PROJECT ASSISTANCE COMPLETION REPORT

MADHYA PRADESH MINOR IRRIGATION PROJECT

(386-0483)

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I. INTRODUCTION

India's growing demand for food and fiber makes it essential that there be corresponding increases in agricultural production. Due to limited new land availability and climatic factors, irrigation holds the greatest potential for increasing agricultural productivity. Reliable and timely supplies of water to the farmer permit higher yields from existing crops, higher crop intensities through multiple cropping and shifts towards higher value crops. The Government of India (GOI), under successive five year development plans, has invested and will continue to invest heavily in irrigation. Given the national priority irrigation development holds, it is important that irrigation systems be efficiently designed, constructed and operated. Moreover, there is a need to ensure that these systems are properly maintained and that water resources are equitably and efficiently distributed among farmers. In July 1983, AID initiated the Madhya Pradesh Minor Irrigation (MPMI) Project, to improve the efficiency of surface irrigation in minor irrigation schemes through improved technologies and management systems. Madhya Pradesh was chosen as the state which could most benefit from improved planning, design and management training in minor irrigation systems at that time.

II. PROJECT GOAL AND PURPOSE

The goal of the project was to raise rural incomes by providing productive on-farm employment opportunities. The original purpose was to increase irrigation "efficiency" at the farm level through improved technologies and management systems; however, the purpose was altered in 1987 to the following: to increase irrigation "coverage and performance" through improved technologies and management systems (Because a system could be efficient without necessarily optimizing productivity -- performance was seen as a more inclusive indicator of project success).

The project identified the following components to encourage and support the development of a more demand-based irrigation system, one which would be more responsive to the farmers' needs and effective in raising agricultural productivity:

- Construction of Minor Irrigation Schemes (MIS): This component was designed to assist the State Government of Madhya Pradesh (GOMP) to plan, design, and construct 50 MISs (sub-projects).
- Technical Assistance: Three categories of technical assistance were to be provided under this component: (1) a U.S. institution would provide a resident long-term U.S. water management specialist and short-term consultants to assist the Government of India (GOI) and the GOMP in defining and carrying out field studies and training activities; (2) local consultants would provide assistance in designing sub-projects and assist in the monitoring and evaluation of sub-project performance; and (3) an Indian consulting organization would provide specialized consulting advice on the control pilot projects.
- Training: Under this component, specialized professional development and training programs would be organized for personnel drawn from the State Departments of Irrigation and Agriculture. A training program for farmers would also be developed to teach proper operation and maintenance of the system.

III. PROJECT HISTORY

The MPMI project represents the first AID financed minor irrigation project in India. The project, authorized in July, 1983, obligated USAID funding of $46 million (loan funds of $41 million and grant funds of $5 million). The Government of Madhya Pradesh (GOMP) was to provide $35 million towards the construction costs and technical services, as well as budgeting the equivalent of $5 annually per irrigated hectare for operation and maintenance costs. Originally planned as a six year project, it was extended three times with a final project completion date of June 30, 1992, with an AID expenditure of approximately $44.75 million.

By virtue of their smaller scale and location, i.e., primarily in remote, hilly areas, with a high proportion of low income tribals and scheduled castes, minor irrigation schemes represented a unique set of challenges and constraints, both technological as well as social. Each MIS commands less than 2000 hectares of cultivable land, and as such a smaller number of farmers are served by each minor scheme, implying more opportunity and responsibility for operation and maintenance by users.

A major lesson learned from past irrigation project evaluations in Asia had been that water management issues must receive as much attention as infrastructure. This was recognized in the project and farmers were to be encouraged to participate in the planning, design, operation and maintenance of the system.

The MPMI project had implementation difficulties and a low disbursement rate during the first three years. Because of perceived deficiencies in the original project design, an internal review in 1987 led to submission and approval of a project paper amendment which was intended to accelerate project activities, tie project disbursements more closely to project objectives, and incorporate modifications and clarifications in technical criteria. In addition, a performance based disbursement system (PBD) was adopted as a management tool for all of the loan and most of the grant disbursements. A total of 44 benchmarks were established, 25 for disbursement of loan funds, and 19 for disbursement of grant funds.

In May 1990, a USAID funded evaluation was completed to assess the progress in the MPMI project, focusing on the period since June 1988 (the date of the GOI's acceptance of the PBD system) and on the nature and extent of progress in terms of achieving the goals and objectives stated in the project paper, as amended. While it noted

that the PBD "has been partially successful in promoting the achievement of the objectives of the project, there were a number of areas in which additional attention should be focused during the remaining life of the project so as to maximize the long-term, beneficial impact of the project."

The team found that the results of efforts to improve the design and construction processes for minor-irrigation sub-projects was impressive. They concluded that the "quality of planning, design and construction appears to be considerably better on the USAID-assisted sub-projects than that found on non-USAID-assisted sub-projects." Improvements had been achieved through better appraisal, monitoring and quality control for sub-projects by the Government of Madhya Pradesh/Water Resources Department (GOMP/WR). The project appraisal units produced detailed reports which led to better engineering designs of system components. Preparation of the reports and implementation of their findings provided useful training for GOMP/WR personnel. Systems were being constructed which had improved technical capacity to provide water to fields on a timely basis. However, while 46 sub-projects had thus far been incorporated into MPMI, none had yet been completed.

The evaluation team also found that 36 of the 46 sub-projects were in tribal areas, yet no special provisions had been made in the project design or implementation to accommodate the differences in social structure as a result of tribe or caste variations. Active involvement of the GOMP Tribal Welfare Department in project planning and implementation would be beneficial in this regard. Also, no PBD benchmark was directed at organizing functioning sub-project water users associations except in the Gadigaltar pilot project, which was not representative of the rest of the irrigation systems in the project.

The team also noted that while one of the objectives of the MPMI project was to foster active coordination between GOMP/WR and GOMP/Agricultural Department (AD) on sub-projects, the GOMP/AD had yet to play a significant role in any sub-project.

Finally, the team found the PBD system excessively complex with too many benchmarks. Only 18 out of the 44 benchmarks had been met. Experience to that date showed that while PBD benchmarks had been used to "persuade" the GOI and GOMP to move in certain directions and adopt institutional changes in the narrow confines of the project, they had not been sufficient in themselves to assure the transfer and replicability of such changes outside the project.

The team made the following recommendations:

--USAID and GOI should revise current benchmarks, drop benchmarks found to be inappropriate and/or not directly linked to achievement of major project objectives and revalue the benchmarks which remain up to the full value of the remaining loan/grant funds.

--Increased assistance should be given to GOMP/WR to ensure adequate attention is given to the substance and content of all non-engineering project activities. Economic expertise should be provided to GOMP/WR to understand and implement proper financial and economic analysis. A training program should be established and implemented, consisting of a water user association organizer and a process documenter, to be involved in communities ready for irrigation. Two courses should be developed to introduce GOMP/AD and WR personnel to the socio-cultural aspects of irrigated farming systems and to introduce engineers to the agronomic requirements of irrigation management.

--A pilot project should be funded to organize water user associations in one or two communities ready for irrigation.

IV. PROJECT STATUS AND ACCOMPLISHMENTS

Based on the mid-term evaluation USAID/I found that fewer irrigation systems should be constructed, farmers should participate more fully in the project, and the State departments should coordinate and cooperate in the designs. It was also decided that the GOMP needed to make several major policy and practice changes to create institutional capacity. In addition, since the evaluation indicated that a number of PBD benchmarks would not be completed by the project completion date, USAID decommitted $10 million in funds earmarked for those benchmarks. The benchmarks which were dropped included (1) completion of identified hydrological investigations and field studies, (2) construction of demonstration blocks and pilot projects and (3) completion of all systems and delivery of water to 75 percent of the command area.

To facilitate the proposed changes, a number of Supplementary Benchmarks were agreed upon by the GOMP and USAID to solidify/institutionalize the project techniques accomplished to that date. They were designed so that, through GOMP policy changes, institutional and curricula development and action research would greatly reinforce the establishment of sustainable linkages between the Water Resources Department and the proposed water user associations/farmer organizations. The benchmarks were novel in that they were tied to an institutional plan for applying the project's innovative techniques to a number of non-project minor irrigation schemes in MP. The new benchmarks addressed many of the mid-term evaluation recommendations. Specific criteria were adopted against these new benchmarks to measure performance and verification of fulfillment.

Three Supplemental Benchmarks (SBMs) were adopted. They required:

(1) the GOMP to develop and form guidelines for: (a) the planning, design and construction of systems beyond the public outlet, (b) system monitoring, operational planning and maintenance, (c) performance testing procedures and (d) a rotational water supply system;

(2) the Water Resources Department was required to establish an inter-departmental working group to facilitate participation of the Department of Agriculture, Department of Tribal Welfare and the WALMI in the project by working out collaborative procedures; and (3) the institutionalization of development and the establishment of farmer organizations/water user associations.

It is clear that the PBD system was the major managerial innovation in the revised MPMI project. When the project emphasis was shifted in June 1988 from reimbursements against construction of dams and canals to a PBD mechanism, project implementation improved significantly. While only two schemes had been completed by 1990, seven years after the start of the project, in the next two years tremendous progress was made. By the project completion date, 20 MISs were completed, with another 26 under construction. The GOMP plans to have 15 completed by June 1993 and another 11 completed by June 1994. (See Attachment 'B' for a list of MISs which have been and are to be completed, and Attachment 'D' for a list of planned versus actual outputs.)

Technical and Policy Innovations: Through the four pilot project activities, the project has achieved the following major technical improvements:

(a) The scheme at Khor has introduced a buried Poly Vinyl Chloride (PVC) pressurized pipe technology (PPT) as an alternative to conventional surface channel network below the outlet. This pilot project has created considerable interest among GOMP/WR engineers. The PVC pipe system represents one of the technical innovations which is being extended to other non-project minor irrigation schemes. Ten non-project MISs using the PVC pipe system are planned for construction in 1992-93. The PPT model is being extended to other project schemes as it is increasingly finding acceptance with GOMP/WRD officers and the farmers since there is no land acquisition problem, which has often caused delays in project implementation. In addition, the cost per meter is 20 - 60 percent less than other models with less required maintenance. About 27 schemes, covering 10,684 hectares will have PPT systems below at least one outlet;

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(b) The Gadigaltar sub-project introduced a major innovation, an "on-demand" flexible supply system, with farmer's participation, utilizing a level-top canal, in addition to buried low pressure concrete pipes;

(c) The Raipura scheme demonstrates the impact of land development for irrigation efficiency and improved productivity;

(d) the fourth pilot sub-project, Ghorapachhar, served as an adaptive research site for the GOMP/ID, GOMP/AD and the Water and Land Management Institute (WALMI) at Bhopal;

The innovation of performance testing, as required in the Supplementary Benchmarks, is especially noteworty in this project. Introduced in the USAID/I Maharastra Minor Irrigation Project, this system was also adopted by the MPMI project. It determines, through actual trial, if the works have been designed and completed as intended and are capable of dependably delivering an adequate and timely supply of irrigation water throughout the system. The psychological effect on the farmers is the most significant immediate benefit of adoption of this system. Traditionally, farmers, on initial introduction to irrigation works by an agency, refuse to attempt irrigated agriculture for several years, or until the reliability of the system is seen as sufficient. Witnessing assured delivery via the performance testing system, however, resulted in the immediate subscription of the system.

The MPMI project, along with the two other minor irrigation projects in the USAID portfolio, (Maharashtra Minor Irrigation and Hill Areas Land and Water Development) realized the long standing but previously elusive goal of involving command area farmers in opting for construction of their respective systems. Following involvement in the design process, they were involved in all subsequent construction and operation activities. The result was the application of a bottom to top approach in which water for the most remote fields of the command area was first provided, thereafter progressing toward the reservoir, assuring adequate irrigation water to all beneficiary farmers.

Reliability of quantity of supply through delivery system, a second tenacious problem, was achieved by basing reservoir capacity on the extent of the demand given a variety of probable cropping patterns and dependable climatic data. Ultimately guidelines incorporating this process were drawn up and accepted as standard operational procedures by the GOMP.

The increased responsiveness of the GOMP to project innovations along with sound technical and administrative contributions from the Liaison and Coordination Unit (LCU) contributed significantly to the improved project performance. The LCU, managed by a private consulting firm under a projct funded USAID direct contract, provided technical assistance and monitored the field activies of the MISs. The progress in Madhya Pradesh was also based on farmer participation and the successful introduction of new technologies (such as the PPT system) which are becoming equally popular with the farmers and officials. The pipeline network, farmer operated, was implemented by a private agency. This achievement is largely attributable to USAID-LCU-GOMP/ID's collaborative effort and holds the potential for breakthroughs in Indian irrigation systems, showing promise of increased private sector involvement.

Sustainability: The upgrading of skills through USAID assisted schemes at various levels in the GOMP, i.e., improvements in the procedures for planning and designs, ensuring quality construction, improved system operation, increased cost-effective experiments such as PPT systems, the demand based pilot irrigation scheme and the clear indication of GOMP's financial and technical commitments to construction and below outlet activities involving farmers all support project sustainability. In addition, 53 officers were trained in the U.S. and 2,246 received in-country training (originally envisioned as 40 and 1,525 respectively), which resulted in upgrading their skills in water management and irrigation related

issues. The greater number of trained personnel established and enhanced recognition of project introduced technologies.

Another large factor contributing to project sustainability is the fact that the GOMP/WRD has adopted the design criteria developed under the project for the entire Madhya Pradesh minor irrigation sector. In October, 1991 the GOI developed an investment strategy according to which about 16 percent of development plan funds will be earmarked during the GOI's Eighth Five-Year Plan to construct distribution systems below the public outlet on ten ongoing/new projects covering about 10,800 hectares. The GOMP has implemented a policy shift away from administering water to managing water per farmers' needs and accordingly has developed a strategy for farmer participation in decision making and operation and management of irrigation systems. An inter-departmental working group consisting of the secretaries of the Water Resource Department, Department of Agriculture and Tribal Welfare Department was formed to coordinate the irrigated agriculture support activities on a sustainable basis. GOMP is also interested in consolidating AID project inputs on the schemes and using them as replicable models/training ground for future non-USAID projects.

V. LESSONS LEARNED

1. The MPMI project demonstrates the usefulness of redesign in a project. At the time of initial design, it is difficult to ascertain a project's complexities. The first redesign, the introduction of the PBD mechanism, in lieu of the cost-reimbursement system, accelerated the project's progress. Another redesign effort, the introduction of supplementary benchmarks, strengthened the institutional and policy base for farmer oriented irrigation systems. The success of the PBD system is dependent upon a simple

application method with fewer rather than more benchmarks. Moreover, the criteria for measuring performance should be quantified in such a way that is appropriate and practical for the implementing agency.

2. It was commendable that the project selected a deserving target area, namely the remote tribal areas of M.P., which have traditionally been underserved. However, by virtue of the target area being remote and populated with a tribal population having a complex traditional culture, the social aspects/constraints probably needed as much attention as the technological considerations. The project did not make adequate provisions for the appointments of social scientists to strengthen the social components of the project. Consequently, the farmer organizations were not as successful as they could have been. Although the mid-term evaluation team noted this shortcoming, the time available was insufficient to make drastic field level changes. However, the GOMP has since utilized short-term social scientists' inputs in addition to ensuring farmer participation at all stages in new schemes.

3. Delays in the project were largely caused by the lack of both public and private sector capacity in the areas of proposed technology introduction. Problems of land acquisition and changes in GOMP personnel were also instrumental in causing delays, chronic to India's bureaucratic system. However, the performance based disbursement procedure focused favorably on institutional issues and helped reorient attitudes and actions, largely contributing to the project's ultimate successes.

VI. MISSION FOLLOW-UP ACTIONS

Since follow-on technical assistance to the Gadigaltar subproject will be provided by the Irrigation Support Project for Asia and the Near East (ISPAN) buy-in currently being negotiated, no mission follow-up actions are necessary.

SPECIAL COVENANTS

1. The Cooperating Country agrees to carry out and use detailed soil and topographical surveys for planning the irrigation and drainage network.

STATUS: As of 06/92, surveys were being carried out and used for irrigation planning and topographical surveys,

2. The Cooperating Country agrees to establish a special Demonstration Chak Unit within the Agricultural Department of the Government of Madhya Pradesh and to staff such unit to coordinate and manage the demonstration chaks.

STATUS: The special unit was not established; however the Demonstration Chaks were coordinated and managed by the Agriculture Departmental staff posted in various regions.

3. The Cooperating Country agrees to establish an adequate number of positions within the Irrigation and Agriculture Departments and to post experienced, qualified staff to those positions at the field level, to implement all project activities satisfactorily and in accordance with the project schedules and budgets established for approved subproject MISs.

STATUS: As of 06/92, adequate construction staff and quality control units were in position.

4. The Cooperating Country agrees to appoint Project Managers from either the Irrigation or Agriculture Department for the Operation and Management of subprojects (in groups of three or four) and ensure timely, reliable and equitable water deliveries.

STATUS: As of 06/92, schemes are being operated by officers from the Water Resources Department and irrigation scheduling through the Agriculture Department and farmers is resulting in timely, reliable and equitable water deliveries.

5. The Cooperating Country shall exercise every reasonable effort to require each person trained under the project to work in activities related to the project or in activities approved for financing under the project agreement, in India, for not less than three times the length of time of his or her training program.

STATUS: Currently being monitored.

Attachment 'B'

MINOR IRRIGATION SYSTEMS COMPLETED/TO BE COMPLETED
UNDER THE MPMI PROJECT (AS OF 7/92)

CONSTRUCTION COMPLETED		AREA (Ha)
1.	KHOR	370
2.	MORDHI	260
3.	RELLA	265
4.	PAJ	460
5.	GWALA	240
6.	SEGVI	362
7.	UTAWAD	335
8.	BHIKARKHEDI	525
9.	KHOKHRA	140
10.	PATPARA	405
11.	RAIPURA	153
12.	KISHANPUR	302
13.	BANGAI	484
14.	DHAPARA	102
15.	KOTHADA	304
16.	PIPALDAGARHI	710
17.	TAKLI	252
18.	LAKHNAUTI	300
19.	BOHITA	310
20.	AUREA	250
	Sub-Total	6,529 Ha

B. CONSTRUCTION COMPLETION BY 6/93

1.	SIRONJ	1,400
2.	BANGANGA	506
3.	MEHGAWAN	256
4.	SAGONA	954
5.	MUKAS	157
6.	SERMI	151
7.	RATNA	102
8.	SURSATOLA	111
9.	GURDAHALA	671
10.	GADIGALTAR	1,130
11.	CHAURA	362
12.	BAMERA	347
13.	SUGANALA	150
14.	GORAKHPUR	300
15.	PONDI	140
	Sub-Total	6,737 Ha

C. CONSTRUCTION COMPLETION BY 6/94

1.	RANIPUR	1,560
2.	BARHETA	140
3.	BHAJIA	1,000
4.	GHORAPACHAR	1,250
5.	RAMPURA	395
6.	RICHAI	732
7.	DOLI	400
8.	BARCHAR	2,350
9.	BAMODI	905
10.	UPPER PALAKMATI	1,800
11.	MOGHA	1,272
	Sub-Total	11,804 Ha

Total 25,070 Ha

Attachment 'C'

TRAINING IN THE U.S. UNDER THE MPMI PROJECT

Course	Location	Trained
Drainage Design & Salinity Control	Utah State University (USU)	2
Irrigation Scheduling Design and Evaluation	USU	11
Soil and Water Conservation & Management	USU	2
Operation & Management of Irrigation Districts	USU	5
Irrigation Water Production Functions	USU	4
Water Logging Drainage & Salinity Course	USU	6
Micro-Computer Applications in Irrigation	Colorado State University (CSU)	2
Planning & Policy Strategies in Irrigated Agriculture	USU	3
Irrigation Problems & Practices	CSU	9
Dam Safety, Operation & Management	U.S. Dept. of Interior Denver, CO.	2
International Commission on Large Dams	San Francisco, Atlanta, & Manila	3
Study Tour in Irrigation Systems	Phillipines	1
Pipeline Irrigation Systems	Arlington, VA	3
Total:		53

ATTACHMENT 'D'

PLANNED VERSUS ACTUAL OUTPUTS

	Planned Output	Indicators	Actual Output
1.	Minor irrigation systems planned, designed, constructed and delivering water and economic benefits earlier	Some 50 minor irrigation systems constructed and delivering water to 70-80% of the net command area within 3 years of beginning operations	20 schemes completed and are delivering water to 100% of the command area within 2 years of beginning operations. Another 26 schemes are under final completion.
2.	Quality control and monitoring functions established in ID	Quality control and monitoring units staffed and functioning	Quality control and monitoring units staffed and functioning.
3.	Regular Irrigation Dept. in-service training programs established with curriculum emphasizing consultative approaches to planning design & operations.	Organized in-country training for 1,500 ID staff; U.S. training for 50 ID staff. Induction training program established for all new employees.	2,246 in-country training personnel trained; 53 officers trained in U.S. Induction program established.
4.	Cost effectiveness criteria used in selecting designs for dams, structures and canal training.	Procedures formally adopted requiring cost effective analyses be performed in designing minor systems.	The required procedures formally adopted.
5.	ID & AD staff coordinating chak demonstration activities and soil survey preparation.	Chak demonstrations planned and executed on some 50 schemes. Topographic, land capability/irrigability and micro-network layout maps prepared and employed on 50 schemes.	240 demonstration chaks completed. Micro-network maps done for 46 schemes.
6.	Farmers involved in operations planning and in scheduling rotational water supply and maintenance activities.	Operational plans and rotational water supply schedules are consultatively prepared and posted for each scheme and revised annually.	Rotational Water supply concept has been operationalized after consulting farmers for 33 schemes which are delivering water

	Planned Output	Indicators	Actual Output
7.	Pilot projects established and employing alternative technology and management modes.	Three pilot projects testing alternative technologies and management modes.	Four Pilot Projects demonstrated better methods & technologies. 9 special studies were taken up of which 6 have just been completed.
8.	Special Studies and socio-economic studies used for planning and evaluation planning and designing	Twelve special studies and ten socio-economic studies completed and used by newly established central research and design unit for planning and design.	9 special studies were taken up of which 6 have been completed. 10 socio-economic studies have also been completed. They are likely to be used for planning and design.
9.	Economic rate of return calculations applied in analyzing all new minor sub-projects.	ERR procedures formally issued and applied.	ERR procedures have been formally issued and applied.