of expenditures were in the area of Technical Assistance, 26.5% in Training/Technology Transfer, and 18.7% in Special Studies, in addition to the 23.4% in Support Services.

In working with the WMS-II financial data, the following guidelines were adopted. These guidelines reflect standard AID contract costing procedures and allow us to calculate "overhead equivalency rates".

1. Overhead percentages were recalculated to reflect the ratio of all indirect costs to direct salaries only. All calculations were done on the basis of the full \$18 million as of the date of this analysis. See Table D-2 in Appendix D.
2. Fringe benefits were separated out from the "salary plus fringes" line shown in WMS-II accounts, and were included in the recalculated effective overhead rate.
3. Overhead-type activities that were billed directly on WMS-II, but which are generally not billed by AID private and non-profit contractors, were separated out and included in the recalculated overhead. These activities include secretaries, typists, and accountants.

4. The costs incurred under WMS-II in the "Support" category were allocated across the three substantive categories, i.e. Technical Assistance, Training and Technology Transfer, and Special Studies. This was done on the basis of the share of costs incurred by each project entity (CID, CSU, CU, and USU) in the three substantive areas. For this reason, no cost figures appear in the "Support" column in the lower half of the overhead recalculation cost sheets (Table D-2 in Appendix D).

5. The professional services of the EPD, UPDs, Associate and Assistant Directors, and graduate students falling in the "Support" cost category were not considered to be overhead-type activities. However, in a simple sensitivity analysis undertaken below, the billable direct costs for these professional support services were reduced by 50% and 100%, respectively, in order to gain further perspective on the magnitude of project management costs.

The rationale for doing this is that private and non-profit firms, for competitive and other reasons, often do not bill the full amount of time that they spend on home-office project direction and management (the 50% reduction). Instead, they cover such costs out of overhead. Also, under AID Indefinite Quantity Contracts (IQCs), IQC firms typically cannot bill professional time spent on work order staffing, mobilization, and/or administrative support (the 100% reduction).

6. A CID G&A factor is applied to all university activities, which is transferred to CID and does not represent overhead costs of each respective university. However, when AID wants to calculate the full cost of contracting through this mechanism with one of the three universities, it must include the CID G&A cost. For this reason, the "effective overhead rate" for each university is calculated twice, once without and once with the CID G&A cost.

7. This procedure was followed for each of the entities involved in WMS-II, and then summed across all four in order to calculate a project-wide "equivalent overhead rate." This was done for both completed activities and the FY88 work plan activities.

#### D. QUANTITATIVE ANALYSIS OF OVERHEAD RATES

Our analysis resulted in the following summary findings for a base case:

**THE BASE CASE: Equivalent Overhead Rate, as Percentage of Direct Salary (1)**

Completed + Closed-out + FY1988 Activities

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	Without CID G&A	With CID G&A
Total Project	-- (2)	137.8
- Tech. Assistance	--	157.3
- Training/TT	--	122.1
- Special Studies	--	136.4
CID/EPD	n.a.	97.4 (3)
CSU	90.0	109.0
Cornell	177.1	201.8
USU	138.5	167.5

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- Notes: (1) Based on average, not marginal, cost accounting.
- (2) Total project costs cannot be considered net of CID G&A, although specific university billings can be.
- (3) Includes G&A billed on top of CID direct billings (\$147,000), but not G&A billed on top of university billings (\$1,125,533).

Several conclusions are apparent. First, the average "equivalent overhead rate" for all project activities is about 138%, expressed as a percentage of direct salaries. That is roughly equivalent to a direct salary multiplier of 2.4, which is at the upper end of the range (2.0-2.5) of standard multipliers often used by AID to estimate private and non-profit contractor total costs.<sup>9</sup> Many small firms have multipliers slightly below 2.0.

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<sup>9</sup> A "multiplier" is defined as the relationship between direct salary (excluding fringe benefits) and the sum of salary, overhead, and fee. For a private firm with a 100% overhead rate and a 10% fee, the multiplier would be calculated as follows:

Direct Salary 100

75

Second, the equivalent overhead percentages for each university are higher than the overhead percentages commonly associated with these universities, simply because much lower overhead percentages are normally applied to a larger accounting base by the universities. When measured against a base of direct salaries, that the three universities can be ranked, in order of lower to higher rates, as CSU, USU, and Cornell. CSU, with the lowest overhead rate, also had the highest volume of activity and the greatest number of staff devoted to the WMS-II project.

Third, the analysis shows that the equivalent overhead costs associated with Technical Assistance are higher than those associated with either Training/Technology Transfer or Special Studies. The average project-wide effective overhead rate for Technical Assistance was calculated to be 157% as with about 130% for Training and Special Studies. The higher average cost can be generally attributed to the higher share of travel/per diem and other direct costs associated with short-term Technical Assistance activities. When the overhead rate based on direct labor only is contrasted with an overhead rate applied to a base of total direct costs, the former rate is higher in those cases where non-labor direct costs are relatively high.

Fourth, we undertook a simple sensitivity analysis to put these estimated "effective overhead rates" into an even broader perspective. Private and non-profit contractors often do not bill the full cost of home-office executive support. Instead, they cover some such costs out of overhead. Under Indefinite Quantity Contracts, IQC firms typically cannot bill professional time spent on work order staffing, mobilization, and

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Overhead @110%	110
Fee @ 10% of Salary + Overhead	21
	---
Total	231/100 = 2.31 multiplier

For a university with an overhead rate equivalent to 131% of direct salaries (but charging no fee), the multiplier would be as follows:

Direct Salary	100
Overhead @131%	131
	---
Total	231/100 = 2.31 multiplier

AID Indefinite Quantity Contracts (IQC) are based on the use of multipliers.

administrative support. In our sensitivity analysis, the billable professional direct salary costs (i.e. those falling in the "Support" category) were reduced by 50% and 100%, respectively. (No other support category costs were touched.) The results are shown in the following table:

**SENSITIVITY ANALYSIS: Effective Overheads, Expressed as Percent of Direct Salary**

	50% Reduction of Billable Management PPMs(1)		100% Reduction of Billable Mgt PPMs	
	Without CID G&A	With CID G&A	Without CID G&A	With CID G&A
Total Project (2)	--	164.5	--	198.0
- Tech. Assistance	--	193.0	--	240.2
- Training/TT	--	143.0	--	168.2
- Special Studies	--	161.7	--	193.2
CID/EPD (3)	n.a.	201.5	n.a.	537.3
CSU	104.3	124.8	121.0	143.1
Cornell	214.2	242.2	262.7	295.0
USU	161.8	193.6	190.2	225.4

Notes: (1) PPMs = Professional person months

(2) Total project costs cannot be considered net of CID G&A, although specific university billings can be.

(3) Includes G&A billed on top of CID direct billings (\$147,000), but not G&A billed on top of university billings (\$1,125,533).

In this sensitivity analysis, the total project "equivalent overhead rate" was estimated to rise to 165% - 200%, depending on the assumptions used. These rates represent a multiplier of 2.65 to 3.0, which are somewhat higher than average AID private and non-profit multipliers (2.0 - 2.5). The effective rate shown above for Technical Assistance (with a direct salary multiple of 3.4) was somewhat higher than for Special Studies (with a direct salary multiple of 2.93) and was significantly higher than for Training (with a direct salary multiple of 2.43). The same pattern in the relative costs of these three main categories of substantive project activities may be observed in the base case.

The salary multiple of the highest-cost university working on a Technical Assistance assignment under WMS-II (in excess of 4.0) could be double that of an AID IQC contractor for a similar short-term assignment.

E. SUMMARY ASSESSMENT OF MANAGEMENT OTHER COST FACTORS

The Introduction to this chapter compared 23.4% expenditure on administrative and support costs with a rule-of-thumb of 12-15% and identified five factors which can affect variations in these costs among contractors and projects. Sections B, C, and D of this chapter analyzed the most complex of these factors-- rate of overhead recovery. The analysis concluded that the CID/university overhead rates (137.8%) placed university multiples at the high end of the competitive range. As indicated earlier, other things being equal, one would expect that a high-multiple contractor would have relatively low direct charges for administration and support. In this section, we look at other factors which affected the level of administration and support for WMS-II and then provide a summary assessment.

The three remaining factors and their impacts may be summarized as follows:

1. Nature, location, and distribution of long and short term assignments

Most large development projects have a heavy long-term technical assistance component in which a resident team leader takes the brunt of the management burden. By contrast, WMS-II was principally a field support project, involving a large number of short term assignments being carried out in Asia, the Near East, Africa, and Latin America-- as well as quite a number of on-campus activities. These characteristics undoubtedly exerted an upward thrust on administrative and support costs. Also exerting some upward thrust on these costs were the following factors:

(a) the shortage of experienced U.S. technical assistance practitioners capable of carrying out interdisciplinary assignments in LDC's;

(b) academic commitments restricting the availability of university personnel; and

(c) difficulties in forecasting and planning Mission buy-ins.

2. Number and location of collaborating entities

CID had three main university subcontractors and a number of

minor contractors. CSU carried out a certain amount of work in tandem with the University of Maryland, a contractor funded by AID through USDA. The number of principal collaborating entities was modest for a contract of the size of WMS-II, and there were no unusual locational problems.

3. Relationships among contracting and subcontracting organizations

Relationships among contracting and subcontracting entities were very complex, in part because of the effective requirement for unanimity among the lead universities, in part because of the complexity of AID's own management structure, and in part because of the extensive informal relationships between the universities and AID.<sup>10</sup> It is difficult to quantify the effects of these complexities, but it seems likely that the effects on management costs have been substantial.

During the second half of the project, AID's management structure became operationally less complex and CID's project management approach was altered. The lead operating executive position was moved from CSU to the offices of CID in Arizona, where a newly recruited Executive Project Director (EPD) was installed. This change was sound from the viewpoint of project management. Analysis also suggests that the change did not result in substantially higher administrative costs.

This transfer of responsibilities did not significantly increase the cost of project administration.<sup>11</sup> The administration budgets of all four institutions actually decreased from the first project year, and were 2% less in FY1986 than in FY1983. If one looks strictly at expenditure on salaries and fringes, in order to subtract out the effect of high expenditures on equipment and other direct costs in the first project year, there was a slight percentage increase over the life of the project. Salaries/fringes in FY1986 were 24% higher than in FY1983, which represents a 7% annual rate of increase.

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Taking the first two factors into account (i.e., omitting consideration of the complexity of the relationships among the

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<sup>10</sup> Management structure is discussed in Chapter V of this report.

<sup>11</sup> Table D-3 in Appendix D presents a comparative analysis of administrative costs from FY 1983 through FY 1986.

contracting and subcontracting parties) an administrative and support cost on the order of 14%-16% seems about right for WMS-II. Taking into account the rather unusual contracting and subcontracting relationships that prevailed among AID, CID, and the universities, a range of 20%-23% seems defensible.

The WMS-II management costs (23.4% of total contract expenditures) were at the upper end of the range. WMS-II's relatively high management cost, in combination with its relatively high overhead recovery (equivalent to 137.4% of direct labor cost) suggests that WMS-II was rather expensive.

#### F. COMMENTARY ON COST ANALYSIS

##### Budgetary Limitations Foregone

It was clear from the beginning that WMS-II would have a substantial overhead cost. The budget summary contained in the 1982 contract showed \$6,374,000 in salaries as compared with fringe benefits of \$1,434,150; indirect costs for the universities of \$4,742,195; and indirect costs for CID of \$1,345,445. That is equivalent to an overhead rate of 118% of direct salaries, well short of the equivalent rate of 138% actually incurred, but a significant recovery of overhead nevertheless. The contract established no maximum rates on overhead nor indeed any limitations on any line item expenditures.

Neither the project paper nor the contract costed out administrative and support costs. Table 2 of the project paper (Estimated Annual Project Cost of Output by Activity, p. 10) conveys the impression that all project costs (\$20,000,000) would be incurred in connection with 20 subcategories of project activities, none of which were characterized in terms of administration and support functions. Table 1 of the Contract Scope of Work shows total person months (with the exception of time of Graduate Research Assistants) distributed among the same 20 subcategories of activities. There was no item in the original contract budget establishing an estimated cost for administration and support, nor any limitations on charges for such costs.

In retrospect, it would have been prudent to address the overhead and management cost issues directly in contract negotiations. Five-year multi-million dollar contracts oriented toward TDY activities are uncommon in AID practice and particularly in AID contracting with universities. Because "other direct costs" are relatively high in TDY assignments and because university overheads are applied to these costs, unusually high recoveries

may be expected when TDY activity is heavy. Establishment of limitations on overhead recoveries is a practice followed in other kinds of AID contracts. Fully allocated cost theories notwithstanding, mechanisms for establishing overhead maximums should have been considered for a contract of the size of WMS-II.

The issue of management and administrative costs likewise should have been squarely addressed in the contract. Presumably AID knew from its WMS-I experience that such costs would exist and that CID and the universities were not planning to absorb them in overhead. The project paper clearly identified management as an area in which substantial adjustments would have to be made as a small project was succeeded by a very large one. It should not have been too difficult to foresee that administration and support costs might become a source of misunderstanding and contention.

Negotiation of administrative and overhead costs are normally the primary province of the Contracting Officer. They represent large issues, requiring experience in contract administration. Nevertheless, under WMS-II, issues of administrative and support costs essentially were passed to the AID Project Manager and became part of Work Plan approval process, while the overhead issue was left untouched. Instead of being addressed squarely in the contract and largely settled at that time, cost issues festered and reemerged in other forms, during the course of the contract.

#### Macro-Cost, Micro-Management

Members of the AID Project Management Team (APMT) sensed that costs of the project were at the high end of the range and felt that they, the APMT, ought to be doing something about cost control. Issues of overhead costs appeared to have been foreclosed in contract negotiations. Once it was established that management and support costs were directly chargeable to the contract, the main questions became those of reasonable need for management activities.

As we shall see in Chapter V, the contractor's work plans often were vague about the details of what was to be accomplished. The activity tracking system installed in the second half of the project kept reasonably good track of costs, but did not report effectively on progress. Although recommended in the Mid-Term Evaluation, a "management by results" work planning approach was never adopted and was never a priority.

APMT attention turned to what in fact it could do-- exercise some control over which assignments were carried out (Were they worth

the relatively high cost?) and over the details of assignments (How could each assignment be structured so as to minimize its direct and indirect costs?)

From a CID/University viewpoint, this reaction looked like AID reneging on the bargain that had been struck in the contract and on the idea expressed in the Scope of Work that Contractor was to provide leadership to AID's water management program.

If the larger issues of cost had been addressed squarely at the start, perhaps the struggle over details would have been less important to the parties, and the management history of WMS-II might have been a good deal smoother.

### Comparative Costs

The Technical Assistance costs of WMS-II seem particularly high, especially when compared with the multiples which applied to AID's Indefinite Quantity Contracts (IQCs). University rates under WMS-II could be two times IQC rates for the same individual. However, the following points should be borne in mind by way of perspective with respect to the costs of Technical Assistance:

- (1) WMS-II was designed primarily as a field support project. CID and the universities were sole-sourced for WMS-II on the basis that they possessed a critical mass of personnel qualified to carry out interdisciplinary analysis in developing countries.
- (2) WMS-II Technical Assistance was generally very well received by Missions. The favorable reception appears to have derived from (a) effective repackaging of university experience gained on long-term projects in LDCs for use on short-term projects (a process primarily associated with WMS-I); (b) reasonably effective control of the quality of persons performing Technical Assistance assignments; (d) dissemination of sound and well-articulated doctrine, and (e) the deference accorded to the imprimatur of three leading universities in the forefront of the state of the art.

Some Technical Assistance assignments, particularly those carried out by members of the WMS-II core staff and those who also engaged in special studies, probably contributed to synthesis activities. Other TA assignments, such those calling for preparation of specifications and having other relatively routine requirements, could have been just as well done by others at

considerably lower multiples and with little or no loss to the project's substantive body of knowledge. As discussed in Chapter Four and in Chapter Six of this report, Technical Assistance assignments do not appear to have been significantly "upwardly synergistic." A discussion of the WMS-II effectiveness and assignment quality is presented in the following chapter.

### Wages of Synergism

We are chary of general claims that WMS-II was highly "synergistic," if that term is understood to mean dynamically cost-effective. There were two kinds of interactions in WMS-II which built upon each other: "vertical synergism" in which studies and training improved the quality of technical assistance and (arguably) the TA in turn improved quality of studies and training. "Horizontal synergism" in which the universities collaborated with each other in producing new knowledge and synthesis work products.

The relatively high costs for individual categories of activities, particularly technical assistance activities, suggest that the price of "vertical synergism" may have been quite high. TA was distributed quite unevenly among the three universities, tending to unbalance the process of vertical synthesis of the results of short-term assignments. Management costs in the upper range in combination with overheads in the upper range suggest that the costs of "horizontal synergism" also may have been quite high.

Chapter Four applies cost-effectiveness criteria to the documentary outputs of WMS-II. Chapter Four also examines the extent to which WMS-II's synthesis work products, a main target for the transmission of "vertical synergism," demonstrated integration of the results of individual TA assignments.

Chapter Four

EFFECTIVENESS

A. INTRODUCTION

Assessing the effectiveness of the WMS-II project objectively is a challenging task, in part because of the size and diversity of the project, in part because of some lack of clarity and definition in the project design, and in part because the project work planning and reporting functions did not provide information on key effectiveness issues. The assessment team formed the clear opinion that the quantitative and qualitative production of tangible outputs was on the modest side, given the magnitude of the resources devoted to WMS-II. At the same time, it assessed the overall performance of the project favorably and concluded that some of its most impressive outcomes were among the least well-documented.

The Contract Scope of Work provides individual projections of person months and numbers of outputs for twenty subcategories of activities, organized under three main categories. The project set up a tracking system which eventually attached numbers to separately approved activities. During the Contractor apparently lost track of total and cumulative person months due to a technical flaw in the management information systems which failed to include professional effort expended in the last quarter of any given activity.

Meanwhile a lively debate developed about whether the project was achieving a variety of what might be termed "floating" or "synergistic" objectives, that is to say objectives which were identified in the project paper, the contract work statement, or elsewhere, but for which no quantified targets or strategies were established in advance-- and to which no resources were explicitly assigned in the project documents. These "floating" objectives included changing attitudes and behaviors of water management bureaucracies, expanding the supply of U.S. practitioners capable of providing assistance to developing countries, generating new and/or improved water management technologies and practices, and creating various kinds of "water management synthesis." In this kind of environment, discussions of "effectiveness" indeed have been impressionistic.

The present assessment cannot in a few weeks impose an retroactive effectiveness framework on the project which all the participants would regard as fair. Nor can it recreate or

restructure the existing data base in so short a period. Instead, we have applied several rather rudimentary tests to the available information on outputs, activities and document production, seeking to present our findings in quantitative terms wherever possible. We then examine objectives and outcomes for which no clear targets were set, and provide some interpretive comments.

Section B compares data on project activities forecasted and completed.

Section C analyzes outputs of tangible products: documents, publications, brochures, slide shows, videos, working papers and the like.

Section D discusses outputs related to project objectives and other outcomes.

Section E provides a commentary on effectiveness issues.

Appendix D to this report lists documents and repeatable presentations produced by WMS-I and WMS-II.

Appendix E contains a synopsis of the document quality review summarized in this chapter.

Appendix F contains materials submitted by each of the universities concerning creation of practitioners and expertise, mainly through the training of graduate students.

## B. PROJECT ACTIVITIES COMPLETED

We attempted two kinds of analyses: (1) comparing completed activities with outputs projected in the WMS-II contract Scope of Work, and (2) comparing completed activities with activities programmed in the project's multi-year work plan. Our findings are discussed below.

### 1. Completed Activities Compared to Projections in Contract Scope of Work

The Contract Scope of Work contained two tables which provided rather specific-- and quite tentative projections of inputs and outputs of WMS-II. Table 1 in the Scope of Work showed estimated person-months by year and activity for each of the five years of the project. Twenty subcategories activities were classified

under three major categories: (1) technical assistance; (2) training and technology transfer; and (3) special studies. Technical assistance included both long term and short term assignments, but heavily emphasized the latter.

Training and technology transfer covered a variety of courses and workshops, a newsletter, and planning guides and handbooks. Special studies included diagnostic analysis for pre-project appraisals, a manual for rapid appraisal methods, monitoring visits, and research studies. Table 2 shows estimated numbers of outputs by activity and project year for eighteen of the twenty categories. In the case of two categories, Network of Professionals and Library, person months were substituted for numbers of outputs were substituted for numbers of outputs in Table 2.

Table 2 may be recapitulated as follows:

Technical Assistance

1. Long Term TA	4
2. Short Term TA	50
3. Consultants for TA	50
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Subtotal	104

Training/Technology Transfer

1. Intensive WM Training Course	3
2. Diagnostic Analysis Workshops	12
3. Audio Visual Materials	10
4. Workshops (Senior Officials)	1
5. Watercourse Rehabilitation	1
6. Water Mgmt. Extension	1
7. Unidentified New Training Course	1
8. Non-degree Training	3
[9. Strategy Papers	5
[10. Library	30]*
11. Network of Professionals	15]*
12. Newsletter	15
13. Planning Guides/Handbooks	10
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Subtotal	62

Special Studies

1.	DA** for Preproject Appraisals	10
2.	Manual for Rapid Appraisal Methods	1
3.	Monitoring Visits	10
4.	Research Studies	10
		---
	Subtotal	31
	GRAND TOTAL	197

\* These items have been not added into the Training and Technology Transfer Subtotal or into the Grand Total in our recapitulation because a footnote to Table 2 indicated that the numbers for these two items represented person months of staff rather than commensurable outputs.

**\*\* Diagnostic Analysis**

(Source: WMS-II Contract Scope of Work - Table 2, Estimated Project Outputs by Activity and Project Year)

Using this framework as a guide, annual work plans were to provide greater precision and accuracy to the initial estimates. Unfortunately, for the purpose of detailed comparative analysis, neither the annual work plans nor the quarterly reporting followed the detailed twenty-item framework of subcategories established in the Contract Scope of Work.

It is possible, however, to track results for the three major categories. The WMS-II End-of-Project Seminar<sup>12</sup> indicated that some 247 activities were implemented as per the following breakdown:

-	Technical Assistance	102
-	Training and Technology Transfer	97
-	Special Studies and Research	48
	TOTAL	247

A document distributed at the Seminar indicated that 273 activities had been implemented. However, 26 of these were allocated to the administration and support, and as such were not considered to be technical project output.

<sup>12</sup> Materials distributed at End-of-Project Seminar, March 2, 1988: "Number of WMS-II Activities by Type and Location."

Comparing the End-of-Project Seminar data with the 1982 Scope of Work projections, the contractor appears to be on target with respect to Technical Assistance outputs, having completed some 102 activities against 104 projected in the Scope of Work.

With respect to Training and Technology Transfer, the contractor bettered initial expectations, having completed 97 activities as compared with the 62 projected. With regard to Special Studies and Research, the CID/University team completed 48 assignments compared to 31 originally expected.

In summary, the Contractor completed 247 activities in comparison to 197 "outputs" anticipated in 1982 contract scope of work. This apparently satisfactory result should be regarded with considerable caution. First, the Scope of Work Projections are understated by the amount of the Library and Networking outputs (probably the equivalent of eight or nine of the other outputs). Second, examining results at three summary levels may miss serious emissions and shortfalls at the level of individual activities. Third, and most fundamentally, the activity projections contained in the WMS-II contract scope of work may have been unrealistically low and/or based on assumptions that proved not to be valid.

## 2. Completed Activities Compared to Activities Programmed in Multi-Year Work Plan

Comparing actual outputs against the expectations established in multiyear work plans would have been of considerably greater value than the previous comparison, because the work plans presumably were based on more recent and relevant experience than the 1982 scope of work projects.

The activity descriptions listed in the rolling workplans are highly "individualized," meaning, that from the description alone it is difficult to compare planned activities (as per the work plan) with either tables in the Contract Scope of Work or the data presented in quarterly reports. To make such a comparative analysis would require a detailed review of all workplans, individual task descriptions, review of related written outputs, and verification of findings with key participants, an effort beyond the purview of the present assessment.

The examination of rolling workplans and quarterly reports which we undertook nevertheless proved to be a highly informative effort from the point of view of understanding the nature of subject matter which the contract addressed. The workplans and the quarterly reports reveal a very wide range of subject matter

treatment, geographic distribution, team composition, and difficulty in scheduling. They demonstrate a serious commitment on the part of the CID/university team to the breadth and complexity of the project.

C. TANGIBLE OUTPUTS

The analysis of project activities described in Section B does not give a very incisive or satisfactory picture of the outputs or effectiveness of the project. As the project team started to examine both the lists of written materials, individual documents, and other tangible outputs produced by the project, it formed the impression that the totality was rather limited given the magnitude of the resources devoted to WMS-II. In order to put these impressions to the test, it followed a three-step procedure which included: (1) comparison of outputs of WMS-II documents and of repeatable presentations under WMS-I; (2) development and application of a standard by which to assess quantity of outputs on the basis of cost-effectiveness and (3) assessment of the content and quality of the documentary outputs provided by WMS-II. The procedures followed and their outcomes are described in turn below.

1. Number of Documents and Repeatable Presentations Attributable to WMS-II Compared with WMS-I Outputs

The Draft Final Report for WMS-II (March, 1988)<sup>13</sup> lists 184 publications and repeatable presentations of various kinds as follows:

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<sup>13</sup> Source: Dan Lattimore and Darlene Fowler, Editors, Water Management: View to the Future (Water Management Synthesis II, Draft Final Project Report, March 1988), "Documenting Project Achievements". This portion of the Draft Final Project Report is reproduced in Appendix D of this management assessment.

**MASTER LIST: Publications and Repeatable Presentations Listed in WMS-II Draft Final Report**

Special Reports 14	76
Professional Papers	3
Other Reports	20
Other Publications	
- Brochures	3
- Handbooks	4
- Manuals	6
- Planning guides	5
Videotapes/Slides	
- Slide shows	4
- Videotape Guides	1
- Videos	17
Working Papers	17
Total	156

A comparative analysis<sup>15</sup> of the publications list in the WMS-I Completion Report indicates that identical publications (all dated before the completion of WMS-I) were attributed to WMS-I as follows:

**SUBTRACTION LIST: Reports and Repeatable Presentations Attributable to WMS-I**

Special Reports	17
Professional Papers	0
Other Reports	3
Other Publications	
- Brochures	3
- Handbooks	4
- Manuals	6
- Planning guides	5

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<sup>14</sup> Includes five publications to which numbers have been assigned, but which have not been completed or catalogued. See Appendix B. Note that the list of "WMS Reports" consists of numbered reports, starting with "1" and ending with "75." But two separate reports (one concerned with Jordan and the other with Nepal) are both numbered "56". Thus there are 76 reports.

<sup>15</sup> Appendix D to the present management assessment shows the entire documentary output of WMS-I and WMS-II, indicating under which project the output was prepared.

Videotapes/Slides	
- Slide shows	4
- Videotape Guides	1
- Videos	10
Working Papers	0
Total	53

The number of publications and repeatable presentations attributable to WMS-II thus appears as follows:

NET PRODUCTION: Reports and Repeatable Presentations  
Attributable to WMS-II

Special Reports 16	59
Professional Papers	3
Other Reports	17
Other Publications	
- Brochures	0
- Handbooks	0
- Manuals	0
- Planning guides	0
Videotapes/Slides	
- Slide shows	0
- Videotape Guides	0
- Videos	7
Working Papers	17
Total	103

WMS-II was nearly seven times larger than WMS-I, but its document production was less than two times that of WMS-I. Excluding all Technical Assistance and Administrative costs from WMS-II (but not from WMS-I), WMS-II was still three times the size of WMS-I. Giving due consideration to inflation and the difference in the output profiles of the project into account, WMS-II outputs still appear to be on the modest side.<sup>17</sup>

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<sup>16</sup> See Footnote 3 above.

<sup>17</sup> A comparison of the WMS-I Completion Report with the WMS-II Draft Final Report considerable overlap in reporting, but some differences. The WMS-I Completion Report reported on seven publications under the category "Articles," five of the "Water Management News," and four theses and publications. The WMS-II Draft Final Report did not list outputs under these categories.

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2. **Application of Rules-of-Thumb for Quantities of Publications and Repeatable Presentations**

WMS-I and WMS-II overlapped for a substantial period, it is conceivable (though unlikely<sup>18</sup>) that some outputs were claimed for WMS-I were in part funded by WMS-II. In any event, it is useful to have an external standard which can be applied to the two projects combined and the two projects separately.

In this subsection, we combine two rules-of-thumb for purposes of establishing and applying order-of-magnitude standards:

- (1) On the average for contracts of substantial size, a qualified senior academic or consulting professional should be able produce one state of the art contribution in six person months of effort.
- (2) On the average for contracts of substantial size, the cost of a senior academic or professional engaged in projects involving a mixture of work overseas and in the United States should cost no more than \$15,000 per person month,<sup>19</sup> including salary, overhead, fee (if

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The WMS-I Completion Report did not list "Working Papers."

<sup>18</sup> WMS-II funding channelled through WMS-I was for technical assistance.

<sup>19</sup> The \$15,000 figure assumes an average annual salary of \$50,000 per year, competitive multiples (overhead and fee), and reasonably good management. The calculation is as follows:

Direct Salary	$\$50,000/12 =$	\$4,161
Overhead and Fee	$\$4161 \times 1.5 =$	\$6,224
Other Direct Costs	*	\$4,615
		-----
Total		\$15,000

\* All other direct costs include, but are not limited to: transportation, per diem, and DBA insurance for overseas portions of short term assignments; and communications, research materials, and report production for portions of assignments performed in the United States.

The \$15,000 person-month average rate is a higher figure than the ones used in the financial planning for WMS-II. Table 1 in the Work Statement of the 1982 WMS-II contract shows the total number of person months to be devoted for specific activities to

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applicable), all direct costs, and cost of supervision.

Putting these two rules-of-thumb together, the cost of a single publication should average no more than \$90,000.

Applying this cost standard to WMS-I and WMS-II combined, the calculation is as follows:

Cost of WMS-I:	\$2.8
Cost of WMS-II:	\$19.5
Total	\$22.3 million = 248 publications @ \$90,000

The two projects together produced on the order of 156 documents, well short of 248 standard.

Applying the standard to WMS-I alone, the calculation is as follows:

Cost of WMS-I:	\$2.8 million = 31 publications @ \$90,000
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On the basis described above, WMS-I produced 53 publications and repeatable presentations, considerably exceeding the standard.

Applying the standard to WMS-II alone, the calculation is as follows:

Cost of WMS-II:	\$19.5 million = 217 publications @ \$90,000
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On the basis described above, WMS-II produced 103 documents and publications, less than half of the standard.

It can be argued, however, that it is not fair to apply the standard against the full amount of WMS-II costs (1) because the project had unusually heavy management requirements and (2) because a substantial portion of the project was devoted to training and technical assistance activities that did not have the production of documents as their principal objectives.

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be 1,361. That figure would translate into a monthly rate of \$14,695 if it were treated as a global estimate of all direct labor to be expended under the contract, but the estimates Table 1 in fact are not comprehensive. The Project Paper LogFrame contains a global estimate of 1,684 person months which would translate into an average rate of \$11,876 per month.

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WMS-II, it can be argued, had a cost dynamic that was the very opposite of synergism. The limited core staff with which the project started could not do everything at once: manage a much larger and more complex project than WMS-I, recruit and train others to do interdisciplinary technical assistance, move the state of the art forward in particular specialties, and at the same time provide synthesis work products. It is not fair, so the argument goes, to treat management as something that is included in six person months per product or included in overhead: it must be priced out separately if the \$90,000 cost standard is to be applied to WMS-II. On the assumption that administration and support cost should be excluded:

Cost of WMS-II:	\$19.5
Less Administration and Support:	6.9
Total	\$12.6 = 140 publications @ \$90,000

The 103 documents and repeatable presentations actually produced still fall well short of this standard of 140.

A second line of argument is that it is not fair to apply the \$90,000 standard to the full costs of the WMS-II project, because training and technical assistance activities often do not have the production of documents and repeatable presentations as their principal objectives. The main outcome sought by many assignments, so the argument goes, was transferring knowledge and experience in LDC or Mission personnel. Since many of these efforts were not directed toward document production, arguably it is not fair to judge them by documentary output. If this line of reasoning is accepted, that leaves only one category of project activities whose cost-effectiveness can be measured by document production-- Special Studies.

A quick inspection of the 103 WMS-II titles suggests that more than half of these documents and repeatable presentations were in fact associated with the Technical Assistance or with the Training and Technology Transfer categories in the WMS-II budget. This inspection finding is supported by the End-of-Project Seminar data indicating completion of 48 activities for Special Studies category. Using this figure (48) as the number of documents produced by Special Studies, the costs of technical assistance and of training and technology transfer, be excluded as follows:

**CASE A: Special Studies Only: Full Allocation of Administrative and Support Costs**

Special Studies Cost      \$3.9 million  
Allocated Cost<sup>20</sup>      1.2 million  
Total      \$5.1 million = 57 publications @ \$90,000

**CASE B: Special Studies Only: No Allocation of Administrative and Support Costs**

Special Studies Cost      \$3.9 million = 43 publications @ \$90,000

The 48 Special Studies documents do not meet standard of Case A (full allocation of administrative and support costs). They more than fulfill the standard if all allocated administrative and support costs are eliminated (Case B).

Another way of stating this result is that the special studies would exactly meet the standard if \$780,000 of the \$1.2 million in allocated administrative and support cost (65%) were transferred to other project categories. Alternatively, the standard number of months devoted to a publication could be increased from six to seven months or the standard cost increased from \$15,000 to \$17,700 per month.

Neither the treatment presented in Case B nor any of the three "breakeven" adjustments seems reasonable.

We conclude that the documentary output of the project has been modest from a quantitative viewpoint. The contract appears to have produced less in the way of tangible outputs than could reasonably be expected of it. We turn now to a consideration of quality.

3. Content and Quality of Outputs Provided

In order to gain an understanding of the content, quality and significance of the reports and other publications developed under the WMS-II project 29 reports were rapidly reviewed for purposes of this management assessment. These reports represented

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<sup>20</sup> \$3.9 is 26% of the cost of the project exclusive of administrative and support cost. Thus 26% of the administrative and support cost (\$4.5) is allocated to special studies.

28% of total number of written outputs for WMS-II listed in Appendix D. The reports were selected at random. The following items were examined:

- Purpose of report,
- Whether state-of-the-art or "cutting edge" concepts were applied ("WMS-II State of the Art")<sup>21</sup>
- Overall quality of writing and presentation.

Overall quality of a report ranged between average, good, and excellent. We found no poor reports.

A synopsis of the report review is contained in Appendix E of this management assessment. Out of the 29 documents reviewed, 11 documents (about 37 percent) were judged to have applied state of the art concepts associated with WMS-II. In terms of overall quality, 11 documents could be ranked as excellent, 15 documents as good, and 3 documents as average. In terms of number of pages, some 800 pages out of a total of 2700, for the 29 documents, were included in the "project-related state of the art" category (30%).

If the set of documents examined is regarded as representative of the universe and the quick judgmental review of their contents was on target, it could be concluded that on the order of about 30 to 37% percent of the written outputs could be ranked as being "project-related state of the art". The quality of all documents, whether state-of-the-art or not, ranged between good and excellent, except for a few exceptions (about 10 percent could be ranked as "average").

#### D. PROJECT OBJECTIVES

##### Lack of Targets and Achievement Reporting

Available information which could be used to judge progress toward or achievement of project objectives set forth in Contract

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<sup>21</sup> The review team looked for specific outputs that reflected the contractor's reputation for approaching water management using incisive, and highly analytical methods, many of which are considered to be State-of-the-art, or "at the cutting edge of new science" and were closely related to the WMS-II project itself. Such outputs are termed, "WMS-II State of the Art."

Work Statement was very limited. Failure to set specific targets for achieving project objectives were major deficiencies of the WMS-II Work Plan and in the activity reporting system.

Four contract objectives found in the Contract Work Statement are examined below.

## 1. Host Country Capabilities

The project purpose was to increase host country capabilities to plan and implement irrigation water management projects and programs. The Contract Work Statement says:

Increasing institutional capabilities means not only improving their abilities to plan and implement projects, but also bringing about changed attitudes at all levels with respect to water management improvement. This, in turn, means stimulating and/or encouraging a needed "bureaucratic reorientation" within the various LDC agencies responsible..

With the exception of information contained in two assessments of Diagnostic Analysis Workshops carried out by Creative Associates, data on specific improvements in capabilities or changes in attitude of host country officials have not been gathered systematically. WMS-II reports contain occasional references to changed behaviors on the part of bureaucracies, but no comprehensive list of changes appears to have been made. Presumably, the Work Plan could have set standards for a documented success story, and projected numbers of successes that were reasonably achievable. It did not do this, or deal with the matter of measuring progress toward this objective in any other way.

It does appear that the project in fact has contributed to a major shift in attitudes toward irrigation development among international development agencies, practitioners, and a substantial number of persons in LDC water development agencies. However, independent verification of the impact of the WMS-II on host country capabilities is beyond the scope of this management assessment, and this finding on our part is, of necessity, impressionistic.

## 2. New Water Management Technologies and Practices

The contract work statement says that the project is to have an agenda which ensures:

(1) the generation of needed new and/or improved water management technologies and practices, through the conduct of field studies, diagnostic analyses, and testing...

There are at least five areas in which the CID/university team have demonstrated or announced plans to generate new technology or knowledge. They are (1) integration of water management systems modelling and water system management theory (CSU/USU) (2) integrating management science to irrigation systems management (CSU/University of Maryland), (3) interdisciplinary collaboration in analyzing irrigation systems (three universities), (4) methods of farmer involvement in identification, design and maintenance of irrigation systems (three universities), and (5) human engineering of standard irrigation system designs to take account of observed patterns of farmer behavior (CSU).

The project Work Plan did not set specific state-of-the-art of objectives as such, although it included descriptions of proposed individual studies and their purposes. We have been unable to discover any comprehensive statement for the entire project as to what the state of knowledge was at the start of WMS-II, what the knowledge was at the end, and what advances were attributable to WMS-II funding during the project period. WMS Report 94c (March, 1988) covers some of this ground for activities in which CSU participated,<sup>22</sup> but we are not aware of any documents analyzing the contributions of USU and Cornell.

### 3. Increasing the Supply of U.S. Practitioners

The Contract Work Statement says:

..one important objective and activity of this project is that of increasing the quantity and quality of U.S. expertise in irrigation-water management. The importance and need for this stems from the serious shortage of personnel and the necessary discipline and multidisciplinary training needed in water management, along with critical field experience in LDC's, all of which are so crucial in this relatively new professional field.

While some memoranda were written during the course of the project on the subject of expanding the supply of practitioners, no quantitative targets were set for this objective, nor were achievements in this area systematically reported. Apparently no

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<sup>22</sup> Paul Wattenburger and Wayne Clyma, Management-Focused Improvement of Irrigated Agriculture, WMS Report 94 (March, 1988).

agreed standards were established as what combination of training, experience, and achievements represented the achievement of "expertise". Appendix F contains a draft submission from CSU on its participation in development of water management capability and lists of Cornell and USU graduates, indicating their current employment. As we read these lists, the three universities together helped to create about fifty U.S. practitioners and an additional twenty persons who are contributing to LDC water management in universities, international development organizations and other institutions.

Judging on the basis of the organizations which they serve and/or the positions which they hold, the quality of the graduates that the three universities have turned out has been high and their impact has been substantial. However, in the absence of a specific budget and related standards and targets for achievement, our favorable impressions of the university accomplishments is necessarily intuitive.

#### 4. Synthesis

The WMS-II contract Work Statement referred to:

"the synthesis of these results [from the generation of needed new and/or improved water management technologies and practices, through the conduct of field studies, diagnostic analyses, and testing] along with information from any other source, into a cohesive program that can not only aid institutional strengthening but will also contribute to improved irrigation water management, and ultimately more efficient irrigation system operation and performance. [Emphasis added.]

The Work Plan did not describe a "cohesive program" nor a strategy for achieving it, although it did refer to synthesis in the context of interaction among the universities as well as in other contexts.

The term "synthesis" is a label which has been applied to many different types of activities during the course of WMS-II, but at project's end, the focus has been on three "triad" studies, each of which is to "synthesize lessons learned" in a particular area.

Cornell University is writing a book entitled "Other Channels" on improving policies and programs for small scale irrigation development.

Colorado State University is writing a review and analysis of methodologies used for irrigation system diagnosis under WMS-II.

Utah State University is leading a team effort by professors from each of the three universities tying together four Special Study components which relate to large-scale gravity irrigation systems serving numerous small land holdings.

None of the triad studies had been completed at the time of the present Management Assessment. However, the assessment team reviewed the Cornell and USU studies in draft, and the first two chapters of the USU triad in draft. The scope of the three studies may be summarized as follows.

a. Cornell: Policies for Improving Small Scale Irrigation

The Cornell book focusses its attention on small scattered systems including both (1) systems of small command in which the state irrigation agency is directly involved and (2) local irrigation works that are managed by a local entity. It identifies achieving the optimal mix of government and local responsibilities for creating and sustaining small-scale irrigation facilities as the critical issue and identifies its approach as "sociotechnical" (the mixture of irrigation technology and organization). The irrigation system is viewed as a holistic combination of facilities, rules, organizations, and individual behavior-- elements which interact with each other. The book argues that if policies for small-scale irrigation systems seriously apply this holistic perspective, profound changes will result. Separate chapters of the book deal with strategies for combining agency and user strengths, small scale irrigation design, and financing small scale irrigation development. A final chapter provides suggestions to donor agencies. The central piece of advice is:

If you work on the principle that you are aiming for self-managed small commands, and that this can be achieved through a set-up that gives local groups the rights and responsibilities of routine operations and maintenance while the technical irrigation agency has the important backstopping jobs-- then many other elements fall in place.

Lessons learned from WMS-II are worked into the text as a leitmotif.

b. CSU: Methodologies for Interdisciplinary Analysis

USU is preparing a paper on methodologies for interdisciplinary analysis of irrigation systems. The paper reviews and analyzes methodologies used for irrigation system diagnosis and provides recommendations for the future. Three types of system studies

employing two general types of analysis are examined. The three types of system studies are:

- Diagnostic Analysis Workshop Studies (TR/TT)
- Sector Reviews (TA)
- Project Design Papers (TA)

The two general types of analysis are Diagnostic Analysis, normally applied to studies of individual systems in Diagnostic Analysis Workshops and Rapid Appraisal, normally applied to sector reviews and project design papers. Since WMS-II system studies (particularly those utilizing Rapid Appraisal) usually did not record the specific methodologies used, the identification of methodologies employed is based on interviews with authors and on content analysis.

The detailed methodologies identified are examined in terms of a reference methodology which includes (1) understanding goals and objectives, (2) comparing actual performance with potential performance, (3) identifying factors contributing to any shortfalls in performance and (4) making recommendations. The central proposition of the reference methodology is that irrigation systems can be evaluated with respect to management objectives such as water control, productivity of agriculture, resource conservation, return on investment, and effective organizational coordination including farmer participation once targets are attached to these objectives.

Six case studies are the basis for the paper, two diagnostic analysis workshop reports, two sector reviews, and two project design papers. The cases show diversity in the goals toward for which irrigation systems may be developed. Farmer participation is regarded as a key goal because it is closely related to farmer welfare, sustainability, and other essential concerns.

The paper notes that in many cases the study teams listed objectives, constraints, and gave recommendations, but what the teams were measuring in terms of performance and how they were measuring that performance were not necessarily recorded in their reports. The paper presents an analytical framework showing principal management objectives, system parameters (e.g. field, farm, unit command, main scheme, national) together with suggested performance parameters (e.g. equity, reliability, and adequacy for water control). The paper argues that if the potential level of performance is not established in the objectives of an irrigation scheme then this level must be established.

The cases included some site-specific recommendations, but most recommendations were common to most case studies: strengthening or creation of water users organizations, and enhancing staff levels and technical capacity of the irrigation department, particularly in the areas of operation and maintenance. Rehabilitation and improvement of physical facilities was a common recommendation, as were recommendations for increased involvement of women.

The study recommends a structured process for irrigation system diagnoses, giving particular attention to team consensus on the direction of diagnosis, which will lead to stronger and clearer reports and a record of repeatable logic. It also recommends that, before irrigation system performance is studied, the diagnostic methodology selected should clearly outline the management objectives and the procedures for achieving these objectives at various organizational levels. The study states that the experience and local knowledge of the time becomes critical where time limits imposed require rapid identification.

c. USU: Large Scale Systems Synthesis<sup>23</sup>

This report draws on four WMS-II Project Special Studies activities as they relate to the management of large-scale gravity irrigation systems serving numerous small-scale holdings. The four Special Studies research activities are:

- (1) Computer modeling of irrigation main delivery and unit command area systems.
- (2) Increasing capacity of farmers for participatory action in irrigation management.
- (3) Designing of organizational interfaces between users and the agencies; and
- (4) Lessons learned about management intensities for effective irrigation performance.

These special studies in turn draw upon experience with the project's technical assistance and training activities. The study presents a framework for relating the various perspectives contained in the four activities. The framework relates hydraulic

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<sup>23</sup> When completed, the report is expected to consist of seven chapters. Two chapters had been completed in draft at the time of the present management assessment.

levels of a large irrigation system (main and branch canals, distributaries and minors, watercourses in unit command areas, and irrigation of fields) to management entities and activities. Management of activities is divided into operational and structural categories. Operational activities include management of allocations (decisions on who gets what shares of the water distributed) and management of flows (dynamic and steady state regulation). Structural activities include planning (design of system for manageability and maintenance scheduling) and execution (construction and maintenance). Management entities include a public or private irrigation agency, a federation of unit command areas, unit command area water users' association and individual farmers.

Organizational activities are described in terms of a three-dimensional matrix. The three axes are organizational management activities (conflict management, communication, resource mobilization, and decision-making), physical system activities (maintenance, operation, construction, and design) and water use activities (acquisition, allocation, distribution, and drainage).

The report states that the share system which is employed by an irrigation system has a major effect on the intensity of management and the type of organizational framework required. Increasing intensity means both hardware inputs (such as lining channels, improving control and measurement structures and software (such as organizing farmers and improving communications). Efforts have been made to find some sort of curvilinear relationship between management intensity and system performance, thus far without success.

A case study of the Gal Oya system in Sri Lanka examines the possibilities for improving water management through the use of the framework. Initially, the design and operation of the Gal Oya system was dominated by an engineering perspective. By the late 1970's the Gal Oya Left Bank was recognized as perhaps the most run-down irrigation system in the country. In the early 1980's, an American engineering consulting firm was brought in to help the irrigation department while Cornell assisted the Agrarian Research and Training Institute. The situation of the Left bank was turned around in five years.

The case study concludes that there is no single way to understand and improve water management as all its elements are interactive. However, viewing systems in terms of four perspectives (which may be more or less important depending on the circumstances) represents a state-of-the art approach to irrigation water management. The four perspectives are (1) an agro-hydrological perspective on main system management which

reverses the civil engineering perspective by aggregating water requirements for agricultural production from the bottom up; (2) the water user perspective from the water course up, which is concerned with adequate local capacity to engage users in integrated systems and focusses simultaneously on water users' organization and on their participation in improved water management. (3) an institutional interface perspective which deals with how irrigation organizations at variously levels interact to establish rules and criteria for allocating water. (4) a management perspective which at factors conditioning farmers' and managers' use of resources to get the most efficient and productive benefits from irrigation, asking how much management should there be, by whom, and of what.

Separate chapters (not reviewed by the management assessment team) deal with irrigation system modeling, increasing capacity of farmers for participatory action in irrigation management, designing the organization interface between users and the agencies, lessons learned about management intensities for effective performance. A final chapter, entitled "Conclusions and Synthesis" will contain on a synthesis of activities and future opportunities.

#### E. COMMENTARY

##### Performance Logic Irony

Applying basic management doctrine, the CSU Triad study argued that performance levels must be established for objectives of irrigation schemes so that the underlying logic of performance diagnosis becomes explicit and repeatable. As indicated above and discussed in greater detail in the following chapter, WMS-II did not establish performance targets related to its own objectives. In the absence of such performance targets, the assessment contained in the present chapter has had to apply general rules-of-thumb to heterogeneous categories of activities, or to simply note the non-existence of targets and reporting information as a basis for judgement. It is conceivable that the output of WMS-II would have been greater and the cost-effectiveness of the project higher if performance standards had been established at the start and applied regularly thereafter.

##### Frameworks Deferred

The Mid-Term evaluation noted the absence of a fully developed conceptual framework for a systems approach and the lack of priority assigned to producing such a framework. The USU study puts forward a framework of analysis for the management of large-scale gravity irrigation systems serving numerous small-scale

holdings. The framework does not purport to apply to isolated small-scale irrigation systems "in patches" which are the subject of the Cornell triad study. Although the authors of the three Triad studies obviously hold some ideas in common, no common framework ties them together, nor are they explicitly related to each other in any systematic way. As introduced in the chapters we have read, the framework presented in the USU study is quite convincing. There seems no strong reason why an adaptation of this approach could not be applied to isolated small scale systems. The USU Triad study is weakened by the fact that it is not retroactively reporting on a practical test of a framework made in real time, but rather hypothesizing that the situation would have turned out better if the framework now being articulated had been used in the past. The trouble with that approach is that while the framework presented in the USU Triad study is quite exiting from an intellectual point of view, it is also rather complex. A key question is whether it represents a practical tool that can be used by practitioners in LDC assignments.

In any event, had priority been given to developing frameworks for large scale and isolated systems in the first year of the WMS-II, an approach such as this could have been tested and suitably adjusted on the basis of experience. It is quite likely that the approach would have been less sophisticated than the one set forth in the USU Triad study, but refinements could have been added along the way. It seems likely that a better integration of work could have been achieved in the last year of the project if a common frame of reference had been established in the first. Even now, however, providing a reasonably comprehensive and well articulated conceptual framework represents a very important contribution.

#### Cost-Effectiveness of "Synergism"

The CSU Triad Study found that the rapid appraisals which it examined failed to record the logic by which system performance was assessed, and hence were of reduced value for purposes of retrospective analysis. In the Cornell and USU Triad materials which we examined, there is a dearth of citations to, or discussion of, specific TA assignments which could form the inductive basis for generalizations and conclusions. The lack of broadly based inductive analysis referring to a substantial number of TA assignments, in combination with the CSU observations on the absence performance logic, suggests the possibility that the synthesis documents may have drawn relatively little substance from the majority of TA assignments (as distinguished from Special Studies, Training/Technology Transfer and limited numbers of TA assignments in which the

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authors of the Triad studies themselves may have participated). Given the rather high comparative costs of these TA assignments under WMS-II, the limited evidence of contributions of TA assignments to synthesis work products is significant. Also significant is the absence of tested conceptual frameworks which might have enabled the universities to achieve "horizontal synergism" in integrating their synthesis work products with each other.

### Rifle Shots

The Triad studies appear to be written around topics of particular interest to each university rather than as part of an organized scheme to cover the full range of WMS-II experience. Although a number of common attitudes and viewpoints are expressed in the Triad studies, they do not reflect a uniformly applied conceptual systems framework, nor has a convincing explanation been provided as to how they fit together.

Apart from the draft final report on the project and the Work Plans, WMS-II documents dealing with substantive aspects of synthesis do not convey a sense of project-wide focus. A review of footnotes and references usually confirms that these documents are focussed on the work of one of two universities rather than the project effort as a whole.

Since the first mid-term evaluation of WMS-I in 1980 (see Section B-3 of Chapter Two) evaluators have noted the absence of integrated summary documents. The mid-Term evaluation of WMS-II in 1985 noted the lack of a fully developed systems framework and the use of a "division of labor approach" rather than synthesis. The present management assessment also finds the lack of integration unsatisfying.

### Doctrine and Documentation

Over a period of more than a decade, the universities have developed, refined, and disseminated key concepts which they believe are of major importance to irrigation development. One central idea is that irrigated agriculture should be viewed as an interrelated set of socio-technical issues rather than as a one-dimensional set of technical activities. A second central idea is the now widely held view that farmer participation is a main ingredient of successful irrigation. A third idea is that farmers, rather than the government, should be responsible for a substantial share of system costs, particularly those of operation and maintenance. The universities have been very effective in articulating these concepts and bringing them to the attention of important decision makers in water management.

As WMS-II comes to a close, it would be helpful to have an documented assessment of what specific achievements support the main tenets of project doctrine and what uncertainties concerning the project's premises remain to be answered in the future. None of the Triad studies seems aimed in this direction, although the CSU study perhaps comes the closest to it in spirit. That study provides a reasonably objective answer to the question of whether CSU's diagnostic analysis approach was used to its full potential in WMS-II. CSU's answer, as we understand it, is, "Only partially."

The USU study contains case study of Gal Oya in Sri Lanka, which is analyzed retrospectively to illuminate a recently-created conceptual framework rather than illustrate the impact of WMS-II on the project. The outline of the paper contains a Chapter on "Lessons Learned About Management Intensities for Effective Performance." A section of the final chapter contains a section on "synthesis of activities." It is too early to judge how inductive these portions of the report will turn out to be.

Neither the Cornell Triad study nor the portion of the USU study which we have seen probe their own basic premises. They do not build up their conclusions from systematic inductive analysis of WMS-II experience. Instead they focus mainly on doctrine, policy recommendations and/or promising new state of the art initiatives, and examples which support the positions advocated. This kind of approach in a project completion document, gives the prudent evaluator pause. The basic questions are, "How many successes has this approach really had so far? Where were they? How transferable are they? In what way did WMS-II contribute to these successes? Absent some kind of comprehensive systematic documentation, it is difficult to distinguish between solid accomplishment and the enthusiasm of intelligent commitment.

#### Residual Questions

Perhaps the failure to state WMS-II's underlying premises (particularly the effectiveness of interdisciplinary analysis and farmer involvement) as formal hypotheses to be tested during the course of the project has nourished an essentially missionary and exploratory posture on the part of the universities. Or perhaps it is their opinion that it is too early to pass full judgement on these underlying premises.

Nevertheless, as the project comes to an end, a number of questions remain, which it would be highly desirable for a WMS-II completion document to address. If the project experience does not provide good answers, then these questions should be

acknowledged as needing further review in the future. These questions include the following:

- How applicable have the project's state-of-the-art methodologies been in LDCs and in the practical context of AID TA assignments? Where and how should the more sophisticated methodologies, such as computer modelling, be applied?
- How successful have water users' associations and farmers organizations in LDCs been thus far? Does the project have any practical prescription for situations in which effective farmer participation cannot be achieved and sustained?
- What kind of track record has the project had in persuading local, regional and central government bureaucracies use interdisciplinary approaches and to involve farmers? What techniques of persuasion have succeeded? Which have failed?
- How do farmers respond to new payback schemes holding them responsible for paying for some portion of improvements and/or for maintenance and operation? Do some schemes work better than others? Do some techniques of persuasion work better than others?

These and similar questions are important to practitioners seeking to make the best use of the body of knowledge and experience accumulated during the project. They are also important to policy-makers in development institutions who are required to make balanced judgments on the likelihood that programs based on the premises promulgated by WMS-II really will work.

## Chapter Five

## MANAGEMENT STRUCTURE, WORK PLANNING, AND REPORTING

## A. INTRODUCTION

Water Management Synthesis II was designed principally as a field support project, combining resources from the Agriculture Office and Rural and Institutional Development Office of AID's Science and Technology (S&T) Bureau, the Asia Bureau, and Mission buy-ins to promote the adoption of improved water management practices in developing countries. Subsequently, the S&T Energy Office and the Africa Bureau also were brought into WMS II.

Initially, the Contractor's Project Manager/Administrator was chosen from CSU. This arrangement encountered some difficulties, and in 1984 a new project management mechanism was placed in operation. An Executive Director, selected from outside the three lead universities (but acceptable to all three) was located in the CID office in Tucson, Arizona. The arrangement remained in place through the end of the project.

The AID Project Management Team (APMT) formally consisted of the AID Project Manager (a Senior Water Management Specialist in S&T Agriculture), the AID Deputy Project Manager located in the S&T Office of Rural and Institutional Development, and designated representatives of the AID bureaus making major contributions to the project.

Following the creation of the new CID/University management structure in 1984, the Contractor Project Management Team (CPMT) included the Executive Project Director, three University Project Directors (UPD's) and a representative of the Executive Office of the Consortium for International Development. The combination of the APMT and the CPMT were called the "Joint Project Management Team" (JPMT).

Initially, several members of the AID Project Management Team had a strong influence on the Agency's administration of the project. In later stages of the project, leadership responsibilities fell almost exclusively on the AID Project Manager located in S&T Agriculture.

In the early years of the project, the AID Project Management Team and the Contractor Project Management Team tended to operate somewhat separately. In the closing years of the project, no

separate CPMT meetings were held. The AID Project Manager was invited to all meetings attended by the Executive Director and the University Project Directors.

In previous chapters of this report, we have referred to problems with management, work planning and reporting that have been areas of weakness in a project whose substantive outputs generally have been quite commendable. In this chapter, we examine the principal problems encountered and the sources to which they may be attributed in greater detail.

This Introduction (Section A) provides an overview of the evolution of the management structure of the project.

Section B reviews the management plans which defined the ways in which CID and the universities expected to operate.

Section C discusses annual workplans and the project's activity tracking system.

Section D explores a variety of explanations for the management difficulties experienced by the project.

Interpretative assessments are presented in Subsection B-3, Subsection C-3, and Subsection D-2, at the end of their respective sections.

## B. MANAGEMENT PLANS

In this section, we review the contents of two management plans which set forth ground rules governing relationships among CID and its three principal university subcontractors, and which in turn affected relations between the CID/university side and AID.

The first management plan for WMS-II (September 28, 1982 - August 5, 1984) operated through a Managing Project Director and an Associate Managing Project Director from CSU. The second management plan (August 6, 1984 - 1988) operated through an Executive Project Director and support staff located in the CID offices in Tucson, Arizona.

Subsection 1 summarizes the first management plan. Subsection 2 discusses the Revised Management Plan. Subsection 3 provides a commentary.

### 1. FIRST MANAGEMENT PLAN

The first management plan states:

The strength of CID in carrying out a project of this type lies in the relative large pool of technical and management experience in Water Management related projects that exists at the member institutions. This personnel pool... is dispersed among institutions and among administrative units within institutions. The challenge, therefore, is to set up a management structure with clear cut lines of authority and responsibility without imposing lengthy and cumbersome channels for technical or routine administrative communication.

The first management plan does not identify specific areas of activity for each university, nor does it delineate lines of authority among them:

The Project will be managed by a Project Management Team (PMT) consisting of the CID Deputy Director responsible for the Project, the Managing Project Director and the Associate Managing Project Director who will be from Colorado State University.

The division of labor and core activities within the Project shall be on the basis of the agreement of the three project directors. The Managing Project Director will be the project officer for communication/administration with CID and AID...

The plan contained an organization chart showing "Administrative and Contractual Communication" in solid lines and "Technical Communication" in dashed lines. The plan states:

The dual channel system proposed here may, at first glance, appear more complex than a single fixed channel organizational structure. In fact, it is conceptually simple and straightforward in practice. Within the framework of planned activities, implementation at the various institutions is carried out as the responsibility of that institution. For such activities, the institutions deal directly with CID on contractual and administrative matters and directly with AID, CID, or their counterparts on technical matters.

The management structure established in the first management plan did not work well. There were conflicts between AID and CID/university project management over the content of work plans, personnel utilization, and concerning initiation and continuation of assignments. Some university people were not pleased with the outcomes of university interaction, and sought to utilize their contacts within AID to rectify the situation. "Technical

communication" channels became avenues for "end runs" by means of which favored ideas and approaches could be broached to AID after they had been screened out in the university planning process. There were personality conflicts within universities and with AID. Some persons within the universities felt that AID was unwisely using its control of inputs to take over its substantive leadership. AID felt the project not sufficiently responsive to the agency's requirements and it was not getting access to the full personnel resources which it had anticipated. The specter of contract termination was raised.

## 2. REVISED MANAGEMENT PLAN

In August of 1984, a revised management plan was approved. The introductory statement of the revised plan explained:

The scope of work in the contract not only requires the contractor to carry out specific activities and generate a particular set of outputs (as under a typical AID contract), but it also involves the contractor in the planning and development of these activities and outputs, through joint formulation with the Agency for International Development of annual work plans. Because of this, and because the project's extensive interaction with AID missions and regional bureaus, collaboration between the contractor and AID is extremely important... Rather than accepting an inherited management system not specifically adapted to these special project requirements, a management system tailored to the requirements of the project has been developed, and is contained herein.

The introductory statement also listed five basic principles which would guide management of the project:

(1) Participatory Management. ..The contractor, CID, will utilize a participatory system of management wherein consensus constitutes the guiding principle by which decisions are made and resulting actions flow.

(2) Planning of Activities. ..Development and modification of the workplan constitutes the key planning effort for the project.

(3) Delegation of Authority and Responsibility. ..once a workplan is approved, implementation responsibility for specific activities is assigned to a designated university, the Executive Project Director, the CID Executive Office, or to another subcontractor.

(4) Cross-Institutional and Peer Group Interaction. ..it is critical that there be cross-fertilization and exchange of experience among the various universities involved in the contract... and other organizations and individuals working in fields related to water use and management.

(5) AID Involvement in Management ...AID plays a substantive but collaborative role in shaping activities and overall programs... The management system adopted accommodates and incorporates the special set of interests and responsibilities that AID has in the management of this project.

The revised management plan identifies the Contract Project Management Team (CPMT) as the primary entity for meeting contract and project objectives. The membership of the CPMT consists of the Executive Project Director, each of the University Project Directors (UPD's), and a representative of the CID Executive Office.

The CPMT is to act collectively to formulate recommendations to AID on strategy, long term and short-term programs of work, allocation of resources, and the assignment of responsibility for specific activities and outputs. Once responsibility and resources for an activity have been assigned, CID delegates the authority and responsibility needed to carry out the activity.

With respect to the role of the Executive Project Director (EPD), the management plan states:

The EPD has the authority and responsibility to lead in the development of a consensus within the CPMT to the maximum extent possible while at the same time ensuring contractual objectives are met and AID and CID policies are followed...

It is anticipated that under the leadership of the EPD most decisions will be based on unanimous agreement within the CPMT. At the same time, there is need for sufficient in-place authority to resolve conflicts which may arise and to make decisions in the absence of consensus of the UPD's, and the EPD may be delegated this authority by CID.

The Executive Project Director's responsibilities included (1) acting as a spokesperson for the project; (2) taking the lead in developing the intellectual and technical dimensions of the project; (3) finalizing the annual work plan; (4) chairing the CPMT; and (5) directing the management support unit. The EPD also was to provide leadership in developing management procedures for approval by AID.

Apart from enunciating objectives and principles concerned with collaboration with AID and among the universities, the main thrust of the second management plan was to establish an Executive Project Director who was not identified with any of the universities, and give the EPD authority to make some decisions where unanimous agreement between the University Project Directors could not be reached. As matters turned out, the UPD's were able to avoid such a situation. In fact, some form of consensus on major issues always was reached, or perhaps more accurately, clear disagreement was never overly acknowledged. The EPD never cast a deciding vote.

Relations with AID and among the universities improved under the new arrangement. Financial reporting was much improved. There was group interaction and cross-fertilization among the universities. However, the subcontractors paid particular attention to their own domains and took care to not to tread on each other's toes. Rigorous peer group review, i.e., frank and open criticism of another university's work products and proposed research agenda, was not an outcome of this arrangement.

### 3. COMMENTARY ON MANAGEMENT PLANS

#### Consensus

Each of the management plans reflect the strength of the universities vis-a-vis CID/Executive Project Director, and the weakness of the central executive function. The Prime Contractor (CID) was essentially an instrument of the universities, who themselves made most decisions by consensus. Except in unusual situations, CID and the Executive Project Director served the University Project Directors, rather than the other way around.

The requirement for consensus in planning and budgeting in fact produced some substantive cross-fertilization among the universities. USU, in particular, appears to have benefited from its interaction between its UPD and the UPDs of CSU and Cornell. CSU benefited from its work with the University of Maryland, which was involved in the project on a collateral basis.

The two management plans nevertheless reflect the reluctance of universities to subordinate themselves to each other or to an entity essentially of their own creation (CID). Viewed as mechanisms for executing a large AID contract, the two plans seem fundamentally flawed for lack of sufficient power at the core. Whatever the strengths and limitations of the individuals

who served as Managing Project Director and Executive Director, each held a structurally weak executive position, structurally weak in terms of formal assignments of authority and weak in terms of the customary patterns of university leadership. The centrifugal distribution of power (effectively requiring unanimity among University Project Directors for all major decisions) contributed to difficulties which the contractor had in:

- (1) Providing convincing evidence of "synthesis";
- (2) Developing suitable work plans;
- (3) Providing useful project tracking; and
- (4) Demonstrating program leadership.

It seems likely that the requirement for consensus among UPD's was at the source of a lack of aggressive peer review, reduced budgetary self-discipline, resulted in the passing decisions to AID that should have been resolved within the contractor's project management team, and consumed considerable time and energy on the part of key CPMT personnel. At times the Contractor proposed more activities than AID could reasonably be expected to fund. Sometimes individual UPD's contacted persons in the AID structure who could find ways to influence or unjam proposals caught in the consensus gridlock of the Contract Project Management Team. Once projected into the AID structure, such issues could tie the management process up in knots.

Viewed from a conventional perspective, the fact that the management structure of this project worked as well as it did on a large and complex AID contract is remarkable. That such a management structure was able to deliver good results is a tribute to the dedication of the members of the contractor's project management team, the quality of the university programs on which the project drew, and the patience of AID management.

### Improvements

The management approach contained in the revised management plan worked better than did the earlier arrangements. Factors in the improvement included (1) a non-aligned Executive Project Director located on neutral territory; (2) the temperament and energy of the Executive Project Director selected; (3) effective communication of the seriousness of AID's concern about problems encountered under previous arrangements; and (4) simplification of relationships in the AID reporting structure combined with less substantive intervention.

The Revised Management Plan provided that the Executive Project Director:

- (1) Acts as spokesperson for the project on a broad range of topics, from administrative matters through articulating project goals and objectives.
- (2) Assumes a lead in developing the intellectual and technical dimensions of the project.
- (3) Has key responsibility for finalizing the annual workplan in collaboration with the UPDs.
- (4) Serves as chairperson for the CPMT and in that role he/she encourages to the fullest possible extent consensus among the UPDs.
- (5) Directs the Project Management Support Unit (PMSU), ensuring that it carries out its assigned responsibilities effectively and efficiently.

While the Executive Project Director was involved in substantive project activities (including leading field studies), there was never a full meeting of the minds among the members of the contract management team on the goals and objectives of the project, nor concerning intellectual/technical frameworks to be commonly applied. It is conceivable that, with assistance from an outside source, the CPMT might have been able to resolve these issues. It is also conceivable that such matters could not have been settled in the absence of an executive structure with considerably stronger centralized authority than CID was able to provide.

### C. WORK PLANS AND ACTIVITY TRACKING

This section consists of three subsections. Subsection 1 deals with Annual Work Plans. Subsection 2 discusses the activity tracking system that was installed late in the project. Subsection 3 contains interpretative comments.

#### 1. WORK PLANS

It was originally envisioned that Annual Work Plans would provide AID and the contractor with detailed guidance on content and scheduling of specific activities within the framework for structuring the overall level of services provided in the Scope of Work. Plans for TDY assignments were to be submitted annually by the regional bureaus and missions and by project management.

The AID Project Advisory Committee (APAC) was to canvass the missions every year, asking them to identify their assistance needs for the forthcoming 12-month period.

As discussed in Section B of Chapter Four, the contract Scope of Work contained two tables showing persons-months and numbers of outputs for twenty subcategories of activities classified under the headings of (1) technical assistance (TA); (2) training and technology transfer (TR/TT); and (3) special studies (SS). The Work Plans were to be tied to these two tables.

Section II-D-4 of the contract Work Statement makes clear that the annual work plans were to utilize the framework and overall balance, but not necessarily the detailed numbers, in Tables 1 and 2:

Using Tables 1 and 2 as a starting place, the Annual Work Plans will be developed, based on requests from missions and regional bureaus and a current redetermination of priorities and needs as derived jointly by the Contractor and AID project management... Annual Work Plans have to be approved by the AID project manager and must remain within reasonable correspondence to the overall balance and mix between broad activity categories over the total life of the project, even though deviations at the individual activity level, as well as within any single year, may be substantially greater. (Emphasis added)

The WMS-II work plans in fact were not fully tied to the framework of inputs and outputs contained in Tables 1 and 2. Work Plans incorporated the three broad headings of (1) technical assistance (TA); (2) training and technology transfer (TR/TT); and (3) special studies (SS) along with an additional category, (4) administration/support (AS). However, the Work Plans simply did not retain the twenty subcategories of activities contained in the framework of Tables 1 and 2.

The expectation that the Missions would be able to formulate their technical assistance requirements a year in advance was not borne out by events: many such requirements were submitted on short notice. As submitted to AID by the Contractor, the Work Plans took on some of the characteristics of loosely coordinated individual university proposals or "wish lists". AID found itself screening, pruning and making cost-effectiveness decisions, that normally would be made by a prime contractor.

Following the Mid-Term Evaluation and the change of CID/university project management arrangements, a rolling multiyear Work Plan (FY 86-87) was substituted for the submission

of annual work plans. As of the time of the present management assessment, eight editions of this work plan had been prepared and a ninth was in preparation.

## 2. ACTIVITY TRACKING SYSTEM

In response to the obvious complexity of tracking hundreds of project activities, the project developed a tracking system that focussed cost reporting. The system was simply and clearly structured, and it generated a set of listings of all activities, broken down by four categories (TA, TR/TT, SS, and AS), and further broken down by lead institutions. However, the tracking system wasn't really fully functioning -- i.e. able to facilitate activity close-outs and reobligate savings -- until the end of 1986.

The tracking system showed: the budgeted and expended costs, the status (initiated, approved, complete, or closed-out), monthly billing activity, and programmed savings, if any, for each activity. A more detailed printout showed expenditures for each of six budget categories (salaries/benefits, travel/per diem, other direct costs, equipment, indirect costs, and CID G&A/DBA), and compared the total with the total authorized expenditure. (The comparison was only for the total amounts, not by line item). The approved budget levels for individual activities could be revised as needed, but no "audit trail", i.e. a note that a revision had taken place or a date when such a revision had been made, was incorporated.

Costs of management and administration were listed as separate activities, and were separately budgeted and approved for each institution. The tracking system did not allocate the cost of support activities to activities in the three substantive project categories (TA, TR/TT, SS).

The tracking system did not contain full information concerning professional person months (PPMs). There was no way to (a) determine if the number of PPMs budgeted in the original activity budget were in fact expended, or (b) calculate the average cost of the PPMs expended. In fact, an inquiry into the average PPM cost in 1985 led to the discovery of a major gap in the tracking system (i.e. the final quarter's costs were not correctly incorporated), and this gap was corrected. However, the correction was only in the cost accounting system, and the exercise to estimate average PPM costs remained a one-time exercise. The tracking system did not lend itself to any monitoring or cost assessment of PPMs. Similarly, the tracking system did not allow an immediate evaluation of the progress being made against the current year's work plan.

3. COMMENTARY ON ACTIVITY TRACKING AND WORK PLANNING

How Much is Left

The tracking system used in the later years of the project was invaluable as a financial planning and accounting tool, but it was not effective in meeting the program monitoring and progress reporting requirements of WMS-II.

The tracking system was essentially concerned with answering the questions: "How much money do we have left?" and "Where is it?" These were questions of particular importance to CID and the universities.

The tracking system did not systematically answer the questions: "What progress are we making on individual activities this year?" "Will these activities be completed on time and within budget?" "What progress is being made toward achieving project objectives?" These were questions of particular concern to AID.

The tracking system did not give a reviewer a sound basis for assessing the progress being made against the current year's work plan. What it did provide was an estimate of cumulative expenditures measured against the budget totals for approved activities, presented in a convenient variety of formats. However, measuring expenditures against total budgets was of very limited value in assessing the program's current progress because:

- (1) Each annual work plan contained many activities that were rolled over from previous years. As a result, the expenditures shown for each activity did not relate directly to the current year, but were cumulative from the beginning of the activity.

If, for example, an activity was started in 1986 and was 75% complete by the end of 1987, it appeared in the FY1988 work plan as 75% complete. A manager not fully knowledgeable of the activity did not have any information -- as part of either the FY88 work plan or the tracking system -- that would keep that 75% figure in perspective, or that would allow him to track progress on the remaining 25%.

- (2) The tracking system did not address progress on objectives, and there were no other available indicators that could allow managers to focus on objectives.

Programmatic indicators such as number of work plan activities completed, outputs completed, or PPMs completed, were not included.

(3) The tracking system lagged behind actual expenditures, and therefore was not always very timely.

Any complicated accounting system takes time to generate results. The effect in the case of WMS-II was to minimize the amount of information available pertaining to the current year.

A management information system (as contrasted with an accounting tracking system) should be designed to permit timely decisions affecting on-going activities by its users. Normally, it should be based on one or more simple indicators that do not require such elaborate processing and precision as cost data. For example, information on person-months expended normally can be provided much more rapidly than data on costs, and can be equally valuable for monitoring purposes. A management information system is intended to show executives who have supervisory responsibilities whether or not work on major outputs is on schedule, whether project objectives are being achieved, and how achievements relate to inputs.

The Mid-Term evaluation of WMS-II discussed in Subsection C-3 of Chapter Two criticized AID for "input management." However, it is difficult to deal with anything other than inputs if only hard information regularly provided is on inputs, and the WMS-II tracking system was input-oriented.

In brief, there were three fundamental problems with activity tracking system. The first was that it did not place the requirements of AID managers and reviewers at the center, or even at the edge, of its target. It did not provide them with what they needed to know when they needed to know it. The second was that the system did not track progress on outputs. The third fundamental problem was that the system did not track progress on achieving project objectives. Systematic tracking of outputs and progress toward objectives was rendered more difficult because the contractor's work plans and quarterly reports did not embrace the entire input-output framework presented in the contract Scope of Work.

#### Discarded Subcategories

The WMS-II work plans incorporated only a portion of the framework of contained in Tables 1 (person months by activity and year) and Table 2 (project outputs by activity and year). The Work Plans showed costs by under the broad headings of (1)

technical assistance (TA); (2) training and technology transfer (TR/TT); and (3) special studies (SS),<sup>24</sup> but they omitted the twenty subcategories of activities under these three headings. Had the Work Plans retained the subcategories, and had person months been consistently included in quarterly reports, Tables 1 and 2 could have been used consistently for planning and reporting purposes, with only minor modifications.

The three broad categories were all "mixed bags," particularly TR/TT and SS. TR/TT included a wide variety of training materials and training services to be provided and/or produced in the United States and abroad. It also included strategy papers, a library, a network of professionals, strategy papers, and a memory mechanism to identify technologies and procedures with transfer potential. Special Studies included the preparation of a manual for rapid appraisal methods (on-campus activity), preproject appraisals (field activities), monitoring visits (field activities), and research studies (on-campus and field activities). Treatment of particular types of activity was not always consistent. For example, the 1984 Sri Lanka Diagnostic Analysis Workshop was funded out of the WMS-II Central Support Technical Assistance fund rather than out of Training and Technology Transfer which was the source of funds for previous workshops.

Using heterogeneous categories to relate inputs, outputs and objectives is uncertain and risky business. Once having foregone the use of the twenty subcategories (or some suitable modification of these subcategories), the contractor was faced with the choice of relating hundreds of individual activities to outputs and objectives, or doing nothing of much significance at all with respect to measuring progress. The latter course was chosen.

### Floating Objectives

A multiplicity of objectives for WMS-II were articulated in Contract Work Statement or were attributed to the project by participants and evaluators. These objectives were not addressed as part of a comprehensive and concrete project strategy in the Contractor's work plans. These plans did not identify multiple objectives and expectations as a basic problem for WMS-II nor did they apply explicit priorities, planning strategies or management disciplines as a solution to the challenge posed.

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<sup>24</sup> Along with (4) administration/support, which was not contained on Tables 1 and 2 and is not pertinent to the current discussion.

Four "floating" objectives (i.e., objectives not clearly attached to specific inputs, outputs, or targets) were contained in the Contract Scope of Work:

- (1) Improving capabilities and changing attitudes and behaviors of LDC irrigation bureaucracies (Contract Work Statement, p. 1, 3).
- (2) Generating new or improved water management technologies and practices (Contract Work Statement, p. 2).
- (3) Increasing the supply of U.S. practitioners who can carry out interdisciplinary analysis of irrigation systems in LDCs (Contract Work Statement, p. 19).
- (4) Synthesizing a cohesive water management program (Section I-B Contract Work Statement, p. 2) and giving leadership to AID's efforts in the water management area (Contract Work Statement, p. 17)

A "matrix budget," showing the magnitudes of the resources to be devoted to each of these objectives in the course of carrying out activities subclassified in Tables 1 and 2 of the contract Scope of Work could have provided a cost related framework for pursuing these project objectives. Some specific targets and/or work products could have been tied to costs as aggregated by objective.

At least four additional objectives<sup>25</sup> have been attributed to the WMS-II:

- (5) Creating a fully developed conceptual framework for a systems approach to water management (Mid-Term Evaluation, pp. 27-28).

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<sup>25</sup> The Water Management Synthesis Final Project Report (March 1988 Draft, p. 3) states:

"To develop and disseminate more efficient water management technologies to increase agricultural production and rural equity" has been the objective of WMS-II.

This objective seems essentially the same as the second objective listed above (technology generation) except that it is specifically linked to a goal level type objective (agricultural production and rural equity). As far as we know, the project did not systematically accumulate information on its impacts on agricultural production and rural equity.

(6) Integrating university programs (FY86-87 Workplan, 8th Edition, p. 11)

(7) Expanding and improving the quality of water management portfolios of AID's missions (LBII's AID interviews).

(8) Changing the orientation and professional practices of international development agencies and practitioners so as to give greater attention to (a) interdisciplinary analysis and (b) farmer involvement in irrigation system design and maintenance (LBII's AID interviews).

The contractor could have developed matrix budgets and targets for any of these objectives which it wished to track during the course of the project. Alternatively, it could have made clear that such imputed objectives would not be systematically tracked.

Proliferation of imputed objectives and related expectations is common problem in large and complex projects. WMS-II work plans appear not to have recognized such proliferation as a management problem requiring a solution.

More fundamentally, neither the work plans nor the tracking system gave AID information by which it could move away from "input control" and focus instead on major issues of project achievement-- the strong recommendation of the Mid-Term evaluation of WMS-II. Stated in terms of the reference framework which CSU applies to performing assessments of irrigation systems<sup>26</sup>, assessments of the performance of WMS-II were rendered ambiguous because the project's performance logic was unstated. WMS-II's performance logic could not be stated because the project's assigned and imputed objectives were not formally identified and incorporated into its work plans, because no targets were attached to project objectives, and because progress toward project objectives remained untracked.

### Functional Overload

Too many functions were loaded onto the Annual Work Plan. The Work Plan was, in effect:

- a surrogate contract amendment, filling in important details not contained in the original contract scope of work or changing details already included;

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<sup>26</sup> See Chapter 4, Subsections D-4-b and E.

- a proposal document, by means of which the universities presented a program of research and training for AID's consideration;
- an early warning activity planning system, which gave the contractor and AID/Washington as much advance notice of Mission requirements as possible in order to rationalize and staff these assignments; and
- a time-phased projection of inputs and outputs (related to the activity framework in the contract and to important contract objectives) which can be used for purposes of reporting progress.

A life-of-project work plan should have been prepared at the beginning of the project, focussing on the last function alone. It should then have been revised as often as necessary to provide reasonable standards against which progress could be reported.

Some substantive work products-- particularly synthesis work products could and should have been required by the scope of work or added by amendment.

#### Approval and Funding Horizons

The system placed in effect by AID under Amendment No. 11 to the contract required reapprovals of previously approved activities each year. It would have been preferable to approve each project on a when-proposed, when-needed basis for the full period anticipated by means of Task Orders (as in AID Indefinite Quantity Contracts) or Orders of Technical Direction (as in ISPAN). If AID were seriously concerned with loss of control over expenditures in particular instances, it either could partially fund particular activities or terminate funded activities whose progress was not satisfactory or not satisfactorily reported. Prior to approving/funding any given activity AID could determine: (1) whether the project was in accordance with the work plan and (2) whether work plan provides a suitable framework for tracking and reporting on the progress of the activity. If the answers to either of these questions were negative, a work plan amendment would be in order.

#### D. VIEWS OF THE MANAGEMENT HISTORY OF WMS-II

There are widely differing perceptions concerning the dynamics behind the management history of WMS-II. The main viewpoints expressed by persons interviewed by the assessment team are summarized in Subsection E-1 below. Our assessment of these views is presented in Subsection E-2

## 1. PRINCIPAL INTERPRETATIONS

The LBII assessment team held interviews with persons with persons from several units within S&T, AID's regional bureaus, CID, and the lead universities. Persons interviewed expressed an extraordinarily wide variety of views concerning the forces driving the management history of the project. In the following paragraphs, we summarize what we perceive to be seven distinct interpretations expressed by the persons interviewed.

### a. Collaborative Personalism

This view holds that the history of the project has been essentially a process of putting in place a group of managers and a set of personal arrangements among them which finally proved effective in enabling collaboration to take place among AID, CID, and the three principal universities.

Problems encountered along the way were not inherent in the formal relationships among institutions, but were rather the result of personality clashes stemming from interactions among a particular cast of characters. Things got better when people assumed roles for which they were well suited and in which they were comfortable. In the future, according to this view, conflicts should be minimized by wise selection and management of people, rather than by alterations in institutional arrangements.

### b. Creative Conflict

This view sees bringing differences of opinion to a head as a salutary and virtually inevitable requirement of a collaborative endeavor among AID and academia in an undertaking of the size and complexity of WMS-II. Needed changes in project management and management practices took place only because some actors became concerned enough with perceived problems to insist on remedial action. Improvements would not have come without decisive action or threats of such action by one party or the other.

In this view, critical assessment of substantive work products by AID/W staff members, while occasionally irritating to the authors of such work products, improved professional performance and provided substantive direction to the project. Similarly, detailed controls on spending and other inputs, while arguably carried too far, are seen as firm responses to real problems requiring decisive management attention, e.g., remedies for favor-trading and payroll-protective behavior among university equals in the establishment of research and other agendas.

The project suffered from a lack of substantive criticism and searching peer review, and would have provided higher quality research outputs had a management structure been put into place that would assure that professional work be challenged more often. In fact, the technical performance of the universities was improved by substantive challenge from AID/W management. The contract management team lacked a strong central source of pressure and discipline. Had the principals been more firmly and vigorously pressed to produce more, they would have produced it.

In this view, that set of arrangements which made all three institutional members feel most comfortable was in fact the most expensive and the least efficient.

c. Payroll/Overhead Determinism

In this view, the management characteristics of the project derive from the distinctly different economic forces driving the participating units of the three universities.

Cornell operated mainly on "hard money." It did not make a heavy investment in "soft-money project staff" (which would be laid off at the end of the project) and was not dependent on return of overhead to the operating department to carry out its functions. Cornell could afford to be relatively dispassionate concerning allocations of contract funds since it had no problems in meeting payrolls, had few concerns about end-of-project layoffs, and was not "overhead-starved."

By contrast, Colorado State University (CSU) had made substantial "soft money" staff commitments. In effect, a number of professionals laid their careers on the line in the expectation that they would be employed by the project, and CSU required their substantial billability to meet that commitment. The University met certain fixed overhead expenses attributable to the operating unit (space, utilities, etc.) but did not return substantial portions of the overhead recovery to the operating unit for its discretionary use. With only limited revenue-producing alternatives available for project staff and little discretionary overhead recovery to cover their down-time, CSU was followed a maximum-utilization strategy which offended AID Project Management and the other universities because it was perceived as being less than cost-effective.<sup>27</sup>

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<sup>27</sup> The USU UPD does not agree with this assessment. He points out that (1) members of the USU project staff often had teaching assignments and sometimes worked on other projects; (2) some project staff members subsequently became tenured members of

Utah State University (USU) was in an intermediate position. Over the course of years, the University had built up a substantial non-teaching "soft-money" staff which was used for a variety of projects sponsored by a variety of units within the University. About half of USU's recovery of overhead was returned to the unit operating the project, essentially for discretionary use. Thus USU's participation in WMS-II was less driven by payroll pressures than CSU, but more payroll-driven than Cornell.

Since the WMS-II units of the three collaborating universities differed substantially in their respective payroll/overhead pressure intensities, according to this view, it was almost inevitable that they would not see eye to eye on division of funds or on scheduling of particular activities.

A variation of this view is that USAID should have permitted the management system to cater to the needs of payroll-driven universities since USAID encouraged the creation of the dependency in the first place.

#### d. Conventional Contract Management

In this view, the USAID and CID/University relationship should be examined in terms of a traditional two party contractual/subcontractual model, for which well-established conventions with respect to the behavior of each contractual party are held to apply. Problems in performance are seen as (1) failures to properly anticipate fundamental issues and to incorporate soundly conceived solutions into contracts and/or subcontracts or (2) violations of standards of conduct which apply to the roles of each party.

In this view, USAID overstepped its role when it "micro-managed" inputs (initiating arrangements with TDY personnel, prescribing types of "super-saver" airline tickets that must be used for an individual assignment, writing specific scopes of work for

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the CSU faculty; and (3) some project staff members were, by mutual consent, persons whose employment was agreed to be contingent on AID funding.

It should be pointed out that many professional organizations are "payroll driven," including law firms, accounting firms, consulting firms, group medical practices and others.

university research and the like). AID/W did not do its job, when it permitted mixed signals to be transmitted from the members of the AID/W Project Management Team.

According to this view, the CID/University side failed in its assigned role when it did not submit work plans and progress reports conforming with AID's expectations. CID/University representatives stepped out of their proper roles with back channel communications and end-runs designed to influence or defeat decisions made through formal mechanisms.

Both parties failed by leaving the objectives of the project vague at the beginning of the project and in permitting relationships among three universities to be subject to arrangements which effectively required unanimity among them with respect to virtually all decisions-- and both parties failed in exercising self-restraint in matters of budgetary freedom and control.

e. Administrative Overload and Attitudes Toward Administration

In this view, neither AID/Washington nor the CID/Universities side had sufficient personnel and organizational resources to handle the administrative load which the project generated. The difficulty was compounded by many participants' attitudes toward administrative routine. Problems derived from:

- (1) USAID's normally heavy administrative requirements;
- (2) unusually burdensome and complex administrative problems stemming from Bureau and Mission buy-ins;
- (3) limitations/reductions in the staff support available to AID/W administrators;
- (4) lack of uniformity among University accounting and management information systems;
- (5) lack of diligence in University administrative reporting;
- (6) tardiness in installation and failure to properly use automated and computerized information systems; and
- (7) an attitude on the part of too many participants in the process that administrative routine was not worthy of their attention and effort.

f. Sanctuary

In this view, universities have unique characteristics and conventions, provide special kinds of contributions to international development, and should therefore be accorded treatment by USAID appropriate to these special circumstances. Lapses in adherence to administrative routine can be forgiven. USAID itself will lend a hand in the process of developing internal consensus. USAID is cast in the role of ombudsman or enabler where normal academic procedures make it difficult for contractual requirements to be met.

USAID would not normally accept a management structure that required the full unanimity on the part of three subcontractors in order to carry out planning and ongoing project management functions. Nor, in dealing with other kinds of institutions, would USAID normally have agreed to fund the equivalent of a separate full-time secretariat as a means of easing a change in project leadership among the principals or of accommodating their sensibilities.

In this view, the universities were entitled to special treatment because to do otherwise would interfere with the independence and freedom which nurtures their substantive contributions.

g. Systemic Mismatch

In this view, WMS II juxtaposed and tied closely together two very complex organizational configurations, while only partially taking into account the respective strengths, limitations, and expectations of each. In so doing, it created "Gordian Knots" in the areas of substantive priority-setting, budgeting, and management. Disproportionate energy and resources were devoted to these problems, and total system performance suffered.

Principal areas of mismatch were (1) USAID's perception of itself as an important client deserving of responsive service versus university perceptions of USAID as a source of funding for activities in which its scholars are interested; (2) lack of effective mechanisms for coordinating, rationalizing, and resolving conflicts among organizational units with separate agendas on both the USAID and CID/University sides; (3) perceived anomalies in competence, status, and experience among persons exercising authority within the system; and (4) multiple formal, informal, and personal networks used to blunt, alter, or challenge decisions made within the system.

2. ASSESSMENT

Anticipated Outcome

A careful reading of the project paper suggests that AID knew from the start that CID and the universities were likely to have difficulty with the management aspects of this large and complicated project. WMS-II was many times the size of WMS-I, and it was obvious that the co-coordinator arrangements set up for first project would not work for the second. The management arrangements for WMS-II proposed by CID and the universities were somewhat more formal than those which applied to WMS-I, but had many of the same fundamental limitations.

The first management plan (discussed in Section II-B above) was made a part of the WMS-II contract. The contract work statement contained a rather unusual provision to the effect that:

From time to time, as deemed appropriate by the AID Project Manager, the management structure set forth in the Contractor's Management Proposal shall be reviewed with the Contractor and revised as necessary and mutually agreeable, to meet the needs of contract performance.

We think that AID anticipated that management trouble might be coming but may not have been sure what could be done to head it off in advance.

In our view, AID made a choice in 1982 between (1) selecting three institutions who together possessed a cadre of personnel with virtually unique qualifications to do an important job for the agency, and (2) considering alternative sources which conceivably might have provided smoother and more efficient management, but could not match the substantive skills of the CSU-CU-USU team. AID rightly chose the first alternative, despite the fact that the three chosen institutions did not have a tradition of working together under strong central management.

With the benefit of hindsight, there is much that might have been done to improve the administration of the project within the parameters of the types of CID/university structures that would have been acceptable to the universities in the early 1980's. Nevertheless, we think that the most telling management difficulties were embedded in these parameters and in AID's fundamental decision to accept them.

Structural Factors

We see some merit in each of the seven explanations of the management history of WMS-II set out in Section D above. However, we are most convinced by those interpretations which

emphasize structural factors: Item c (Payroll-Overhead Determinism), Item d (Conventional Contract Management) and Item g (Systemic Mismatch).

We do not think that recasting the WMS-II contract in the form of a Cooperative Agreement would have resulted in better project management or more cooperation among the parties. We have seen Cooperative Agreements characterized by more assertiveness, acrimony and intervention than was the case with the WMS-II contract. And so too has CID. Those elements of the WMS-II project design which called for joint planning between AID and the CID/University side were perhaps those which caused the most misunderstanding, because they created ambiguities with respect to leadership and responsibility.

Conflict experienced by the parties during the contract period could have been reduced by their willingness to face and resolve tough questions during negotiations or during the first contract year. Agreements should have been reached concerning:

-- Targets, funding, and strategy for expanding the cadre U.S. professionals capable of carrying out interdisciplinary assignments in LDC's;

--Allocation or sharing of the risks of staff downtime.

--University policies concerning financial support of operating units carrying out WMS-II activities (overhead-sharing).

--Basic objectives and contents of a program for producing new knowledge and state of the art advancement:

--Specific synthesis products to be supplied throughout the course of the project.

--Ground rules concerning contacts between UPDs and the AID staff.

Human relations clearly made a difference in WMS-II, in some cases moderating and in other cases exacerbating particular problems. It is possible to envision a set of managers so capable, so compatible, and so united in their professional objectives that most of the management difficulties experienced by WMS-II could have been avoided. In the real world of development project management, however, one would not expect to find a better cast of characters than AID, CID, and the universities assigned to leadership roles in WMS-II.

Chapter Six

WMS-II: FINDINGS AND RECOMMENDATIONS

A. INTRODUCTION

Our concluding assessments are contained in two separate chapters. The present chapter (Chapter Six) presents the principal findings and recommendations of LBII's management assessment of the Water Management Synthesis II project. Chapter Seven, which follows, identifies alternatives and makes recommendations for the successor project to WMS-II for Africa, Latin America and the Caribbean.

Section B of this chapter sets forth LBII's findings with respect to WMS-II following the outline of the sets of issues contained in the Scope of Work for this management assessment.

Section C contains recommendations with respect to completion of work on WMS-II for AID's consideration.

B. FINDINGS

The findings presented below respond to list of issues contained in the Scope of Work for this management assessment. That Scope of Work is reproduced in Appendix B to this report.

Overall Concept and Scope of the Project

1. The concept of combining extensive field support (technical assistance) with broader sector-support activities (action research, training and technology transfer) was appropriate to the circumstances of the early 1980's and was a qualified success during the project period as a whole. The integration of field-support and sector-support activities was, on balance, desirable, but quite expensive. The project's "vertical synergism" was not fully successful in integrating the results of rapid appraisal activities into the whole.

In the early 1980's there was a significant shortage of U.S. based technical assistance practitioners who understood the importance of farmer involvement in irrigation system management and knew how to carry out interdisciplinary analyses. The three universities possessed a critical mass of personnel and experience derived from substantial resident experience in LDCs. A fundamental notion of the project was that this critical mass

could be expanded to meet demand by involving capable people with less than the full set of skills required in a series of interactive assignments under the guidance of an experienced project leadership.

During the course of WMS-I, the predecessor project to WMS-II, the contractor had repackaged experience which CSU had gained on long-term technical assistance projects in Pakistan and Egypt, and applied it principally to (1) Diagnostic Analysis Workshops, several weeks in length, involving middle-level host country agency personnel in interdisciplinary analysis of constraints affecting particular irrigation systems in their own countries and (2) sector reviews and project designs of LDC irrigation systems performed on TDY assignments for AID Missions.

The Diagnostic Analysis Workshops, which were continued from WMS-I to WMS-II, were valuable as a means of training host country nationals, building the interdisciplinary skills of prospective practitioners, disseminating WMS-II concepts and as a source of information and insight for use in special studies and syntheses. Their synergistic effects moved "upward" because the their interdisciplinary studies were carried out with sufficient rigor and in sufficient detail to permit their findings to be easily integrated into special studies.

The situation with respect to rapid appraisal assignments was far more complex. During the early years of the project, Technical Assistance supplied under WMS-II filled a critical need. It was well received by AID's Missions and was found by the Mid-Term Evaluation to be the most successful of the three main contract activities. However, because of the cost structure of the WMS-II contract, the price of university-provided TA could be very high, in many cases very substantially above the cost of the same persons provided under AID's Indefinite Quantity Contracts (IQCs).

As time progressed, the WMS-II concepts and approaches to technical assistance spread to U.S. consulting firms, as well as to agencies, universities, and individual practitioners in LDC's. Indeed, the universities transferred the WMS-II technology "in person" as their graduates moved into pertinent positions in the public and private sectors.

The project succeeded in disseminating its basic concepts and contributed to expanding the supply of practitioners, and thus created alternatives for AID that did not exist at the start of the project.

As WMS-II draws to a close, it has become evident that many of the TA assignments did not provide the rich kind of "upward synergism" (contributions of field activities to special studies and synthesis activities) that the project derived from the Diagnostic Analysis Workshops. Quick response TA work products that were quite acceptable for their intended immediate purposes proved to be of much less value for broader study purposes.

CSU's draft Triad paper states that sector reviews and project design papers often did not state their "performance logic" (system performance related to performance objectives) and did not set forth their methodologies. These assignments were generally too short and/or lacked assignment of sufficiently experienced personnel to fully apply the recommended methodologies in a rapid appraisal mode.

Much of the WMS-II TA effort was of immediate use to AID Missions, but made no particular contribution to synthesis. In effect, the project met its own design logic marching in the opposite direction. The central managerial concept of the WMS-II Project Paper was that the experienced core staff of WMS-II were not to do TA: they were to focus their attention on training new practitioners and on management. Yet in at least the four cases documented in the CSU Draft Triad Paper, persons assigned to TA appeared not to have enough experience to fully apply prescribed state-of-the-art techniques within the brief compass of a rapid appraisal. The objectives of expanding the supply of practitioners appears to have come into conflict with the objective of moving the state-of-the-art forward, and achieving a general synthesis of project results.

In summary, the "downward synergism" of the project worked well, creating new practitioners both inside and outside the project who were capable of meeting mission standards for TA assignments. The "upward synergism" was most likely to work where experienced practitioners were involved in the TA and/or when participants were also involved in Special Studies. Future project designs should not assume that a very high degree of "upward synergism" will occur in TA assignments unless (1) very experienced practitioners are used for assignments, (2) these practitioners themselves participate in synthesis studies, and/or (3) a very precise framework specifying contributions to general studies and synthesis activities is laid out in advance in combination with allocation of sufficient time and resources to enable regular practitioners to meet the requirements of the framework.

2. Broadening the project's scope to include Africa as well as Asia and Latin America strained the integrating capabilities of AID's management and added to the administrative problems

faced by CID and the universities. The underlying difficulty lay less in the diffusion of the project's substantive focus or the "thinning" of the technical resources available to AID than it did in the additional pressures it placed on the project's management structures.

Though irrigation systems and water management practices do vary from continent to continent, the range of practices within each continent is itself very wide and there is a very considerable overlap among them. Expanding the project to include Africa added some language and country-knowledge requirements to other complexities of the project as well as expanding the range of water management problems with which the project had to deal. But incorporating Africa Bureau requirements into WMS-II neither expanded the totality of AID's needs for water management expertise nor shrank the size of the talent pool available to serve the agency.

Adding an additional bureau on the AID side was not unlike the effect of adding another lead university to the CID team-- the number of "equals" whose requirements and special characteristics had to be taken into consideration expanded and complicated the management task for all concerned. It put particular pressure on the AID Project Manager in S&T Agriculture, who had limited administrative support. Had WMS-II been set up to permit the contractor to deal directly with AID Missions along the lines of the WASH and ISPAN models, some difficulties might have been avoided, but substantial changes in the WMS-II contractor's mandate and operating style would have been required to do this well.

3. The multi-entity contract mechanism used for WMS-II in practice required unanimity among three university equals. Although CID was formally designated as AID's "prime contractor" for WMS-II, it served primarily as a kind of common service organization for the universities. The project would have been better served by an arrangement with more strength at the center than the CID structure was able to provide. While it provided a vehicle for achieving common understandings and developing consensus among the universities, WMS-II's multi-entity contract mechanism made it difficult to impose structure, to achieve substantive closure, and to provide the project with the benefits of "horizontal synthesis."

WMS-II was a large and complex project, with substantial quick-response requirements as well as needs for common strategies and conceptual frameworks. These requirements, in combination with mandated AID-CID joint planning functions and AID's own

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involvement of a multiplicity of its bureaus and offices, placed a premium on the integrating capabilities and adaptability of the contractor.

The structural weakness the WMS-II organization was not the number of entities involved in WMS-II but rather the lack of operational primacy in the relationships among them.

The centrifugal distribution of power (effectively requiring unanimity among University Project Directors for all major decisions) contributed to difficulties which the contractor had in:

- (1) Providing convincing evidence of "synthesis";
- (2) Developing suitable work plans;
- (3) Providing useful project tracking; and
- (4) Demonstrating program leadership.

It seems likely that the requirement for consensus among UPD's discouraged aggressive peer review, reduced budgetary self-discipline, resulted in the passing decisions to AID that should have been resolved within the contractor's project management team, and consumed considerable time and energy on the part of key CPMT personnel.

The requirement for consensus in planning and budgeting in fact produced some substantive cross-fertilization among the universities. USU, in particular, appears to have benefited from its interaction between its UPD and the UPDs of CSU and Cornell. CSU benefited from its work with the University of Maryland, which was involved in the project on a collateral basis. Cornell benefited from the direct participation in short-term field assignments.

Viewed from a conventional perspective, however, the fact that the management structure of this project worked as well as it did on a large and complex AID contract is remarkable. That such a management structure was able to deliver reasonable good overall results is a tribute to the dedication of the members of the contractor's project management team, the quality of the university programs on which the project drew, and the patience of AID management.

#### Program Planning

4. A multiplicity of objectives for WMS-II were articulated in the Contract Work Statement and have been attributed to the

project by participants. These objectives were not addressed as part of a comprehensive and concrete project strategy in the Contractor's Work Plans. Work Plans did not identify multiple objectives and expectations as a basic problem for WMS-II, nor did they apply explicit priorities, planning strategies or management disciplines as a solution to the challenge posed.

Four "floating" objectives (i.e., objectives not clearly attached to specific inputs, outputs, or targets) were contained in the Contract Scope of Work:

- (1) Changing behavior of LDC irrigation bureaucracies (Contract Work Statement, p. 1, 3).
- (2) Generating new or improved water management technologies and practices (Contract Work Statement, p. 2).
- (3) Increasing the supply of U.S. practitioners who can carry out interdisciplinary analysis of irrigation systems in LDCs (Contract Work Statement, p. 19).
- (4) Synthesizing a cohesive water management program (Section I-B Contract Work Statement, p. 2) and giving leadership to AID's efforts in the water management area (Contract Work Statement, p. 17).

At least four additional objectives have been attributed to the WMS-II:

- (5) Creating a fully developed conceptual framework for a systems approach to water management (Mid-Term Evaluation, pp. 27-28).
- (6) Integrating university programs (FY86-87 Work Plan, 8th Edition, p. 11).
- (7) Expanding and improving the quality of water management portfolios of AID's missions (LBII's AID interviews).
- (8) Changing the orientation and professional practices of international development agencies and practitioners so as to give greater attention to (a) interdisciplinary analysis and (b) farmer involvement in irrigation system design and maintenance (LBII's AID interviews).

Some general references and qualitative observations were made on these subjects in the Contractor's Work Plans, and, in the case of synthesis activities, some work products, approaches, and

costs were identified. However, there was no general analysis of project objectives on an across-the-board basis. No attempt was made to prioritize project objectives or to tie them systematically to the contract framework of project inputs and outputs. Apart from financial data on specific assignments, there was a notable absence of specific deadlines, benchmarks, targets, or indications of a disciplined strategy for reaching the larger objectives of the project contained in Contract Statement of Work.

Proliferation of objectives and related expectations is common difficulty with complex projects. WMS-II work plans appear not to have recognized such proliferation as a management problem requiring a solution.

5. The provisions calling for Annual Work Plans contained in the WMS-II Contract Scope of Work were ill-conceived. A life-of-project work plan should have been prepared early in the first year of the project. This Work Plan should have included a time-phased projection of inputs and outputs fully related to important contract objectives and to the two-level activity framework in the contract Scope of Work. It also should have established a readily understandable basis for tracking progress on objectives and outputs. The Contract Scope of Work assigned too many ancillary functions to WMS-II Work Plans. Such other functions should have been handled by contract amendment, work plan amendment, periodic proposals, individual approvals or by other means.

Too many functions were loaded onto the Annual Work Plan. The Work Plan called for in the WMS-II Statement of Work was, in effect:

- a surrogate contract amendment, filling in important details not contained in the original Contract Scope of Work or changing details already included;
- a proposal document, by means of which the universities presented a program of research and training for AID's consideration;
- an early warning activity planning system, which gave the contractor and AID/Washington as much advance notice of Mission requirements as possible in order to rationalize and staff these assignments; and
- a conventional project Work Plan.

After four years of WMS-I (during which at least two years were focused on Mission-support activity), it should have been possible to write a tighter and more specific work statement than one contained in the WMS-II contract. If that were not possible, the contract should have been amended as soon as more specifics could be provided.

A life-of -the-project Work Plan should have been written in the first year of the project and revised as necessary thereafter. The Work Plan should have provided a disciplined framework on the basis of which specific proposals could be examined. Work Plans should not themselves have been used as vehicles for submitting proposals or providing "wish lists" for AID consideration.

A Scope of Work written in general terms, in combination with an annual work planning approach, a significant proportion of Mission-generated activity, and multiple institutional interests on both the AID and CID/university sides was an invitation to adhocery. The contractor's approach to WMS-II was too open ended. The project would have benefitted from a greater emphasis on structure and on closure. The annual work planning approach described in the Contract Scope of Work and followed in the early years of WMS-II was fundamental error.

6. The approach that the universities took to integration of ideas, concerns, and concepts readily led to thoughtful diversity. The universities preferred flexibility to closure-oriented formal planning and implementation approaches, and moved toward intellectual consensus with considerable deliberation. The integration style followed by universities was a familiar and natural one for them-- and it was a source of discomfort for AID.

There was no intellectual master strategy for WMS-II as a whole, nor were any benchmarks established for moving toward objectives established by consensus. The universities relied on mutual understanding, an agreed division of labor, and a collective commitment to the success of the project to guide their courses.

The WMS-II project paper put forward the CSU interdisciplinary problem-solving approach as "the conceptual framework and approach that undergirds this project." At project's end, it seems clear that each of the universities have developed and applied a number of different approaches, which they are starting to pull together at project's end. There are some ideas and values held in common among the three universities, but there is as yet no full agreement on a single, unified approach or package of approaches.

The search for new knowledge and methods, and the identification of the limitations of current wisdom is the lifeblood of vital universities, but flexibility does have some limitations,

The universities appear to be coming to the end of more than ten years of two "water management synthesis" projects without having produced a fully developed conceptual framework for a systems approach to water management-- and apparently without having reached a full understanding with their client concerning what kind of "synthesis" it was that they were supposed to produce at the close of the project.

An outcome of this kind might have been avoided if early effort had been devoted to defining objectives, project strategies and work products, and to making sure that integration efforts served AID's needs as well as those of the universities.

### Operational Management

7. Contractor project management during the second half of the project was a substantial improvement over earlier experience, but project management was structurally weak at the center. Each of CID's two management plans reflected the strength of the universities vis-a-vis central management.

Under the first management plan, the Managing Project Director was drawn from CSU and essentially served as first among equal University Project Directors. He was described as "the project officer for communication/administration with CID and AID." Under the revised management approach a non-aligned Executive Project Director was located in the CID offices in Tucson, Arizona.

The management approach contained in the revised management plan worked better than did the earlier arrangements because (1) AID had effectively communicated to CID and the universities the seriousness of its concern about problems encountered under previous arrangements; (2) the person selected for the position of Executive Project Director was well suited by temperament for his role; and (3) simplification of relationships in the AID reporting structure, combined with less substantive intervention on AID's part, reduced tensions among the parties.

The Prime Contractor (CID) was essentially an instrument of the universities, who themselves made most decisions by consensus. Except in unusual situations, CID and the Executive Project Director served the University Project Directors, rather than the other way around.

The two management plans reflect the reluctance of universities to subordinate themselves to each other or to an entity of their own creation (CID). Viewed as mechanisms for executing a large AID contract, the two plans were fundamentally flawed for lack of sufficient power at the core.

8. The activity tracking system used in the later years of the project was invaluable as a financial planning and accounting tool, but was not effective in meeting the program monitoring and progress reporting requirements of WMS-II or in fulfilling the traditional role of a management information system. There were three problems with the activity tracking system. The first was that fundamentally it was not designed to serve managers and reviewers in AID. The second was that the system did not track progress on outputs. The third problem was that the system did not define project objectives and track progress in achieving them.

The tracking system compared authorizations with actual expenditures for individual activities and for a variety of classifications of activities. It was essentially concerned with answering the questions: "How much money do we have left?" and "Where is it?" These were questions of particular importance to CID and the universities.

The tracking system did not systematically answer the questions: "How close to completion are individual activities?" "Will these activities be completed on time and within budgeted inputs?" and "What progress is being made toward achieving project objectives?" These were questions of particular concern to AID.

The tracking system did not contain full information concerning professional person-months (PPMs). There was no way to (a) gauge if the number of PPMs budgeted in the original activity budget were in fact expended, or (b) calculate the average cost of the PPMs expended.

The tracking system did not provide a sound basis for assessing progress being made against the current year's work plan. What it did provide was an estimate of cumulative expenditures measured against the budget totals for approved activities, presented in a convenient variety of formats. However, measuring expenditures against total budgets was of very limited value in assessing the program's current progress because:

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-- Each Annual Work Plan contained many activities that were rolled over from previous years. As a result, the expenditures shown for each activity did not relate directly to the current year, but were cumulative from the beginning of the activity.

-- The tracking system did not address progress on objectives, and there were no non-budgetary indicators that allowed managers to make inferences concerning progress. The tracking system did not provide commensurable data on number of work plan activities completed, outputs completed, or PPMs expended.

-- Cost data and invoicing required considerable processing and documentation, and was subject to substantial delays.

A management information system (as contrasted with an accounting tracking system) should be designed to permit timely decisions affecting on-going activities by its users. Normally, it should be based on one or more simple indicators that do not require such elaborate processing and precision as cost data. For example, information on person-months expended normally can be provided much more rapidly than data on costs, and can be equally valuable for monitoring purposes. A management information system is intended to show executives who have supervisory responsibilities to determine whether or not work on major outputs is on schedule, whether project objectives are being achieved, and how achievements relate to inputs. It is difficult to manage by objectives or by "results" if the only hard information regularly provided is on inputs.

9. The difficulties and misunderstanding which marked relationships among the universities and the interactions between AID and the contractor side during the early years of the project subsided during the second half of the project. However, while overt contentiousness was much reduced, the functioning of the project's integrating processes was not entirely satisfactory.

Following the recruitment of an Executive Project Director under the Revised Management Plan, the tone of the project's various dialogues changed for the better. The Joint Project Management Team which included both AID and university representatives became a primary vehicle for interaction. End-running was less apparent. Collaborative research efforts among the universities were carried out successfully.

Less dramatic deficiencies in the functioning of the management system nevertheless persisted. The process of combining research suggestions from the various universities suffered from lack of an integrating conceptual framework, from the absence of searching peer review, and from less than full application of budgetary discipline.

Financial reporting improved, but the contractor did not provide AID with a management information system that gave managers at upper levels of the system better data on progress and achievements that would permit decisions in real time. Nor did the framework of the dialogue between the contractor and AID encourage or facilitate effective bi-directional optimization of the substantive content of the Contractor's Work Plans.

The "consensus rule" effectively requiring the unanimous agreement of all three University Project Directors on important project decisions virtually eliminated the possibility that conflict resolution could take place at the level of the Executive Project Director, limited the EPD's role, and involved the UPD's more heavily into the process of central management process than was prudent. Both substantive synthesizing functions and integrating administrative activities suffered as a result.

In brief, the early atmosphere of anger and contention was replaced by one of greater civility and objectivity. Improvements in management practices and in atmosphere took place on both AID and the contractor sides, but these changes did not result in profound transformation. The contractor did not fully face up to the management challenge of work planning or the substantive challenge of synthesis. AID dealt with its internal complexities through staff attrition and did not supply needed resources to handle the substantive and administrative requirements of project integration on its side.

10. Direct costs of management and administrative activities were at the high end of the range for WMS-II as were the overhead charges of the universities.

"Administrative and Support Costs" accounted for 23.4% of the administrative costs of total expenditures of the WMS-II project, a percentage which is clearly at the upper range of the range for development projects. A rule-of-thumb for large development projects is that such costs represent 12-15% of the total, but some special factors were operating in the case of WMS-II. These included an unusually large proportion of short-term overseas assignments, the shortage of experienced practitioners capable of

undertaking interdisciplinary water management development assignments in the LDCs, academic commitments restricting the availability of university personnel, difficulties in forecasting and planning Mission buy-ins, and the complexities of relationships among the universities, and between the universities and AID. Taking these considerations into account, management costs of 18-23% are defensible. However, when direct charges for administrative and support costs are at the upper end of the range, overheads are usually expected to be in middle or lower ranges. WMS-II overheads were comparatively high.

Measured as a percentage of direct labor, overall project overhead was 137.8%. This is at the high end of the range of overheads charged by private firms and non-profit institutions other than universities, even when profit recoveries are taken into consideration. Of the three categories of project activity, overheads associated with Technical Assistance were the highest (157.3%). Special Studies overhead were 136.4% and Training and Technical Assistance overheads were 122.1%.

Normally, organizations serving AID which charge overheads in the high ranges do not charge all administrative and support costs directly to AID, but instead charge off a substantial portion of them to overhead. On the assumption that 50% of WMS-II administrative and support costs were treated as a form of overhead, the equivalent overhead recovery for the project as a whole would be 164.5% of direct salaries.

Indefinite Quantity Contracts (IQCs) under which AID obtains short term services on a task order basis do not provide for direct recovery of any administrative and support costs incurred in the United States, except by means of their inclusion in multipliers which are applied to direct salaries. On this basis, the equivalent overhead rate for the project would be 198% of direct salaries (equivalent to a direct salary multiplier of 2.98 for the project as a whole). For Technical Assistance alone (the WMS-II category most directly comparable to IQC activity), the equivalent overhead rate would be 240% of direct salaries (equivalent to a direct salary multiplier of 3.4). Such recoveries result in multipliers well above those charged by organizations holding AID IQCs.

### Progress and Achievement

11. The stated purpose of WMS-II was to increase host country capabilities to plan and implement irrigation project and programs. Specific quantitative targets were not established for achieving this purpose and available information on

improved capabilities is very limited. Judged in terms of the original projections of numbers of activities to be completed, WMS-II overfulfilled its output requirements, but the original projections and the final count provide very blunt instruments indeed for measuring achievement. Review of a selection of WMS-II documents, indicates that about a third of these documents were "state-of-the-art" and the remainder rather conventional. Comparative and cost-effectiveness analyses of substantive documents produced by the project indicate documentary output was modest. The most significant contributions of the WMS-II appear to be its good early performance on field activities, the training of a cadre of talented graduate students who have become contributing member of pertinent professions, and the profound influence of the basic ideas which WMS-II has articulated and spread throughout the world.

The contractor completed 247 activities in the areas of Technical Assistance, Training and Technology Transfer, and Special Studies and Research as compared with 197 such activities projected in the contract Scope of Work. However, aggregate comparisons of this kind are not particularly meaningful. Documentary outputs of WMS-II were modest when compared with those of WMS-I, taking into account the differing sizes of the two projects. A number of cost-effectiveness comparisons also were made, using a cost of \$90,000 per document as a standard of comparison. The analyses also indicated that WMS-II outputs were modest in number, taking the cost of the project into account.

End-of-project-status is described in the LogFrame as: "Host country water management programs being conducted effectively and efficiently on a continuing basis." However, neither the LogFrame nor the rolling Work Plans set specific targets against which progress could be measured. The Contract Work Statement speaks in terms of changed attitudes and behavior and a "bureaucratic reorientation" with the various LDC agencies responsible, but again no measure targets were set. It does appear that the project has contributed to a major shift in attitudes toward irrigation development among international development agencies, practitioners, and a substantial number of persons in LDC water development agencies.

12. The Water Management Synthesis II project has had difficulty defining and achieving a convincing "synthesis." While useful and interesting in themselves, the Triad documents being prepared by the three universities as a "synthesis of lessons learned" have not been fit together within a common framework and do not appear to provide a comprehensive

statement of lessons learned during the project. Additional effort should be devoted to the task of summarizing and integrating the substantial body of experience and knowledge which has been compiled during the project ends.

Like its predecessor, WMS-II has had difficulty defining and delivering holistic work products. The phrase "water management synthesis" as it was used in the predecessor project (WMS-I) apparently reflected the idea that investigation of irrigation systems worldwide would reveal that desirable and transferable system features found in a number of different developing countries could be combined into one or more superior total systems models.

Unlike WMS-I, which defined a series of four specific synthesis work products, WMS-II generalized the concept of synthesis. The Project Paper for Water Management Synthesis II did not explicitly define what was meant by "synthesis," but explicitly adopted a problem-solving framework developed by CSU as its underlying "conceptual framework and philosophy". The Contract Work Statement talks in terms of synthesizing "a cohesive water management program," but did not give specific definition or content to this concept.

The Mid-Term Evaluation identified lack of progress on synthesis as a major problem. It noted the absence of a fully developed systems framework and the lack of priority for developing one. The contractor's Revised Management Plan and its rolling Work Plans give considerable play to the rhetoric of synthesis, but the tangible work products boil down to three "Triad" studies now being prepared by each of the universities. Cornell's Triad study is a book (reviewed by the management assessment team in draft) concerned with policies for improving small-scale irrigation. CSU's Triad study is a paper (reviewed in draft) concerned with methodologies for carrying out interdisciplinary analysis. USU's Triad study (two of seven chapters reviewed in draft) is a report which draws together and builds on the frameworks of four WMS-II Project Special Studies activities as they relate to the management of large-scale gravity irrigation systems serving numerous small-scale holdings.

The USU Triad study, a collaborative effort of professors from each of the three universities, comes closest to fulfilling the Mid-Term Evaluation's call for a fully developed systems' framework, but it does not cover isolated small scale irrigation. Work on the Triad studies was not complete at the time of the present management assessment. However, judging from what we have seen so far, the studies have the following limitations:

- (1) They have not been presented as parts of a single, logically organized effort.
- (2) They do not explicitly apply a common conceptual framework.
- (3) They do not, individually or collectively, attempt to cover the full range of WMS-II subject matter and experience.
- (4) They do not provide a comprehensive statement of lessons learned from the WMS-II project.

These limitations should be remedied to the extent practical. However, there is no way that a conceptual systems framework for the study can be both developed and put to a full test at the eleventh hour. In our judgement, such a framework should have been created in the first year of the study and then have been revised along the way when necessary. We think that a framework compatible with that being developed by USU for large scale systems should be developed for isolated small scale systems as well. In that way, full closure can be achieved on a basic building block of the process of synthesis.

13. WMS-II has been a fundamentally successful project whose shortcomings have been closely related to its strengths.

The project engaged the creative energies and skilled personnel of three leading universities at a time when skills and insights they could offer were critically needed in AID's host countries. As a result of the combined efforts of these universities, Mission portfolios have been improved, the supply of knowledgeable practitioners has been expanded, and the orientation of a profession has been changed. However, the management structure established by CID and three independent universities lacked strength at the center and was not well suited for handling a large and complex AID contract. Costs of the project have been relatively high and production of tangible outputs has been relatively modest. Work planning and activity reporting has not measured up to conventional management standards. The project has been slow in reaching closure on key synthesis work products and frameworks needed to achieve substantive integration of substantive results. AID, the universities, and other organizations with interests in improving water management in developing countries should seek ways to sustain university contributions in the field within more efficient management frameworks.

### C. RECOMMENDATIONS

WMS-I and WMS-II together represent an effort spanning more than a decade and costing well over \$20 million. As efforts on these projects come to a close, it is important that results should be integrated, made readily available to practitioners and policy makers, and consolidated into a substantial base from which further advances in the state-of-the-art can be launched. To this end, we recommend that:

1. The contractor prepare a factual addendum to its final report listing specific accomplishments relating to each of the four objectives set forth in the Contract Work Statement.
2. The contractor's Triad studies should be submitted in a single volume with an introduction describing relationships among them.
3. A systems' framework or taxonomy compatible with the frameworks presented in the USU Triad study should be prepared to serve as a basic framework for analyzing isolated irrigation systems.
4. A volume containing an analytical summary of the entire body of knowledge developed under WMS-I and WMS-II, generously footnotes so that the reader can readily trace principles, allusions, and references to factual circumstances to their documentary sources.

Recommendations for IMSAR, the follow-on project to WMS-II for AID's Bureaus for Africa and for Latin America and the Caribbean, are set forth in the following chapter.

## Chapter Seven

### ALTERNATIVES AND RECOMMENDATIONS FOR THE IRRIGATION MANAGEMENT SUPPORT AND RESEARCH PROJECT (IMSAR)

#### A. INTRODUCTION

The previous section of this report summarized lessons learned from a retrospective assessment of WMS-II and its related projects. The present section provides recommendations concerning the design of the forthcoming Irrigation Management Support and Research Project (IMSAR). These recommendations are made in the light of the range of alternatives that might be considered for IMSAR, and the experience of WMS-II and its related projects.

#### B. ALTERNATIVES FOR IMSAR

WMS-II will have two successors. ISPAN, the ANE Bureau's "stand-alone" follow-on project is already in place. The Irrigation Management Support and Research Project (IMSAR), the follow-on for Africa and Latin America, is currently being designed within AID. Given the existence of ISPAN, the main alternatives for IMSAR appear to be as follows:

- (A) Emulate WMS-II, but limit IMSAR's scope to Africa and Latin America.
- (B) Emulate ISPAN, but limit IMSAR's scope to Africa and Latin America.
- (C) Combine ISPAN with IMSAR.
- (D) Emulate WMS-I, but limit IMSAR's scope to Africa and Latin America.
- (E) Separate "support" (TDY assignments in responding to Mission requirements) from "research" (studies of water management issues carried out by universities and other organizations in the United States), handling support through competitive IQC contracts and research through one or more contracts for defined research products.
- (F) Separate Africa from Latin America, giving each separate treatment.
- (G) Variations on, and combinations of, Alternatives A-F.

Several considerations affect choices among these alternatives. Such considerations include the nature and extent of research activities to be carried out within ISPAN and IMSAR, the extent of the buy-in anticipated expected from the Africa and LAC Missions, the philosophies of S&T and the respective AID regional bureaus concerning project administration and substantive leadership, and many other factors beyond the scope of the present management assessment. Choices among alternatives for IMSAR necessarily are the province of AID and of the team preparing the IMSAR Project Paper.

C. RECOMMENDATIONS FOR THE DESIGN OF IMSAR

The purpose of this concluding chapter is to make recommendations for consideration in the design of IMSAR, drawing on the assessment of predecessor projects presented earlier in this report. Our recommendations for IMSAR, made in the light of the principal alternatives identified above, are as follows:

1. Neither WMS-I, WMS-II nor ISPAN appear to provide models that are fully congruent with the requirements of IMSAR.

WMS-II essentially sought to adapt the structure of WMS-I, a \$600,000 per year university-led water management research project (with a minor TDY component) to the needs of \$4,000,000 per year multi-activity undertaking (with a heavy TDY Mission buy-in component mostly generated by the Asia Bureau). The adaptation was quite successful in terms of the quality of the support provided to Missions but fell short on management.

Like WMS-II, ISPAN is a \$4,000,000 per year multi-activity undertaking but it has an even heavier buy-in component than WMS-II (33% for WMS-II; 50% for ISPAN). The managerial design of ISPAN drew some features from the model of the Water, Sanitation, and Health project (WASH) a consulting firm-led undertaking (heavily oriented toward centralized management of short-term overseas assignments in the fields of water supply and sanitation). ISPAN will have less involvement of U.S. universities than did WMS-II, but has added a significant effort to utilize indigenous regional institutions in its activities. The key feature of ISPAN is a Washington-located technical and administrative center designed to give prompt and efficient service to the ANE Bureau. ISPAN may be regarded as a fusion of the WASH and WMS-II models. Presumably the university role in ISPAN will be less central than it was in WMS-II, but more central than it was in WASH.

It is too early to assess the experience of ISPAN, but it seems reasonably clear that the project faces four major questions:

(1) Can the fixed costs of the technical and administrative center be justified in terms of the volume of substantive activity it will handle?

(2) Will the project devote enough resources to university activities and involve them sufficiently in its basic strategy to evoke their creative commitment to ISPAN purposes?

(3) Will the project succeed in establishing a research agenda that serves AID's requirements?

(4) Does the project have sufficient resources and a realistic strategy to add to the cadre of practitioners, researchers and other needed personnel through indigenous regional institutions, or will it instead generate additional competition for the limited pool of talent available to these institutions?

In terms of the proportion of resources devoted to research and functions other than TDY activities, WMS-I lies at one end of the spectrum (largest proportion of research activities), ISPAN at the other (smallest proportion of research activities) with WMS-II in the middle.

WMS-II was much larger than WMS-I. ISPAN is designed to be slightly larger than WMS-II. Presumably IMSAR falls on the WMS-I side of WMS-II. That is to say, one would expect IMSAR to be smaller in size than WMS-II and that the relative share of IMSAR represented by its research component will be heavier than was the case of WMS-II. While Latin America and the Caribbean have indigenous institutions that compare in quality with those in Asia, indigenous institutions in Africa may not be comparable with those in the Asia Region.<sup>28</sup>

Like some other centrally funded projects, WMS-I experienced difficulty undertaking field activity until Missions themselves decided they had need of its services. During the second half of the WMS I, a breakthrough was experienced, enabling the project to provide substantial field services in Asia. This thrust was continued in WMS-II. Field activities appear to have had both positive and negative impacts on the research activities of WMS-I

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<sup>28</sup> See, for example, Three Nigerian Universities and Their Role in Agricultural Development, A.I.D. Project Impact Evaluation Report No. 66 (March, 1988).

and WMS-II. On the one hand, they have made research activities more field-relevant. On the other hand, the WMS-II research agenda was too encapsulated, lacked a sense of strategic priorities, and fell somewhat short on output. Earlier, WMS-I fell rather short on contractually specified research outputs. WMS-I instead concentrated on a highly successful effort of repackaging experience gained on long-term projects in Pakistan and Egypt and using this experience effectively on short-term training, project identification, and other assignments deemed important by Missions in Asia and elsewhere.

In the light of its antecedent projects in the water management field, the essential question posed by IMSAR is as follows:

How can this new water management project retain the significant benefits of the Water Management Synthesis projects and at the same time avoid the shortcomings of these projects?

The benefits to be retained from WMS-I and WMS-II are the capacity to create, validate, and disseminate sound interdisciplinary doctrine, maintaining a good reputation for performance of technical assistance projects, and expansion of the number of capable professionals in the field.

The deficiencies of these projects to be avoided are management problems, limited output and cost-effectiveness, and the inability to formulate and execute a research agenda satisfactory to AID. No existing model fully satisfies the requirements of IMSAR.

2. IMSAR should define desired products of "synthesis" research very clearly and specifically early in the project period and it should specifically budget resources for them. The contractor then should be held accountable for specific synthesis work products.

WMS-I, the predecessor to WMS-II, dealt with "synthesis" in very specific terms. The contractor was to:

- a. summarize findings and experience of AID water management projects "so that improvements can be made based on principles and procedures learned from each specific case";
- b. develop, as the "central" output of the project, training aids and handbooks which present combinations of the best practices in developing countries; and

- c. develop analytical descriptions of LDC small farm water application systems, using a multidisciplinary taxonomy.

A review of the project documents suggests that the WMS-I contractor was not able to provide most of the specified synthesis work products in useful forms, but WMS-I did make important contributions to synthesis in more generalized ways.

The WMS-II project design was much less explicit about the nature and content of the synthesis it sought to achieve than WMS I had been. The mid-term evaluation of WMS-II found a lack of synthesis and a lack of strategy for achieving it. As of the time of the present assessment, each of the three universities was to present its own approach to synthesis in "triad" studies, but the nature and extent of any final synthesis to be presented at the close of the project is not clear.

Achieving synthesis requires strong and persistent leadership, on both intellectual and administrative levels. It was impeded in WMS-I and WMS-II by competing priorities and by centrifugal forces within the management structure of the project.

IMSAR can do better than its predecessors if it specifies the content of synthesis work products to be delivered, sets schedules for their delivery, during the course of the project, and insists on performance.

3. IMSAR should provide for a high level peer review committee to assess the priorities and contents of a recommended research program.

Although CSU, USU, and Cornell learned much from each other, the WMS-II research program suffered from an ingrown cast. IMSAR should utilize a high level peer review committee with representation from outside AID and the Contractor staff to review the priorities and contents of its proposed research program. Candidates for membership on such a committee could include the World Bank's Senior Irrigation Advisor, the Chief of FAO's Land and Water Division, the Director of the International Irrigation Management Institute, the President of the International Commission on Irrigation and Drainage, the Chief Engineer of the U.S. Bureau of Reclamation, and an executive officer of a leading irrigation district in the United States.

4. Initial concentration on understanding irrigation systems in a few countries in Africa and in Latin America is preferable to superficial treatment of many.

CSU, USU, and Cornell each brought in-depth experience with the irrigation systems of particular countries to WMS-II, and were able to use that knowledge most effectively. By contrast, the current professional literature which attempts to promulgate lessons of universal applicability to LDCs with respect to irrigation is introductory in nature and substantively superficial. Initially, at least, IMSAR is likely to be most effective if it concentrates most of its resources on a few countries in Africa and in Latin America.

The Water Management Synthesis projects were successful in large part because the universities had experience in countries in which irrigation system improvements were attainable. Where "lower end of the scale" country selections are made in Africa and Latin America IMSAR should identify countries which at least have a tradition of rainfed agriculture and some evidence of an administrative structure amenable to new learning.

There are wide variations in irrigation practices within and between countries in Africa and Latin America. IMSAR should take those variations into account in selection of countries for concentration. Also, particularly in Africa, IMSAR should expand the range of its inquiry, looking beyond irrigation systems to larger questions of LDC water management.

5. There are a few areas of activity and a few types of assignments in which current knowledge and the skills of experienced practitioners appear suitable for carrying out assignments throughout Africa and Latin America.

Areas in which general dissemination of current knowledge and techniques can be appropriate on a wide scale include:

- a. training in interdisciplinary approaches to water management;
- b. strategic planning of water resource development;
- c. project identification for national irrigation systems; and
- d. summarizing experience of USAID and other donor water management projects.

The Water Management Synthesis projects were not as successful in summarizing project experience as they were in the first three areas, but other contractors and researchers have demonstrated that useful work can be done in this fourth area.

6. It is not essential that IMSAR emulate the rationale of vertical and horizontal "synergism" embodied in prior water management projects, since the combinations involved may have produced disadvantages as well as advantages.

In WMS-II, as in ISPAN, the prime contractor combined central research and support activities with individual field assignments. The rationale was that combination was necessary because the research would improve the quality of the field assignments while conversely the field assignments would make the research more field-relevant (vertical synergy).

Several organizations combined to provide research and technical assistance under WMS-II and IMSAR (horizontal synergy). The rationale of this horizontal combination was that it was necessary to meet volume requirements for professional personnel generated by Mission buy-ins and to provide a range of skills and viewpoints for both field activities and supportive research.

The problem presented by the experience of WMS-II is perhaps not unlike that which occurs in industrial structures where economies of scale and complementarities are claimed for combinations and associations of firms. Absent effective competition, such combinations may deliver a product that is quite good, but rather expensive and unresponsive to demand. As costs mount and responsiveness declines, it may be prudent to explore ways to uncouple the "synergies" and reintroduce competition.

In the case of IMSAR, AID should consider:

- a. requiring that the organization which formulates the research agenda for the project have no substantial interest in performing the research itself; and
- b. exploring mechanisms which will link ISMAR-funded research to AID financed water management field projects, by means of linkages to Indefinite Quantity Contracts and other contractual vehicles outside of IMSAR which afford opportunities to deal with water management problems in their field contexts.

Further discussion of these suggestions is contained in the following paragraphs.

7. IMSAR should establish and execute an action research agenda reflecting AID's priorities as a development institution. The entity responsible for formulating this agenda should not participate in the performance

of the research itself. Once the agenda has been established, most individual assignments should be subject to open competition in the United States and in pertinent LDC's.

WMS-I and WMS-II had trouble formulating and executing an ordered research agenda responsive to AID's needs, in part because of differences in views among lead universities and in part because of differences between them and AID. ISPAN may now be facing the same challenge. Research institutions tend to have strong individual agendas. These agendas make it difficult for them to replace their own priorities with those of other institutions. Suggestions for research should be welcomed openly by IMSAR and interaction of researchers with Missions concerning field requirements should be encouraged, but, in the final analysis, the creation of IMSAR's research agenda should be done by persons and organizations who do not have strong interests in carrying out the research assignments which may be placed on that agenda.

If the matter of the IMSAR research agenda can be resolved, its execution becomes a matter of managerial skill and contractual technique: e.g., specific research assignments/grants can be awarded on the basis of open competition and payment based in whole or in part on delivery of satisfactory work products.

8. IMSAR should experiment with financial incentives which would encourage IMSAR researchers and other AID contractors carrying out water management assignments in Africa and Latin America to combine forces on a case by case basis. Ultimately, such mechanisms might be able to serve as a cost-effective supplement or alternative to ISPAN-type centralized administrative arrangements.

IMSAR probably will not have Mission buy-ins as a main focus, but the project design should give some attention to mechanisms by which short-term assignments can be carried out. Absent a buy-in mechanism, centrally funded AID research projects frequently have difficulty in persuading Missions and host countries to accept their involvement in field research. WMS-I had this problem in its early years as did USU's early efforts at involvement in Pakistan.

University personnel involved in WMS-I and WMS-II have benefitted from the serendipity of Mission-generated assignments. A decision to concentrate work on a few countries in Africa and Latin America should help to overcome Mission reluctance in the countries selected. IMSAR could build in a limited amount of TDY assistance, provided that this does not require a heavy

investment in centralized staffing and provided further that the assignments are structured and staffed in ways that assure that their results can be fed back to sector-wide activities.

A supplement or alternative would be for IMSAR to offer financial incentives to its researchers and to organizations holding IQC's, long-term technical assistance contracts, and other kinds of AID contracts involving field work on water management activities. A "pay for synergism" type of activity could offer special incentives to key academic persons and to organizations holding AID contracts to work together in their mutual interests on a case by case basis. Such an activity could give AID, researchers, and contractors the benefits of "vertical synergy" at marginal cost.

**Appendix A**

**Management Assessment Team**

## THE MANAGEMENT ASSESSMENT TEAM

Harvey A. Lerner served as team leader for the management assessment of the WMS-II project. Mr. Lerner recently completed a nineteen month assignment in the Eastern Caribbean where he supervised the evaluation of 14 AID-financed private sector projects for the Agency's regional Mission in Barbados. Earlier he participated in worldwide evaluations of the Title II of the Food for Peace program and of child feeding programs. He participated in an evaluation of AID assistance to the Afghan Fertilizer Company and headed a worldwide assessment of private sector participation in fertilizer distribution and marketing in AID's host countries.

Mr. Lerner served as co-coordinator of two LBII technical assistance projects in Somalia concerned with water resource development and management: the Comprehensive Groundwater Development Project and Central Rangelands Development Project. He also contributed to the redesign of the AID-financed Arid and Semi-Arid Lands Project in Kenya. Earlier he directed the provision of technical assistance and planning services to the Luwu Area Development and Transmigration Project, a resettlement project which centered on the rehabilitation of two irrigation systems on the island of Suluwesi in Indonesia.

Mr. Lerner joined Louis Berger International in 1981. Earlier, he served as Vice President of Checchi and Company where he was responsible for economic consulting activities and for a wholly owned subsidiary providing management counsel to schools, universities, and non-profit institutions.

Mr. Lerner received a Bachelor of Arts Degree from Wesleyan University, where he was Phi Beta Kappa and President of the Student Body. He holds law degrees from Harvard Law School and Georgetown University Law Center. He also carried out graduate studies in economics at Georgetown University and in business policy at Harvard Business School.

Jan Stofkoper, LBII's Director of Rural Development since 1983, has participated in numerous AID-sponsored irrigation and rural development projects including the India Irrigation and Training Project, the Pakistan Command Water Management Project, and the Egypt Agricultural Mechanization Project. Prior to joining LBII, Dr. Stofkoper was Chief-of-Party for the IADB-sponsored irrigation rehabilitation project in Haiti. There he directed the renovation of a 4000 hectare area which had been subjected to major erosion and sedimentation problems. From 1972 to 1980, Dr. Stofkoper served with the California Water Resources Control Board where he directed water quality control programs in conjunction with University of California Agricultural Research programs.

Dr. Stofkoper completed his education at the Wageningen Agricultural University, The Netherlands, with specializations in Water Resources and Soil Science.

Carter P. Brandon is Director of LBII's Development Economics Group. With Mr. Lerner, he carried out a review of industrial dispersal policy in the Philippines and developed an economic growth model to analyze the impact of policy changes and public and private investment on regional growth. He also participated in LBII's worldwide assessment of fertilizer distribution and marketing, in an analysis of the costs of water resource development in Somalia, and in an evaluation of credit unions in the Philippines. He is currently serving as Project Coordinator for a large fiscal reform program in Liberia. He joined LBII in 1981.

Mr. Brandon received a Bachelor of Arts Degree from Harvard University, where he was Magna cum Laude. He received a Master of Science Degree in Agricultural Economics from Oxford University, where he was a Rhodes Scholar.

**Appendix B**

**Management Assessment Scope of Work**

## ARTICLE I - Title

Agriculture Technology Research and Development Assessment of Water Management Synthesis II (WMS II)

## ARTICLE II - Objective

The objective of this Delivery Order is to carry out an end-of-project, managerial review and assessment of A.I.D.'s Water Management Synthesis II Project (936-4127); and, based on this evaluation, to make specific as well as general recommendations relative to various conceptual, programmatic, organizational and operational aspects of the project, which will be useful in the development and design of a follow-on project in the irrigation and water management area.

## ARTICLE III - Statement of Work

Under the Delivery Order, the IQC Contractor will provide the services of a three-person team to assist the S&T Bureau's Office of Agriculture carry out an end-of-project managerial review and assessment of the Water Management Synthesis II (WMS II) Project, the purpose of this review/assessment being not so much aimed at benefiting the WMS II Project itself, which terminates 3/28/88, as to provide findings that will be useful in the design of a follow-on (successor) project to WMS II, which is now under development and scheduled to become operational later this fiscal year (FY1988).

Consequently, through the review of project-generated documents, discussions with project personnel, both contractor and A.I.D., and an analysis of the project's experience and performance, the review team is to assess the effectiveness and efficiency achieved in these areas; identify the major factors influencing this situation; and make recommendations regarding these aspects in designing the follow-on project:

Following are the specific tasks to be carried out:

### 1. Review of Relevant Documents

Review background documents such as project paper, contract and annual workplans to gain a thorough understanding of the project, its purpose and the general as well as specific outputs and objectives it has tried to accomplish. In addition, the team should review a cross-section of the technical publications, trip reports and other documents generated by the project, including quarterly reports, to gain a measure

of both what has been addressed as well as the type and range of activities carried on under the project. Finally, it should also review the mid-term evaluation report as a means of gaining insights into earlier project strengths and weaknesses which have been previously identified.

2. Interview A.I.D. and Contractor Personnel

Team should undertake substantive discussions with WMS II Project Manager and other appropriate persons in the respective A.I.D. Offices and Bureaus closely involved in the project (S&T/AGR, S&T/RD, S&T/EY, ANE/TR/ARD, AFR/TR/ARD, LAC/DR/RD). They will also need to hold detailed discussions with the three University Project Directors (UPDs), the Executive Project Director (EPD) and other people the contractor may wish to have involved. The former discussions will need to take place in Washington, D.C. and the latter in the contractor's home office.

3. Prepare Managerial Assessment Report

Based on the above review and discussions, the team will prepare an Assessment Report that not only evaluates the project's effectiveness and efficiency in both carrying out its work and in achieving its design objectives but also makes practical and implementable recommendations about specific aspects of the project, which will benefit the design, implementation and ultimate success of the follow-on (Irrigation Management Support and Research) Project now under development. This includes recommendations regarding the project's structure and approach; its overall program scope and framework; and its operational management mode.

Following is a list of questions depicting the main issues which the Managerial Review and Assessment Team will address. This list is primarily illustrative and is not intended to impose excessive rigidity on either the approach to be followed in the review/assessment or the choice of factors to be examined.

A. Overall Concept and Scope of the Project

- 1] Was the concept of trying to combine extensive field-support to A.I.D. Missions with the carrying out of broader, sector-support activities (action research, training and technology transfer) proven effective in

practice; do synergistic relationships among these broad program components really exist, and, if so, do the benefits therefrom outweigh the costs and other negative aspects incurred in exploiting them?

- 2] Has broadening the project's geographic scope to include all geographic regions resulted in spreading resources too thin, diffusing the project's focus and complicating the task to be done? Can one project effectively address such a broad range of concerns? What are the implications with respect to the type of implementing entity needed?
- 3] Has the project's reliance on a multi-entity contractor been appropriate and effective, given the above? Has the contractual arrangement used been best-suited or would a Cooperative Agreement been better? Has the consortium structure used adequately served the project's needs?

B. Program Planning

- 1] Were clear and well articulated (overall) program objectives developed and accepted? Were these consistent with the project's stated purpose? Was an overall strategy formulated and used to guide annual workplan development and implementation?
- 2] Have annual workplans shown sufficient consistency and continuity from year to year? Have there really been unified plans of work, or more a collection of separate workplans by the individual implementing entities?
- 3] Have individual activities collectively reflected a recognition of a broader program, with specified objectives and a strategy for achieving them? Has there been sufficient integration of ideas, concerns and thinking among the several implementing entities in formulating and developing individual activities and annual workplans?

C. Operational Management

- 1] Has the operational management structure of the project proven to be appropriate and effective? What have been its major strengths and weaknesses?

Table C-2, continued

Average Overhead Cost Calculations for All Activities, FY1983-FY1988

(Based on FULL Billing of Professional Project Management Time)

D. USU	Support	Tech Asst	Training	Sp. Stud	Total
Salaries/Fringe	599,317	715,019	445,891	430,577	2,190,804
Travel/Per Diem	40,204	388,295	145,932	93,972	668,403
Other Direct	98,753	1,020,762	131,426	217,468	1,468,409
Equipment	38,270	30,634	1,397	14,682	84,983
Subtotal	776,544	2,154,710	724,646	756,699	4,412,599
Indirect	250,853	646,448	245,302	246,462	1,389,065
CID G&A	73,089	213,113	74,497	73,621	434,320
Total	1,100,486	3,014,271	1,044,445	1,076,782	6,235,984

Revised Calculations

- Direct Costs

Direct Salaries less overhead functions	711,090	399,987	389,798	1,500,875
Travel/Per Diem	411,893	154,109	102,402	668,403
Other Direct	1,078,725	151,510	238,174	1,468,409
Equipment	53,097	9,180	22,706	84,983
Subtotal	2,254,804	714,786	753,080	3,722,670

- Overhead Costs

Direct Salaries less overhead functions	115,877	40,151	41,394	197,423
Fringe Benefits	239,820	127,640	125,046	492,506
Indirect	793,686	296,320	299,059	1,389,065
Subtotal	1,149,383	464,111	465,500	2,078,994

Overhead as %

of Direct Salary	161.6%	116.0%	119.4%	138.5%
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CID G&A	256,012	89,362	88,946	434,320
Subtotal	1,405,395	553,473	554,446	2,513,314
Total, All Payments	3,660,199	1,268,259	1,307,526	6,235,984

Overhead + CID G&A as

% of Direct Salary	197.6%	138.4%	142.2%	167.5%
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Table C-3

## Comparative Analysis of WMS-II Administrative Costs, FY1983-FY1986

	CID/EPD	CSU	Cornell	USU	Total
<b>A. 1983</b>					
Salaries/Fringe	66,694	120,724	84,796	102,938	375,152
Travel/Per Diem	10,500	2,800	13,500	20,000	46,800
Other + Equipment	25,550	78,272	42,000	56,000	201,822
Subtotal	102,744	201,796	140,296	178,938	623,774
Indirect	33,694	59,445	64,013	57,260	214,412
CID G&A	9,499	17,079	13,321	17,893	57,792
Total	145,937	278,320	217,630	254,091	895,978
<b>B. 1984</b>					
Salaries/Fringe	97,157	115,526	91,680	125,663	430,026
Travel/Per Diem	8,400	4,900	12,950	13,000	39,250
Other + Equipment	6,843	42,326	24,926	23,951	98,046
Subtotal	112,400	162,752	129,556	162,614	567,322
Indirect	40,464	58,591	59,113	52,036	210,204
CID G&A	11,240	16,275	12,301	16,261	56,077
Total	164,104	237,618	200,970	230,911	833,603
<b>C. 1985</b>					
Salaries/Fringe	119,400	118,867	88,929	127,338	454,534
Travel/Per Diem	10,000	11,900	12,925	13,000	47,825
Other + Equipment	26,000	28,000	20,565	23,951	98,516
Subtotal	155,400	158,767	122,419	164,289	600,875
Indirect	18,975	57,156	72,394	52,572	201,097
CID G&A	17,435	15,718	12,119	16,265	61,537
Total	191,810	231,641	206,932	233,126	863,509
<b>D. 1986</b>					
Salaries/Fringe	119,400	123,620	86,860	134,724	464,604
Travel/Per Diem	10,000	9,600	13,905	10,500	44,005
Other + Equipment	26,000	31,400	21,500	19,039	97,939
Subtotal	155,400	164,620	122,265	164,263	606,548
Indirect	18,975	65,683	73,704	52,564	210,926
CID G&A	17,435	16,297	12,104	16,262	62,098
Total	191,810	246,600	208,073	233,089	879,572
<b>Percentage Changes</b>					
FY1984/FY1983	12.4%	-14.6%	-7.7%	-9.1%	-7.0%
FY1985/FY1983	31.4%	-16.8%	-4.9%	-8.3%	-3.6%
FY1986/FY1983	31.4%	-11.4%	-4.4%	-8.3%	-1.8%

Appendix D

Lists of Documents and Repeatable Presentations  
for WMS-I and WMS-II

## Appendix D

### LIST OF DOCUMENTS AND REPEATABLE PRESENTATIONS

This appendix contains an annotated list of WMS-I and WMS-II documents. The list is taken from the "Documenting Achievements" section of the WMS-II Draft Final Report (March, 1988). The documents and repeatable presentations marked with a "I" are also found listed in the Completion Report for WMS-I. All other reports and repeatable presentations have been marked with a "II" to indicate they were produced under WMS-I

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## Special Reports

Irrigation Projects Document Review. WMS Report 1. P. S. Coolidge *et al.* Utah State University. 1981.

- Appendix A: The Indian Subcontinent
- Appendix B: East Asia
- Appendix C: Near East and Africa
- Appendix D: Central and South America
- Executive Summary

Irrigation Development Options and Strategies for the '80s. WMS Reports 2-7. Utah State University.

- Nepal. WMS Report 2. T. F. Weaver and H. B. Peterson. 1981.
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- India. WMS Report 6. J. Keller. 1981.
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- Project Review for Bakel Small Irrigation Perimeters, USAID/ Senegal Project No. 685-0208. WMS Report 9. J. Keller *et al.* 1982.
- Evaluation Review of the Water Management Project No. 3830057, USAID/ Sri Lanka. WMS Report 10. J. Keller *et al.* 1982.
- Irrigation Development Options and Investment Strategies for the '80s - Sri Lanka. WMS Report 11. G. Levine *et al.* 1982.
- Ecuador Irrigation Sector Review. WMS Report 12. J. Keller *et al.* 1982.
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- Irrigation Development Options and Investment Strategies for the '80s - Peru. WMS Report 14. J. Keller *et al.* 1984.
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- System H of the Mahaweli Development Project, Sri Lanka: 1983 Diagnostic Analysis. WMS Report 20. J. Jayewardene and M.K. Kikkelly.

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Rapid Mini Appraisal of Irrigation Development Options and Investment Strategies, Tanzania. WMS Report 23. T. Weaver *et al.* 1984.

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Selected Alternatives for Irrigated Agricultural Development in Azua Valley, Dominican Republic. WMS Report 28. G.V. Skogerboe and Anderson. 1984.

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Watering the Shambaa: Current Public and Private Sector Activities in Small-Scale Irrigation Development, Kenya. WMS Report 40. E.W. Coward *et al.* 1986.

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Rapid Appraisal of Nepal Irrigation Systems. WMS Report 43. Lutes *et al.* 1986.

# Documenting Project Achievements

- II. Direction, Inducement and Schemes: Investment Strategies for Small-Scale Irrigation Systems. WMS Report 44. J.E. Nickum. 1986.
- II. Post 1987 Strategy for Irrigation, Pakistan. WMS Report 45. D.F. Peterson. 1986.
- II. Irrigation Rehab: User's Manual. WMS Report 46. R.L. Oaks *et al.* 1986.
- II. The Relay Adapter Card: User's Manual. WMS Report 47. R.L. Oaks and T.S. Steenhuis. 1986.
- II. Small-Scale and Smallholder Irrigation in Zimbabwe: Analysis of Opportunities for Improvements. WMS Report 48. T.H. Podmore, R.J. McConnen and A. Hungwe. 1986.
- II. Design Guidance for Shebelli Water Management Project, Somalia. WMS Report 49. J. Keller, T.F. Weaver and J.S. Mayo. 1986.
- II. Farmer Irrigation Participation Project in Lam Chamuak, Thailand: Initiation Report. WMS Report 50. A.C. Early *et al.* 1987.
- II. Pre-Feasibility Study of Irrigation Development in Mauritania. WMS Report 51. D.J. Thom, D.C. Slack and M.B. Lynham. 1985.
- II. Command Water Management, Punjab: Pre-Rehabilitation Diagnostic Analysis of the Niazbeg Subproject. WMS Report 52. P. Wautenburger. 1987.
- II. Pre-Rehabilitation Diagnostic Study of Sehra Irrigation System, Sind, Pakistan. WMS Report 53. M.I. Haider *et al.* 1987.
- II. Framework for the Management Plan: Niazbeg Subproject Area. WMS Report 54. 1987.
- II. Framework for the Management Plan: Sehra Subproject Area. WMS Report 55. 1987.
- II. Review of the Jordan Valley Authority Irrigation Facilities. WMS Report 56.
- II. Nepal: Intensities of Management. WMS Report 56. E. Martin and R. Yoder. 1987.
- II. Diagnostic Analysis of Parakrama Samudra Scheme, Sri Lanka: 1985 Yala Discipline Reports. WMS Report 57. D. A. Fowler and M. K. Kilkelly (eds.). 1987.
- II. Diagnostic Analysis of Girtale Scheme, Sri Lanka: 1985 Yala Discipline Reports. WMS Report 58. D. A. Fowler and M. K. Kilkelly (eds.). 1987.
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- II. Diagnostic Analysis of Kaudulla Scheme, Sri Lanka: 1986 Yala Discipline Reports. WMS Report 60. D. A. Fowler and M. K. Kilkelly (eds.). 1987.
- II. Diagnostic Analysis of Four Irrigation Schemes in Polonnaruwa District, Sri Lanka: Interdisciplinary Analysis. WMS Report 61. D. A. Fowler and M. K. Kilkelly (eds.). 1988.
- II. Workshops for Developing Policy and Strategy for Nationwide Irrigation and Management Training, USAID/India. WMS Report 62.
- II. Irrigation in Africa: Forum on Irrigation Systems and Research Applications. WMS Report 63. B. D. Lynch (ed.).
- II. Irrigation Rehab: Africa. User's Manual. WMS Report 64. R. Oaks *et al.* 1987.

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Small-Scale Irrigation -- A Foundation for Rural Growth in Zimbabwe. WMS Report 66. Zimbabwe Joint Workshop Team. 1988.

Variations in Irrigation Management Intensity: Farmer-Managed Hill Irrigation Systems in Nepal. WMS Report 67.

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Improving Policies and Programs for Farmer Organization and Participation in Irrigation Water Management. WMS Professional Paper 1. N. Uphoff, R. Meinzen-Dick and N. St. Julien. 1985.

Designing Projects for Irrigation Developments Using External Consultants. WMS Professional Paper 2. E. W. Coward. 1987.

Improving the Management of Irrigated Agriculture: The Management Training and Planning Program for Command Water Management, Pakistan. WMS Professional Paper 3. A. Jones and W. Clyma. 1987.

**Appendix C**  
**Cost Tables**

Table C-1

## Breakdown of WMS-II Expenditures by Institution and Type, FY1982-FY1988

	Technical Assistance	Training/Technology Transfer	Special Studies	Support Activities	Total	Percentage
Colorado State	\$1,411,995	\$2,960,196	\$1,144,960	\$1,545,668	\$7,062,819	39.2%
Utah State	\$3,014,271	\$1,044,445	\$1,076,782	\$1,100,486	\$6,235,984	34.6%
Cornell	\$664,605	\$477,214	\$861,988	\$921,965	\$2,925,772	16.2%
CID	\$581,361	\$288,704	\$280,398	\$651,732	\$1,802,195	10.0%
<b>Total</b>	<b>\$5,672,232</b>	<b>\$4,770,559</b>	<b>\$3,364,128</b>	<b>\$4,219,851</b>	<b>\$18,026,770</b>	<b>100.0%</b>
<b>Percentage</b>	<b>31.5%</b>	<b>26.5%</b>	<b>18.7%</b>	<b>23.4%</b>	<b>100.0%</b>	

Source: WMS-II Tracking System.

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Table C-2

Average Overhead Cost Calculations for All Activities, FY1983-FY1988

(Based on FULL Billing of Professional Project Management Time)

Summary for the Total Project	Support	Tech Asst	Training	Sp Studies	Total
Salaries/Fringe	2,192,736	1,665,604	2,076,422	1,376,071	7,310,833
Travel/Per Diem	177,481	876,686	613,236	392,593	2,059,996
Other Direct	526,124	1,504,085	663,601	564,030	3,257,840
Equipment	79,808	40,612	24,992	32,161	177,573
Subtotal	2,976,149	4,086,987	3,378,251	2,364,855	12,806,242
Indirect	959,868	1,173,963	1,048,580	765,633	3,948,044
CID G&A	283,834	411,282	343,728	233,640	1,272,484
Total	4,219,851	5,672,232	4,770,559	3,364,128	18,026,770

Revised Calculations

- Direct Costs					
Direct Salaries less overhead functions		1,790,841	2,089,339	1,388,993	5,269,173
Travel/Per Diem		953,310	666,296	440,390	2,059,996
Other Direct		1,709,146	851,191	697,503	3,257,840
Equipment		77,831	49,478	50,263	177,573
Subtotal		4,531,129	3,656,304	2,577,149	10,764,582
- Overhead Costs					
Direct Salaries less overhead functions		284,217	257,259	193,936	735,412
Fringe Benefits		476,303	469,938	360,008	1,306,248
Indirect		1,531,842	1,383,201	1,033,002	3,948,044
CID G&A		525,378	440,110	306,996	1,272,484
Subtotal		2,817,739	2,550,507	1,893,941	7,262,188
Total		7,348,868	6,206,811	4,471,091	18,026,770

Overhead as % of Direct Salary	157.3%	122.1%	136.4%	137.8%
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Table C-2, continued

## Average Overhead Cost Calculations for All Activities, FY1983-FY1988

(Based on FULL Billing of Professional Project Management Time)

A. CID/EPD	Support	Tech Asst	Training	Sp. Stud	Total
Salaries/Fringe	373,651	97,916	18,395	14,313	504,275
Travel/Per Diem	59,863	85,967	132,120	98,495	376,445
Other Direct	124,561	326,053	108,064	134,410	693,088
Equipment	15,311	0	0	5,797	21,108
Subtotal	573,386	509,936	258,579	253,015	1,594,916
Indirect	26,052	23,849	6,491	3,936	60,328
CID G&A	52,294	47,576	23,634	23,447	146,951
Total	651,732	581,361	288,704	280,398	1,802,195
Revised Calculations					
- Direct Costs					
Direct Salaries less overhead functions		209,388	78,144	72,860	360,392
Travel/Per Diem		116,217	147,142	113,085	376,445
Other Direct		388,997	139,322	164,769	693,088
Equipment		7,737	3,842	9,529	21,108
Subtotal		722,340	368,451	360,242	1,451,033
- Overhead Costs					
Direct Salaries of overhead functions		35,682	17,720	17,210	70,612
Fringe Benefits		41,662	16,297	15,312	73,271
Indirect		37,014	13,029	10,286	60,328
CID G&A		74,002	36,757	36,192	146,951
Subtotal		188,360	83,802	79,000	351,162
Subtotal, Direct + Overhead		910,699	452,253	439,242	1,802,195
Overhead as % of Direct Salary		90.0%	107.2%	108.4%	97.4%
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CID G&A Transferred from the Universities		451,377	403,353	270,803	1,125,533
Total, All Payments		1,362,076	855,607	710,045	2,927,728
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Table C-2, continued

Average Overhead Cost Calculations for All Activities, FY1983-FY1988

(Based on FULL Billing of Professional Project Management Time)

B. CSU	Support	Tech Asst	Training	Sp. Stud	Total
Salaries/Fringe	784,098	656,873	1,461,101	570,260	3,472,332
Travel/Per Diem	38,288	245,370	296,882	117,772	698,312
Other Direct	214,927	98,337	310,758	100,539	724,561
Equipment	22,168	7,738	23,370	0	53,276
Subtotal	1,059,481	1,008,318	2,092,111	788,571	4,948,481
Indirect	383,440	293,851	652,454	274,750	1,604,495
CID G&A	102,747	109,826	215,631	81,639	509,843
Total	1,545,668	1,411,995	2,960,196	1,144,960	7,062,819

Revised Calculations

- Direct Costs

Direct Salaries less overhead functions	657,399	1,450,000	565,221	2,672,621
Travel/Per Diem	255,169	317,425	125,718	698,312
Other Direct	153,343	426,076	145,142	724,561
Equipment	13,411	35,264	4,600	53,276
Subtotal	1,079,322	2,228,765	840,682	4,148,770

- Overhead Costs

Direct Salaries of overhead functions	75,546	158,380	61,259	295,185
Fringe Benefits	124,601	273,425	106,502	504,527
Indirect	391,984	858,187	354,324	1,604,495
Subtotal	592,131	1,289,991	522,085	2,404,206

Overhead as % of Direct Salary	90.1%	89.0%	92.4%	90.0%
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CID G&A	136,122	270,759	102,962	509,843
Subtotal	728,253	1,560,750	625,047	2,914,049
Total, All Payments	1,807,575	3,789,515	1,465,728	7,062,819

Overhead + CID G&A as % of Direct Salary	110.8%	107.6%	110.6%	109.0%
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Table C-2, continued

## Average Overhead Cost Calculations for All Activities, FY1983-FY1988

(Based on FULL Billing of Professional Project Management Time)

C. Cornell	Support	Tech Asst	Training	Sp. Stud	Total
Salaries/Fringe	435,670	195,796	151,035	360,921	1,143,422
Travel/Per Diem	39,126	157,054	38,302	82,354	316,836
Other Direct	87,883	58,933	113,353	111,613	371,782
Equipment	4,059	2,240	225	11,682	18,206
Subtotal	566,738	414,023	302,915	566,570	1,850,246
Indirect	299,523	209,815	144,333	240,485	894,156
CID G&A	55,704	40,767	29,966	54,933	181,370
Total	921,965	664,605	477,214	861,988	2,925,772
<b>Revised Calculations</b>					
- Direct Costs					
Direct Salaries less overhead functions		212,964	161,207	361,114	735,286
Travel/Per Diem		170,031	47,620	99,185	316,836
Other Direct		88,081	134,283	149,418	371,782
Equipment		3,586	1,192	13,428	18,206
Subtotal		474,663	344,302	623,145	1,442,110
- Overhead Costs					
Direct Salaries of overhead functions		57,111	41,008	74,073	172,192
Fringe Benefits		70,220	52,576	113,149	235,944
Indirect		309,158	215,666	369,332	894,156
Subtotal		436,489	309,250	556,554	1,302,292
Overhead as % of Direct Salary		205.0%	191.8%	154.1%	177.1%
CID G&A		59,242	43,232	78,895	181,370
Subtotal		495,731	352,482	635,449	1,483,662
Total, All Payments		970,394	696,783	1,258,594	2,925,772
Overhead + CID G&A as % of Direct Salary		232.8%	218.7%	176.0%	201.8%

# Documenting Project Achievements

## Other Reports

- Diagnostic Analysis Workshop. D.L. Latimore and L.J. Nelson. 1983.
- Proposed Activities for Developing an Integrated Strategy for Improving Irrigated Agriculture in Northeast Thailand. W.R. Walker *et al.* 1983.
- Rice Irrigation Water Management. R.N. Oad and D.A. Fowler. 1983.
- Women's Roles in Irrigated Agriculture: 1984 Diagnostic Analysis Workshop, Dahod Tank Irrigation Project, Madhya Pradesh, India. P. Stansbury. 1984.
- African Irrigation Overview: The Soils Aspect. T.E. Flack and T.H. Podmore. 1985.
- Economic Policy Toward Irrigation in Sub-Saharan Africa. E. Sparling. 1985.
- Computer Simulation Model for Designing and Evaluating Irrigation Canal Networks. D. Molden. 1985.
- Thailand Irrigation Organization Project: Workplan and Proposals. A. C. Early *et al.* 1985.
- Training Trainers: A Workshop Report. W. R. Laitos *et al.* 1985.
- Training Strategies for International Participants: A Workshop Report. A. G. Madsen and L. M. Madsen. 1985.
- Microcomputer Programs for Irrigation Data Management: User's Manual. T. S. Sheng, D. J. Molden and D. A. Fowler. 1986.
- Reconnaissance of Irrigation Systems in Nepal: A Precursor to the 1985-86 Rapid Appraisal Studies. W. R. Laitos *et al.* 1986.
- Review of Jordan Valley Authority Irrigation Facilities. R. W. Hill and J. Keller. 1987.
- Diagnostic Analysis of Lasbella Subproject, Hub, Pakistan. A. R. G. Baluch *et al.* 1987.
- International Conference on Irrigation System Rehabilitation and Betterment, Vol. 1: Proceedings. M. I. Haider. 1987.
- International Conference on Irrigation System Rehabilitation and Betterment, Vol. 2: Papers. D. A. Fowler (ed.). 1987.
- Proceedings of the Review and Planning Workshop for the Thailand Irrigation Organization Project. W. R. Laitos, K. Paranakian and A. C. Early. 1987.
- A Short History of the Farmer Irrigation Participation Project in Thailand. W. R. Laitos, K. Paranakian and A. C. Early. 1987.
- Diagnostic Analysis of the Warsak Lift Canal, Subproject Area, Northwest Frontier Province, Pakistan. R. L. Tinsley and P. L. Wattenburger. 1987.
- Draft Management Plan for Command Water Management, Lasbella Subproject Area, Hubchowl, Baluchistan. 1987.

## Other Publications

### Brochures

- Diagnostic Analysis Workshop Videotapes
- Interdisciplinary Water Management: A Videotape Package
- Water Management Synthesis Project

### Handbooks

- Circular Concrete Irrigation Turnout: Design and Construction. Handbook 1. T. Trout, W. D. Kemper and H. S. Hasan. 1982.
- Farm Irrigation Structures. Handbook 2. A. R. Robinson. 1983.
- Pumps and Water Lifters for Irrigation. Handbook 3. R. E. Griffin *et al.* 1983.
- Small-Farm, Self-Help Irrigation Projects. Handbook 4. B. L. Embry and N. L. Adams. 1983.

### Manuals

- Diagnostic Analysis of Irrigation Systems, Volume 1: Concepts & Methodology. C. A. Podmore (ed.). 1983.
- Diagnostic Analysis of Irrigation Systems, Volume 2: Evaluation Techniques. C. A. Podmore and D. G. Eynon (eds.). 1983.
- Field Study of Level basin Irrigation: A Manual for Engineers. T. K. Gates and W. Clyma. 1980. (draft).
- Soil-Water Engineering Field and Laboratory Manual No. 1. T. Trout, I. G. Garcia-Castillas and W. E. Hart. 1982.
- Water Management on Small Farms: A Training Manual for Farmers in Hill Areas. L. J. Salazar. 1983.
- Water Management on Small Farms: A Training Manual for Farmers in Hill Areas; Instructor's Guide. L. J. Salazar. 1983. (See Slide Shows.)

### Planning Guides

- Land Leveling, Planning Guide No. 1. D. L. Latimore. 1981.
- Farmer Involvement, Planning Guide No. 2. M. K. Lowdermilk and D. L. Latimore. 1981.
- Irrigation Pumping, Planning Guide No. 3. R. E. Griffin and G. H. Hargreaves. 1982.
- Farm Irrigation Structures, Planning Guide No. 4. A. R. Robinson. 1982.
- Small Farm, Self-Help Irrigation Projects, Planning Guide No. 5. B. L. Embry and N. L. Adams. 1983.

# Documenting Project Achievements

## Videotapes/Slides

### Slide Shows

(available only on videotape.)

- I. **Farmer Organization in Minipe, Sri Lanka.** Nine-minute slide show indicating the success of one irrigation scheme's farmer organization.
- I. **Diagnostic Analysis Workshop.** Eleven-minute slide show about the five-week workshop that the Project has presented in several countries.
- I. **Water Management on Small Farms: Training for Farmers in Hill Areas.** A series of five slide-tapes that explain water management for farmers in hill areas: a companion to *Water Management on Small Farms: A Training Manual for Farmers in Hill Areas*.
- I. **Plant-Nutrient Deficiencies.** Discusses major nutrient deficiencies and their symptoms.

### Videotape Guides

- I. **Diagnosing Problems with Irrigation Conveyance Channels.** T. Trout. 1982.

### Videotapes

- I. **Measuring Conveyance Losses in Watercourses.** T. Trout. Series of tapes discuss how to measure and evaluate water losses. (See *Videotape Guides*)
- II. **Farmer Involvement.** Investigates the need and benefits of involving farmers in all phases of the development process.
- I. **Diagnostic Analysis Workshop.** Shows the process used in the five-week project workshop.
- I. **Research-Development Process.** Discussion of the development model used by Water Management Synthesis II Project.
- I. **Diagnostic Analysis Process.** Outlines the first phase of the development model. This phase is divided into reconnaissance and detailed studies. Flow charts describe the sequence of activities.
- I. **Pakistan: Investments in Water Management.** Discusses the Pakistan Project with slide show of the the project included on the tape.
- I. **Diagnostic Analysis in Gujarat, India.** Examines training program in Gujarat, India.



photo

Caption

**Diagnostic Analysis in Sri Lanka.** An overview of the diagnostic analysis workshop conducted in Sri Lanka in July 1983.

**The Minipe Project.** Looks at how a group of religious leaders organized farmer groups in Minipe, Sri Lanka.

**The Agronomy Series.** Three tapes that examine soil moisture measurements, salt-affected soils, and plant/soil/water relationships.

**The Role of Economics in Diagnostic Analysis.** Discusses the major economic considerations in the diagnostic analysis of a system.

**Diagnostic Analysis Phase I.** Opportunity cost concept.

**Diagnostic Analysis Phase II.** Capitalization, discounting.

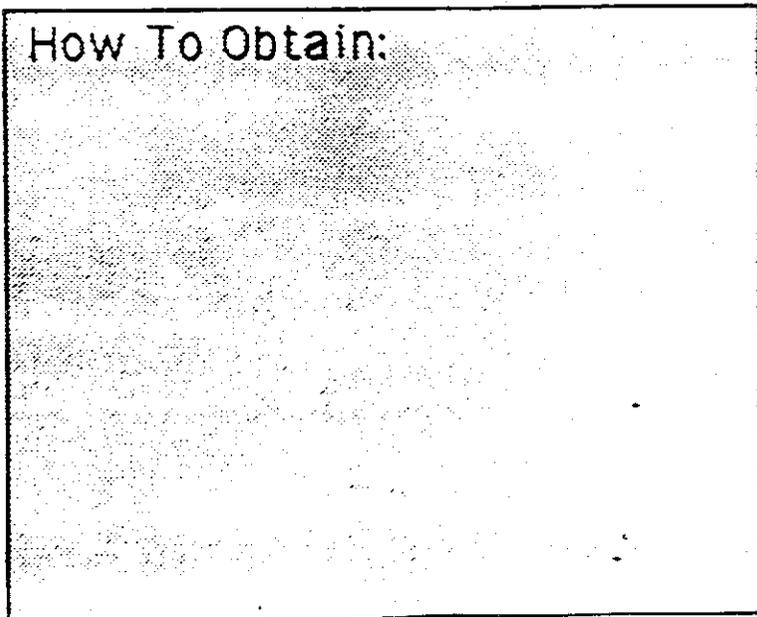
**Farmer Organization.** Describes the necessity of organizing farmers into groups for more efficient water management.

**The Social Organization of Irrigation.** Discusses social processes involved in an irrigation system.

**The Role of Women in Development.** Examines the WID component in understanding the role of women in an irrigation system.

**Exercises in Vision.** Examines the India Training Program and the diagnostic analysis of an irrigation site near Fort Collins, Colorado by 19 Indian participants.

## How To Obtain:



# Documenting Project Achievements

## Working Papers

- Institutional Aspects of Water Management in Bangladesh. H. W. Blair. 1983. II.
- Report of the Three-Week Study in Bangladesh for the Cornell/USAID WMS II Project. J. K. Campbell. 1983. II.
- Minor Irrigation Development in Bangladesh. M. Hanratty. 1983. II.
- Consultancy Report: Water Management Systems Design (Bangladesh). I. R. Khan. 1983. II.
- Bangladesh: Water Management Systems Project Final Report. D. H. Murray-Rust. 1983. II.
- Water Management Systems Project: Interim Report. D. H. Murray-Rust. 1983. II.
- Economic Aspects of Minor Pump Irrigation Development in Bangladesh. L. E. Small. 1983. II.
- Local Organization for Irrigation in Bangladesh. S. Turnquist. 1983. II.
- Shallow Irrigated Agriculture: A Review of French Literature Sources. C. Wells and W. R. Norman. 1984. II.
- Workshop on Research Priorities for Irrigation Management in Asia, Ceylon, Sri Lanka. R. Barker and L. Small. 1985. II.
- Recurring Cost of Irrigation in Asia: Operation and Maintenance. K. W. Easter. 1985. II.
- Gai Oya Water Management Project: Preliminary Report on a Special Study Carried Out in Ampara During Yala 1984. O. Zolezzi. 1985. II.
- Small-Scale Irrigation Technical Assistance in Indonesia: Sulawesi Selatan, Nusa Tenggara Barat, Nusa Tenggara Timur. J. Brewer. 1986. II.
- Social and Economic Influences on Perimeter Management and Operation: Findings from Research in the Maggia Valley, Niger. L. Goldring. 1986. II.
- The Importance of Land Tenure in the Distribution of Benefits for Irrigation Development Projects: Findings from the Cayes Plan, Haiti. L. Reynolds. 1986. I.
- Getting the Process Right: Farmer Organization and Participation in Irrigation Water Management. N. Uphoff. 1986. (Currently available as *Improving International Irrigation Management with Farmer Participation. Studies in Water Policy and Management, No. 11.* Westview Press. II.
- Labor Demand and Employment Generation in Irrigation Systems. R. S. Meinzen-Dick. 1987. II.

**Appendix E**

**Synopsis of Document Quality Review**

## Appendix E

### ASSESSMENT OF DOCUMENT QUALITY: A SYNOPSIS

In order to gain an understanding of the content, quality and significance of the reports and other publications developed under the WMS-II project 29 reports were rapidly reviewed for purposes of this management assessment. These reports represented 28% of total number of written outputs for WMS-II shown in Appendix D. The reports were selected at random. The following items were examined:

- Purpose of report,
- Whether project-related state-of-the-art concepts were applied ("WMS-II State of the Art")<sup>1</sup>
- Overall quality of writing and presentation.

Overall quality of a report ranged between average, good, and excellent. We found no poor reports.

A synopsis of the results of the report review follows.

1. Title: Design Guidance for Shebelli Water Management Report  
Year of Publication: 1986  
No. of Pages: 50  
Purpose: Project design for Shebelli Irrigation Projects  
Key Authors: Keller, Weaver, Mayo  
WMS-II State of the Art: No  
Overall Quality: Good
2. Title: Diagnostic Analysis Workshop  
Year of Publication: 1983  
No. of Pages: 17  
Purpose: Booklet, briefly describing diagnostic analysis training course and benefit.  
Key Authors: Lattimore, Clyma, Nelson, Fitzgerald  
WMS-II State of the Art: Yes  
Overall Quality: Excellent
3. Title: On-Farm Water Management  
Year of Publication: Undated  
No. of Pages: 30

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<sup>1</sup> The review team looked for specific outputs that reflected the contractor's reputation for approaching water management using incisive, and highly analytical methods, many of which are considered to be State-of-the-art, or "at the cutting edge of new science" and were closely related to the WMS-II project itself. Such outputs are termed, "WMS-II State of the Art."

**Purpose:** Describing on-farm water management research development process.

**Key Authors:** Lattimore, Mealler, Rosenbach

**WMS-II State of the Art:** Yes

**Overall Quality:** Excellent

4. **Title:** Farm Irrigation Structures, Handbook No. 2  
**Year of Publication:** 1983  
**No. of Pages:** 100  
**Purpose:** To provide information on small structures used in irrigated agriculture.  
**Key Authors:** Robinson  
**WMS-II State of the Art:** No  
**Overall Quality:** Good
5. **Title:** Water Management Review - Volume 1 - No. 2  
**Year of Publication:** 1986  
**No. of Pages:** 16  
**Purpose:** Newsletter for WMS II  
**Key Authors:** Merkley, Lowdermilk, Early, Lattimore, Freeman and Dearth  
**WMS-II State of the Art:** No  
**Overall Quality:** Good
6. **Title:** Water Management on Small Farms - A Training Manual for Farmers in Hill Areas  
**Year of Publication:** 1983  
**No. of Pages:** 90  
**Purpose:** Teaching guide for use by farmers organizations and extension services.  
**Key Authors:** Salazar  
**WMS-II State of the Art:** No  
**Overall Quality:** Good
7. **Title:** Diagnostic Analysis of Irrigation Systems Volume 1 Concepts and Methodology  
**Year of Publication:** 1983  
**No. of Pages:** 200  
**Purpose:** Detailed description of diagnostic analysis (DA)  
**Key Authors:** Lowdermilk, Clyma, Dunn, Haider, et. al.  
**WMS-II State of the Art:** Yes  
**Overall Quality:** Excellent
8. **Title:** Users Manual for the Pascal Version of the USA Main System Hydraulic Model WMS Report 75  
**Year of Publication:** 1987  
**No. of Pages:** 110  
**Purpose:** Detailed manual for computer operation & programming.  
**Key Authors:** Merkeley  
**WMS-II State of the Art:** Yes  
**Overall Quality:** Excellent
9. **Title:** African Irrigation: An Overview of an Annotated

**Purpose:** Describing on-farm water management research development process.

**Key Authors:** Lattimore, Mealler, Rosenbach

**WMS-II State of the Art:** Yes

**Overall Quality:** Excellent

4. **Title:** Farm Irrigation Structures, Handbook No. 2  
**Year of Publication:** 1983  
**No. of Pages:** 100  
**Purpose:** To provide information on small structures used in irrigated agriculture.  
**Key Authors:** Robinson  
**WMS-II State of the Art:** No  
**Overall Quality:** Good
5. **Title:** Water Management Review - Volume 1 - No. 2  
**Year of Publication:** 1986  
**No. of Pages:** 16  
**Purpose:** Newsletter for WMS II  
**Key Authors:** Merkley, Lowdermilk, Early, Lattimore, Freeman and Dearth  
**WMS-II State of the Art:** No  
**Overall Quality:** Good
6. **Title:** Water Management on Small Farms - A Training Manual for Farmers in Hill Areas  
**Year of Publication:** 1983  
**No. of Pages:** 90  
**Purpose:** Teaching guide for use by farmers organizations and extension services.  
**Key Authors:** Salazar  
**WMS-II State of the Art:** No  
**Overall Quality:** Good
7. **Title:** Diagnostic Analysis of Irrigation Systems Volume 1 Concepts and Methodology  
**Year of Publication:** 1983  
**No. of Pages:** 200  
**Purpose:** Detailed description of diagnostic analysis (DA)  
**Key Authors:** Lowdermilk, Clyma, Dunn, Haider, et. al.  
**WMS-II State of the Art:** Yes  
**Overall Quality:** Excellent
8. **Title:** Users Manual for the Pascal Version of the USA Main System Hydraulic Model WMS Report 75  
**Year of Publication:** 1987  
**No. of Pages:** 110  
**Purpose:** Detailed manual for computer operation & programming.  
**Key Authors:** Merkeley  
**WMS-II State of the Art:** Yes  
**Overall Quality:** Excellent
9. **Title:** African Irrigation: An Overview of an Annotated

Bibliography WMS II Report Thirty-seven

Year of Publication: 1985

No. of Pages: 280

Purpose: Detailed bibliography of irrigation in Africa

Key Authors: Morris, Thom

WMS-II State of the Art: No

Overall Quality: Excellent

10. Title: African Irrigation Overview, Main Report WMS 37

Year of Publication: 1985

No. of Pages: 630

Purpose: Detailed narrative of irrigation practices in Africa

Key Authors: Morris, Thom

WMS-II State of the Art: No

Overall Quality: Good

11. Title: Small Farm Self-Help Irrigation Projects Handbook No. 4

Year of Publication: 1983

No. of Pages: 50

Purpose: Follows history of development of a successful small farm, self-help irrigation program being carried out in Guatamala.

Key Authors: Embry, Adams

WMS-II State of the Art: No

Overall Quality: Average

12. Title: Pumps and Water Lifters for Irrigation Handbook No. 3

Year of Publication: 1983

No. of Pages: 100

Purpose: To provide a general overview and guidance for development without benefit of experienced pump engineers.

Key Authors: Griffin, Hargreaves, Watters

WMS-II State of the Art: No

Overall Quality: Average

13. Title: Water Management News, 1982 Newsletter

Year of Publication: 1982

No. of Pages: 8

Purpose: Various articles on water management.

Key Authors: Clyma, Lattimore

WMS-II State of the Art: No

Overall Quality: Good

14. Title: Designing Projects for Irrigation Development - Using External Consultants

Year of Publication: 1987

No. of Pages: 5

Purpose: Brief description on irrigation development projects with outside consultants.

Key Authors: Coward

WMS-II State of the Art: No  
Overall Quality: Good

15. Title: Irrigation Rehab Users Manual WMS Report 46  
Year of Publication: 1986  
No. of Pages: 45  
Purpose: Presents use of Cornell University Rehab software, originally used for Sri Lanka Water Management Project.  
Key Authors: Oaks, Vandervelde, Steenhuis  
WMS-II State of the Art: Yes  
Overall Quality: Excellent
16. Title: USU Unit Command Area Model WMS Report 71  
Year of Publication: 1987  
No. of Pages: 160  
Purpose: Model provides a framework for formulating guidelines for the selection and development of appropriate irrigation system technologies  
Key Authors: A. Keller  
WMS-II State of the Art: Yes  
Overall Quality: Excellent
17. Title: Improving Policies and Programs for the Development of Small-scale Irrigation Systems WMS Report 27  
Year of Publication: 1984  
No. of Pages: 15  
Purpose: Reviews past project problems and develops a set of initial guidelines for program planners instituting small-scale projects throughout the world.  
Key Authors: Coward  
WMS-II State of the Art: Yes  
Overall Quality: Excellent
18. Title: Project Review for Bakel - Small Irrigated Perimeters Project WMS Report 9  
Year of Publication: 1982  
No. of Pages: 120  
Purpose: Intended to serve as a project review document.  
Key Authors: Keller, Meyer, Peterson  
WMS-II State of the Art: No  
Overall Quality: Good
19. Title: Strategies for Irrigation Development - Egypt WMS Report 42  
Year of Publication: 1986  
No. of Pages: 100  
Purpose: Thorough analysis of present irrigation practices in Egypt with recommendations for future developments.  
Key Authors: Peterson, James, Roberts  
WMS-II State of the Art: No

Overall Quality: Good

20. Title: Post 1987 Strategy for Irrigation in Pakistan - WMS Report 45

Year of Publd help in identifying irrigation development options and investment strategies.

...This resulted in the Project being invitt: No

Overall Quality: Good

21. Title: Review of Irrigation Facilities Operation and Maintenance in Jordan - WMS Report No. 3

Year of Publication: 1984

No. of Pages: 70

Purpose: Review of present status of Jordan Valley Authority Irrigation Facilities with recommendations for future developments.

Key Authors: Keller, Hill, Mickelson, Serpekian

WMS-II State of the Art: No

Overall Quality: Good

22. Title: Small-Scale and Small-Holder Irrigation in Zimbabwe: Analysis of Opportunities for Improvements - WMS Report 48

Year of Publication: 1986

No. of Pages: 50

Purpose: Review of small skill irrigation systems.

Key Authors: Podmore, McConnen, Hungwe

WMS-II State of the Art: No

Overall Quality: Good

23. Title: Pre-feasibility Study of Irrigation Development in Mauritania - WMS Report 51

Year of Publication: 1985

No. of Pages: 100

Purpose: For the generation of a proposal for Agricultural Development of Dirol Plain, Senegal River Valley.

Key Authors: Thom, Slack, Lynham

WMS-II State of the Art: No

Overall Quality: Good

24. Title: Improving the Management of Irrigated Agriculture: The Management Training and Planning Command Water Management Pakistan

Year of Publication: 1988

No. of Pages: 30

Purpose: Review of experience in designing and implementing management improvement efforts, called "The Management Training and Planning Program". Built on results of DA Studies.

Key Authors: Jones, Clyma

WMS-II State of the Art: Yes

Overall Quality: Excellent

25. Title: Improving Policies and Programs for Farmer Organizations and Participation in Irrigation Water Management WMS Professional Paper No. 1  
Year of Publication: 1985  
No. of Pages: 40  
Purpose: Summarizes conclusions of a study on Farmer Organization and Participation.  
Key Authors: Uphoff, Meinzen-Dick, St. Julien  
WMS-II State of the Art: Yes  
Overall Quality: Excellent
26. Title: The Research on Irrigation in Africa - WMS Report 63  
Year of Publication: 1987  
No. of Pages: 85  
Purpose: Series of papers presented at the Forum on Irrigation Systems Research and Application, May 13 to May 15, 1986 at Cornell University.  
Key Authors: Lynch, Ssenyonga, Rukuni, Koita, Bernsten, Horst  
WMS-II State of the Art: No  
Overall Quality: Good
27. Title: Water Management: View to the Future - WMS II Final Project Report (Draft)  
Year of Publication: 1988  
No. of Pages: 30  
Purpose: Summary of WMS II effort with recommendations for follow-up projects.  
Key Authors: Lattimore, Fowler  
WMS-II State of the Art: No  
Overall Quality: Average
28. Title: WMS II Project - End of Project Seminar  
Year of Publication: 1988  
No. of Pages: 60  
Purpose: Presentation to AID-Washington, summarizes findings and significance of WMS II project.  
Key Authors: Coward, Keller, Clyma, McConnen  
WMS-II State of the Art: Yes  
Overall Quality: Good
29. Title: Water Management on Small Farms: A Training Manual for Farmers in Hill Areas  
Year of Publication: 1983  
No. of Pages: 90  
Purpose: Pictorial presentation of Water Management designs for small-scale farmers.  
Key Authors: Salazar  
WMS-II State of the Art: Yes  
Overall Quality: Excellent

**Appendix F**  
**Creation of Expertise**

## Appendix F

### CREATION OF EXPERTISE

The Contract Work Statement says:

..one important objective and activity of this project is that of increasing the quantity and quality of U.S. expertise in irrigation-water management. The importance and need for this stems from the serious shortage of personnel and the necessary discipline and multidisciplinary training needed in water management, along with critical field experience in LDC's, all of which are so crucial in this relatively new professional field.

The present appendix contains pertinent information received from the three universities on this subject.

In his letter of April 20, 1988 (reproduced in full in Appendix H), Dr. Jack Keller writes:

While on the university advantage issue, it should be mentioned that students fulfill two important functions: they provide us with a supply of rather dedicated junior professionals to carry out research in a cost-effective way; but of even more importance, they become trained in the process and available to consulting firms to fill their staffing needs for executing future projects. Projects like WMS-II are particularly good for generating and extending new knowledge, and thus, good for both the universities involved and AID. This is not the case for executing many of the in-country projects or the servicing of TA assignments.

Besides the list of our WMS-II graduate students we have also provided significant support to the expansion of the professional capacity of the USU staff in international development work related to irrigation. Some 26 regular USU professionals in 7 different disciplines have participated in the Project's activities. We have been able to bring mid-level professionals who had gained their experience elsewhere into becoming experienced in irrigation development. This has been done by involving them first in workshop or seminar activities and then into the field with competent practitioners. In addition, and perhaps of even more importance, we have been able to increase the pool of professionals capable of taking leadership responsibilities from an original set of three to eight.

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Through WMS-II indirect (namely overhead return) and direct support we spawned the International Irrigation Center (IIC) here at USU. This is now a well established institution devoted to training and applied research related to irrigation development worldwide. The IIC has spawned satellite Centers in Morocco (training in the French language) and Thailand. In addition WMS-II indirect assistance as indicated in the above paragraph has resulted in establishing an International Center related to rural development focusing on irrigated agriculture. Both USU and CU have similar stories to tell.

WAYNE CLYMA  
March 17, 1988

## DEVELOPMENT OF WATER MANAGEMENT CAPABILITY - CSU

### Introduction

The contract calls for the WMS II Project to develop capabilities in water management by expanding the number of professionals experienced in the WMS II approach. The increase in water management capability was to be accomplished while carrying out the activities of the project. Thus, this note does not document the substantial numbers of host country personnel trained in training programs developed for host country professionals, but those professionals -- U.S. and other countries -- that have increased their capabilities by involvement in the carrying out of WMS II activities. This note provides a summary of the individuals that have developed increased experience in water management through their involvement in project activities.

The categories and a brief explanation of the nature of the activity for documenting the development of water management capabilities are as follows:

#### Increasing the Capability of Host Country Professionals

Some of the major training efforts are reviewed here briefly for host country professionals. No list of persons trained is provided subsequently.

#### Social and Technical Aspects of Irrigation Organizations

This course was taught for senior host country officials, was not started by WMS II, but was funded partially in different amounts, different years by WMS II. Its purpose was to teach interdisciplinary analysis and synthesis of social-organizational and technical problems. Approximately 20 to 30 professionals and some Mission staff received training from this workshop.

#### Diagnostic Analysis Workshops

The Diagnostic Analysis Workshops and the Joint Field Study provided training to host country professionals in the interdisciplinary study of an irrigation system. The 12 different DA studies and one JFS provided training to co-trainers from host countries (5 to 8 in each) and some professionals from other countries (an Egyptian to India, two from Bangladesh to Sri Lanka and an Indian to Bangladesh), but focused on providing training to 20 to 40 host country professionals.

## Computer Training

This emphasis provided training to host country professionals in the use of computers in irrigation and project management. Courses were developed and taught in Sri Lanka, Pakistan and India. A workshop on computer use in irrigation was also held in India jointly with USU. About 15 to 20 host country professionals were involved in each workshop. A course on computer use for irrigation professionals was subsequently taught at CSU, independent of WMS II.

## Increasing the Capability of WMS II Professionals

Developing capability in water management involved many activities, but two primary efforts for CSU were having individuals participate in interdisciplinary field studies. A list of participants in each area is attached.

## Social and Technical Aspects of Irrigation Organizations

The course on "Social and Technical Aspects of Irrigation Organizations" was taught by a senior team and assisted by junior faculty and graduate students. WMS II provided stipends for selected individuals from CSU, CU and USU to participate in the course to gain experience in interdisciplinary field studies and in interdisciplinary analysis and synthesis.

### For Graduate Students:

<u>From Cornell</u>	<u>From CSU</u>	<u>From USU</u>
Bob Johnson	Susan Smolnik	
Connie Johnson	Dave Molden	
Ujjual Pradhan	Lyn Gibson	
Chris Wensley	Pat Wilkens-Wells	
Susan Thompson	Horunur Rashid	

### Junior Faculty

Dr. Deanne Durnford    Dr. Pamela Riley  
Dr. Mark Lusk

## Diagnostic Analysis Workshops

Graduate students were involved as assistant trainers in the DA Workshops as funding was available for their participation. Junior and senior faculty also gained experience through participation as members of a DA trainer team.

### Graduate Students:

Wayne Honeycutt, Agronomy Department, CSU  
Max Donkor, Agricultural Engineering, CSU  
Pamela Stansbury, Sociology, University of Arizona

### Junior Faculty:

Dr. John Baxter, Agronomy Department, CSU  
Dr. Mohan Reddy, Agricultural Engineering, CSU  
Dr. S. Sritharan, Civil Engineering, CSU

### Senior Faculty:

Dr. Terry Podmore, Agricultural Engineering, CSU  
Dr. Brad Parlin, Sociology, USU

## **Developing Capability Through Graduate Education**

The project attempted to provide one graduate student in each of the six discipline areas to support the activities of the project while conducting research on a thesis or dissertation that contributed knowledge in meeting the project objectives. In some instances, the graduate research contributed directly to the objectives of the special studies and more extensive research, including field research in a host country as part of the program. These graduate students were required to perform regular responsibilities under the project, complete specific research responsibilities, and sometimes became involved in project activities where their level of knowledge and expertise would contribute to project objectives. Resources were not available to implement this plan adequately.

### Graduate Students Completing Degrees:

Dr. Robert Mohammed  
Irrigation Engineer  
Associates In Rural Development

Dr. Paul Wattenburger  
Agricultural Engineer  
University Teaching

Dr. Ed Shinn  
Sociologist  
Research Associate  
University

Dr. John Wilkens-Wells  
Sociologist, CSU  
On Assignment in Sri Lanka  
with water management contract

Dr. Kanda Paranakian  
Professor of Sociology  
Kasetsart University  
Bangkok, Thailand

Ms. Vrinda Bandarkar  
(Employed in an Eastern State)

Dr. Rafiq Chaudhary  
Assistant Professor  
Agricultural University  
Faisalabad, Pakistan

Ms. Lynn Gibson  
Assistant Economist  
Federal Reserve Bank  
Kansas City, MO

Mr. Tim Martin  
Vice-President  
Computer Assisted  
Development, Inc.  
Fort Collins, CO

Ms. Pat Wilkens-Wells  
Sociologist, CSU  
On assignment in Sri Lanka  
with water management contract

Dr. M.S. Shafique  
Assistant Professor  
Agricultural and Irrigation  
Engineering Department  
Utah State University  
Logan, Utah

Dr. Dave Molden  
Civil Engineer  
Computer Assisted Development, Inc.  
Fort Collins, CO

Continuing Graduate Students:

Mr. Max Donkor  
Graduate Research Associate  
Agricultural and Chemical  
Engineering Department  
CSU

Mr. Peter McCormick  
Graduate Research Associate  
Agricultural and Chemical  
Engineering Department  
CSU

**Junior Faculty Gaining Experience with WMS II**

The project was required to respond appropriately to requests for assistance. Therefore, management at CSU elected to hire junior professionals in the various disciplines needed by WMS II to accomplish project objectives to enable prompt response, longer resident times in country, be a part of teams involving senior professionals, and develop the capability required by the project. These junior professionals were primarily involved with WMS II, but to varying degrees had responsibilities in the home departments for teaching, advising and other research. They were involved in the teams of other universities, responded to specific requests from missions and AID/W for their services, and eventually served as team leaders for project activities by the end of the project. Some graduate students became junior faculty during the course of the project and appear more than once as a result.

Dr. Robby Laitos  
Project Manager (Sociologist)  
U.S. Agency for International  
Development  
Manila, Philippines

Dr. Mohammed Haider  
Economist  
Associates in Rural Development  
Lahore, Pakistan

Dr. Tom Sheng  
President (and Civil Engineer)  
Computer Assisted Development, Inc.  
Fort Collins, CO

Dr. Larry Nelson  
Research Agronomist  
(Completing arrangements  
with Sheladia and Associates  
for an assignment in India)

Dr. Ramchand Oad  
Assistant Professor (Tenure Track)  
Agricultural and Chemical  
Engineering Department  
CSU

Dr. John Baxter  
Assistant Professor  
Department of Agronomy  
Arizona State University  
Tempe, AZ

Dr. Kerry Gee  
Economist  
Economic Research Service  
U.S. Department of Agri.  
Fort Collins, CO

Dr. Kyung Yoo  
Auburn University  
(formerly Univ. of Idaho)

Dr. Mohan Reddy  
Assistant Professor  
Dept. of Agr. Engineering  
University of Wyoming  
Laramie, WY

Ms. Pat Wilkens-Wells  
Sociologist/CSU  
On assignment in Sri Lanka  
with water management contract

Ms. Darlene Fowler  
Editor  
Technical Journalism Department  
CSU

### Senior Faculty Involvement Through WMS II

In one instance, Dr. Podmore, the faculty member was interested in international development work in irrigation but had limited experience in other countries. WMS II provided the context for him to gradually gain this experience until he was able to effectively serve as a team leader for project activities.

In another instance, Dr. Early, the professional initially serving as a consultant to the project, and because of this involvement, became a department faculty tenure track member with heavy responsibility in WMS II.

In the third instance, some on-going involvement provided related irrigation experience which led to the person becoming a resource for long-term involvement in implementing irrigation development projects.

Dr. Parlin had no specific irrigation experience until he was added as an additional person to a Sri Lanka DA. Dr. Lattimore has gained both international, LDC experience and management experience.

Dr. Terry Podmore  
Associate Professor  
Agricultural and Chemical  
Engineering Department  
CSU

Dr. Alan Early  
Associate Professor  
Agricultural and Chemical  
Engineering Department  
CSU

Dr. Wendell Gwinn  
Agricultural and Chemical  
Engineering Department  
CSU

Dr. Dan Lattimore  
Chairman (formerly Assoc. Proj. Dir.)  
Journalism Department  
Memphis State Univ.

Dr. Brad Parlin  
Associate Professor  
Department of Sociology  
Utah State University

Dr. Duane Johnson  
Associate Professor  
Department of Agronomy  
CSU

### USAID Staff Provided Experience

The project facilitated the assignment of USAID staff to CSU for periods of one year or more to work directly or indirectly with WMS II to gain additional experience in water management.

Dr. Sherry Plunkett  
Project Manager  
Rural Development  
Science and Technology  
Washington, D.C.

Mr. Dennis Wendell  
Project Manager  
Water Management and Training  
Project  
USAID  
New Delhi, India

**PH. D GRADUATES OF AG ENGINEERING - CORNELL  
INTERNATIONAL INTERESTS**

<b>NAME</b>	<b>DEGREE</b>	<b>YEAR</b>	<b>LOCATION</b>
J. Kampan	Ph.D.	1970	World Bank, Washington, DC.
T. Wickham	Ph.D.	1971	Director General IIMI, Sri Lanka
A. Early	Ph.D.	1975	IRRI, Colorado State University
J. Wolf	Ph.D.	1975	DAI, IIMI
S. Miranda	Ph.D.	1975	Director of Res, IIMI, Sri Lanka
R. Oad	Ph.D.	1982	Colorado State University
C. Garces	Ph.D.	1983	Winrock Int., Honduras
H. Murry-Rust	Ph.D.	1983	IRRI-IIMI, Indonesia
M. Svendson	Ph.D.	1983	USAID-IFPI, Washington, DC
P.K. Ng	Ph.D.	1984	IIMI-FAO, Indonesia
A. Saleh	Ph.D.	1985	BUET, Kkaka, Bangladesh
A. Valera	Ph.D.	1985	IIMI, Philippines
R. Yoder	Ph.D.	1986	IIMI, Nepal
C. Wensley	M.S./Ph.D.	1984/88	Research in Philippines
W.R. Norman	M.S./Ph.D.	1984/88	Research in Niger
N. Pickering	M.S./Ph.D.	1983/88	Research in Venezuela
O. Zolezzi-Del Rio	Ph.D.	1988	Research in Sri Lanka
R. Sikkens	M.S./Ph.D.	1986/90	Research in Rwanda
E. Thiessen	M.S./Ph.D.	1986/90	Research in Nepal
T. Moya	Ph.D.	1989	Research in Philippines
R. Johnson	Ph.D.	1989	Research in Pakistan

GRADUATE STUDENTS WHO HAVE WORKED ON WATER MANAGEMENT SYNTHESIS II PROJECT

Mohamed Ait Kadi	Created new institution of irrigation training in Morocco
Rachid Abdellaoui	Teaching at the Institut Hassan II in Morocco and developing new institution applying main system management in Morocco
Anisa Divine	Has been on long-term assignments in India and Pakistan
B. Mulik	Teaching in India
M.M. Sawant	In line to be professor on various teams
Kurt Lonsway	In demand in development. Working for Africare
Francis Gichuki	Planning to return to his University and work on development in Kenya and Africa
Andrew Keller	In demand as consultant; called upon through USAID worldwide
Hubert Eisele	In process of finishing PhD.
Gary Merkley	On staff at USU and in demand for technical assistance
Willem Vlotman	Working in development for Louis Berger
Amala Jayasakara	Returned to host organization in Sri Lanka
Thomas Cronkite	In demand for developing irrigation training materials worldwide
Bill Lowrey	Returned to finish degree and plans to be in development
Ken Boutwell	Working in telecommunications as professional
Elaine Campanella	Using skills for technology transfer
Earl Rouse	In private practice developing training modules
Boubkar Essafi	Teaching at Institut Agronomique in Morocco
Philippe Zgheib	Getting degree and has developed proficiency in translating technical materials

Bruno Gerard

Getting degree and has developed proficiency in translating technical materials, and will do it in development of agriculture

Glen Dobbs

Computer software company and has done extensive programming in irrigation design

Tom Tenney

Worked on Guatemala field evaluation of sprinkler irrigation development (do not know present whereabouts)

Diane Hernandez

Do not know present whereabouts

**Appendix G**

**Comments of Dr. Richard McConnen on LBII's Submission,  
"Preliminary Notes on Overhead Rates"**

## Appendix G

### COMMENTS OF DR. RICHARD McCONNEN

On March 2, 1988, LBII circulated to CID and the universities a preliminary analysis of the costs of WMS-II, translating the university overhead rates (based on all direct costs, according to accounting conventions applicable to the universities) into overhead rates based on direct labor alone. The final form of this analysis is presented in Chapter Three of this report and in the Cost Tables set out in Appendix C.

Dr. McConnen served as CID's Executive Project Director for WMS-II during the second half of the project. His comments on LBII's preliminary analysis are contained in a memorandum of 10 March 1988 to Harvey Lerner, LBII's Team Leader. This memorandum is reproduced on the following pages.



# Water Management Synthesis Project

## Executive Project Director

Consortium for International Development 5151 E. Broadway, Suite 1500 Tucson, AZ 85711-3766  
(602) 745-0455 TWX 910-952-1102

10 March, 1988

To: Harvey Lerner

copies - UPD's, CID & Fitzgerald

From: Dick McConnen - EPD - WMSII

*Dick McConnen*  
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Subject: Response to Your Draft "Cost Analysis", March 2, 1988

### I. Introduction:

I discussed your March 2, 1988 memo with Carter Brandon on Friday (4 March, 1988) and studied your memo over the weekend. I'm now in better shape to respond to your memo than was the case when we discussed it briefly on the evening of 2 March, 1988. As I mentioned then, I'll not redo any of Carter's calculations. I will instead concern myself with the assumptions that Carter used in his analysis. I've discussed most of these ideas with Carter and you may already be aware of the nature of my response. We distributed the memo to CID and the UPD's when I arrived in the office on Friday, 4 March, 1988. I've sent the same people a 7 March, 1988 draft of this memo for review before sending the final version to you.

This memo is based on the assumption that the statement in the first paragraph on page 3 of your memo which reads " - - - a multiplier of 2.5 - - - to estimate private contractor overhead costs." should read contractor total costs.

I think there are two basic sets of issues raised in your memo which need to be examined with more care. The first deals with the comparative cost advantage of Universities and consulting firms for different kinds of work with AID. The second set deals with issues which are somewhat more specific in nature including the use of the information from the WMSII Tracking System reports.

### II. Comparative Cost Advantages - Universities and Consulting Firms

As you state, "---the evaluation team was asked to assess the cost-effectiveness of the project's management and overhead activities." While this is the team's assignment, I think the more relevant (and difficult) assignment would have been to look at the cost-effectiveness of the entire project.

#### Managing universities:

Dr. Wayne Clyms  
Colorado State University  
University Services Center  
Fort Collins, CO 80523  
(303) 491-6991; TWX 910-930-9011

Dr. E. Walter Coward  
Cornell University  
Rural Sociology, Warren Hall  
Ithaca, NY 14853  
(607) 256-3163; TWX 937478 CORNELL ITCA

Dr. Jack Keller  
Utah State University  
Dept. of Agricultural & Irrigation Engineering  
Logan, UT 84322  
(801) 750-2787; TWX 3789426 UTAHSTATEU LOGN

This is particularly true since the indirect cost rates for the Universities and CID are a by-product of the way Universities define those expenses on which they will be paid indirect costs. As you know, a government audit determines the indirect cost pool which is allowable as a basis for determining total allowable indirect costs. The indirect cost rate reflects the average indirect costs which are allowable given the way in which the direct cost base is defined. Indirect cost rates are therefore a type of "average cost" pricing and there are well known economic problems associated with average cost pricing. Universities generally use a broader base to distribute indirect costs than do private consulting firms. The argument from Universities, as I understand it, is that the broader the base, the more equitable the distribution of indirect costs across a wide range of projects. Even if this contention is correct, no one would argue that there is an absolutely "right" way to allocate "joint costs." Indirect costs are by in large joint costs for if they weren't, it would make more sense to allocate them as direct costs. Despite the theoretical problems, it is generally accepted that the use of an indirect cost rate is a workable way to deal with the problem of billing an agency such as AID for indirect or joint costs.

If University indirect cost rate were changed so it would be based only on direct salaries, the total allowable indirect costs for the University would not change, but the indirect cost rate would show a significant increase. If a particular project had the average direct cost distribution for the University (in terms of salaries, benefits, travel, equipment etc.), such a change would have no effect on the total indirect costs paid on that project. However, if the project had a relatively lower portion of the total direct costs in the form of salaries, the total indirect costs charged to that project would decrease. The total indirect costs for some other project with a relatively high portion of the total direct costs in the form of salaries would increase. If such a change in procedures resulted in a significant change in the mix of projects under contract to the University, there would eventually be a change in the University indirect cost rate (the price based on the "average cost" of indirect costs).

In the short run, the University indirect cost rates would probably not change. At the individual project level, the impact of "average cost" pricing could be much different from project to project. If indirect cost rates were to hold in a "bidding war" between Universities and consulting firms, in the short run (all else being equal - which it never is) Universities would "win" contracts where salaries would be a high portion of total cost and consulting firms would "win" contracts where salaries would be a low portion of total cost. Would this be a "good" outcome in economic terms? Economists would argue, "Probably not." since "average cost" pricing is not an effective procedure to use if you want to capitalize on the comparative advantage of Universities and consulting firms. Unless the joint costs are covered in the long run, neither the Universities nor the consulting firms can stay in the "aid business."

The potential for this same kind of problem arises when you compare the overhead costs for different types of Activities within WMSII. For example, most WMSII TA Activities required more travel than most SS Activities. This can be seen below by comparing travel and per diem costs as a percent of salary and benefit costs for each University for Technical Assistance and Special Studies for Closed-Out Activities.

Un.	Technical Assistance	Special Studies
CSU	50%	15%
CU	80%	11%
USU	57%	22%

AID could shift TA Activities to private consulting firms. In the short term, individual AID Project Managers may feel that such shifts would be financial advantageous. However, such a shift would be in response to the "average cost" pricing scheme designed by the Federal Government itself and would not be based on the comparative advantage of either Universities or private consulting firms. While such a shift might be to the short term financial advantage of AID, there is no indication that such a shift would have an impact on the total cost of AID's programs in the longer run, since indirect cost rates for both Universities and consulting firms would be adjusted as the result of government audits to determine allowable indirect cost to reflect the change in mix of projects under contract. Economics says that there would be no basis to conclude that such a change in mix of projects would result in the better use of either Universities or private consulting firms to accomplish the objectives of AID.

This may seem like an "How many angels on the head of a pin?" argument, but it is important as the issue deals with "Who does what?" This issue should be resolved on some basis other than an "average cost pricing" analysis of indirect cost rates. One approach would be an analysis of total direct costs of comparable activities even though this approach would not deal with the quality of output issue. Another and I think more productive approach, would be not to approach the University-consulting firm issue as an either/or issue but rather as an issue of how a collaborative approach might be better for all concerned.

In the real world and in the short run, Universities and consulting firms do often bid against one another. Costs are often a factor in determining who wins such a bid. In my opinion, that's as it should be, but only if those costs are appropriately configured. I think there are enough methodological problems with the cost analysis in your memo of 3 March, 1988 so that I'd be reluctant to conclude that consulting firms have a cost advantage over Universities with technical assistance (TA) activities and to build this conclusion into the design of the follow-on project. I'd be particularly reluctant to reach that decision since I think we have evidence that in the case of WMSII, there has been a real complimentary relationship between TA, TR & TT and SS Activities. I would not argue that the management structure of WMSII be replicated in the follow-on project. I would argue that regardless

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of what kind of organization is awarded the follow-on project, it would not be wise to segment the project, even in a defacto sense, by type of activity. Such a segmentation would greatly diminish the chance to exploit the complementarity which exists among the different types of activities.

### III. Specific Issues of Concern in the 2 March, 1988 Memo

A. The Use of Information from the WMSII Tracking System: I think that Carter has a good working understanding of the nature of the information contained in the WMSII Tracking System reports. However, there is one inappropriate use of information which could have an impact on your conclusions. Exhibit C, "Closed Out Activities" contains 81% of the expenditures under Administration Activities, but only 71% of the expenditures for substantive activities. This occurred because it is easier to close out an Administrative Activity shortly after the close of the fiscal year during which the activity was initiated than is the case for other activities which may have such things as AOC's outstanding and which were designed to continue beyond the fiscal year during which the activity was initiated. The use of Administration expenditures for closed out Activities in this way is one of the reasons for the difference between "Effective Overhead Rate" (Pg. 2, 2 March memo) for Closed-Out (147%) and FY88 Activities (118%). If you weighted the Closed-Out rate by .71 and the FY88 rate by .29, the average "Effective Overhead Rate" would be 138.9%. I wouldn't argue that's the right number; it's merely a different conclusion using the same type of methodology which leads to a different conclusion than you reached. This would result in changes in the information presented on page 4, but I haven't tried to determine what the numerical consequences would be. There is also a discrepancy caused by the fact that the \$202,223 expenditures in Exhibit B (all from substantive activities which are not closed-out and not part of the FY88 Workplan) do not appear to be included in the calculations of the 3 March memo.

B. TA Activities: You state on page 3, "-- -- universities' general comparative advantage -- -- not in providing Technical Assistance -- -- in terms of cost as well as in terms of technical ability to field teams on a relatively short term basis -- --." The cost issue has already been discussed and as I've already stated, I'm not certain your conclusions on that score are solid. I've already talked about this item with Carter. Our problem is not with short term field teams. If we have adequate lead time, we can put first rate teams in the field drawn largely from University staff. Because of the nature of the University planning time table, we often find it difficult to respond with a short lead time and come up with a first rate field team comprised primarily of University staff.

C. Comparative Duties of UPD's, EPD etc.: I don't have much first hand knowledge of how consulting firms allocate the cost of support activities. However, based on my knowledge of University overseas contracts, the UPD's and EPD have a job that more closely corresponds to chief-of-party and campus coordinator. Such overseas projects also have a full component of secretarial and

accounting support. These costs are billed as direct costs to the project. I've been on evaluation teams looking at overseas contracts run by consulting firms and it is my impression that they function in much the same way as University contracts in terms of direct administrative costs. The Universities (and CID) provide general support and supervision which is not billed directly to the project. I'm not certain what the appropriate adjustments should be in order to be able to compare University and consulting firm support costs. I am certain that the 100% Reduction (pg. 4) is far too high and I expect the 50% reduction is also too high. If such comparisons are to be made, the assumptions need to be checked very carefully. I expect fairly careful case studies are called for before such information should be used by decision makers. However, as your memo indicates, such studies could provide AID administrators with information that could help them make better decisions.

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# Water Management Synthesis II Project

Department of Agricultural and Irrigation Engineering  
Utah State University Logan, Utah 84322-4105  
(801) 750-2787

April 20, 1988

Mr. Harvey Lerner  
Louis Berger International, Inc.  
1819 H Street N.W.  
Suite 900  
Washington, DC 20006

Dear Harvey:

Included herein are some review comments pertaining to your preliminary Executive Summary of the Water Management Synthesis II Project assessment. I have already visited about most of these comments with you by phone, but as you mentioned it is always best to get things down in writing -- it is good to articulate them carefully. So, here goes:

1. I don't feel competitors have eroded the lead we had in multidisciplinary analysis. But, rather by virtue of our very own TA, TT and TR activities and, if you may, networking we increased the knowledge base or pool of informed professionals. Now it is to the point where it would appear on the surface that we no longer have our initial advantage.

I do not believe this to be the case as we have now progressed beyond the initial level of diagnostic analysis (DA). The CSU and Maryland group have reached into new areas by involving the managers in their DA approach. Here at USU we have evolved a different approach which we call performance analysis (PA). Furthermore, we have a good start on articulating the PA approach as a result of our Irrigation Experience Transfer (IET) activity. (I am forwarding some material on this, namely a little table outlining it and a chapter from the IET activity.) The critical difference between the DA and PA approaches is that the DA takes a clinical view of the situation at hand looking for what is wrong with the irrigation system and how to fix it, while the PA takes a managerial view, looking for what is right and how to extend it.

2. The fact that we have the capacity and inclination to integrate our thinking and articulate (or codify) the results of it to teach others testifies to one of the uniqueness or advantages of universities. Being academics we know our mission is to research, teach and extend both old and new knowledge. While we do market knowledge and are competitive in doing it, we do not try to possess or hold knowledge in bondage for our exclusive use as a consulting firm might.

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This is different than consulting firms, while it is true that they would take a contract to generate new knowledge, they would only tend to do it under contract, but hardly for the sake of doing it because it was something needed. On the other hand university professionals get advanced for their successes in developing and extending new knowledge.

While on the university advantage issue, it should be mentioned that students fulfill two important functions: they provide us with a supply of rather dedicated junior professionals to carry out research in a cost-effective way; but of even more importance, they become trained in the process and available to consulting firms to fill their staffing needs for executing future projects. Projects like WMSII are particularly good for generating and extending new knowledge, and thus, good for both the universities involved and AID. This is not the case for executing many of the in-country projects or for ordinary servicing of TA assignments.

Besides the list of our WMSII graduate students we have also provided significant support to the expansion of the professional capacity of the USU staff in international development work related to irrigation. Some 26 regular USU professionals in 7 different disciplines have participated in the Project's activities. We have been able to bring mid-level professionals who had gained their experience elsewhere into becoming experienced in irrigation development. This has been done by involving them first in workshop or seminar activities and then into the field with competent practitioners. In addition, and perhaps of even more importance, we have been able to increase the pool of professionals capable of taking team leadership responsibilities from an original set of three to eight.

Through WMSII indirect (namely overhead return) and direct support we spawned the International Irrigation Center (IIC) here at USU. This is now a well established institution devoted to training and applied research related to irrigation development worldwide. The IIC has spawned satellite Centers in Morocco (training in the French language) and Thailand. In addition WMSII indirect assistance as indicated in the above paragraph has resulted in establishing an International Center related to rural development focusing on irrigated agriculture. Both CSU and CU have similar stories to tell.

3. I have trouble with the way you have done your cost per unit of output analysis. Not knowing the procedure used I can't put my finger on it but it doesn't seem to me you take into account: the

**Appendix H**

**Comments of Dr. Jack Keller on LBII's "Pro Forma  
Executive Summary"**

## Appendix H

### COMMENTS OF DR. JACK KELLER

On March 10, 1988, LBII circulated to CID and the universities a "Pro Forma Executive Summary" which indicated the main thrust of the management assessment team's thinking following completion of the main interviews, but before completion of analysis and the writing of text.

Dr. Jack Keller, the University Project Director for USU provided comments on the preliminary executive summary, first orally and then in writing. A letter of April 20, 1988 to Harvey Lerner contain his comments. Dr. Keller's letter is reproduced in the following pages.

matter of training and also utilizing graduate students in a professional capacity, professional journal articles, the building of institutions like the IIC, the development of audio-visual materials, the cost realities of putting on workshops and seminars, and the inherent high cost of research.

4. It seems you missed one very important point and that is the complementary nature of TA, TT, TR, and SS. Assuming that you buy the premise that universities have a special advantage in the SS and TR activities, then one must also conclude that it is important to also do TA. The important interactions between the TA and the others is that through TA we have gained important insights into what does work and what needs further study. Separating this field contact from the development of new insights is obviously problematic. Even if it isn't always apparent, knowledge and training that is separated from practice isn't worth much. I could say more about the synergistic nature of wrapping TA, TT, TR and SS activities together but the above should be sufficient.
5. The matter of synthesis is a tangled one. I believe this is because by virtue of the process it takes place at different levels. Obviously a great deal of synthesis must have taken place in the doing of the various Project tasks. In addition, synthesis took place in that we individually and collectively synthesized what we learned as we proceeded and utilized this "new knowledge" in our continuing efforts. The big question is, where is the so called "grand synthesis" and how well did the three universities do in synthesizing their collective experiences and SS activities?

Well, the answer to the first part of the question is that there is no grand synthesis and probably never will be, for it is not within the nature of irrigation development. I feel we do have a positive answer for the second part and that is through the Irrigation System Management (ISM) Triad activity (and perhaps to a lesser extent through the other Triad activities) we did create a synthesis of major SS activities at all three universities. (I have attached at least some of the material you requested on this ISM Triad activity.) I had covered this area in my discussions with your Team and did present it in outline form at the Grand Debriefing to AID/Washington which you attended. However, I realize with the information you have and even with what I'm sending, you can only rely on faith to be a believer in it.

6. I am in support of a collaborative management style which requires consultation to be effective. I fully realize it is difficult to pull off, and we certainly had our problems in working with the forms of it or manner in which we chose. However, there is no evidence

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that it failed or was not superior to any other form of management we could have chosen. I can certainly imagine other management systems as having produced less desirable results.

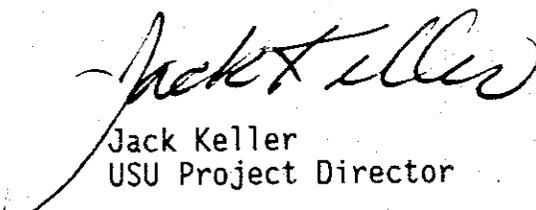
The important thing is that we were always all individually and collectively committed to making the Project a success. We used different approaches, but that kept more options open and made each of us continuously aware of potential improvements and promoted philosophical flexibility. Also, it gave the Project more inherent strength because we had a larger pool of mentally (or at least emotionally) committed resources to draw from.

Modern approaches to management call for this very collaboration I am talking about. In fact that is what we are asking of the farmer clients of irrigation schemes and the irrigation agency. Furthermore, for WMSII, AID itself relied on such a management strategy. The trick is, how can we hold meaningful collaboration in place in a more cost effective and less painful way. Perhaps you can help do this. I think your dialogue on the management issues is interesting. I can find a bit of what happened with our management of WMS II in each of the alternatives you presented.

I realize now that the management style we had and the way we carried it out was too personality sensitive. But, this may be due as much to not paying enough attention to building ourselves into a "true community" at the beginning as to the design of the management system. Perhaps we drifted too far apart and didn't spend the needed time to get our thinking together sufficiently in the first place!

Well, that's about all for now. Good luck on putting the finishing touches on the Assessment. I enjoyed meeting and visiting with you in Washington. Thanks for your help and advice on our inputs to the WMS II Project Debriefing.

Best regards,



Jack Keller  
USU Project Director

JK/ss

Attachements

- 2] Has the procedure of operating under annual workplans been efficient? Would a longer and/or more flexible planning/operational horizon have been more practical? Should individual activities be fully-funded regardless of their duration? Should activities be approved on a when-needed and when-proposed basis rather than at pre-designated annual intervals?
- 3] Has the activity tracking system used over the latter part of the project been effective in meeting monitoring and reporting requirements relative to the programmatic and the financial status of separate activities as well as to the project as a whole?
- 4] Has there been effective cooperation and collaboration between contractor and A.I.D. Project Management, on the one hand, and among the various contractor entities on the other? What have been the project's biggest stumbling blocks as well as its positive attributes?
- 5] Have management costs been reasonable, given the nature of the activities involved and the types of management structure required? Are these costs in line with those of other projects of this nature?

D. Progress and Achievement

- 1] Is the overall purpose of the project being achieved? Will the outputs called for be produced? Has the project been successful in attracting and servicing Mission buy-in requests for assistance? Do action research achievements add up to a meaningful accomplishment?
- 2] Has the project been effective in synthesizing "lessons learned," documenting this experience and disseminating findings to Missions, host-countries and others?
- 3] What are the project's most important achievements? What are its greatest shortcomings? What can be learned from its experience regarding design, implementation, operations, and development impact?