



Report Number: ICRR0021874

1. Project Data

Project ID
P092217

Project Name
IN:National Cyclone Risk Mitigation Proj

Country
India

Practice Area(Lead)
Urban, Resilience and Land

L/C/TF Number(s)
IDA-47720,IDA-54130

Closing Date (Original)
30-Apr-2015

Total Project Cost (USD)
284,882,334.99

Bank Approval Date
22-Jun-2010

Closing Date (Actual)
31-Dec-2018

	IBRD/IDA (USD)	Grants (USD)
Original Commitment	255,000,000.00	0.00
Revised Commitment	312,552,031.53	0.00
Actual	284,882,334.99	0.00

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2. Project Objectives and Components

a. Objectives

According to the Project Appraisal Document (PAD) (p. 3) and the Financing Agreement of January 14, 2011, the objective of the project was "to reduce the vulnerability of coastal communities to cyclone and other hydro meteorological hazards".

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



No

c. Will a split evaluation be undertaken?

No

d. Components

The project included four components:

A. Early Warning Dissemination System (EWDS) and Capacity Building for Coastal Communities (appraisal estimate US\$15.0 million, actual US\$16.45 million): This component was to finance the installation and operation of EWDS allowing the state and/or district/sub-district level control center to send communication directly to the villages using Global System for Mobile Communications (GSM)/Code Division Multiple Access (CDMA) based technology including strengthening emergency operation centers to channelize the warning through different communication modes. This component was also to finance the purchase of satellite phones to key officials to fail proof the EWDS and pilot new radio based wireless communication technology in one block in each state. Furthermore, this component was to strengthen capacity in operating, maintaining and regular use of the EWDS equipment by officials and village representatives, and of communities in disaster preparedness and response by preparing disaster management plans and arranging mock drills etc.

B. Cyclone Risk Mitigation Infrastructure (appraisal estimate US\$250 million, Additional Financing US\$128 million, actual US\$331.29 million): This component was to finance improving the access to emergency shelter, evacuation and protection against cyclone and other hydro meteorological hazards such as wind storms, flooding and storm surge in high risk areas. Each of the states reviewed the existing system and gaps and developed risk mitigation infrastructure portfolio. For emergency shelters, identification mechanism included assessment of total requirement, available shelters including other government and private buildings and the gap. This component was to finance a portfolio including a broad set of measures such as investments in multipurpose emergency shelters, up-grading of existing roads and providing bridges suitable for evacuation, drainage improvement measures and repair and up-grading of existing embankments, and creation of corpus funds for operation and maintenance of cyclone shelters.

During the Additional Financing, the target for the construction of Multipurpose Cyclone Shelters (MPCSs) was increased by 86 percent and the target on access roads by 25 percent. The targets on the length of embankments was reduced by 50 percent (due to the improved designs, environmental sensitivity, and revised costing). Also, the target on proportion of people having access to emergency shelters in Andhra Pradesh was reduced by 10 percent considering the updated baseline that was lower than the original estimate and the revised design capacity of MPCSs.

C. Technical Assistance for National and State Level Capacity Building and Knowledge Creation (appraisal estimate US\$6.0 million, actual US\$3.07 million): This component was to support the preparation of key institutions for addressing risks and vulnerabilities effectively across all coastal states and Union Territories (UTs). This component was to finance the development of studies, assessments, training and capacity building activities related to risk and damage assessments, development of training modules and action plans and implementing them through identified partner agencies.

D. Project Management and Implementation Support (appraisal estimate US\$20.7 million, Additional Financing US\$8.7 million, actual US\$18.27 million): This component was to finance support for project management by financing incremental operating costs for Project Management Units (PMU), Project



Implementation Units (PIUs), nodal units in line departments and National Institute of Disaster Management (NIDM), office equipment, training and exposure visits and consulting services for specialist activities.

a. **Comments on Project Cost, Financing, Borrower Contribution, and Dates**

Project Cost: The project was estimated to cost US\$423.0 million. The actual cost was US\$370.1 million.

Financing: The project was financed by a US\$255.0 million credit by the Bank of which US\$221.5 million was disbursed and, following an Additional Financing credit by the Bank of US\$104.0 million, a total of US\$284.8 million was finally disbursed.

Borrower Contribution: The Borrower was to contribute US\$64.0 million, but the actual contribution was US\$85.2 million.

Dates: The project was restructured four times:

- On March 25, 2014 the project received Additional Financing in the amount of US\$104 million to scale up the the construction of multi-purpose shelters and its related evacuation infrastructure following the extremely severe Cyclonic Storm Phailin in October 2013. The target for the construction of Multi-purpose Cyclone Shelters (MPCSs) was increased by 86 percent and the target for access roads by 25 percent. The targets on the length of embankments was reduced by 50 percent (due to the improved designs, environmental sensitivity, and revised costing). Also, the target for the proportion of people having access to emergency shelters in Andhra Pradesh was reduced by 10 percent considering the updated baseline that was lower than the original estimate and the revised design capacity of MPCSs. None of these revisions in PDO indicators (as listed in Table 1 in the ICR) justified a split rating of the project's outcomes.
- On May 21, 2015 the project was restructured to extend the closing date from April 30, 2015 to October 31, 2015 to extend the timeline for the submission of annual audit reports.
- On October 19, 2015 the project was restructured to extend the closing date of the original financing by 23 months to October 2, 2017 to accommodate (i) the delay in obtaining environmental clearances; (ii) challenges in identifying appropriate land for some works; (iii) the need to re-tender some works due to lack of bids; (iv) state bifurcation process in Andhra Pradesh; and (v) disruptions caused by Cyclone Phailin and very severe Cyclonic Storm Hudhud of 2014.
- On October 3, 2017 the closing date of the original and Additional Financing was extended to December 31, 2018 to allow for the completion of delayed activities.

3. Relevance of Objectives

Rationale

According to the PAD (para 1) India is highly vulnerable to natural hazards, especially earthquakes, flood, drought, cyclone and landslides. Approximately, 40 percent of the population lives within 100 kilometers of the coastline and exposed to severe cyclones. Studies indicate that natural disaster losses equate up to 2 percent of India's Gross Domestic Product (GDP) and up to 12 percent of federal government revenues.



India has lost many lives through natural hazards. Especially, two eastern coastal states, Andhra Pradesh and Odisha are exposed to cyclones. At the time of appraisal, neither of the states had any comprehensive early warning system in place which did not allow for an evacuation to safe shelters before the landfall of cyclones.

The Bank and the government collaborated closely on defining the objective for this project (see the PAD, para 22). A number of options for the project's objective were considered as explained in Section 8 (a) of this review. Among the agreements between the Bank and the government on the objective was that the project should avoid being overly complex, that there should be a sharp focus on cyclone risk mitigation in two highly vulnerable state and early warning systems for vulnerable coastal village communities, and that there should be a programmatic approach to lending for the multi-hazard resistant infrastructure investment. This was a sophisticated but straightforward framework to address climatic hazards and highly relevant to reducing the vulnerability of coastal communities in AP and Odisha to cyclones.

The agreed objective of the project, to reduce the vulnerability of coastal communities to cyclone and other hydro meteorological hazards, supported India's plan to move away from reactive post-disaster response to a proactive disaster risk reduction approach. In 2005, the government implemented the Disaster Management Act which established the National Disaster Management Authority (NDMA), the State Disaster Management Authorities (SDMAs), and the District Disaster Management Authorities (DDMAs). Also, the project's objective supported the National Disaster Management Plan (NDMP) which the government developed in 2016 and which is consistent with the Sendai Framework for Disaster Risk Reduction 2015-2030 endorsed by the United Nations' General Assembly and was adopted by the government. In addition, the project's objective was in line with the Bank's most recent Country Partnership Framework (FY18 to FY22) which stresses the importance of "promoting resource-efficient growth and poverty reduction" which is one of the three focus areas of the Bank's engagement with India and arguably also partly the focus of this project.

This review rates the relevance of the project's objective as High

Rating

High

4. Achievement of Objectives (Efficacy)

OBJECTIVE 1

Objective



To reduce the vulnerability of coastal communities to cyclone and other hydro meteorological hazards

Rationale

Theory of Change. The project's theory of change was that the installation of an early warning dissemination system (EWDS) and the construction and maintenance by multi-purpose cyclone shelters (MPCS) in vulnerable communities which allowed the evacuation of coastal communities in Andhra Pradesh (AP) and Odisha to these shelters before the cyclones or other hydro-meteorological hazards made landfall would lead to the reduction of deaths from the destructive force of these events. In addition, the project's investment in the construction of roads in areas vulnerable to cyclones, the development of a cyclone risk atlas and post disaster needs assessment (PDNA) tools, the preparation of a multi-sectoral disaster risk management (DRM) capacity as well as the training of officials on risk reduction, emergency preparedness and response would all be expected to have an impact on minimizing damage to life and property and more rapid recovery from the effects of cyclones in the two states and their population. The construction of embankment and maintenance by surveillance committees was expected to minimize damage to agricultural land and reduce the consequent loss of livelihoods. Finally, assisting 13 other vulnerable states and territories to improve their understanding of natural disaster risks and vulnerabilities, strengthening the capacity and supporting pilot activities to address them were included as a small element in the project.

Outputs (based on paragraphs 20 through 36 and Annex 1 in the ICR):

- A comprehensive Early Warning Dissemination System (EWDS) was built, providing last-mile connectivity to 1,055 coastal villages in AP and Odisha and covering approximately 4.2 million people, achieving the target of the targeted coastal population being covered. In addition, the Odisha Project Implementation Unit (PIU) integrated the location-based alerting system (LBAS) with Bharat Sanchar Nigam Limited (BSNL) - India's state-owned telecommunications company. Approximately 3.75 million BSNL subscribers in Odisha can receive warnings via a short message service (SMS), including about 80 percent (928,700 people) of coastal residents
- 275 alert sirens with an area of influence of 1.5 to 2 kilometers radius each in AP and Odisha, covering all of the 1,740 vulnerable coastal villages.
- 413 towers and poles for mounting alert sirens were built. This output did not have a target.
- 219 Multipurpose Cyclone Shelters (MPCS) were constructed in AP and 316 MPCS were constructed in Odisha, totaling 535 MPCSs, surpassing the revised target of 532 MPCSs.
- 1,087 kilometers of rural roads were constructed in AP and Odisha, falling short of the revised target of 1,310 kilometers. According to the ICR (p. 36) PIUs constructed 12 bridges in addition to the planned 23 bridges.
- 88.12 kilometers of embankments were completed, achieving the revised target of 90 kilometers. The area of land and number of people protected by 180 kilometers long embankments was not established at appraisal since detailed studies and final site selections had not been finalized.
- 535 village-level emergency task forces and 535 MPCS committees from the local communities received training in the use of early warning and evacuation, achieving the target of all targeted people being trained.
- Embankment Surveillance Committees were established in both states to increase community ownership and timely identification of needed repairs and report damages to the State Department of Water Resources.



- 86 percent of government officials were trained on specific disaster management skills, not achieving the target of 100 percent.
- A long-term training and capacity building strategy was developed by the National Institute of Disaster Management (NIDM) based on an institutional SWOT analysis and a survey of over 18,000 community members from across six states, achieving the target.
- All studies required for developing a Composite Risk Atlas were launched and completed, achieving the target. The atlas provides: i) the cyclone risk status associated to each state; ii) historical cyclones; iii) exposure distribution risk, and expected loss details for residential, industrial, and commercial buildings; and iv) population distribution details and the associated risk and loss with respect to cyclones.
- 7 multi-hazard training modules were prepared by the NIDM focusing on mainstreaming disaster risk reduction and climate change adaptation in Panchayat Raj institutions, rural development, ULBs, city planning and education and disaster management planning for hospitals and cities.
- 476 digital mobile radios and 34 Satellite-based Mobile Voice Terminal (SBMDVTs) in the MPCs and Emergency Operation Centers

Outcomes (based on paragraphs 23 through 35 and Annex 1 in the ICR)

- 1.55 million coastal residents during the extremely severe cyclonic storm Fani, which hit Odisha in May 2019, were evacuated. The Odisha State Disaster Management Authority (OSDMA) was able to efficiently provide early warnings to the coastal communities by remotely operating alert sirens 36 to 48 hours before the landfall and sending 18 million SMS to BSNL subscribers through LBAS. This resulted in one of the largest emergency evacuations in a record time frame, reducing fatalities to 64 people.
- A baseline survey, which was conducted in 2010, interviewed 2,000 households in AP and Odisha in terms of awareness about cyclone warnings and emergency response and established a baseline at 30 percent. A beneficiary survey, conducted in December 2017, found that all interviewed households received warnings through alert sirens before a cyclone hit the coastal areas, achieving the target of 100 percent.
- The proportion of the coastal communities in the two states having access to emergency shelters increased from 61 percent in 2010 to 87 percent in 2018, surpassing the target of 78 percent. In AP the proportion of coastal communities having access to emergency shelters increased from 78 percent in 2010 to 90 percent in 2018, not achieving the original target of 98 percent but achieving the revised target of 88 percent. In Odisha the proportion of communities having access to emergency shelters increased from 30 percent in 2010 to 82 percent in 2018, surpassing both the original target of 60 percent and the revised target of 80 percent.
- 1.86 million of coastal people have been protected by strengthened/improved embankments, almost achieving the target of 1.9 million. According to the beneficiary survey, which was conducted in 2017, about 79 percent of respondents in AP and 84 respondents in Odisha stated that the loss of agricultural land has been minimized during the last cyclone in comparison to before project implementation.
- 29,525 hectares of agricultural land were protected by strengthened/improved embankments, almost achieving the target of 30,000 hectares of agricultural land.



This review concluded that the efficacy of the project's achievements was substantial

Rating
Substantial

OVERALL EFFICACY

Rationale

The overall efficacy of this project's achievements was substantial.

Overall Efficacy Rating

Substantial

5. Efficiency

Economic Efficiency:

The PAD included an economic and financial analysis by establishing cyclone hazard intensity and frequency discharge relation in selected local districts, then building the vulnerability function, and finally estimating the cost and benefit under scenarios with and without project and calculates the economic rate of return (ERR).

According to the PAD (p. 12) the scenarios were selected based on the investment proposals prepared by the states financing under the project, and on the data availability. Three districts were selected: Kendrapara in Orissa, Jamanagar in Gujarat, and Vishakhapatnam in AP. Using a discount rate of 12 percent over a time period of 10 years and the value of a statistical life at US\$150,000 the Economic Rate of Return (ERR) for the embankment component was estimated at 31 percent with a benefit-cost ratio between 1.7 and 2 percent. The ERR for a shelter forest component was 29 percent with a benefit-cost ratio of 3 percent. Finally, the estimated ERR for the cyclone shelter component was 73 percent in Kendrapara, 15 percent in Jamanagar and 28 percent in Vishakhapatnam with a benefit-cost ratio between 1.9 and 4 percent.

When the project received Additional Financing a benefit-cost analysis was conducted to assess avoided damage cost due to the scaled-up project activities. The damage assessment from cyclone Phailin was used as the baseline estimate. The analysis estimated with a discount rate of 5 percent the benefit-cost ratio for the MPCs at 6.4 percent and at 3.9 percent with a discount rate of 10 percent. For roads and bridges, the benefit-



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cost ratio was 15.6 percent (discount rate of 5 percent) and 12.4 percent (discount rate of 10 percent). The analysis did not calculate an ERR.

With respect to the analysis of efficiency at appraisal and at the time of the additional financing the ICR observed that at appraisal the analysis was for only three districts which did not adequately cover the project's scope. Regarding the analysis of the likely efficiency of the additional financing the ICR commented, without evidence, that it did not "adequately substantiate its claims". The ICR also noted that neither of the two analyses made reference to the vulnerable population in terms of number of persons likely to be affected.

To provide a more comprehensive analysis of the project's efficiency benefit and cost streams over 20 years were estimated for the two dominant groups of investments. One was made up of the EWDS, roads, the MPCSSs, and facilities whereby people were being warned about a cyclone and then moved to the MPCSSs (together labeled as block 1 in the analysis). The other was the embankments assessed by land saved from salinization or submergence and therefore preserving agricultural livelihoods (labeled as block 2 in the analysis). For block 1 the internal rate of return (IRR) was calculated at 53 percent, the net present value (NPV) at US\$1.09 billion at a 6 percent discount rate, and a benefit-cost ratio at 5.28 (ICR, Annex 4, para 21 and Table 4.3). For block 2 the IRR was calculated at 13 percent, the NPV at US\$17.2 million at a discount rate of 6 percent, and an assumed benefit-cost ratio of 1.5 because (in the absence of any direct measure of embankment benefits but with known costs) this was the basis for estimating the benefits from block 2 investments. When combining the results of the analyses for blocks 1 and 2 the IRR was 48 percent and the NPV was US\$1.1 billion (ICR, Annex 4, para 28, Table 4.7).

These analyses indicate that the project's economic efficiency was substantial.

Operational Efficiency:

The ICR (para 61) stated that the signing of the original financing agreement and the additional financing was delayed due to political and administrative issues. Frequent disasters and the bifurcation of AP impacted project implementation. Procurement related and technical issues also caused additional delays in project implementation. As a result, the project's closing date was extended by 3.7 years. However, despite these delays, the project's management cost was only 5 percent of the total actual project cost suggesting operational efficiency.

According to the ICR (para 41) the actual unit costs of MPCSSs, road, bridges, and embankments increased by 59 percent, 47 percent, 87 percent, and 109 percent, respectively (in Indian rupees (INR)) compared to the appraisal estimates. The increase in costs resulted from the remoteness of project sites and small civil contracts which resulted in less competition and higher costs. Also, increased cost of labor and materials over time and



the difficulty of sourcing materials near the project sites also pushed costs higher than anticipated. There were also other issues that reduced procurement efficiency which are detailed below in Section 10 of this review.

Summary of efficiency estimates. This review concluded that, considering the geographical spread of investments and institutional development and despite some operational inefficiencies, the overall efficiency with which this project was implemented was Substantial. This was based on an estimated consolidated IRR for the entire project (based on well justified and plausible assumptions in the ICR) of 48 percent (Annex 4, para 28). This compares with the rating of efficiency of Modest in the ICR without an explicit rationale, but an implicit rationale that the IRR calculations were based on estimates, as well as shortcomings in operational efficiency (paras 38 to 47).

Efficiency Rating

Substantial

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		0	0 <input type="checkbox"/> Not Applicable
ICR Estimate	✓	48.00	100.00 <input type="checkbox"/> Not Applicable

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

6. Outcome

The Relevance of the objective is rated High given its close alignment with the Bank's most recent Country Partnership Framework (FY18 to FY22) and its high relevance to reducing the vulnerability of coastal communities in Andhra Pradesh and Odisha to the damaging effects of cyclones. The Efficacy with which the project's objectives were achieved was rated Substantial because during the project's implementation it was successful in evacuating 1.55 million people to shelters in advance of a severe cyclone and the project also achieved most of its targets. The ICR estimated high rates of return from the project's investments leading this review to conclude that, despite some operational inefficiencies, the project's overall efficiency was



substantial. This project had minor shortcomings in its relevance, its achievements and its efficiency and therefore its overall outcome is rated Satisfactory. .

a. Outcome Rating
Satisfactory

7. Risk to Development Outcome

According to the ICR (para 90), strengthening the robustness of power and telecommunication infrastructure will be critical for ensuring uninterrupted use of emergency operation centres (EOCs) and EWDS equipment due to power outages and limited telecommunication coverage. Also, climate change related high intensity hydro meteorological hazards might pose a threat to the infrastructure built under the project. Even though the project ensured the establishment of community-based infrastructure maintenance through "corpus funds", infrastructure will require proper inspections, rehabilitation and upgrades which will have to be budgeted for by the line government departments which have the technical expertise and knowledge (ICR, para 91)

The ICR did not, however, provide any information on whether the federal and state governments continue to be committed to the project's objective and to the future financial support for inspections of community-managed maintenance of the infrastructure built by the project.

8. Assessment of Bank Performance

a. Quality-at-Entry

The PAD (para 5) stated that the project was part of a broader national hazard mitigation program taken up by NDMA that included programs on earthquakes, flood, landslides and establishment of a National Disaster Management Communication Network.

It was also noted in the PAD (para 22) that the Bank and government teams considered different options for interventions and assessed each carefully. The options considered were:

(a) **Multi-disaster risk vs. cyclone risk.** In order to avoid an overly complex project; the Bank and the government decided to focus on cyclone risk mitigation and look into institutional response systems and create multi-hazard resistant infrastructure.

(b) **All vulnerable states vs. limited number of highly vulnerable states.** In the interest of simplicity of management, readiness of the investment proposals in various states and variable degree of



vulnerability of the various states towards cyclones, it was decided to start with risk mitigation investments in the two highly vulnerable states and later expand to other states:

(c) Hi-tech disaster warning and response systems vs. reaching coastal communities. Since the government was financing a program to augment the India Meteorological Department's forecasting capacity, this project's focus was shifted towards ensuring that early warnings reach vulnerable coastal village communities.

(d) Investment lending vs. programmatic lending. It was concluded that as the project's M&E capacity gets established program lending would be more suitable than the normal investment lending. A programmatic option to provide support to government and the states, where the new states come into the project as they become ready with investment proposals and detailed studies was therefore preferred.

In addition, a number of studies informed the project's design.

In summary the project's design was based on not being overly complex, have a sharp focus on cyclone risk mitigation in two highly vulnerable state, early warnings systems for vulnerable coastal village communities, and a programmatic approach to lending for multi-hazard resistant infrastructure.

The Bank team identified relevant risk factors such as a change in government priorities. However, all identified risks were rated as Moderate or Low. This review assessed the risk mitigation measures proposed in the PAD as adequate.

The project's M&E framework was also assessed as adequate.

Quality-at-Entry Rating
Satisfactory

b. Quality of supervision

According to the ICR (para 86) supervision missions identified and resolved technical challenges to ensure development impact. After Cyclone Phailin hit India in 2013 the Bank improved the Multi-Purpose Cyclone Shelters (MPCS) designs to ensure that open spaces on the ground floor would remain dry during cyclone events and using continuous eaves to protect walls and openings during heavy rains. The ICR (para 88) stated that the Bank provided training to the PIUs on a regular basis and reviewed the safeguard and fiduciary aspects of the project. During the Mid-Term Review in May 2013, the Bank worked with the PMU and PIUs to develop an action plan to speed up implementation and address procurement issues.



Since India was experiencing an increasing amount of lightning incidents, the Bank supported the Bank in installing lightning arresters in every MPCS (ICR, para 86). Also, the Bank formed a task team specialized in civil, hydraulic, and architectural engineering to ensure that the civil works were designed and constructed appropriately.

The ICR (para 87) stated that even though there were several gaps between Implementation Status Reports (ISRs) and the Bank prepared four Aide Memoires based on field visits without accompanying ISRs. The Bank also participated in Project Steering Committee meetings and field visits on a regular basis (ICR, para 57). The Bank also provided technical assistance to the National Disaster Management Authority (NDMA) and the National Institute for Disaster Management (NIDM) on developing a cyclone risk assessment model and standardizing the post-disaster needs assessment (ICR, para 87).

There were, however, some moderate shortcomings in the Bank's supervision capacity and performance. According to the ICR (para 86) the Bank team did not have the internal expertise on EWDS to expedite the implementation of component A and relied on the knowledge partner which was appointed by the PMU. In addition it was noted in the ICR that "there was a discrepancy between the target values adopted in ISRs and the Results Framework. Also, intermediate results indicators for Components A and C were not measured and reported in the ISRs. At the time of the third restructuring, the project could have updated the intermediate results indicators on: (i) the EWDS as the target value became irrelevant to the corresponding PDO indicator with the advancement of technology; (ii) the road length considering the additional bridges constructed; and (iii) the bridges as they were not included in the results framework but constituted 14 percent of the total actual costs at closing" (para 73). Finally, as noted in section 10 (b) of this review, there were a number of significant procurement delays.

Quality of Supervision Rating
Moderately Satisfactory

Overall Bank Performance Rating
Moderately Satisfactory

9. M&E Design, Implementation, & Utilization

a. M&E Design

The extent to which the project's activities and outputs would lead to the intended outcomes was soundly reflected in the Results Framework. The selected indicators encompassed all outcomes of the PDO statement and the intermediate outcome indicators were adequate for measuring the contribution of the



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project's activities and outputs towards achieving the PDO. The indicators were sufficiently specific and relevant.

The PDO statement would have benefited from including a definition for the term "vulnerability". Also, according to the ICR (p. 24) the project did not establish the baseline and target value for the PDO indicators on strengthened embankments and the level of awareness about warnings and emergency response since the feasibility studies, designs, costings, and household surveys had not been completed by the time the project was appraised.

The project designed a benefit monitoring and evaluation (BME) study under component D to establish the baselines for MPCS accessibility and awareness. Each survey covered 5 percent of the total coastal residents. The same residents were interviewed at mid-term and end-term.

According to the ICR (para 69) the project's Management Information System (MIS) which covered procurement, financial management, physical progress, the grievance redress mechanism and key information on environmental and social aspects functioned well. The PMU was to prepare regular progress reports to be submitted to the Ministry of Home Affairs and the Bank

b. M&E Implementation

According to the ICR (para 70) the project's MIS and monitoring arrangements were well embedded in the PMU and PIUs. The PIU submitted progress reports to the PMU on a monthly basis and the results were presented at the project steering committee meetings. The planned baseline data collection was conducted in 2010 and 2014 by an external consultant.

The ICR (para 73) stated that while the PDO indicators were reported in the ISRs, the intermediate indicators for components A and C were not measured and reported in the ISRs. Also, there was a discrepancy between the target values included in the ISRs and the Results Framework which were not updated in any of the project restructurings.

A shortcoming of the benefit monitoring and evaluation (BME) study was that it focused on the household's perception of project activities and did not conduct a quantitative analysis of the outputs and outcomes the project produced.

c. M&E Utilization

According to the ICR (para 74) the monitored data was shared with various stakeholders. Also, the data was used to inform project management and decision making. From November 2012 the PMU and PIUs held 20 project steering committee meetings to discuss the project's performance and key implementation bottlenecks. The monitoring information was publicly disclosed on the project's website. Data from the BME's survey was used to inform the design of the Additional Financing in 2014. On the other hand, the ICR (para 76) noted that the project "could have improved the M&E methodology and analysis to provide evidence of achievement of outcomes".



M&E Quality Rating
Substantial

10. Other Issues

a. Safeguards

The project was classified as Category A for safeguard issues and triggered the Bank's safeguard policies OP/BP 4.10 (Environmental Assessment), OP/BP 4.11 (Physical Cultural Resources), OP/BP 4.12 (Involuntary Resettlement) and OP/BP 4.10 (Indigenous People). According to the ICR (para 77) the project prepared an Environmental and Social Management Framework (ESMF), a Resettlement Policy Framework, and an Indigenous People's Instrument. The environmental impacts resulted from the construction of buildings, roads and repairs of the existing embankment and the installation of towers and poles for mounting alert sirens. The ICR (para 77) stated that the project's overall safeguards performance was rated Moderately Satisfactory to Satisfactory.

According to the ICR (para 79) the implementation of the project's civil works complied with the Indigenous People's Instrument and OP/BP 4.10. The project did not cause any involuntary resettlement. According to the ICR (para 80) land was purchased only from one household for the construction of a bridge in AP. A Resettlement Action Plan was prepared and the affected household was compensated in accordance to OP/BP 4.12. Small strips of land were donated by the community to enhance the community's resilience to natural hazards.

The ICR (para 81) stated that a Grievance Redress Mechanism (GRM) was built on existing systems in both states and was in accordance with OP/BP 4.01. The PIU trained approximately 40 community mobilizers for stakeholder engagement and consultations. This had a positive impact on timely information sharing which promptly addressed grievances.

b. Fiduciary Compliance Procurement:

The ICR (para 82) stated that the project's procurement plans were in accordance with the procurement manual and were updated and published every 12 to 18 months. However, according to the ICR the Bank's procurement policies and AP's state procurement regulations were different which resulted in extensive rebidding and delays in awarding contracts. Also, the ICR (para 62) stated that in AP the project faced several challenges such as: (i) lacking market appetite for small civil works in remote areas; (ii) high bid prices due to remoteness; and (iii) transition to e-procurement system of the National Informatics Center (NIC) in 2013 which required training of the contractors and line departments. Furthermore, the



completion of the Early Warning Dissemination System (EWDS) was delayed due to procurement and technical challenges. The terms of reference for the supply and installation of the EWDS did not sufficiently define the necessary associated infrastructure and equipment required, resulting in installation delays of the EWDS. The ICR did not state how the project or the Bank addressed these delays.

According to the ICR (para 82) the project's procurement performance was rated Moderately Satisfactory to Satisfactory throughout implementation.

Financial Management:

According to the ICR (para 83) the project's institutional financial management arrangements and control procedures were adequate. The PMU and PIUs had financial specialists and internal and external auditors to support the project. External audits were prepared in a timely manner and had several qualified opinions. For example, in AP, the Odisha PIU had questionable payments of approximately US\$5.5 million in the financial statements of FY10-11 and FY16-17. The ICR (p. 27) stated that the Odisha PIU rectified these issues, however, the corrective actions by the AP PIU were still pending by project closure. The ICR did not state how the Bank addressed these issues.

c. Unintended impacts (Positive or Negative)
NA

d. Other

11. Ratings

Ratings	ICR	IEG	Reason for Disagreements/Comment
Outcome	Moderately Satisfactory	Satisfactory	This review rated the project's efficiency as Substantial, whereas the ICR rated efficiency as Modest. This resulted in the different overall outcome ratings.
Bank Performance	Moderately Satisfactory	Moderately Satisfactory	
Quality of M&E	Substantial	Substantial	
Quality of ICR	---	Substantial	

12. Lessons



The ICR (paras 92-96) included several lessons learned. Two that stand out and have general application were as follows:

- **Engaging with communities in infrastructure management is important for ensuring a sense of ownership and vulnerability preparedness** This project involved local communities from the start by establishing village-level emergency task forces and MPCS committees. The successful mock drills within communities to make people aware of early cyclone warnings and the actions to take to gain shelter were associated with the successful operation of the early warning system and the utility of the community shelters during cyclones that actually occurred during project implementation. The lesson is that the continued engagement of communities in disaster risk management was important for the success of the project in addressing cyclones during implementation and will be an important necessary condition for the future success of the infrastructure established by this project
- **Regularly assessing available technology during implementation is essential for maintaining reliability and efficiency.** During this project's implementation the level of EWDS technology advanced increasing the population coverage of the Remote Public Alerting and Communication System (R-PACS). The project team was sufficiently flexible to adapt the indicator for the measurement of the achievement of the EWDS in the Results Framework accordingly. The lesson is that for the early warning system to be sustained in future the technology on which it is based can be upgraded and make the system more reliable and efficient.

13. Assessment Recommended?

No

14. Comments on Quality of ICR

The ICR provided a good overview of project preparation and implementation and was "outcome driven". On the whole, the ICR was sufficiently clear and candid. It was also internally consistent. The lessons learned included in the ICR were generally useful and two stood out as being important. However, the ICR lacked conciseness in some areas and also did not provide enough information on what type of risks might be a threat to development outcomes. One area in which the ICR was not concise was in its rating of efficiency. Despite an elaborate and well crafted analysis of the project's efficiency, the conclusions behind its final rating of the project's efficiency as modest was unclear and not concise. With respect to a lack of information on threats to development outcomes, the ICR rarely referred to these threats directly or analyzed an issue such as "reducing the vulnerability of coastal communities", which was a critical aspect for this project's objective. Nevertheless, on the whole this review rated the ICR's quality as Substantial.



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- a. Quality of ICR Rating
Substantial