



1. Project Data

Project ID P073370	Project Name IN: Madhya Pradesh Water Sector Restruct	
Country India	Practice Area(Lead) Water	
L/C/TF Number(s) IBRD-47500	Closing Date (Original) 31-Mar-2011	Total Project Cost (USD) 443,190,000.00
Bank Approval Date 07-Sep-2004	Closing Date (Actual) 30-Jun-2015	
	IBRD/IDA (USD)	Grants (USD)
Original Commitment	394,020,000.00	0.00
Revised Commitment	387,402,287.00	0.00
Actual	387,402,287.00	0.00

Sector(s)

Irrigation and drainage(80%):Sub-national government administration(11%):Agricultural extension and research(7%):Animal production(2%)

Theme(s)

Rural policies and institutions(29%):Water resource management(29%):Rural services and infrastructure(28%):Administrative and civil service reform(14%)

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2. Project Objectives and Components

a. Objectives

According to the Loan Agreement (page 18), the project objective was as follows:

- **To improve productivity of water, thus contributing to sustainable growth and poverty reduction, in Selected River Basins.**

The Project Appraisal Document (PAD, page 3) articulates the project objective similarly, although it includes the selected project areas:



- **To improve productivity of water for sustainable growth and poverty reduction in selected focus river basins (Chambal, Sindh, Betwa, Ken and Tons) of Madhya Pradesh.**

The PAD (footnote, page 3) further defines the "productivity of water" as follows: the sum of the net multi-sectoral benefits per unit of water use in a riverbasin framework. This would include the net benefits of irrigated agriculture, fisheries, hydropower, drinking water, industries, navigation, and environmental or other uses of water.

Two outcome indicators related to institutional strengthening were dropped, and the related indicators were monitored at the intermediate/output level. Several output targets were revised to reflect changes in scope or focus of the project (i.e. number of minor I&D schemes rehabilitated, number of reservoirs and fish ponds rehabilitated).

- b. Were the project objectives/key associated outcome targets revised during implementation?

No

- c. Components

1. Water Resources Management - Institutions and Instruments (Appraisal: US\$ 7.27 million; Actual: US\$ 2.6 million): This component supported the establishment and operationalization of the institutions and instruments proposed by the project. At the state level, activities included: establishment of a State Water Resources Agency (SWaRA) to oversee inter-sectoral water allocation; establishment of the State Water Resources Data and Analysis Center (SWaRDAC) to collect data for improved management and planning; and establishment of the State Water Tariff Regulatory Commission (SWaTReC) to review and monitor water sector costs and revenues and set bulk water user fees. At the basin level, activities included: establishment of Basin Management Boards for the Sindh Basin and Tons Basin to support decentralized integrated water resources management.

2. Service Delivery - Irrigation and Drainage Institutions (Appraisal: US\$ 38.35 million; Actual: US\$ 8.95 million): This component supported measures to deliver reliable irrigation services at rational cost. Activities included: modernization of operations of the Water Resource Department (WRD) including use of information technology and change management techniques; implementation of management information system; and piloting options for management of irrigation schemes (including leasing to private sector operators, transferring management to water user associations, and specialized crop zone management).

3. Improving Productivity of Selected Existing Irrigation and Drainage Assets in Five Basins (Appraisal: US\$ 388.09 million; Actual: US\$ 398.3 million): This component aimed to provide necessary investments in five river basins (Chambal, Sindh, Betwa, Ken and Tons) to improve operations of irrigation schemes. Specific goals were to provide reliable delivery of water measured and supplied on a volumetric basis, shift to outcome-oriented approach with agricultural intensification and diversification, and improve operations and maintenance especially through increased participatory management by water user associations. Activities included: upgrading of 616 minor schemes, 33 medium schemes and 5 major schemes following consultations with local stakeholders; agricultural extension services; and fisheries development.

4. Project Management Support (Appraisal: US\$ 5.52 million; Actual: US\$ 6.62 million): This component supported operations of a project coordination unit housed in the Water Resources Department to oversee implementation of all project activities.

- d. Comments on Project Cost, Financing, Borrower Contribution, and Dates

Project Cost

- The appraised project cost was US\$ 443.2 million, of which US\$ 418.5 million was the actual project cost.
- Costs for Component 1 (Institutions and Instruments) were significantly lower than appraised (US\$ 7.27 million vs. US\$ 2.6 million) due to shortcomings in establishing the three new institutions. Costs for Component 2 (Service Delivery) were also significantly lower than appraised (US\$ 38.35 million vs. US\$ 8.95 million) due to shortcomings in piloting options for managing irrigation schemes.



Financing

- The project was largely financed by an IBRD loan of US\$ 396.0 million, of which US\$ 387.4 million was disbursed.

Borrower contribution

- The appraised Borrower contribution was US\$ 47.2 million, of which US\$ 31.07 million was provided. The project team reports that the latter amount reflects the actual need, which turned out to be lower than appraised.

Dates

- *March 2011*: From November 2009 to June 2012, project supervision reports rated implementation progress in the unsatisfactory range. The closing date was extended from March 2011 to December 2011 to allow time for the implementing agency to demonstrate sufficient implementation progress and to consider options for continued Bank support.
- *December 2011*: The closing date was extended December 2011 to March 2012 to allow the government to review proposals for restructuring the project.
- *March 2012*: The closing date was extended from March 2012 to June 2012 allow the government and the Bank to finalize the proposal for restructuring the project.
- *June 2012*: The project objective remained the same, although the scope of project activities was slightly modified and the results framework was simplified by dropping several indicators, including two outcome indicators (i.e., improved intersectoral environmentally sustainable water resources management; and modernized and well-performing assets), the progress on which was to be tracked through the related intermediate level indicators. The closing date was extended from June 2012 to June 2015.

3. Relevance of Objectives & Design

a. Relevance of Objectives

The project objective is consistent with the prevailing country conditions. The economy of Madhya Pradesh (MP), the second largest state in India, is dominated by agriculture, accounting for 35% of the state's GDP and 80% of total employment. Despite adequate annual rainfall amounts, the long dry season and irregular rainfall even during the monsoon season, necessitate a more effective surface water system to support agriculture. At the time of project appraisal, less than 50% of "created potential" from irrigated water was actually being utilized. Consequently, agricultural yields and income levels of farmers are also lower than their potential. Given the critical importance of policy reforms in the water sector, an explicit sub-objective relating to policy reform may have strengthened focus on the relevant outcomes.

The project objective is also consistent with the country and Bank strategic priorities. The government of India's National Water Policy (2002) promotes more comprehensive and integrated management of water resources, including a focus on irrigation to improve agricultural productivity. The state of MP's State Water Policy (2003) also prioritizes increasing irrigation potential utilization (including for small and marginal farmers) and developing participatory irrigation management approaches. The Bank's Country Partnership Strategy for FY 2002-04 includes rural development as a key priority and the Strategy for FY2013-17 identifies increased access to water supply and sanitation services and increased agricultural productivity as key outcomes.

Rating

High

b. Relevance of Design

The project had an objective to "improve the productivity of water," which reflects the prevailing approach to integrated water resources management to ensure an optimal combination of water use across sectors. However, as outcomes were expected across several specific areas (household income, crop yield productivity and fisheries productivity), sub-objectives may have been helpful to clarify the results chain.



The overall project design is notable for considering both institutional reforms and immediate infrastructure needs. Project outputs were likely to achieve intended outcomes: infrastructure interventions included rehabilitating and modernizing the irrigation system that serves small, medium and large scale farming schemes, and upgrading of fisheries; institutional support was planned for all levels, from local water user associations to the state Water Resources Department. Given the numerous sectors relying on water resources, there was also a need for improved coordination among agencies and a strengthened integrated water resources management framework. Complementary support to farmers and fishers to improve farm management was also likely to contribute to increasing productivity levels.

Rating
Substantial

4. Achievement of Objectives (Efficacy)

Objective 1

Objective
To improve productivity of water

Rationale

Outputs

- Rehabilitation of 228 medium and major irrigation schemes (original target: 654; revised target: 290), which included 5,900 km of irrigation canals. Interventions included canal lining, canal cleaning, and repair of hydraulic structures. Project funds were initially expected to be used from small, medium and major schemes; however, the government of MP obtained grant funds from the central government of India to fund all minor schemes instead.
- Provision of agricultural intensification and diversification support to all 228 project schemes, including cropping patterns, soil testing, integrated plant nutrient and pest management, training on use of machinery, and seeds. Agricultural universities also received institutional development support.
- Upgrading of 170 reservoirs and 82 village ponds to improve fish production (original targets: 117 reservoirs and 1,142 ponds; revised targets: 170 reservoirs and 100 ponds). The ICR reports that the project shifted focus to reservoirs as they are more directly linked to irrigation.
- Creation and/or strengthening of 367 water user associations (target: 380). Training was provided in managing the allocation and distribution of water to users and the maintenance of irrigation systems. The project also supported revisions to the governance of associations, including in the election of officers. The ICR (page 19) reports that these associations "have been able to improve the link between the [Water Resources Department] and water users": however, no specific information is provided.
- Establishment of the Water Resources Management (WRM) Wing within the state Water Resources Department. The WRM Wing is staffed with WRM specialists trained in modern methods and tools for river basin planning and management. The original project design was to create an entirely separate water resources management agency (the SWaRA); this agency was created but was not fully supported by the government and not adequately resourced. Subsequently, it lacked sufficient experience and authority to be able to collect critical data from other agencies. As a pragmatic alternative, the WRM Wing was created. According to the project team, this institutional action was still highly effective in separating water resources management functions from irrigation and drainage service delivery functions.
- Preparation of comprehensive river basin management plans for the Sindh and Chambal river basins, which will be used for preparation of other river basin plans.
- Provision of communication networks for WRD offices, which was critical to enabling performance-based irrigation water management (i.e. performance benchmarks set for each scheme are monitored and low-performing schemes are investigated).

However,



- River Basin Management Boards for each of the project river basins were formed but did not perform any functions due to the delays in creating river basin plans. The project supported existing institutions at the district level to implement the river basin plans instead.
- The establishment of a State Water Tariff Regulatory Commission was not completed, as this required an Act of Parliament. The ICR (page 6) reports that there was little political will to establish the Commission, as the government's position was that the setting of user fees is the service providers' responsibility. According to the project team, there were no negative impacts on fiscal sustainability of the irrigation and drainage operations, as evidenced by the increased budget for annual maintenance.
- Public-private partnership schemes were not piloted due to the improved performance of the WRD in managing irrigation schemes.
- The Voluntary Retirement Scheme for WRD staff was dropped due to other existing staff reduction mechanisms.

Outcomes

Coverage

- 635,414 water users benefitted from improved irrigation and drainage services (of which, 243,796 were females). This fell short of the target of 750,000 users. The ICR reports that this shortfall was due to the reduction in the number of minor schemes supported by the project. The ICR (page 18) also notes that "a large number of project beneficiaries" were farmers with less than two hectares of land; no specific data are provided.
- 597,000 hectares of land were under irrigation at project closing, compared to 242,000 at appraisal. This represents 92% of the total cultivable land; at appraisal, only 27% of the total cultivable land was under irrigation. The ICR (page 47) also reports annual rainfall amounts (which declined during the last two years of the project period) to verify the impact of the project on increased irrigated land.
- 100% of targeted families reported increases in incomes (411,000 farm households).

Productivity

- The average farming income of project beneficiaries increased from 5,000 rupees/hectare in 2005 to 22,674 rupees/hectare in 2015 (all values are in 2004 constant prices). This was calculated by averaging the incomes of farms, weighted according to the category of farm size (marginal, small, medium and large). This surpassed the target of 17,000 rupees/hectare. In the Chambal River Basin, the increase in income was proportionally greater for tail-end water users.
- Crop production per unit of water increased for wheat from 0.40 kg/m³ in 2005 to 0.78 kg/m³ in 2015. This surpassed the target of 0.48 kg/m³. Production for green gram increased from 0.29 kg/m³ to 0.58 kg/m³ and for mustard from 0.24 kg/m³ to 0.55 kg/m³.
- Average fish productivity in reservoirs increased from 10-20 kg/ha (per water spread area) in 2005 to 114 kg/ha in 2015. This surpassed the target of 60 kg/ha. Average productivity in village ponds increased from 500-1,000 kg/ha (per water spread area) in 2005 to 2,479 kg/ha in 2015. This was at the lower range of the target of 2,500-3,000 kg/ha.

Also,

- 91% of survey respondents were satisfied (64%) or highly satisfied (27%) with the irrigation services provided.

Achievement of the objective to improve water productivity is rated **Substantial** due to significant increases in coverage of irrigated land and evidence of increased incomes, agricultural productivity, and fisheries productivity. These likely contributed to the overarching objectives of sustainable growth and poverty reduction.

Rating

Substantial

5. Efficiency



The PAD provided a cost-benefit analysis of the project. Benefits were calculated using the following: 1) increases in crop yields, fodder crop production, cropping intensity, and fisheries production; 2) increased incomes and creation of new jobs; and 3), incremental water charges and revenues. Costs were calculated as total project costs plus incremental recurrent costs after the project closing. The economic rate of return at appraisal was estimated at 21.6% and estimated NPV is 11.1 billion rupees. The financial rate of return at appraisal is estimated at 24.6% and estimated financial NPV of 17.2 billion rupees.

The ICR reassessed the benefits and made the following adjustments based on actual implementation and results from the impact studies: slight crop yield increases were observed in the period between project approval and the start of interventions (therefore the "without project" scenario benefits were slightly increased); the number and types of schemes supported were adjusted; and crop diversification benefits were dropped due to lack of results. The economic rate of return at closing was estimated at 28.9% and estimated NPV of 16.7 billion rupees. The financial rate of return is estimated at 28.3% and estimated financial NPV of 17.6 billion rupees. The ICR also assessed the economic rate of return in a scenario of "no project implementation delays," which was estimated at 36.1% and estimated NPV of 35.1 billion rupees.

Project delays resulted from procurement delays, weak capacity, complexity of project design, and issues in project management in the early years of project implementation that contributed to lengthening of the project period by over four years. Due to administrative and operational inefficiencies, Efficiency is rated Modest.

Efficiency Rating
Modest

a. If available, enter the Economic Rate of Return (ERR) and/or Financial Rate of Return (FRR) at appraisal and the re-estimated value at evaluation:

	Rate Available?	Point value (%)	*Coverage/Scope (%)
Appraisal	✓	21.60	100.00 <input type="checkbox"/> Not Applicable
ICR Estimate	✓	28.90	100.00 <input type="checkbox"/> Not Applicable

* Refers to percent of total project cost for which ERR/FRR was calculated.

6. Outcome

Relevance of the project objective is rated High and relevance of the project design is also rated Substantial. Achievement of the objective to improve productivity of water is rated Substantial due to significant increases in coverage of irrigated land and evidence of increased incomes, agricultural productivity, and fisheries productivity. Despite a satisfactory economic rate of return, Efficiency is rated Modest as a result of administrative and operational inefficiencies that led to a four-year project delay.

a. Outcome Rating
Moderately Satisfactory

7. Rationale for Risk to Development Outcome Rating

The ICR (page 15) reports that "timely maintenance has been recognized as a key contributory factor to improving system performance" and thus annual maintenance expenditures have steadily increased over the project period. This will ensure continued operations of irrigation schemes. Water user associations have received training to assist in managing schemes. Institutional capacity gains are also likely to be



sustained due to the effective functioning of the WRD WIng, as well as the adoption of institutional processes such as the river basin management plans and the performance-based management approach.

- a. Risk to Development Outcome Rating
Modest

8. Assessment of Bank Performance

a. Quality-at-Entry

This was the first Bank operation in the irrigation sub-sector in Madhya Pradesh and although project preparation was extremely thorough, Borrower capacity and commitment to implement such an ambitious project was overestimated. The project design was complex, involving numerous line departments and external consultancies to coordinate and execute activities. As noted in the Project Paper (June 2012 project restructuring paper), other design issues included: cumbersome scheme modernization plan preparation and approval processes; lengthy processes for establishing new government agencies (which required Cabinet approval and on-going budget allocation); and significant changes needed in attitudes and operational procedures to switch to volumetric allocation of water. The risk assessment included the key risk of sustaining buy-in and financial support from the government, although other risks such as implementation capacity weaknesses and complexities of institutional reform were not clearly identified. Environmental and safeguard issues were thoroughly considered, given the high potential impact on the environment. The M&E framework was comprehensive, and it included baseline and target data (though the ICR notes some shortcomings in quantifying targets (page 26), and clear data collection arrangements (utilizing both modern tools and traditional survey methods).

Quality-at-Entry Rating
Moderately Satisfactory

b. Quality of supervision

Implementation of infrastructure works was initially slow due to inadequate capacity. As noted in the ICR (page 26), Bank supervision report ratings during this time did not accurately reflect the implementation problems and low disbursement levels. However, the various institutional challenges began to be resolved through multiple project restructurings. Revisions to the project design and implementation arrangements included: reducing the scope of activities; utilizing existing institutions rather than creating new ones; simplifying the M&E framework and procedures for approving the irrigation scheme modernization plans; and centralizing procurement in the project implementation unit. These measures significantly improved the pace of implementation and disbursements, although they were not fully in place until June 2012 (six years after project approval). There were issues in the fiduciary and safeguards performance, which were subsequently resolved (see Section 11).

Quality of Supervision Rating
Moderately Satisfactory

Overall Bank Performance Rating
Moderately Satisfactory

9. Assessment of Borrower Performance

a. Government Performance

The state government of Madhya Pradesh demonstrated strong commitment to addressing water resources management through a modern, integrated approach. However, capacity to follow through with the more complex institutional reforms was inadequate. For example, covenants to establish the new state water resources agency (SWaRA) and the tariff reform commission were passed but these agencies were not effectively operational due to lack of adequate staff and lack of clear mandate/authority to carry out their responsibilities. The government provided the necessary counterpart funding, for which the actual need was lower than appraised.



Government Performance Rating
Moderately Satisfactory

b. Implementing Agency Performance

The project coordination unit was led by senior level government personnel, with low turnover in the the Project Director position. However, there were still initial implementation delays due to lack of experience with Bank procedures, as well as in technical areas including water resources planning and management, remote sensing, organizational change management. The project also relied on a numerous external consultancies, the procurement of which was slow and cumbersome. Monitoring and evaluation activities were effectively carried out. There were some shortcomings in safeguards and fiduciary performance (see Section 11), as one scheme to line the Swarn Rekha River was subject to a Phase I Inspection Panel investigation following a complaint that there was increased pollution in the river, and one case of misprocurement was identified, resulting in a cancellation of US\$ 6.62 million of loan funds in March 2009.

Implementing Agency Performance Rating
Moderately Satisfactory

Overall Borrower Performance Rating
Moderately Satisfactory

10. M&E Design, Implementation, & Utilization

a. M&E Design

The M&E framework was comprehensive, included baseline and target figures for key outcome and intermediate outcome indicators. Although the stated project objective ("to improve productivity of water") was very broad, specific outcomes were identified for each relevant sector. However, there were some shortcomings that needed to be rectified in subsequent project restructurings. As noted in the ICR (page 12), a key indicator to measure increased agricultural production was not clearly identified. A number of the indicators were later refined ("improved incomes of targeted river basin stakeholders" was revised to "average farm income of project beneficiaries" and "targeted families with increased incomes"); two key outcome indicators were dropped ("improved inter-sectoral, environmentally sustainable water resources management" and "modernized and well-performing assets") for lack of measurability, and the related indicators were monitored at the intermediate/output level.

M&E arrangements included hiring of an external firm to carry out M&E responsibilities; however, the project coordination unit instead hired additional specialists for these tasks. Evaluative activities included assessments of the upgraded irrigation schemes to measure impact on incomes and agricultural productivity.

b. M&E Implementation

A management information system was installed to monitor irrigation scheme improvement plans and to support modern irrigation management practices. The system allowed the WRD to collect, process and report daily on reservoir water levels, canal discharges, and cropped areas for all irrigation schemes. Targets were set for the irrigated areas, and monitoring of major and medium schemes took place regularly. Eight impact studies were conducted, covering 19 schemes (75% of the project coverage).

c. M&E Utilization

Performance of each irrigation scheme and of individual WRD staff were assessed at the end of each dry season. Satisfactory performance was rewarded and less well-performing schemes were further assessed to determine actions for improvements.

M&E Quality Rating
Substantial



11. Other Issues

a. Safeguards

The project was classified as an Environmental Category "A" project due to the "spatial scale of investment, the new nature of some of the activities, the possible cumulative impacts of multiple components in a scheme area, and the number of safeguard policies triggered" (PAD, page 16). The safeguard policies triggered included the following: Environmental Assessment (OPBP 4.01); Pest Management (OP 4.09); Cultural Property (OPN 11.03, being revised as OP 4.11); Involuntary Resettlement (OP/BP 4.12); Indigenous Peoples (OD 4.20, being revised as OP 4.10); Safety of Dams (OP/BP 4.37); and Projects on International Waterways (OP/BP/GP 7.50). An environmental and social assessment was conducted, along with a social and environmental management framework, and project activities included training for implementing agency staff on implementing safeguard actions.

The ICR (page 13) reports that one incident resulted in a Phase I Inspection Panel Investigation in 2011. One scheme to line the Swarn Rekha River was subject to the investigation following a complaint that there was increased pollution in the river. After conducting the Phase I investigation, the Inspection Panel opted not to conduct a full investigation; rather, the government of Madhya Pradesh was required to prepare and implement an action plan to reduce sewage inflow. According to the ICR (page 13), no other issues were raised under safeguard policies on Cultural Property, Involuntary Resettlement, Indigenous Peoples, or Projects on International Waterways. Pest and plant nutrient management demonstrations were conducted with farmers to incentivize reduced use of chemicals. Work programs for dam safety are reported to have been implemented satisfactorily.

b. Fiduciary Compliance

Procurement: Procurement performance was overall satisfactory. Procurement was initially slow due to lack of experience of the implementing agency, and therefore, the project was restructured to centralize procurement in the project coordination unit. According to the ICR (Page 14), the period for tendering was subsequently reduced from four months to an average of two months. One instance of misprocurement was identified, resulting in a cancellation of US\$ 6.62 million of loan funds in March 2009. No specific details are provided in the ICR. The misprocured work was later retendered and financed from state funds. Post-procurement reviews did not discover any other procurement problems.

Financial management: The ICR (page 14) reports that project accounts were audited on an annual basis by the State Accountant General and that there were no major qualifications in the audit reports. There were some minor issues regarding advance payments to water user associations that were later declared as ineligible, pending submission of utilization certificates. The project intended to develop online financial reporting for the district units and the project coordination unit; however, due to delays in developing the software, "much of its relevance was lost with alternative systems developed by the state for government departments and the software was not rolled out to all divisions (ICR, page 14).

c. Unintended impacts (Positive or Negative)

d. Other

12. Ratings

Ratings	ICR	IEG	Reason for Disagreements/Comment
Outcome	Moderately Satisfactory	Moderately Satisfactory	---



Risk to Development Outcome	Modest	Modest	---
Bank Performance	Moderately Satisfactory	Moderately Satisfactory	---
Borrower Performance	Moderately Satisfactory	Moderately Satisfactory	---
Quality of ICR		Substantial	---

Note

When insufficient information is provided by the Bank for IEG to arrive at a clear rating, IEG will downgrade the relevant ratings as warranted beginning July 1, 2006.

The "Reason for Disagreement/Comments" column could cross-reference other sections of the ICR Review, as appropriate.

13. Lessons

Lessons drawn from the ICR, adapted by IEG:

- Limit the range and complexity of the project, especially on institutional aspects. The institutional reforms initially proposed by this project were overly ambitious, particularly given the need to absorb new concepts and the reliance on government approvals that were beyond the direct scope of the project. Management concepts such as separation of water resources management and irrigation service delivery, as well as volumetric measurement, were beyond the experience of the implementing agency staff. Also, staffing and financing of the newly created state water agency (SWaRA) were inadequate due to the broader government decisions.
- Take account of short construction periods for rehabilitation and modernization of irrigation and drainage systems. The constraints of the monsoon season and the need to keep systems functioning in the dry season were not sufficiently taken into account for this project. The total available construction period was only 30 months, or less than 25% of the project period.

14. Assessment Recommended?

No

15. Comments on Quality of ICR

The ICR is notable for strong quality of the data and the analysis of outcomes. The results chain is clearly analyzed, identifying outputs and project support that directly contributed to each outcome. The quality of the evidence and data are robust, including changes in annual rainfall to validate actual impact of the project on water levels. The economic analysis was notable for including a scenario assuming no project delays.

- a. Quality of ICR Rating
Substantial