



1. Project Data

Project ID P096532	Project Name ID: Dam Operational Improvement (DOISP)	
Country Indonesia	Practice Area(Lead) Water	
L/C/TF Number(s) COFN-C1460,IBRD-76690,IBRD-87110	Closing Date (Original) 31-Dec-2013	Total Project Cost (USD) 171,752,768.20
Bank Approval Date 19-Mar-2009	Closing Date (Actual) 30-Jun-2017	
	IBRD/IDA (USD)	Grants (USD)
Original Commitment	50,000,000.00	0.00
Revised Commitment	50,000,000.00	0.00
Actual	47,021,857.19	0.00

Prepared by Craig Phillip Kullmann	Reviewed by Dileep M. Wagle	ICR Review Coordinator Avjeet Singh	Group IEGSD (Unit 4)
--	---------------------------------------	---	--------------------------------

2. Project Objectives and Components

a. Objectives

The Project Development Objectives in the PAD (p.6) are: i) to increase the safety and the functionality with respect to bulk water supply of large Ministry of Public Works-owned reservoirs; and ii) to strengthen the safety and operational management policies, regulations and administrative capacity of Ministry of Public Works. In the Financing Agreement for the loan (p. 6) the objectives have the same meaning, but are simplified as follows:

- i. to increase the safety and functionality of dams in selected locations and



- ii. strengthen management capacity of dam safety.

The restructuring that took place in February 2017 incorporated additional financing and modified the PDO to state: *increase the safety and functionality of dams in selected locations and strengthen the operation and management capacity for dam safety* (restructuring paper, p. 10-11), which is the same as in the loan agreement. This modified PDO is a simplified version of the original PDO and does not materially change the original PDO. This ICRR updates the interim ICRR that was completed prior to the additional financing in February 2017.

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

Yes

Did the Board approve the revised objectives/key associated outcome targets?

No

c. Will a split evaluation be undertaken?

No

d. Components

Component 1: Dam Operational Improvement and Safety Works and Studies (estimated cost at appraisal: US\$34.2 million; actual cost US\$196.5 million). Under the first phase of the project, this component supported minor rehabilitation and remedial works on about 34 prioritized large reservoir sites to restore operational performance; developing surveys, investigations and designs for medium to major works, providing Basic Dam Safety Facility (BDSF) repair and/or upgrading for improved safety monitoring and preparedness systems, establishing a river inflow and sediment monitoring system, and an assessment of spillway capacity and downstream flooding risks. The additional financing expanded the scope to rehabilitate an additional 140 dams and incorporate updated standards, new studies, and the installation of advanced safety systems.

Component 2: Operation and Maintenance Improvement and Capacity Building:(estimated cost US\$14.6 million, actual cost: US\$34.9 million). Under the first phase of the project, this component supported the preparation of Operations and Maintenance (O&M) plans, Standard Operating Procedures (SOP) and manuals, as well as undertaking needs-based budgeting and O&M activities. The additional financing added strategic studies, emergency preparedness plans, community participation programs, and human resource development to further enhance operational safety and efficiency.

Component 3: Reservoir Sedimentation Mitigation (estimated cost: US\$15.1 million, actual cost: US\$64.6 million). Under the first phase of the project, this component supported i) surveys to determine the total available water storage in reservoirs affected by sedimentation; ii) feasibility studies, designs and the Environmental and Social Management Framework (ESMF) for medium-term interventions within the reservoir; iii) preparations for a sample study for decommissioning of severely silted reservoirs, (to be financed under a successor project); and, iv) piloting of institutional models and plans to construct sediment retention and river bank protection structures of upstream rivers and sub-catchments. The additional financing expanded activities to include a comprehensive Sedimentation Management Program, adding both corrective and preventative measures like dredging and community watershed management.



Component 4: Dam Safety Institutional Improvement (estimated cost US\$ 2.3 million, actual cost US\$14.7 million). Under the first phase of the project, this component supported i) the preparation of the needed Government and Ministerial regulatory documents and concept/academic papers; ii) a public awareness campaign about dams and reservoirs; iii) strengthening and developing the Dam Safety Unit (DSU), providing it with a fully furnished and equipped office and updated guidelines; establishing a dam engineer and technician training and certification system; and, iv) supporting incremental costs of the Central Dam Management Unit within the Ministry. The additional financing extended these activities to include institutional assessments, regulatory support, enhanced coordination mechanisms, and the development of a dam technology center.

Component 5: Project Management (estimated cost: US\$ 4.4 million, actual cost: US\$17.1 million). This Component provided overall project management including the provision of (i) the principal Project Management TA Consultant; (ii) the incremental operating costs of the Central Project Management Unit's (CPMU) and Project Implementation Units (PIUs) activities for coordinating all project interventions; and (iii) a TA support to prepare for the successor project. The additional financing added further support for project management through enhanced technical assistance, oversight by expert panels, and additional resources for effective project implementation.

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

Cost: The estimated total project cost at appraisal was US\$70.4 million with the Bank's contribution and counterpart funding included. At the restructuring for additional financing, the total project cost increased to US\$370.4 million, which included contributions from the borrower, World Bank, and the Asian Development Bank. The actual project cost at closing was US\$327.7 million.

Financing: The World Bank's financing at appraisal was US\$50.0 million, which increased by US\$125 million with the additional financing for a total of US\$175 million. The actual expenditure of World Bank financing at closing, December 31, 2023, was US\$172.1 million. The Asian Development Bank contributed US\$125 million to the restructuring for the additional financing and closed with actual expenditures of US\$124.9 million.

Borrower Contribution: At appraisal, the Borrower's contribution was estimated at US\$20.4 million. During the restructuring for additional financing, the borrower's contribution increased to US\$70.4 million. The actual contribution at project close was US\$30.8 million.

Dates: The original project closing date was December 31, 2013. In total, the project was restructured six times. The closing date was extended three times to allow the completion of project activities, reallocation of loan proceeds, and revision of some intermediate outcome indicators. The third restructuring was on October 23, 2016, to extend the closing date to June 30, 2017. This was to allow time for the preparation of additional financing to be implemented as a second phase of the Dam Operational Improvement and Safety Project.

The project was restructured on February 27, 2017, to include additional financing, and modify the results framework and PDO. The fifth restructuring modified the results framework, and the final restructuring extended the closing date by 6 months. The project became effective on June 8, 2009, and closed on December 31, 2023, for a total of 14.5 years of implementation which included 54 months of extensions.



3. Relevance of Objectives

Rationale

The Project Development Objectives (PDOs) are sufficiently outcome-oriented and appropriate for the development status of the country. The country relies heavily on reservoirs for water supply for various sectors such as agriculture, drinking water, and electricity generation as well as flood protection. (PAD, p.1) The need to improve the declining reservoir performance in the country was recognized and prioritized in the WBG Country Partnership Strategy (CPS) at project appraisal and remained relevant to the Country Partnership Framework (CPF) at the time of the interim ICR. The CPS (FY09 – FY 12) for Indonesia focused on strengthening the country's institutions and investments in (water) infrastructure, climate change and disaster mitigation. The CPF (FY16 – FY20) acknowledged the historical underinvestment in infrastructure in Indonesia and identified water and sanitation projects, including irrigation and dams, to help close the infrastructure gap highlighting dam safety in the CPF. A shortcoming of the PDOs at appraisal was the lack of attention given to sedimentation. Sedimentation is an important factor for reservoir storage capacity, impacting water delivery and flood protection. It was considered at component level, but it was not considered in the PDOs.

Indonesia sought universal access to water and sanitation by 2019 (CPF FY16-20) (p. 23). To this end the WBG gave support to expanding existing and supporting new national level water-related programs. The objectives were relevant to the country priorities: the Indonesian Government makes long-term development plans as well as five-year medium-term development plans (RPJMN). Each RPJMN identifies development priorities for the specified period.

The first RPJMN 2004-2009 emphasized infrastructure development, and the sustainable development of natural resources and food security, all of which were reliant on the effective and sustainable use of water resources. During project implementation, the government further developed its vision of water and food security by translating it into an ambitious program of constructing 65 new dams within its legislative period, 2014-2019. The PDOs remain relevant to the government's 2020-2024 medium-term development plan, and specifically their strategic areas: (5) Strengthening Infrastructure to Support Developing Economy and (6) Basic Services Developing the Environment, Increasing Disaster and Climate Resilience.

The CPF (FY16-20) prominently featured dam safety as an integral part of water security in the country. The PDOs are still relevant to the CPF (FY21-25) Engagement Area II: Improve Infrastructure, specifically Objective 2.1 Improve infrastructure provision for quality of service where the project is directly referenced (CPF, p 56-57). Likewise, the project is relevant to the CPF's Engagement Area IV: Sustain Management of Natural Assets, Natural Resources-Based Livelihoods and Disaster Resilience, namely: Objective 4.2 Improve Agriculture and Natural Resources Based Livelihoods; and Objective 4.3 Strengthen Multi-Hazard Disaster Resilience..

The project and PDOs are based on the historical experience of the Bank in the sector. Prior to this project, the Bank invested in the Dam Safety Project (DSP: 1994-2003), which helped develop the country's first dam safety institutions such as the Dam Safety Commission, Dam Safety Unit, Central Dam Monitoring Unit, and Provincial Dam Monitoring Units. The evaluation of DSP recommended that institutional strengthening support for this sector would require a long-term commitment such as through an Adaptable



Loan Program with different phases. (PAD, p. 11) The PDOs reflect the evolution of the Bank's sector engagement.

The PDOs remain relevant to the current CPF and the government's medium-term plan and are rated as High.

Rating

High

4. Achievement of Objectives (Efficacy)

OBJECTIVE 1

Objective

Increase the safety and functionality of dams in selected locations.

Rationale

The theory of change (ToC) in the Implementation Completion Report (ICR, p. 8) identified that the outcome of interest was *to increase safety and functionality of dams in selected locations*.

The mix of inputs identified is adequate and sufficient to reach the outcome. These included the financing of interventions through various components: (i) developing surveys, investigations and designs for medium to major rehabilitation; (ii) minor to major rehabilitation and remedial works on prioritized dams; (iii), providing Basic Dam Safety Facility (BDSF) repair and/or upgrading for improved safety monitoring and preparedness systems; and (iv) emergency preparedness plans, community participation programs, and human resource development to further enhance operational safety and efficiency.

Aside from improved instrumentation and rehabilitation to improve safety and functionality, additional inputs were important for dam functionality, which included: (i) surveys to determine the total available water storage in reservoirs affected by sedimentation; (ii) feasibility studies, designs and the Environmental and Social Management Framework (ESMF) for medium-term interventions within the reservoir; (iii) piloting of institutional models and plans to construct sediment retention and river bank protection structures of upstream rivers and sub-catchments; and (iv) dredging activities.

As a result, the expected outputs would have been: (i) 147 dams rehabilitated with respect to civil works as well as new mechanical equipment installed; (ii) improved instrumentation installed as well as hardware and software systems supporting dam operation, monitoring, and communication of information; (iii) emergency preparedness plans and community participation plans developed; (iv) sedimentation studies and reforestation and sediment retention programs developed, and (v) dredging of reservoirs conducted.



As a result of these outputs, expected intermediate outcomes would have been: (i) rehabilitated dams have improved operation; (ii) increased land area under sustainable landscape management preventing sedimentation; (ii) communities participating catchment area activities; (iii) increased number of dams with

BDSFs operational, (iv) emergency action plans disseminated, and (v) dams are providing real-time data to operators and decision-makers.

The result of these intermediate outcomes would be the PDO outcome of increased safety and functionality of the dam, which would contribute to a higher level of outcome of increased resilience to climate change and increased access to water for human and productive uses.

The ToC's activities, outputs, intermediate outcomes, and outcomes provide a logical and properly sequenced causal chain that was sufficient to reach the PDO outcome target. The ToC was comprehensive in addressing the safety and functionality aspects of the PDO. The ToC included explicit assumptions such as (i) community activities in landscape and watershed management will reduce soil erosion and sediment loading of reservoirs; (ii) the government will consistently allocate sufficient funding to cover O&M and dam safety; and (iii) there will be sufficient institutional and technical capacity to implement the regulatory framework for dam safety. (ICR, p 8). The results framework captured key outputs and intermediate outcomes that were appropriate. The PDO indicator for measuring 'safety' was based on reduced risk scores and was adequate and based on good international practice, despite the shortcomings identified in the ICR. However, there were shortcomings in measuring outcomes related to 'functionality'. The outcome indicator for the 'functionality' aspect of the PDO captured a series of outputs and fell short of capturing the impact of the interventions by focusing on whether infrastructure improvements to the dams were made. A more outcome-oriented indicator could have measured the reservoirs' ability to deliver volumes of bulk water based on their rehabilitated storage capacity. Given that sedimentation is a significant issue for Indonesia's dam portfolio and sedimentation activities were planned for almost half of the reservoirs, an indicator that measured the reservoirs' restored storage capacity could have been included.

OUTPUTS:

The output level indicators for this objective in the results framework included:

- 147 dams were rehabilitated. (Original target was 140). (**achieved**) (ICR, p. 34). The rehabilitation of dams included repairing structural deficiencies, inoperable mechanical systems, and replacement of non-functional instrumentation. (ICR, p. 6) Although the ICR highlights the target for this indicator should have been 150 when accounting for the number of dams under the first phase and the additional financing. If the target should have been 150, then the achievement is 98 percent, which is substantially achieved. (ICR, p. 17)
- 141 dams with basic dam safety facilities operational. (Original target was 140 dams) (**achieved**) (ICR, p. 34). These improvements included daily access and mobility at dam sites, communication facilities, basic equipment for surveillance and monitoring, equipment for inspections and emergency repairs, standby power supplies, water transportation, lighting, etc.
- 160 dams with emergency action plans updated and disseminated. (Original target was 140 dams) (**exceeded**) (ICR, p. 35). These plans are a requirement under the new regulations and detail the necessary actions in the event of a dam breach or under other specified emergency conditions to protect life, economic assets, and the environment downstream. (ICR, p. 17)



- 761 Ha under sustainable landscape management practices. (Original target was 300 Ha). **(exceeded)** (ICR, p. 37). Sustainable landscape management practices were introduced over an area of 761 hectares, including the greenbelts and areas surrounding the dams, exceeding the target of 300 hectares. These measures aimed to reduce erosion in those areas and slow the rate of sedimentation of reservoirs. (ICR, p. 18) While this target was exceeded, the ICR does not discuss the impact of these interventions and notes that sedimentation of dams remains a major challenge.
- 70 percent of communities join catchment management activities. (Original target was 25 percent). **(exceeded)** This indicator included soft components of increasing awareness of conservation, trainings/education on catchment management, and empowerment; however, the indicator is not well defined and there is little information in the ICR to describe the impact other than reporting on the indicator.
- 86 dams, implementing at least 70% of catchment management activities. Original target was 60 dams). **(exceeded)** (ICR, p. 38). The ICR noted that this indicator was achieved, but did not elaborate on the impact nor provide details other than briefly mentioning training, awareness-raising activities, and the introduction of landscape practices such as greenbelts, which was captured in a separate indicator. The additional financing paper discussed piloting a payment for the environmental services program, but this was not discussed in the ICR. The ICR does not reflect the impact of these interventions.

The ICR reported the following additional output that did not have targets and was not included in the results framework but was related to inputs in the ToC that would contribute to dam safety and functionality.

- A total of 123 dams supported under the project began a process to issue dam operation licenses from the Ministry of Public Works and Housing. A total of 64 dams received their operation license by project closing. The remaining 56 dams were moving through the process, including discussions with the Dam Safety Unit, and responding to its recommendations. (ICR, p. 16)

OUTCOMES:

The outcome level indicators for this objective in the results framework are the following:

- Overall reduction of the risk score by 31.8 percent for all dams under the project. (Original target was 20 percent). (ICR, p.31) **(exceeded)**. This reduction was calculated by assessing the risk scores among 141 dams that were rehabilitated. The risk score reduction was reportedly attained through remedial works, mechanical improvements, improved instrumentation, improved basic dam safety facilities and emergency management plans. The ICR did not substantiate the reported figure for risk score reduction with data showing risk scores pre- and post-intervention as was done in the interim ICR; however, the Task Team did provide the analysis that was conducted to substantiate the reported figure. The risk scores were developed before and after rehabilitation interventions by technical assistance consultants using a methodology based on best international practice and endorsed by the International Commission on Large Dams (ICOLD). (ICR, p. 16)
- 127 dams with individual hazards reduced by > 20% of risk score. (Original target was 98). (ICR, 31). **(exceeded)**. This reduction in risk scores also included dams not only reducing their risk score by 20 percent but also the number of dams classified as 'high' risk (score 46-75) reduced from 118 to 18 dams and the number of dams classified as extreme risk (score 76-90) reduced from 3 to 0. The measurement of risk scores follows international good practice, which evolved during the life of the project. (ICR, p. 16). The annexes of the ICR summarized the type of activities carried out at each



dam; however, there was no information in the ICR on risk score reductions for individual dams, which was provided by the Task Team after the interview. The overachievement of this indicator was primarily due to: (i) improved coordination among stakeholders, and optimized resource allocation, (ii) advancements in assessment methodologies (such as the Risk Score Assessment developed in DOISP2) that allowed additional dams to be assessed more quickly, (iii) timely implementation of interventions, and (iv) and inclusion of small dam type structures that benefited from the installation of basic safety equipment and safety documents.

- 95 percent of dams returned to improved operations. (Original target was 74 percent). (**exceeded**). One hundred and thirty-four dams out of 141 were returned to improved operation during the project supporting the PDO element of improved functionality. This indicator was introduced at the additional financing restructuring to better measure 'functionality' of PDO 1, which did not exist in the first phase. There was no definition for this indicator in the restructuring paper at additional financing, but the ICR used the following: (i) hydro-mechanical instrument repaired; (ii) Sediment work in the inlet irrigation structure completed; (iii) Spillway repaired; (iv) Dam and reservoir leakage stop; (v) O&M manual is available and utilized. The interview with the task team confirmed that the definition of this indicator was documented in other project documents such as aid memoirs and the monitoring and evaluation system.

The project achieved or exceeded its output, intermediate outcome, and outcome indicators as articulated in the results framework; however, it was not always clear that the achievement of indicator translated into impact (e.g. while the rehabilitation likely improved the safety of the dams, it is less clear whether this portfolio of dams is better able to meet water demands for agriculture, drinking water supply and energy production as a result of the interventions, as this was not measured particularly given the challenges with sedimentation that are documented in the ICR). The ICR notes that even though an indicator was added on the return of dams to improved operation to measure functionality, it "only partially addressed the shortcoming in the M&E system around the sub-objective on functionality", for which the evidence could have been further enhanced by measuring dams receiving their operational licenses after passing inspection or trying to measure the reliability or quality of service from the dams. The achievement of Objective 1 is rated Substantial with moderate shortcomings.

Rating

Substantial

OBJECTIVE 2

Objective

Strengthen the operation and management capacity for dam safety.

Rationale

The theory of change (ToC) in the Implementation Completion Report (ICR, p. 8) identified that the outcome of interest was *to strengthen the operation and management capacity for dam safety*.

The mix of inputs identified is adequate and sufficient to reach the outcome. These included financing the following: (i) the preparation of the needed Government and Ministerial regulatory documents and concept/academic papers; ii) a public awareness campaign about dams and reservoirs; (iii) developing Dam Safety Unit (DSU), and providing it with a fully furnished and equipped office and updated guidelines;



(iv) preparation of Operations and Maintenance (O&M) plans, Standard Operating Procedures (SOP) and manuals, as well as undertaking needs-based budgeting and O&M activities; (v) establishing a dam engineer and technician training and certification system; and, (vi) supporting incremental costs of the Central Dam Management Unit (CDMU) within the Ministry; (vii) institutional assessments; and (viii) and the development of a dam technology center.

As a result, the expected outputs would have been: (i) regulatory documents prepared and issued, (ii) dam operations staff trained and certified, (ii) O&M plans, budgets, and SOPs developed; (iii) DSU and CDMU fully equipped, and (iv) dam technology center developed.

As a result of these outputs, expected intermediate outcomes would have been: (i) regulations were being implemented, (ii) dam operation staff were conducting operation and maintenance and applying SOPs, and (iii) the dam technology center was sharing real-time data (hydrological, dam water levels, etc.) informing dam operations and safety measures.

The result of these intermediate outcomes would be the PDO outcome of strengthened dam operation and management capacity, which would contribute to a higher level of outcome of improved performance and sustainability of the water sector, increased resilience to climate change, and increased access to water for human and productive uses.

The ToC's activities, outputs, intermediate outcomes, and outcomes provide a logical and properly sequenced causal chain that was sufficient to reach the PDO outcome target. The ToC was comprehensive in addressing the operation and maintenance aspects of the PDO. The relevant assumptions in the ToC that pertain to Objective 2 are: (i) the government would consistently allocate sufficient funding to cover O&M and dam safety; and (ii) there would be sufficient institutional and technical capacity to implement the regulatory framework for dam safety. (ICR, p 8). While the ToC was logical, the results indicators to measure the outcomes had minor shortcomings. The outcome indicators were heavily focused on outputs making it difficult to assess the impact of the investments on strengthened operation and management capacity. See the section below.

OUTPUTS:

The output level indicators for this objective in the results framework included:

- 100 percent of dam operational staff receive annual training. (Original target was 100 percent) (**achieved**). (ICR, p.19). At appraisal, this indicator was a one-off training for identified staff, and at the restructuring for the additional financing, the indicator was modified to ensure annual training in dam operations and safety, which strengthened the indicator. By the end of the project, 100 percent of dam operators were receiving annual training. These training courses included 19 staff in the CDMU and 146 staff in the DSU. By the close of the project, 1,042 people that operate dams were certified as dam professionals by the Indonesia Committee on Large Dams (INACOLD), which is a member of the International Commission on Large Dams (ICOLD). (ICR, p. 19)
- 152 O&M Manuals (including related training) for dams completed. (Original target was 140). (**exceeded**) (ICR, p. 36) These manuals contain the equipment needs for each dam, which are important inputs for the calculation of needs-based budgets for the River Basin Organizations.



- 39 Community-Dam Management MOUs signed on greenbelt management. (Original target was 30 MOUs). (**achieved**) (ICR, p. 36). These MOUs were signed between communities and dam operators to raise awareness of dam safety and improve landscape management to reduce sedimentation.
- Dam Management Technology Center established and operationalized DGWR-MPWH. (Original target was to establish and operationalize) (**achieved**). At the central level, a Dam Management Technology Center within the DGWR-MPWH was established and equipped with forecasting capabilities and was receiving real-time hydrological and water level data from 149 dams. (ICR, p. 19)
- 149 dams providing real-time data. (Original target was 80 dams). (**exceeded**) (ICR, p. 38). 149 dams were sending real-time hydrological and water level data. A subset of dams also sent real-time video from their CCTV networks. At the basin level, 67 Dam Monitoring Units were also established with project support, helping to strengthen the flow of information between central authorities and the dam operators who are geographically very dispersed.
- 19 CDMU staff trained annually. (Original target was 5) (**exceeded**) (ICR, p. 39)
- 146 DSU staff trained. (Original target was 15) (**exceeded**) (ICR, p. 39). The interview with the Task Team highlighted that the original targets were overly conservative and could have been set higher.
- 1,042 professionals certified by the Indonesia Committee on Large Dams (INACOLD). (Original target was 200) (**exceeded**). The interview with the Task Team highlighted that the original targets were overly conservative and could have been set higher. The interview also noted that the government was motivated to train and certify professionals, which also explained why this target was surpassed.

The ICR reported the following additional output that did not have a target and was not included in the results framework but was related to inputs in the ToC that would contribute to the strengthened operation and management capacity for dam safety.

- The project supported institutional benchmarking across different River Basin Organizations (RBOs), which introduced clear targets for institutional development and promoted constructive competition among RBOs.

OUTCOMES:

The outcome level indicators for this objective in the results framework were the following:

- 13 River Basin Organizations with need-based O&M budget and plan operationalized within a national asset management system. (Original target was 13 RBOs) (**achieved**) (ICR, p. 32) The O&M budget allocations from the MPWH increased from IDR 21 billion in 2009 to IDR 48 billion in 2014 (IDR 35.5 billion in 2009 prices) to IDR 93 billion in 2023 (IDR 52.6 billion in 2009 prices). (ICR, p. 19). The need-based budgeting exercises appeared to raise awareness of O&M costs and supported the increases over time, but current funding remains below the needs for sustainable O&M. (ICR, p. 19)
- Issuance of 4 regulations on dam safety (incl. Government/PP, Minister, and/or DG Decree on dam safety assurance. (Original target was 3 regulations issued). (**achieved**) (ICR, p. 33). The key regulation of dam safety was the 2015 Ministerial Regulation on Dams (27/PRT/M/2015), which clearly defines the roles and responsibilities for dam safety, details guidelines and standards, and empowers the regulator. In addition, it requires the certification of large dams by the Dam Safety Commission and requires these dams to have dam safety instruments such as Emergency Action Plans (EAPs) and O&M Manuals. (ICR, p. 19)



The ICR's ToC adequately captured the causal chain and included assumptions. However, the results framework had minor shortcomings in measuring the PDO's dimensions of operation and management capacity of dam safety. Solely reporting on the number of staff trained limits the understanding of the impact of the training. The ICR noted the limitations of using the number of dam operational licenses issued, which would serve as a proxy for strengthened O&M capacity; however, the project storyline could have been strengthened with some information on how the training has helped them improve dam operation and management. While increased government financing for O&M is positive, what is less clear is the adequacy of those funds for proper O&M and how well those funds are being spent.

The output and outcome targets were achieved or exceeded, but there were minor shortcomings in measuring the outcome. Objective 2 is rated as Substantial.

Rating
Substantial

OVERALL EFFICACY

Rationale

The ICR documented the achievement of the output, intermediate, and outcome indicators with moderate shortcomings in how the PDOs were measured. The overall efficacy was rated as Substantial with moderate shortcomings.

Overall Efficacy Rating

Substantial

5. Efficiency

Ex Ante Economic Efficiency: At appraisal, the economic rate of return (EIRR) was estimated at 32.8 percent with a Net Present Value (NPV) of US\$108 million at a discount rate of 6 percent. With the restructuring for additional financing, the EIRR increased to 60.3 percent with an NPV of US\$522.9. The benefit streams that were included were: (i) avoided irrigated agricultural losses, (ii) avoided hydropower losses, (iii) avoided household property losses, (iv) avoided dam replacement or rehabilitation costs, and (v) avoided emergency response costs.

Ex Post Economic Efficiency: The economic analysis at project completion in the ICR included the same benefits streams identified at appraisal. The EIRR at closing was estimated at 48 percent with an NPV of US\$1,182 million. The ex-post analysis also used a discount rate of 6 percent. The same methodology for the economic analysis was applied at ICR stage, which assumed a dam failure probability of 13 percent and a reduction of this probability by 90 percent because of project interventions. (ICR, p.53).



Operational and Administrative Efficiency: The project was designed to be implemented in two phases. The first phase was to be implemented in 5 years but was extended three times for a total of 4 years beyond the initial closing date. The reason for these extensions was in part due to: (i) initial delays in implementation, (ii) reorganization of the implementing agency, (iii) issues around procurement and contract management, (iv) safety concerns with regards to weather conditions, and (v) allowing time to process the additional financing. The project was restructured with additional financing, adding 6 years to the implementation period. During the second phase, the project was extended by 6 months. In total, the project was implemented over a 15-year period. (ICR, p.48) The project was originally envisioned as a series of projects, but the approach was switched to an extension with additional financing, as requested by the client because it was expected to be faster than processing a new stand-alone project and easier for the client, but delays still occurred. (ICRR interview)

Financial Analysis. At appraisal, the financial analysis assessed the fiscal impact on the budget of central and provincial governments, and the financial burden of water users from increased O&M expenditure of dams and reservoirs if the project dams were to be maintained at good condition. At the appraisal stage, water users were not charged for using water for irrigation and the O&M cost was fully borne by the governments. The interim ICCR noted that if this practice continues, the annual fiscal burden to the central and provincial government would increase by 64 percent from US\$2.82 million to US\$4.63 million. (Interim ICRR, p. 6) There was no financial analysis conducted at the interim ICR nor at the final ICR.

Conclusion. While the economic analysis of the portfolio of dams was positive, the economic analysis done for each cluster of dams revealed mixed results. The EIRR ranged from 12 to 99 percent, while the benefit-cost ratio ranged from 1.5 to 51.7. All clusters of dams had positive NPVs and EIRR exceeding the cut-off discount rate range of 8-12 percent. The EIRR at closing, estimated at 48 percent, was lower than the EIRR after the additional financing at 60.3 percent. The project experienced significant operational and administrative delays totaling 4.5 years, which is almost one-third of the total implementation period of 14.5 years. An additional shortcoming of the efficiency analysis was that a financial analysis was not conducted. The efficiency rating is 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	✓	32.80	0 <input checked="" type="checkbox"/> Not Applicable
ICR Estimate	✓	48.00	0 <input checked="" type="checkbox"/> Not Applicable

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

6. Outcome



The project remains highly relevant to the World Bank CPF. The project design was consistent with the objectives, and substantially scaled up activities because of the additional financing. The project interventions helped improve the safety of dams and strengthen the O&M capacity of the Ministry of Public Works. The project corrected course at the restructuring and attempted to measure a proxy indicator for 'functionality'; however, this was more output-based rather than focusing on outcomes. At the same time, the project implementation experienced 54 months of delays. While the project largely achieved its stated output and outcome indicators, the quality of those indicators to measure outcomes had moderate shortcomings. Nevertheless, taken together, a Substantial rating for Relevance, a 'Substantial with moderate shortcomings' rating for efficacy, and a Modest rating for efficiency results in a Moderately Satisfactory rating for the overall outcome

a. Outcome Rating
Moderately Satisfactory

7. Risk to Development Outcome

After the completion of the second phase of the project, the main risk to development outcome remains the sustainability of O&M funds for dams. The project did not fundamentally change how dam O&M is funded but was successful in helping develop an asset management system and strengthening the annual budget estimation process within RBOs and the MPWH based on real O&M needs. (ICR, p. 28) The ICR reported that the government had demonstrated its commitment to increase the capacity for management of dam operation and safety with some increase in national budget allocation for dam O&M. However, a systemic challenge for financing dam O&M is the inability of River Basin Organizations (RBOs) to charge fees for water used for irrigation, and hydropower generation. O&M needs are expected to increase in the future with the government's investments in new dam construction to meet growing demands for water storage services.

An additional risk to the development outcomes achieved is the issue of sedimentation. Sedimentation of dams reduces their storage capacity to manage hydrological events and the ability to reduce the risk of downstream flooding. Likewise, reduced storage capacity limits the ability of dams to deliver bulk water on demand to meet the needs of users (e.g., irrigation, water supply, hydropower). The ICR noted the complexity and importance of dealing with sedimentation to ensure that the dams can realize their full potential.

8. Assessment of Bank Performance

a. Quality-at-Entry

The project was highly relevant and aligned with national priorities related to dam safety and operation. The project benefited from lessons learned from the predecessor Dam Safety Project (1994-2003), which highlighted the need to commit to a long-term time horizon for institutional strengthening (PAD, p 11). The project design recognized that a phased approach was appropriate by starting with a smaller portfolio and scaling up activities in the second project. While a two-phase project was originally envisioned, the Bank



and client opted during implementation to use Additional Financing for the original project rather than develop a second-phase project.

With multiple implementing entities at the central and RBO level, the team underestimated the project's complexity, contributing to delays in implementation after project effectiveness. The indicators and targets selected for measuring the PDOs regarding dam safety were complex and some were unrealistic (ICR, p 23). The reduction in risk scores envisioned at appraisal was not realistic for some dams because the factors to reduce the risk scores were outside of the control of the project (ICR, p. 23). In addition, there were limitations in measuring specific PDO indicators such as "increased functionality with respect to bulk water supply of large Ministry of Public Works-owned reservoirs".

Quality-at-Entry Rating

Moderately Satisfactory

b. Quality of supervision

The World Bank task team provided consistent support to the client through 27 formal missions, which is an average of two missions per year. The turnover in the task team with the project resulted in six task team leaders during implementation with an average tenure of less than 2.5 years each.

Near the close of the first phase of the project, the Bank decided not to pursue a series of projects approach and process a restructuring with additional financing. This second phase of the project, intended to scale-up activities, was informed by a Public Expenditure Review, a study of the regulatory framework for dam safety in Indonesia, as well as the findings and lessons from the Interim ICR, including the design of community participation activities and the need to build capacity at the sub-national level to support dam O&M. (ICR, p. 27) The Task Team took advantage of the restructuring to simplify the indicators in the results framework.

The geographic spread of the project made it impossible for the task team to perform site visits of all dams during the missions; therefore, the team relied heavily on consultants supporting the CPIU and CPMU to support monitoring and due diligence. In the remaining two years of the project, the client requested that the scope of the soft interventions be increased from 140 to 163 dams, which spread the available resources. (ICR, p 30) The project struggled with compliance with OP (BP 4.01) Environmental Assessments, which was rated Moderately Unsatisfactory for the last three years of the project, up until the last supervision report, when it was upgraded to Moderately Satisfactory. The scope and scale of the project made it difficult to monitor all works across a large portfolio with limited environmental staff assigned to support the sub-projects, which was a shortcoming of the Bank's supervision. All other project ratings for safeguards and fiduciary were consistently rated Moderately Satisfactory or Satisfactory.

The Task Team helped the counterparts achieve the project outputs and outcomes with no major non-compliance issues other than OP 4.01. There were shortcomings in the M&E system design and implementation, as well as late changes to the project's scope, which had the potential to reduce the development impact in terms of overall dam safety improvement. The overall rating of World Bank's performance is Moderately Satisfactory



Quality of Supervision Rating

Moderately Satisfactory

Overall Bank Performance Rating

Moderately Satisfactory

9. M&E Design, Implementation, & Utilization

a. M&E Design

The original PDO indicators followed good practice in attempting to measure the risk levels of dams at the time of appraisal, but implementation proved more challenging. There were significant shortcomings in measuring the PDO for Objective 1 as there was no definition for the “functionality” of dams, which was identified by IEG in the interim ICR. The ICR noted that the targets for the dam risk scores turned out to be overambitious. The additional financing, introduced via restructuring, attempted to resolve the issue of measuring functionality by adding an explicit indicator, but this indicator was based on a series of outputs, and the ICR acknowledges that it partially addressed the issue of measuring “functionality.”

b. M&E Implementation

The project M&E system was put in place when the project started. The Central Project Management Unit was mainly responsible for monitoring project progress and submitted quarterly monitoring reports to the World Bank. The ICR noted various weaknesses in the implementation of the M&E system such as: (i) the definition of targets and baselines at the additional financing restructuring were not clear and hindered the monitoring of the full achievement of results across the whole project; (ii) revisions in the results indicators made during the restructuring for additional financing were not fully reflected in the Bank’s system in a timely manner; (iii) the client measured the PDO indicator for the overall risk score reduction differently than the indicator definition defined at restructuring, and (iv) some of the original indicators were dropped from the results framework even though they were already achieved. (ICR, p. 24) The Task Team was requested to reduce the overall number of indicators by management at the additional financing restructuring which may explain why indicators were dropped despite being achieved. These shortcomings are considered significant, making it challenging to monitor the outcomes of the project. While there were challenges with the M&E, the client’s documentation allowed the ICR to adequately report on the indicators in the results framework.

c. M&E Utilization

MPWH, Bappenas, and the World Bank used the project monitoring information to review progress and inform adjustments to project activities toward achieving the PDOs. The project adjusted the methodology for risk assessment scores, which was based on good international practice. Despite the issue of using a different definition as noted in the previous section, the adjustment to the risk



assessment methodology helped the client prioritize resources and adapt to changes in the conditions of the dams that occurred during implementation. The ICR noted that the client maintained good documentation on disaggregated results of progress over the 14-plus years of implementation despite the challenges with the M&E design and implementation.

M&E Quality Rating

Modest

10. Other Issues

a. Safeguards

Environmental: The project was rated a Category B project and triggered the following Safeguard policies: (i) OP 4.01 on Environmental Assessment, and (ii) OP 4.37 on Safety of Dams. The additional financing triggered the following additional policies: (iii) OP BP 4.01 Natural Habitats, (iv) OP 4.09 Pest Management, (v) OP BP 4.11 Indigenous Peoples, and (vi) OP BP 4.12 Involuntary Settlement.

The ICR reported challenges in the second phase of the project that included delays in the preparation of the contractor for Emergency Management Plans (EMPs), obtaining environmental permits needed for the commencement of civil works, and integrating environmental requirements into the bidding documents. During the last three years of the project, the client was late or did not submit safeguards reports which led to the downgrading of the Environmental safeguards' ratings to Moderately Unsatisfactory.

The Bank worked closely with the client and additional safeguards consultants were hired to close the gaps, and the situation improved in the last six months of the project. However, nine contractor EMPs were not prepared, and two Environmental Management and Monitoring Statement Letters (SPPLs) were not completed. The client agreed to prepare Environmental and Social Due Diligence Reports (ESDDR) to bring the project back into compliance. All ESDDRs for the project were finalized, and all environmental safeguards were upgraded to Moderately Satisfactory or Satisfactory by project closing.

The Safety of Dams (OP/BO. 4.37) was rated as Moderately Satisfactory for 26 out of 27 ISRs, including at closure. The project established a Panel of Experts (PoE) to review the rehabilitation designs and advise on the implementation of the works. During the additional financing phase, the client was delayed in fully establishing the PoE, which was done in 2022 to review high-hazard dams. The PoE should have been established earlier in the project to provide sufficient quality control and to comply with OP/BP 4.37. The ICR noted several shortcomings; for example (i) Potential Failure Mode Analysis was only carried out for one dam when it was supposed to have been done for all high-hazard dams, and (ii) in the first phase of the project, Special Studies identified several dams in serious conditions that required immediate action, but no action had been taken to address the issues.

The client complied with the social safeguards and prepared a Preliminary Land Acquisition and Resettlement Action Plan (LARAP). The project did not involve any land acquisition, but people were relocated from restricted areas at three dam sites where area activities were being undertaken. There were no issues concerning indigenous peoples, and the project Grievance Redress Mechanism (GRM) was systematically incorporated into all PIUs. The project GRM registered 204 complaints related to



construction-related disturbances and had a resolution rate of 100 percent. There were no sexual harassment or gender-based violence cases were reported during the project.

b. Fiduciary Compliance

Financial Management. The ICR (p. 26) noted that the project struggled with timely processing of Interim Financial Reports (IFRs) in the early years of implementation. However, by closing, the project had consistently maintained its compliance on IFR submissions, as well as timely budget availability to mitigate payment delays. The project had one non-compliance issue related to the use of loan funds for civil servant honorarium payments, but this was resolved. After 2010, the project consistently received unqualified audit opinions on its financial statements. The project was consistent on the timeliness of all audit report findings, including required refunds of ineligible expenditures noted in the audit reports. (ICR, p. 27) The project closed with a Moderately Satisfactory rating for financial management.

Procurement. The project had a heavy procurement burden with a total of 568 procurement packages across 19 PIUs. The project faced challenges in the beginning because of the lack of experience with World Bank procurement processes within some PIUs. An ex-post review in 2014 revealed various deviations in procurement processes that required clarification and follow-up from a specific PIU.

During the first phase, the project faced delays in major procurements related to heavy equipment. During the additional financing stage, the project continued to experience delays in procuring new technical assistance consultants with selected PIUs due to high contract prices relative to the available budget. The ICR reported significant improvements in procurement as implementation continued, and near project close all contracts had either been completed or were under implementation. The ICR (p. 27) reported that overall, the project complied with procurement requirements, with some exceptions in the case of specific PIUs, but these issues were resolved. The project closed with a Moderately Satisfactory rating for procurement.

c. Unintended impacts (Positive or Negative)

n/a

d. Other

11. Ratings

Ratings	ICR	IEG	Reason for Disagreements/Comment
Outcome	Satisfactory	Moderately Satisfactory	Moderate Shortcomings in Efficacy and Efficiency



Bank Performance	Moderately Satisfactory	Moderately Satisfactory
Quality of M&E	Modest	Modest
Quality of ICR	---	Substantial

12. Lessons

Dam safety projects that contain a large portfolio of dams can benefit from a programmatic approach, which is a suitable way to scale up project interventions and strengthen capacity over time. DOISP was designed and implemented as a programmatic approach, which allowed for a significant scale-up of interventions and gradual institutional strengthening. Starting with a smaller set of interventions in the initial phase can enable implementing agencies to learn and strengthen their capability to expand activities in the second phase. While the project utilized the Additional Financing mechanism to scale up activities instead of developing a new second-phase operation, the scale-up over time was a logical choice.

Sediment management requires multi-institutional coordination and a clear strategy for next-generation dam safety investments. Sedimentation is a complex challenge for dam safety projects as the causal factors stem from land use patterns far upstream of dam facilities. Governmental institutions that may be responsible for the regulation of land use (e.g., ministries of environment or agriculture) are likely to be different than those who manage and operate dam facilities. The complexity of the issue is increased as mitigation involves changing behaviors and incentives of private landholders who are upstream and likely to not directly receive the downstream benefits of the dam facility (e.g., flood protection, water supply). Nevertheless, sedimentation can pose serious risks to investments in dam rehabilitation and new construction reducing the impact of the investment. While DOISP was cognizant of this issue, the impact of the sedimentation mitigation activities was limited. The design of next-generation dam safety projects should incorporate robust interventions that will likely require multi-institutional coordination to address the challenge, or explicitly do so in concert with other projects.

If dam risk indices are to be used as PDO-level indicators, the indicator definitions and targets should be set with the recognition that they measure relative risk within a portfolio of projects and not actual risk reduction (i.e., the product of the probability of failure and the consequences). There are some risk parameters that can and will change in response to the implementation of dam safety measures, and others will be influenced by factors beyond the control of the project. Given this, risk indices may be better suited as intermediate outcome indicators. Regardless, the agreed approach to measuring risk must be applied consistently throughout the project to be able to track project-induced changes. Since the selection of parameters and weights of risk indices introduces some element of subjectivity, these assessments must be done by or under the guidance of experts and according to a common guideline or standard. (ICR, p. 29)

13. Assessment Recommended?



No

14. Comments on Quality of ICR

This ICR was comprehensive with detailed information on the results of the project with minor shortcomings. The ICR was transparent and candid on the shortcomings of the results framework and the monitoring and evaluation system as well as on safeguards and fiduciary aspects. Detailed information on measuring risk scores across the portfolio of dams in the project was not included in the ICR as it was reported in the interim ICR, but it was provided by the Task Team after the interview. The ICR could have included a summary of the changes in risk scores or made reference to the database indicating source to substantiate the results.

a. Quality of ICR Rating
Substantial