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SECOND QUARTERLY ACTIVITIES REPORT
ON THE
COOPERATIVE AGREEMENT NO. 391-0467-A-00-1818-00
IRRIGATION RESEARCH

PART I: IRRIGATION SYSTEM MANAGEMENT RESEARCH PROJECT

PART II: MANAGEMENT SUPPORT FOR CANAL OPERATIONS AND MAINTENANCE

PART I

IRRIGATION SYSTEM MANAGEMENT RESEARCH PROJECT

INTRODUCTION

After a contentious start brought about primarily by the reduced level of funding available vis-a-vis the expectations of the participating institutions, the implementation of the Cooperative Agreement has gained momentum during the quarter (December 1991 to February 1992) being reported. The meeting of the Advisory/Coordination Committee on the Irrigation System Management Research (ISM/R) Project component held early this year resolved a number of outstanding issues and came up with decisions that have contributed greatly to much smoother and more fruitful interactions among all parties concerned.

PROGRESS OF ACTIVITIES

The chronology of interaction visits and meetings in implementing the ISM/R component of the CA given in Attachment A describes the progress of activities on all facets of the implementation. These include workplan preparation, signing of sub-grant MOUs, provision of technical assistance, and procurement of equipment. The meeting of the Advisory/Coordination Committee held in early January facilitated the step up implementation.

The Advisory/Coordination Committee met on 8 January 1992 in the office of the Chief Engineer (P&I), WAPDA to decide on a number of issues that had arisen since it last met about a year ago. The meeting was chaired by Mr. Asif H. Kazi, Chief Engineering Advisor, Government of Pakistan. On the allocation of funds until June 1993, it was confirmed that the amount of US$ 0.850 million is available for equipment procurement, establishment and works. On the reimbursement of expenditure for the period January 1991 to July 1991, the Chair decided that reimbursement claims submitted by WAPDA and PARC should be sorted out for payment. Expenditure reimbursement requests incurred beginning 1 August 1991 will be submitted as usual to the Federal Coordinator (ISRP), with a copy to IIMI, for onward transmission to USAID. On the closing date of the ISM/R Project, except for WAPDA field research activities which will end in June 1992, the rest will continue until end May 1993. Even for WAPDA, analysis of data and report writing will continue till end May 1993 while the advisory services of IIMI will be utilized simultaneously. On the activities being undertaken by IIMI-Pakistan under the Cooperative Agreement and on the request of

the Chair and with the resolution of outstanding issues, IIMI promised to accelerate the pace of providing technical assistance and, hopefully, in coming up with useful results. On the sub-grant MOUs between IIMI and the participating agencies, the Chair requested that the signing of MOUs be expedited.

Immediately after the meeting, PARC indicated that it was ready to sign an MOU with IIMI. The MOU was signed by the two parties on 14 January 1992 and approved by USAID on 22 January 1992. Except for some questions on the equipment procurement, the MOU with WAPDA was also set for signing.

Both PCRWR and the SID are still finalizing their individual workplans. The newly installed leadership at PCRWR was given an opportunity to revise and integrate the separate workplans for its four subprojects, namely, the National Documentation and Library Information Network (NADLIN), the Competitive Grants Program (CGP), Encouraging Water Users Involvement in Better Water Management (EWU), and Surface Drainage and Water Table Control (SDWTC). Joint visits by IIMI and USAID to the Soil Mechanics and Materials Testing Laboratory in Karachi and the Hydraulics and Soil Mechanics Laboratory in Hyderabad during the later part of February provided the impetus for some movement in the preparation of the workplan for the upgrading of the two laboratories.

IIMI's provision of technical assistance, which was emphasized by the Chief Engineer (P&I), WAPDA during the meeting of the Advisory Committee, has been greatly accelerated. IIMI has organized technical assistance teams, each with a lead person, for each subproject. Attachment B presents a table illustrating the technical assistance scheme. As an example, the subproject on Farm Water Management which is being conducted by Mona and LIM has Dr. Kijne as the lead person for a team with three other members. After an initial introduction to the staff of the participating institutions, these teams have now been able to initiate different regular interaction modes for most of the subprojects. This is particularly true with respect to subprojects being done by PD(S), WCMED, SMO and LIM for WAPDA, and PARC. More work needs to be done to regularize the interaction on the subprojects under Mona, PCRWR and the SID.

The technical assistance is envisioned to be in the nature of providing to participating institutions advice in the conduct of the various activities such as workplan preparation, data collection and analysis, writing of research results and reports, reviewing research equipment required, and formulating post ISM/R research proposals on irrigation system management. Training of research staff to enhance their capabilities in doing research and in disseminating research findings is another important aspect. In this regard, the participation of the IIMI teams in reviewing reports currently being prepared by the PD(S) on the improvement of

→ to scatter or spread widely, promulgate extensively -

karezes and by the WCMED on the evaluation of the OFWM II has been useful in facilitating the teams' working relationship with staff involved with the agencies' mainstream activities. It also has made it possible for the teams to understand better the expertise and level of preparation of the staff being trained.

On equipment procurement, the list for PARC has been finalized and endorsed to USAID. Since WAPDA has opted not to acquire additional equipment, the only remaining lists still being considered are those from SID and PCRWR.

PROBLEMS

Consideration of the activities being proposed to be undertaken by the PCRWR under the CA has proved to be problematic because of the unresolved issue on expenditure reimbursement. The various meetings being held between IIMI and PCRWR, sometimes in the presence of the USAID Project Officer, to consider the technical features of the four subprojects (NADLIN, CGP, EWU, SDWTC) have helped in defining the financial dilemma. In the case of the upgrading of the laboratories of the SID in Hyderabad and Karachi which is a new addition to the ISM/R project, IIMI's role in this subproject is only now being understood by the SID since it was dealing solely and directly with USAID earlier. The recent joint visits of IIMI and USAID, hopefully, have been helpful in encouraging SID to submit the needed upgrading workplan. Due to travel restrictions in Balochistan, IIMI expatriate advisers are continuing to experience constraints in visiting the field sites of the PD(S) in the province.

FUTURE PLANS

IIMI plans to further intensify technical assistance as it develops suitable working modalities with the various participating Pakistan organizations. Visits to the cooperating organizations of PARC located in four provinces and northern areas as well as to field research sites of PD(S) in Balochistan will be done in April. Finalization of workplans, including equipment lists and specifications of the PCRWR and SID prior to the signing of sub-grant MOUs, is expected within the next quarter.

Attachment A

CHRONOLOGY OF INTERACTION VISITS AND MEETINGS IN IMPLEMENTING THE ISM/R COMPONENT OF THE CA

Date	Description of Interaction
27 November	Meeting with Mr. Muhammad Saleem Bashir, designated staff member from IWASRI to liaise with IIMI on the CA implementation, regarding latest and proposed activities under ISM/R component of the CA
29 December	Meeting with Messrs. Jan Emmert and Jalil U. Ahmed at the USAID-Islamabad regarding progress of CA implementation
8 January	Meeting of Technical Advisory Committee of the CA at the office of the Chief Engineer (P&I), WAPDA, which was chaired by Mr. Asif Kazi, the Chief Engineering Adviser
14 January	Meeting with PARC in Islamabad re: signing of subgrant MOU between PARC and IIMI, and with USAID regarding equipment procurement procedures
9-22 January	Visit to Planning Directorate (South) field research sites in Balochistan
26 January	Meeting with the Deputy Director (Planning) regarding details on the WAPDA ISM/R Workplan for 1991-92
28 January	Discussion with research staff of the Watercourse Monitoring and Evaluation Directorate (WCMED) regarding the collection and analysis of field data on watercourses along distributaries
6 February	Meeting with PD (S) to discuss and formalize the mode of IIMI's provision of technical assistance on the Outside the Indus Basin subproject
11 February	Meeting with Dr. Bashir Chandio, Acting Chairman of the PCRWR, and Mr. Jalil U. Ahmed regarding the preparation of a consolidated workplan for the subprojects on NADLIN, CGP, EWU, and SDWTC
17 February	Meeting with WCMED to discuss and formalize the mode of IIMI's provision of technical assistance on the Beyond Watercourse Improvements subproject

18-19 February	Visit of IIMI's technical assistance team to Mona Reclamation Experimental Project (Mona) to discuss and formalize the mode of interaction with Mona staff on the subprojects on Integrated Watercourse Management and Farm Water Management
19 February	Meeting with the Scarp Monitoring Organization (SMO) to discuss analysis of tubewell deterioration
20 February	Meeting with SMO to discuss and formalize IIMI's provision of technical assistance on the subprojects of Development of Ground and Surface Water Models and Public and Private Tubewell Performance
23-24 February	Meeting in the company of the USAID Project Officer with the Sindh Irrigation Department (SID) in Karachi and Hyderabad regarding the preparation of workplan for the subproject on the Upgrading of the Soil Mechanics and Hydraulics Laboratories in Karachi and Hyderabad
24-25 February	Joint visit with the USAID Project Officer to field research and campus sites of both the Lower Indus Water Management and Reclamation Research Project (LIM) and the Drainage and Reclamation Institute of Pakistan (DRIP) to review studies being carried out under the ISM/R Project and to meet with research staff regarding IIMI's provision of technical assistance
2 March	Meeting with PCRWR in Islamabad to discuss revised workplan on the subprojects on the NADLIN, CGP, EWU, and SDWTC and to formalize IIMI's provision of technical assistance to the subprojects

Attachment B

TECHNICAL ASSISTANCE FOR THE ISM/R COMPONENT OF THE USAID-CA

Research Area/Title of Study	Principal Investigator (Agency)	IIMI Staff Providing T.A.
A) Integrated Watercourse Management:		
1. Mechanized construction and maintenance of earthen watercourse.	MONA[xx] / LIM	Senen M. Miranda[x]
2. Buried pipeline for watercourse		M. Akhtar Bhatti
3. Water supply augmentation with fractional tubewells.		Erik van Waijjen
4. Effective water distribution in watercourse command.		E.J. Vander Velde
5. Matching cropping pattern with water supply.		Carlos Garces
6. Monitoring irrigation water flows in a sub system.		
7. Development and testing of tile drainage and reuse of drainage water.		J.W. Kijne
B) Farm Water Management:		
1. Water management strategies for areas with poor drainage.	MONA / LIM	J.W. Kijne[x]
2. Use of brackish groundwater for crop production.		Marcel Kuper
3. Irrigation and nitrogen fertilizer management.		Senen M. Miranda
4. Biotic and chemical reclamation of sodic soils.		M. Akhtar Bhatti
5. Salt balance at root zone.		

Research Area/Title of Study	Principal Investigator (Agency)	IIMI Staff Providing T.A.
C) Beyond Watercourse Improvements:		
1. Training of the directorate's staff in quantitative, socio-economic, and salinity evaluation methods.	WCMED	D.T. Bandaragoda[1] Zaigham Habib Pierre Strosser J.W. Kijne E.J. Vander Velde
2. Features of watercourse. 3. Existing flows in watercourses as compared to design discharge.		Senen M. Miranda M. Akhtar Bhatti Erik van Waijjen
D) Irrigation Systems Outside the Indus Basin		
Karez Irrigation 1 Monitoring and evaluation of improved karezes Abdul Hakim, Khanozai, and Jungle Bundat. 2. Preparation of plan for rehabilitation and improvement of karezes in Balochistan. 3. Effect of Karez improvement on cropping pattern, intensity and yield of crops. 4. Effect of phosphorus on onion yield irrigated with saline sodic water of Abdul Hakim Karez. 5. Improvement of Kala Cheena Karez. 6. Improvement of Tungi karez and monitoring. 7. Effect of delay action dams in Ziarat valley on karez discharge and its economic evaluation.	SPD	Carlos Garces[1] M. Akhtar Bhatti Pierre Strosser Marcel Kuper Senen M. Miranda E.J. Vander Velde
Salaba Irrigation 1. Monitoring and evaluation of improved salaba scheme of Hamid-ullah and Nali Killi (Loralai)		

Research Area/Title of Study	Principal Investigator (Agency)	IIMI Staff Providing T.A.
Well Irrigation		
1. Monitoring and evaluation of different advanced irrigation systems installed by using dugwell in kuchlak.		
Other Studies		
1. Installation of low head bubbler in Mastung area for increasing irrigation efficiency.		
Northern Areas		
1. Experimental improvement of one irrigation scheme in Northern area and its monitoring.		
E) Development of Ground and Surface Water Models.		
1. Solute Transport Model Study of Allahabad Unit SCARP-VI.	SMO	Mohammad Nadeem[1] Senen M. Miranda Zaigham Habib M. Akhtar Bhatti
2. Development of a General Purpose Finite Difference Two dimensional digital model.		
F) Public and Private Tubewell Performance		
1. Development of computerized data base for public tubewells.		
2. Identification of causes of tubewell deterioration through data analysis.	SMO	E.J. Vander Velde[1] Zaigham. Habib M.A. Bhatti J.W. Kijne Senen M. Miranda
3. Development of tubewell rehabilitation techniques.		
4. Investigation of causes of early deterioration of tubewells.		

Research Area/Title of Study	Principal Investigator (Agency)	IIMI Staff Providing T.A.
G) Improving Efficiency of On-farm Water Use and Application		
1. Improving efficiency of on-farm water use through effective and efficient border irrigation procedures	PARC (UAF, SAU***) (UE, MONA)	Senen M. Miranda* M. Akhtar Bhatti Marcel Kuper J.W. Kijne
2. Improving efficiency of on-farm water use through sprinkler and drip irrigation	PARC (NARC, ARI) (ARINA)	Senen M. Miranda* M. Akhtar Bhatti Marcel Kuper J.W. Kijne
3. Management strategies for improving efficiency of water use under farmer managed irrigation systems	PARC (NARC) ( )	Senen M. Miranda* M. Akhtar Bhatti Marcel Kuper J.W. Kijne
H) National Documentation Center, Library and Information Network (NADLIN)	PCRWR	D.T. Bandaragoda* Erik van Waijjen Senen M. Miranda
I) Competitive Grants Program (CGP)	PCRWR	D.T. Bandaragoda* Erik van Waijjen Senen M. Miranda
J) Encouraging Water Users Program (EWU)	PCRWR	D.T. Bandaragoda* Erik van Waijjen Senen M. Miranda
K) Surface Drainage and Water Table Control Program	PCRWR	J.W. Kijne Senen M. Miranda
L) Soil Mechanics and Hydraulics Lab Karachi and Hyderabad	SID	Senen M. Miranda* Bagh Ali Shahid M. Akhtar Bhatti J.W. Kijne

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* Lead Person

** Principal Investigators (Agencies)

MONA - Mona Reclamation Experimental Project
LIM - Lower Indus Water Managenent and Reclamation Research Project
WCMED - Watercourse Monitoring and Evaluation Directorate
SPD - Planning (South) Directorate
SMO - SCARP Monitoring Organization

PARC - Pakistan Agricultural Research Council
PCRWR - Pakistan Council of Research in Water Resources
SID - Sindh Irrigation Department

*** Research Institutions Collaborating with PARC

UAF - University of Agriculture, Faisalabad
SAU - Sindh Agriculture University, Tandojam
UE - Engineering University, Peshawar
ARI - Agricultural Research Institute (Deciduous Fruit Development Project), Quetta
ARINA - ARINA, Gilgit
MONA - Mona Reclamation Experimental Project
NARC - National Agricultural Research Centre

30/3/93

PART II

MANAGEMENT SUPPORT FOR CANAL OPERATIONS AND MAINTENANCE

INTRODUCTION

The first quarterly report submitted in December, 1991, specified the schedule of activities (attached) for this component of the Cooperative Agreement.

Computer-based simulation modelling is a particularly cost effective method to observe canal flow behavior under varying conditions, facilitating the identification of necessary changes likely to produce improved system performance. Such models, when calibrated for a given channel, can be used to evaluate the results of different operational plans before implementation; calibrated for design parameters, they can predict operational limits or identify constraints to achieving operational objectives; they are useful tools for training system operators in new management procedures. A flow simulation model, IIMI Rajbah, specific to Pakistan's canal irrigation environment comprises the core of this effort to develop a Decision Support Package (DSP) for improved canal operations and maintenance.

When complete, the DSP will comprise tested tools and procedures, based upon computer modelling of existing distributary canal hydraulic conditions, capable of predicting with reasonable accuracy the impact of different operational and maintenance inputs upon water distribution equity and reliability at the outlet. Irrigation Department officers at the canal operations level will be able to use DSP outputs to better allocate scarce resources and other managerial inputs, to more effectively achieve canal maintenance and operational objectives.

PROGRESS OF ACTIVITIES

The following activities were under taken during this quarter:

1. In consultation with the Punjab Irrigation Department, "representative distributary" pilot testing of the DSP computer model now will be undertaken using Pir Mahal distributary (Bhagat sub-division, Lower Gugera division, Lower Chenab Canal system) instead of using the Fordwah Branch canal (Fordwah Canal system, Bahawalnagar Canal Circle), as previously reported.

2. Re-calibration of the IIMI-Rajbah (I) model was completed for Lagar distributary. (Lagar distributary is in Farooqabad sub-division, Upper Gugera division, LCC, under the administrative control of Chief Engineer, Faisalabad zone. Previous IIMI research has demonstrated a pattern of persistent inequitable and unreliable water deliveries to Lagar distributary watercourses. Extensive and detailed hydraulic data are now available for this distributary.) Distributary flow simulations were performed under different operation scenarios and an optimal solution was sought using data obtained from a hydraulic survey completed before annual closure was initiated in mid-January, 1992. Maintenance activities (desilting, etc.) carried out by the PID during the 1992 annual closure period will be compared to those proposed based upon the optimal solution. Lagar distributary operations also will be monitored during the next quarter to assess the results of those maintenance activities and to compare actual with predicted performance changes.

3. A hydraulic survey of Pir Mahal distributary was implemented prior to annaul canal closure in mid-January. Extensive, heavy maintenance activities on Pir Mahal were completed by the PID during the closure period. Following resumption of canal operations in late February and the stabilization of supply conditions in the channel, its resurvey was initiated in mid-March and is still in progress. (Pir Mahal has 4 off-taking minors and 50 turnouts (outlets) along the main channel alone; hence, an extensive hydraulic survey is required for model calibration.)

4. Programming work to simplify IIMI Rajbah (I) and to make it more appropriate and user friendly (essential to a DSP) continued. These include: improved sub-routines to better handle screen display and numerical output for graphic files, elimination of non-essential input and output files, sub-routine development to permit user to select between metric and English units, inclusion of formula for canal seepage losses with capability to modify coefficients for canal reach conditions, and modifications of screen messages.

6. IIMI's research program in Sri Lanka also has had a canal modelling and decision support package component on which work began several years ago. IIMI Pakistan was able to draw upon that extensive experience through the visit in February of Mr. Jacques Rey, Irrigation Engineer, and coordinator for the IIMI (Sri Lanka) research project to improve the management capability of the Sri Lanka ID in the Kirindi Oya scheme. Mr. Rey worked extensively with the IIMI Pakistan DSP team in identifying an appropriate framework and suitable methodologies for initiating training of professional canal staff in using decision support tools.

7. An internal seminar was held at IIMI Pakistan on February 9th for program staff to review the comparative strengths and

weaknesses of several canal simulation models currently being used in different IIMI research programs. The purpose was to highlight the strengths and weaknesses of these models for accurately simulating conditions and problems of canal maintenance and operations in Pakistan (Punjab). Models reviewed were IIMI Rajbah (I), Pakistan; MODIS, Delft, The Netherlands; and RBMC, Sri Lanka.

8. From March 2nd thru March 4th, the first phase of a collaborative program of joint discharge measurement with the Punjab ID was implemented in Bhagat sub-division, Lower Gugera division. Nine ID irrigation engineers of the division were trained in current metering and calculation of discharges for structure calibration. Part of a larger program of management interventions or improvements designed to enhance the ID's field level system management capabilities, this activity also links directly to the Cooperative Agreement component of management support for canal operations and management. Accurate and timely information on canal flow conditions is central to taking effective system management decisions. Previous IIMI research has identified the general absence of such a capability at the sub-division and division levels in the ID. This activity is designed to mobilize significant departmental energies to enhance the quality of basic management information at the operational level, in the very location where pilot testing of the DSP will be undertaken later this year.

PROBLEMS

There are no problems with implementing this component of the Cooperative Agreement that need highlighting at this juncture.

FUTURE PLANS

IIMI anticipates following the work plan for this CA component submitted with first quarterly report. A small workshop for selected engineers of the Punjab ID focusing upon issues in more effective canal system maintenance is being planned for the 4th quarter period, mid to late-July 1992.

SCHEDULE OF ACTIVITIES

ACTIVITY	1991					1992												1993				
	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M
1. Study of Project Document.	X	X	X	Completed ----------																		
2. Recruitment of national staff (Principal Irrigaiton Engineer		X	X	Completed ----------																		
3. Further development of mathematical model for hydraulic performance of controlled irrigation systems.		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X						
				(In Progress)																		
4. Field testing of model on pilot project area of Pir Mahal distributary, Lower Chenab East Canal Circle, Faisalabad.			X	X	X	X	X	X	X	X	X											
				(In Progress)																		
5. Preparation of Report on "guidelines" for improved management of canal operations and maintenance.				X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		
									(In Progress)													
6. Holding of a series of small workshops for senior engineers of Irrigation Dept. on maintenance management for improving canal operations.													X	X	X	X						
7. Training for 15 Executive Engineers and Sub-divisional Officers of I&P's in the use of management support package.																		X	X			
8. Reporting Progress Reports.			X					X				X				X				X		
9. Final Report Preparation.																				X	X	