Report Number : ICRR0021583

1. Project Data

Project ID P100954	**Project Name** Water Sector Improvement Project
Country India	**Practice Area(Lead)** Water

L/C/TF Number(s)	Closing Date (Original)	Total Project Cost (USD)
IBRD-78970	31-Jul-2016	399,203,614.34
Bank Approval Date	**Closing Date (Actual)**	
03-Jun-2010	28-Jul-2018	

	IBRD/IDA (USD)	Grants (USD)
Original Commitment	450,600,000.00	0.00
Revised Commitment	450,600,000.00	0.00
Actual	395,079,989.85	0.00

Prepared by	Reviewed by	ICR Review Coordinator	Group
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2. Project Objectives and Components

a. Objectives

The Project Development Objectives as stated in the Loan Agreement (Schedule 1, page 5) and in the Project Appraisal Document (PAD, page 5) were:
(**a) To improve irrigation service delivery on a sustainable basis so as to increase productivity of irrigated agriculture in the Nagarjuna Sagar Scheme: and**
(b) To strengthen Andhra Pradesh's institutional capacity for multi-sectoral planning, development and management of its water resources.

b. Were the project objectives/key associated outcome targets revised during implementation?
No

c. Will a split evaluation be undertaken?
No

d. Components

There were four components (PAD, pages 5 to 8).

One. Improving Irrigation Service Delivery in Nagarjuna Sagar Scheme (NSS). Appraisal estimate US$752.15 million. Actual cost at closure US$806.67 million. The Nagarjuna Sagar is a multipurpose irrigation and hydropower dam and the NSS, the target project area, represented about 13 percent of the State of Andhra Pradesh's (AP's) irrigated scheme. Activities in this component included: (i) rehabilitation of the entire canal system of NSS; (ii) dam safety works; (iii) capacity building of 750 Water User Organizations (WUOs);(iv) implementation of improved water management practices, (such as, volumetric supply of water to the WUOs, water auditing, benchmarking and asset management); and (v) support for implementing the social and environmental management plans. A WUO, which is headed by a Water Users Committee, refers to a grouping of farmers in a selected area, responsible for operating and maintaining the tertiary irrigated structure.

Two. Irrigated Agriculture Intensification and Diversification. Appraisal estimate US$21.27 million. Actual cost at closure US$10.35 million. This component supported capacity building activities, such as: (i) organizing demonstrations of improved agricultural production technologies and efficient on-farm use of irrigated water, training farmers and the district Agricultural Technology Management Agencies; (ii) capacity building activities for promoting diversification to high-value horticultural crops and increasing dairy and fish production; (iii) training farmers on efficient use of irrigation water; and (iv) capacity building activities to the Agricultural Technology Management Agencies and WUOs for improving agricultural marketing. The actual cost of this component was only about half of the originally allocated financial resources as the sub-component activities of increasing production of fisheries, dairy production and agricultural marketing were dropped and the funding for these activities were reallocated to other components.

Three. Water Sector Institutional Restructuring and Capacity Building. Appraisal estimate US$23.04 million. Actual cost at closure US$2.85 million. This component aimed at institutional reform of the water sector institutions for multi-sectoral planning and management of water resources. Activities included: (i) support for establishing the Andhra Pradesh Water Resources Regulatory Commission (APWRRC), an autonomous regulatory institution, to be established under the APWRRC Act of 2009; (ii) capacity building

of the Irrigation and Command Area Development Department (I&CADD) and the Water and Land Management Training Institute in Hyderabad for training the Water User Associations (WUAs) and I&CADD staff; (iii) use of Information Technology in the project activities for improved water management; (v) a pilot for implementing the users-centered aquifer level ground water management in the Telangana region of AP; and (vi) promoting conjunctive use of surface and ground water in two pilot areas. The actual cost of this component was only about 10% of the originally allocated amount. This was due to the changes in the activity to establish the Andhra Pradesh Regulatory Commission, following the bifurcation of the state (discussed in Sections 2e and 4).

Four. Project Management. Appraisal estimate US$14.24 million. Actual cost at closure US$8.87 million. Activities in this component included: (i) support for establishing a project preparation and management unit; (ii) support for Monitoring and Evaluation (M&E); and (iii) communication and dissemination of the state government's irrigation and water initiatives.

e. Comments on Project Cost, Financing, Borrower Contribution, and Dates

Project cost. The appraisal estimate (including baseline cost and costs of contingencies) was US$988.97 million. The actual cost at closure was US$828.73 million. The cost of Component One was seven percent higher than estimated and the costs of Components Two, Three and Four were 51 percent, 88 percent and 37 percent lower than estimated, respectively. The actual project cost was lower than estimated due to a combination of factors including, reducing the scope of some project activities, changes caused by the bifurcation of the state and 37 percent depreciation of the Indian Rupee relative to the US$ during implementation. This resulted in "windfall" savings as the project expenditures were mainly in Indian Rupees. The savings were made available to the two states for funding additional activities (ICR, para 53).

Project financing. The project was financed by an IBRD loan of US$450.60 million. The amount disbursed at closure was US$395.07 million. The actual amount disbursed was lower than estimated due to a combination of factors, including reduced scope of some activities and significant depreciation of the Indian Rupees relative to the US$ during implementation.

Borrower contribution. The appraisal estimate was US$529.06 million. The contribution at closure was less than planned at US$433.65 million. The expected contribution from local farmer's organizations was estimated at US$9.30 million at appraisal. The ICR (page 9) notes that there was no contribution from local farmer organizations at closure.

Dates. The project, approved on June 3, 2010, became effective on September 10, 2010 and was originally scheduled to close on July 31, 2016. The project was restructured through a Level 2 restructuring on January 2015. In March 2014, AP was bifurcated into two states covering the same geographic space: a smaller AP and a new Telangana state (TS). The restructuring was approved to address the changes occasioned by the bifurcation. The PDO was revised and all references to "AP" were

revised to the AP and TS states. There was no change in the PDOs for the states and the undisbursed loan was divided between them. The restructuring also resulted in changes in implementing agencies and the Project Management Unit was separated into two units for AP and TS. Corporate indicators were added and the project closing date was extended by two years, in view of the delays to activities caused by disruptions in the project area in the wake of the state bifurcation. The project closed on July 28, 2018.

3. Relevance of Objectives

Rationale

The agricultural and allied sectors accounted for 29 percent of the Gross Domestic Product of the AP state and 73 percent of the state population were dependent on income from the agricultural sector for their livelihood. The availability of water in the state was uneven spatially and temporally, with most of the rainfall in the state occurring in just about 40 to 100 days a year. The PDOs were substantially relevant to the state government's strategy articulated in the AP Water Policy (2009). The strategy articulated policy directions for multi-sector and environmentally-sustainable water resources planning, allocation and management. This policy was still in effect when the project closed. In 2009, the government enacted enabling legislation through the Andhra Pradesh Water Resources and Regulatory Commission (APWRRC) act of 2009 aimed at forming a state-level independent APWRRC.

At appraisal, the project objectives were well-aligned with the Bank's Country Assistance Strategy (CAS) for the 2009-2013 period. The strategy underscored the need for strengthening the enabling environment for development and growth and pro-poor rural development through irrigation sector projects. The PDOs remain currently relevant. The Bank's Country Partnership Strategy (CPS) for 2013-2017 underscored the need for increasing agricultural productivity. The Bank's India Systematic Country Diagnostic in 2018 specifically identified inefficient agricultural water practices, low irrigation water productivity and inadequate agricultural diversification as major constraints to India's economic development. The first focus area of the Country Partnership Framework (CPF) for the 2018- 2022 period highlighted the need for promoting resource efficient growth through among other things, inclusive and diversified growth in the rural sector.

Rating
Substantial

4. Achievement of Objectives (Efficacy)

Objective 1

Objective

To improve irrigation service delivery on a sustainable basis so as to increase productivity of irrigated agriculture in the Nagarjuna Sagar Scheme

Rationale

Theory of Change. The project framework, which included investments in irrigation infrastructure assets with capacity-building activities for WUOs was comprehensive and the causal links among project activities, the outputs, and outcomes were logical. The outputs of activities associated with infrastructure investments (repair and rehabilitation of the canal system, dam safety works and off-take delivery of irrigation services), can be expected to improve delivery of irrigation services. Capacity-building activities such as training farmers and WUOs, could also result directly in promoting diversification to high-value horticultural crops in the project-intervened areas. The combination of these activities could credibly be expected to contribute to the PDO of increasing productivity of irrigated agriculture in the NSS scheme.

Outputs (ICR, page 11, page 38-39 and paragraphs 22 to 26).

The following outputs met or exceeded their original targets:

- The entire length of canals (10,030 kilometers) were rehabilitated to their original design flow sections as targeted. Concrete lining of 995 kilometers was provided to the most deteriorated sections as compared to the target of 1,000 kilometers.
- According to the Dam Safety Review Panel, the quality of the completed dam safety work was satisfactory.
- 88 percent of the total WUA managed command areas were provided with adequate irrigation services at project closure. This exceeded the revised target of 80 percent. The total included 92 percent in AP as compared to the target of 80 percent, and 80 percent in TS as targeted.
- The water use efficiency improved by over nine percent to 169.1 hectares compared to the baseline of 154.7 hectares. There were no targets for this indicator. The ICR (para 23) notes that at normal reservoir storage capacity, the project canal rehabilitation interventions ensured that water now reaches the middle and tail end farmers, who had been previously been deprived access to irrigation water and that evidence of this was provided in 2016 when water reached the farther extents of the NSS despite low water release from the dam.
- A total of 212,996 female water users were provided with improved irrigation and drainage services at project closure, exceeding the target of 85,000. The total included 147,048 female water users in AP as compared to the target of 58,650, and 65,918 female water users in TS as compared to the target of 26,350 water users.
- 94,610 farmers benefitted from improved agricultural practices. This exceeded the target of 60,000 farmers.

- 116,853 on-farm demonstrations of improved agricultural practices in the project-intervened areas were conducted at project closure. This exceeded the target of 40,000 on-farm demonstrations.
- Demonstrations of improved agricultural practices covered over 255,574 hectares of the NSS command area at project closure. This exceeded the target of 223,912 hectares.

The following outputs were partially achieved.

- 495 WUA off-takes to sub-branch canals were rehabilitated. This was short of the target of 672 off-takes.
- System readiness to supply the required volumes of water at WUO off-takes (measured in number of WUOs) increased to 661 WUOs at project closure. This was short of the target of 672.
- Improved irrigation and drainage services were provided in 788,459 hectares in total. This was short of the target of 895,455 hectares. The total included 574,639 hectares in AP (as compared to the target of 627,150 hectares) and 213,820 hectares in TS (as compared to the target of 268,305 hectares).
- 425,992 water users were provided with improved irrigation and drainage services at project closure. This was short of the target of 500,000 water users. The total included 294,156 water users in AP as compared to the target of 350,186, and 131,836 water users in TS as compared to the target of 149,814 water users in TS.

Outcomes.

- 425,992 people in the NSS benefitted from the rehabilitated activities. This was short of the target of 500,000 people. The ICR (paragraphs 24 and 25 notes that this shortfall was due to low water levels in the NSS reservoir compared to historical levels, due to prolonged drought, climate variability and increased upstream development on the Krishna river.
- The ICR (page 30) notes that since the project commenced the State governments have been releasing Operation and Maintenance (O&M) funds to WUOs as necessary to meet the assessed demand, accounting for the ongoing canal rehabilitation works.

The outcomes were to be reflected through increases of 15 to 25 percent in crop yields of five major crops (rice, maize, chilies, cotton and groundnut) after completion of the rehabilitation of the irrigation system and the implementation of the agricultural development program. According to the information on yield data provided by the Department of Economics and Statistics (the agency in charge of estimating the yields) at project closure:

- The yield on paddy in project- intervened areas showed a 24 percent increase at project closure relative to the baseline (from 3.149 tons per hectare at the baseline to 3,901 tons per hectare at project closure).
- The yield on maize showed a 50 percent increase at project closure relative to the baseline (from 5.014 tons per hectare to 7.545 tons per hectare).
- The yield on chilies showed a 16 percent increase at project closure relative to the baseline (from 3.824 at the baseline to 4.444 tons per hectare).

- The yield on cotton showed a 48 percent increase at project closure relative to the baseline (from 1.446 at the baseline to 2.145 tons per hectare).
- The yield on groundnut showed a 36 percent increase at project closure relative to the baseline (from 1.535 tons per hectare at the baseline to 2.085 tons per hectare).

Given that the water levels released from the reservoir were not sufficient, the ICR (page 16) notes that "despite the limited water availability from the NSS reservoir, the higher than yield gains in the project areas as compared to in the non-project areas" were attributable to the improved agricultural practices, provided under the auspices of this project.

Rating
Substantial

Objective 2
Objective

To strengthen Andhra Pradesh's institutional capacity for multi-sectoral planning, development and management of its water resources.

Rationale

Theory of Change: The causal links between the capacity building activities supported by the project, their outputs and outcomes were logical. Establishing the Andhra Pradesh Water Resources Regulatory Commission - an autonomous institution, training the staff of the Irrigation and Command Area Development Department and WUOs in water management practices, using Information Technology in the project activities and pilot activities aimed at promoting conjunctive use of surface and ground area, can be expected to contribute to the institutional reform of the water sector institutions. These activities in turn can be expected to strengthen Andhra Pradesh's institutional capacity for multi-sectoral planning, development and management of water resources.

Outputs.
The following outputs were achieved:

- Pilot activities of user-centered aquifer-level groundwater management and conjunctive groundwater use of selected for selected WUA's in NSS were completed as targeted.
- The Water and Land Management Training and Research Institute, Hyderabad delivered three training modules and conducted over 84 workshops for WUA's and the government staff as targeted.
- Using their own resources, farmers constructed 361 wells/bore wells in the Khammam pilot area and 124 wells in the Guntur Pilot area, serving an area of 995 hectares.

The following outputs were not achieved or were partially achieved:

- This activity was not achieved: to operationalize the Andhra Pradesh Water Resources Regulatory Commission, which was changed after the bifurcation of the state to the Krishna River Management Board and the State Level Committees for Integrated Water Planning and Management. These agencies were to be responsible for inter-state and intra-state level water resources regulation.
- Computerized database for recording entitlements were not yet completed when the project closed.

Outcomes.

- 672 water entitlements in NSS were approved by the Krishna River Management Board (established by the Government in place of the Andhra Pradesh Water Resources Regulatory Commission at project closure) for the overall NSS and its two main canals. These entitlements were to be shared by all the WUOs under the canals, as decided by the respective state authorities, depending upon the availability of water. This was slightly short of the target of 680.
- As of December 2018, the Krishna River Management Board and the State Level Committee for Integrated Water Planning and Management, approved and issued water entitlements for eight other irrigation projects. This was 60 percent above the target.

Rating
Substantial

Rationale
Outcomes were for the most part, substantially achieved.

Overall Efficacy Rating
Substantial

5. Efficiency

Economic analysis. An economic analysis was conducted both at appraisal and at closure for the first three project components. These components accounted for 97 percent and 99 percent of the total project cost at appraisal and at closure (excluding the costs associated with contingencies). The direct benefits of the project were assumed to come from: (i) expected gains from expansion in irrigated area; (ii) improved technological impacts due to adoption of resource-efficient technologies in major irrigated crops; (iii) benefits

from diversification to high-value items in the irrigated area; (iv) development of fisheries; (v) improvement in livestock; (vi) increased power generation; (vii) reduction in water-logged area; and (viii) power savings due to the reduced need for many of the lift irrigation currently in use to supplement the canal flow in tail reaches. The Net Present Value at closure was Indian Rupees (INR) 14.7 billion as compared to the NPV of INR 11.90 billion at appraisal. The ex post Economic Internal Rate of Return (EIRR) was 22.40 percent as compared to the ex ante EIRR of 19.1 percent (ICR, page 20). The ICR notes that the higher NPV and EIPP at closure was mainly due to greater adoption of improved production technologies and higher diversification away from paddy than envisaged at appraisal.

Administrative and Operational inefficiencies. The scope of the project was reduced, with some activities such as capacity-building (aimed at increasing production of fisheries, dairy production and agricultural marketing) being dropped during implementation. Given that the Telangana movement has had a long history and was known at appraisal, the uncertainties that preceded the state bifurcation had a negative impact on all aspects of government functioning. The agitations in connection with the secessionist movement impeded implementation, including progress on the activity associated with the formation of the Andhra Pradesh Water Resources Regulatory Commission. This activity was eventually not completed and following the bifurcation, the Government of India constituted a Krishna River Management Board to supervise Krishna river water-sharing between the states of AP and TS. The state bifurcation also raised challenges relating to the uncertainty of the legal framework, the election of WUO members and the sharing of implementation arrangements between the two states.

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	✓	19.10	97.00 ☐Not Applicable
ICR Estimate	✓	22.40	99.00 ☐Not Applicable

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

6. Outcome

The relevance of the PDOs to the strategies of the government and the Bank is rated Substantial. Efficacy is rated Substantial, based on the substantial achievement of the two PDOs. Efficiency is rated Modest. The number of beneficiaries were lower than targeted due to the low water levels in the NSS reservoir, climate

variability and increased upstream developments on the Krishna river. Further, funds required for funding O&M comes from inadequate State budgets. WUA's complete dependence on state budgets presents sustainability risk. Taking these ratings into account, overall outcome is rated as Moderately Satisfactory.

a. Outcome Rating

Moderately Satisfactory

7. Risk to Development Outcome

Technical risk. There is risk to ongoing benefits from the project activities given the recent persistent low levels in the NSS reservoir and prolonged droughts linked to climate change. This risk is exacerbated by the increasing water demand from competing water uses including urban households, and industrial water demand from the rapidly growing urban centers of Hyderabad and Vijayawada. Combined with unpredictable weather patterns, these pressures could impact water availability and water quality, rendering the existing water resources insufficient to meet irrigation requirements in the NSS.

Institutional risk. There is risk to ongoing benefits given that the uncertainty over the legal framework of the WUAs following the bifurcation of the state have not been fully resolved in TS. In TS, the terms of the WUA committee representatives expired in 2014 and elections have hot been held since then.

Financial risk. Financial sustainability of irrigation systems depends on recovering O&M costs and the arrangements for recovering the costs from WUOs. Funding for O&M in the NSS is currently dependent on State government resources. Only 48 percent of WUOs in AP collect the targeted water tax amount, which the ICR notes (para 79) is not sufficient for full cost recovery. In TS, state WUA water tax collection was discontinued and O&M funding for the irrigation system is currently fully funded using state resources. This exposes the NSS to O&M risks arising from competing State Budgetary priorities and difficulties of accessing allocated state resources.

8. Assessment of Bank Performance

a. Quality-at-Entry

This project was prepared based on the lessons from two prior bank projects: the Third Andhra Pradesh Irrigation Project and the Andhra Pradesh Economic Restructuring Project, which had an irrigation component. (PAD, para 42). Lessons incorporated at design included: (i) combining irrigation activities with agricultural support activities and institutional reforms for ensuring sustainability; (ii) tailoring activities to the country context such as focusing on water resources management through separating water resource management from irrigation and drainage service to prevent conflict of interest; (iii) adopting participatory

and key community-level implementation entities through involvement of WUOs in line with internationally accepted good practice; and, (iv) support for enabling legislation and regulatory framework. Several risks were identified at appraisal including moderate risks associated with lack of capacity of the government to meet counterpart funding requirements. The mitigation measures included securing commitment on the part of the government to provide counterpart funding requirements and the overall project risk was rated moderate at appraisal. The implementation arrangements were appropriate, with the Project Preparation and Management Unit housed in the Irrigation and Command Area Development of the State (the agency in overall charge of implementing the project). The agency had implemented several Bank-financed projects and was familiar with the Bank's fiduciary requirements (PAD, para 67). The arrangements made at appraisal for safeguards and fiduciary compliance were appropriate (discussed in section 10).

There were moderate shortcomings at Quality at Entry. The project underestimated the risk associated with the formation and operationalization of the Andhra Pradesh Water Resources Regulatory Commission. This risk was rated low at appraisal. A higher risk rating for this activity would have been appropriate given the political situation in the state and in particular, the disruption caused by the Telangana movement. The ICR (page 22) notes that the Telangana movement has had a history of several decades and the issue was known at appraisal. The design also underestimated the risk associated with drought and climate variability.
There were modest shortcomings in M&E (discussed in section 9a).

Quality-at-Entry Rating
Moderately Satisfactory

b. Quality of supervision

Supervision missions were held twice a year, with 18 missions over a nine-year project implementation period (ICR, para 71). The continuity of leadership was more or less maintained, with three task team leaders over nine years. The team was proactive and provided timely and effective advice to the counterparts to ensure that issues were addressed as they arose. This was particularly so in responding to the challenges in the wake of the bifurcation of the state. The Borrower's ICR (page 55) notes that the Bank took the right step of permitting the project to go ahead with activities associated with WUOs despite the absence of the elected bodies of the WUOs (as originally planned), which recognizes the ground realities in the wake of the bifurcation of the state. This aided in implementation of the WUO activities. The Borrowers ICR (page 55) notes that the Bank team provided effective support throughout the implementation period. However, there were issues associated with M&E implementation (discussed in section 9b).

Quality of Supervision Rating
Moderately Satisfactory

Overall Bank Performance Rating
Moderately Satisfactory

9. M&E Design, Implementation, & Utilization

a. M&E Design

In addition to the Project Preparation and Management Unit, which was responsible for Monitoring and Evaluation(M&E), an independent M&E agency external to the government was to be hired by the government for monitoring project performance (PAD, para 52). However, despite the critical role that WUOs were expected to play, there was no indicator specifically aimed at monitoring their performance (ICR, para 56).

b. M&E Implementation

Core sector indicators were incorporated during implementation. however, there were shortcomings in M&E implementation. Although data was collected regularly by field staff, it was not consistently entered into the electronic database. Hence the data was not readily available for detailed methodical analysis. There was confusion on the Bank's part during much of the project period on what indicators to report on. The ICR (para 23) notes that while the project's M&E framework at design included seven outcome indicators and eight intermediate indicators, the Implementation Status and Results Reports (ISR) were reporting on only four PDO indicators. This issue was eventually resolved in March 2017.
The M&E indicators were not adjusted to reflect realities on the ground during implementation. For instance, indicators could have been adjusted for: (i) reflecting lowered irrigation coverage due to the construction of upstream farms that resulted in much lower than expected flows into the NSS; and (ii) delays on the rehabilitation works that reduced the need to undertake and fund regular Operation and Maintenance. Timely adjustments of the M&E framework would have helped in calibrating the expected results to be achieved.

c. M&E Utilization

The ICR does not provide information on whether the indicators were used for purposes other than monitoring the performance of project activities.

M&E Quality Rating

Modest

10. Other Issues

a. Safeguards

The project was classified as a Category A project for environmental purposes: The project triggered the following safeguard policies: Environmental Assessment (OP/BP 4.01), Pest Management (OP 4.09), Indigenous Peoples (OP 4.10); involuntary Resettlement (OP/BP 4.12): and Safety of Dams (OP/BP 4.37). (PAD. page 23).

Environmental Assessment, Pest Management and Indigenous Peoples. The PAD (para 75) noted that adverse environmental impacts were not anticipated, as the project activities were confined to rehabilitation of the existing irrigation works on the NSS scheme. There was however the possibility of agriculture-related environmental impact, due to the increased use of pesticides and chemical fertilizers. Indigenous peoples (tribal people referred to as Scheduled Tribes) constituted around 6.6 percent of the State's population. An Integrated Social and Environmental Assessment (ISEA) was conducted at appraisal to address potential environmental issues during implementation. A sustainable agriculture strategy was developed as part of the ISEA to encourage environmentally sustainable agriculture through promotion of Integrated Nutrient Management, Integrated Pest Management and organic farming in the project areas (PAD, para 76). As part of the ISEA, a separate tribal study was conducted, and a tribal strategy was prepared to mitigate any adverse impacts to the tribal population (PAD, para 73-74). An Environmental and Social Management Plan was prepared and publicly-disclosed at appraisal. The ICR (para 64) notes that the Environment and Social Management Plan was updated during implementation as part of the canal rehabilitation works.

The ICR (para 60) notes that there was compliance with the safeguards mentioned above and there were no environmental and pest management issues. The ICR (page 63) notes that there was no adverse impact on the tribal population due to the project.

Involuntary Resettlement. The PAD (para 72) reports that Resettlement Action Plans were prepared at appraisal to ensure that those affected by the project were compensated for the loss of their livelihood. The ICR (para 63) reports that there was no land acquisition and there was no resettlement during implementation.

Safety of Dams. The PAD (page 90) noted that no new dams were to be constructed under the project and that only existing dams were to be rehabilitated under the project. To ensure the safety of existing dams and appurtenant structures, a dam safety plan was prepared at appraisal. The ICR (para 67) notes that at project closure, inspection of the dams that were rehabilitated under the project showed that the dams were safe and of good quality.

b. Fiduciary Compliance

Financial management. An assessment of the financial management capacity of the implementing agency was conducted at appraisal (PAD, page 56). The financial management risk was rated as High on account of factors such as, risks due to the large volume of transactions and inadequate counterpart funding (given that over 50 percent of the total project cost was through counterpart funding). Several mitigation measures were incorporated at design, including firm commitment from the government for appropriate budget allocations. The

ICR (page 24) notes that there were no financial management issues during implementation and at project closing, all audit reports were submitted with unqualified audit opinions.

Procurement. An assessment of the implementing agency's ability to address procurement issues was conducted at appraisal (PAD, page 70). The assessment concluded that the procurement arrangements were satisfactory. The ICR (para 62) notes that there were no procurement issues during implementation and that procurement management of the project was in compliance with Bank procedures (ICR, para 62).

c. Unintended impacts (Positive or Negative)

The ICR (para 46) notes that over 1,066 kilometers access roads were constructed on canal side bunds during canal rehabilitation, using the excavated earth to allow tractors to move. The roads constructed for canal rehabilitation, is used by the local people in many ways, such as accessing nearby markets, hospitals, schools, offices and other purposes. Further, the construction of new bridges across the canals helps in reducing people's travel times.

d. Other

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11. Ratings

Ratings	ICR	IEG	Reason for Disagreements/Comment
Outcome	Moderately Satisfactory	Moderately Satisfactory	---
Bank Performance	Moderately Satisfactory	Moderately Satisfactory	---
Quality of M&E	Modest	Modest	---
Quality of ICR		Substantial	---

12. Lessons

The ICR draws the following main lessons from the experience of implementing this project, with some adaptation of language (ICR, pages 28-29).

(1**) Climate change risk screening may be required for large infrastructure projects during preparations**. The performance of this project was adversely affected by persistent low water levels in the Nagarjuna Sagar

dam in part due to prolonged drought. The project could have benefitted from climate change screening to better understand the potential impacts of climate variability.

2) Integrated River Basin Planning and 'Transboundary' Water Resources Management approaches may be useful for major inter-state irrigation systems, irrespective of whether or not they cross international boundaries. This may be particularly important in countries with decentralized/federal governance systems where water resources management may be within the purview of the national government.

(**3) Demonstrations of pilots can help in fast-tracking innovative concepts for better project performance**. Successful demonstrations and pilots on improved agricultural practices and conjunctive surface and groundwater use for selected WUOs helped this project in achieving significant development outcomes of improving aggregate crop yields.

13. Assessment Recommended?

No

14. Comments on Quality of ICR

The ICR is reasonably clear and candidly discusses the issues that arose following the bifurcation of the state. It also provides a clear description of how the bank assisted in resolving the issues. The ICR is consistent with the guidelines.
The ICR could have provided more details on the Krishna River Management Board and how it is intended to resolve transboundary issues. The ICR is unduly long (almost twice the recommended length of 15 pages).

a. Quality of ICR Rating
Substantial