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**Report No.: 47950**

**PROJECT PERFORMANCE ASSESSMENT REPORT**

**INDONESIA**

**DAM SAFETY PROJECT**  
**(CPL-37420; SCL-3742A; SCPD-3742S)**

**April 1, 2009**

*Sector Evaluation Division*  
*Independent Evaluation Group (World Bank)*

## Currency Equivalents (annual averages)

*Currency Unit = Indonesian Rupiah*

1994	US\$1.00	Rp 2144	2001	US\$1.00	Rp 11350
1995	US\$1.00	Rp 2220	2002	US\$1.00	Rp 8750
1996	US\$1.00	Rp 2330	2003	US\$1.00	Rp 8300
1997	US\$1.00	Rp 2398	2004	US\$1.00	Rp 8800
1998	US\$1.00	Rp 11700	2005	US\$1.00	Rp 9400
1999	US\$1.00	Rp 7800	2006	US\$1.00	Rp 9200
2000	US\$1.00	Rp 8236	2007	US\$1.00	Rp 9800

## Abbreviations and Acronyms

Balai PSDA	Balai Pengelolaan Sumber Daya Air <i>or</i> Provincial Water Resources River Basin Management Unit
Balai WS	Balai Wilayah Sungai <i>or</i> Central River Territory Organizations
BDSF	Basic Dam Safety Facilities
CDMU	Central Dam Monitoring Unit
DGWR	Directorate General of Water Resources (former DGWRD)
DGWRD	Directorate General of Water Resources Development
DMU	Dam Monitoring Unit
DOISP	Dam Operation and Improvement of Safety Project
DSC	Dam Safety Commission
DSO	Dam Safety Organization
DSP	Dam Safety Project
DSU	Dam Safety Unit
EAP	Emergency Action Plan
FY	Financial Year
GOI	Government of Indonesia
ICOLD	International Commission on Large Dams
ICR	Implementation Completion Report
IEG	Independent Evaluation Group
MPW	Ministry of Public Works
O&M	Operation and Maintenance
OMS	Operation, Maintenance and Surveillance
PJT	Perum Jasa Tirta <i>or</i> River Basin Organization
PLN	State Electricity Corporation
PMF	Probable Maximum Flood
PMP	Probable Maximum Precipitation
PPAR	Project Performance Assessment Report
PWRS	Provincial Water Resources Services
SAR	Staff Appraisal Report
WISMP	Water Resources and Irrigation Sector Management Project

## Fiscal Year

April 1 – March 31

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### **About this Report**

The Independent Evaluation Group assesses the programs and activities of the World Bank for two purposes: first, to ensure the integrity of the Bank's self-evaluation process and to verify that the Bank's work is producing the expected results, and second, to help develop improved directions, policies, and procedures through the dissemination of lessons drawn from experience. As part of this work, IEGWB annually assesses about 25 percent of the Bank's lending operations through field work. In selecting operations for assessment, preference is given to those that are innovative, large, or complex; those that are relevant to upcoming studies or country evaluations; those for which Executive Directors or Bank management have requested assessments; and those that are likely to generate important lessons.

To prepare a Project Performance Assessment Report (PPAR), IEGWB staff examine project files and other documents, interview operational staff, visit the borrowing country to discuss the operation with the government, and other in-country stakeholders, and interview Bank staff and other donor agency staff both at headquarters and in local offices as appropriate.

Each PPAR is subject to internal IEGWB peer review, Panel review, and management approval. Once cleared internally, the PPAR is commented on by the responsible Bank department. IEGWB incorporates the comments as relevant. The completed PPAR is then sent to the borrower for review; the borrowers' comments are attached to the document that is sent to the Bank's Board of Executive Directors. After an assessment report has been sent to the Board, it is disclosed to the public.

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**Outcome:** The extent to which the operation's major relevant objectives were achieved, or are expected to be achieved, efficiently. The rating has three dimensions: relevance, efficacy, and efficiency. *Relevance* includes relevance of objectives and relevance of design. Relevance of objectives is the extent to which the project's objectives are consistent with the country's current development priorities and with current Bank country and sectoral assistance strategies and corporate goals (expressed in Poverty Reduction Strategy Papers, Country Assistance Strategies, Sector Strategy Papers, Operational Policies). Relevance of design is the extent to which the project's design is consistent with the stated objectives. *Efficacy* is the extent to which the project's objectives were achieved, or are expected to be achieved, taking into account their relative importance. *Efficiency* is the extent to which the project achieved, or is expected to achieve, a return higher than the opportunity cost of capital and benefits at least cost compared to alternatives. The efficiency dimension generally is not applied to adjustment operations. *Possible ratings for Outcome:* Highly Satisfactory, Satisfactory, Moderately Satisfactory, Moderately Unsatisfactory, Unsatisfactory, Highly Unsatisfactory.

**Risk to Development Outcome:** The risk, at the time of evaluation, that development outcomes (or expected outcomes) will not be maintained (or realized). *Possible ratings for Risk to Development Outcome:* High Significant, Moderate, Negligible to Low, Not Evaluable.

**Bank Performance:** The extent to which services provided by the Bank ensured quality at entry of the operation and supported effective implementation through appropriate supervision (including ensuring adequate transition arrangements for regular operation of supported activities after loan/credit closing, toward the achievement of development outcomes. The rating has two dimensions: quality at entry and quality of supervision. *Possible ratings for Bank Performance:* Highly Satisfactory, Satisfactory, Moderately Satisfactory, Moderately Unsatisfactory, Unsatisfactory, Highly Unsatisfactory.

**Borrower Performance:** The extent to which the borrower (including the government and implementing agency or agencies) ensured quality of preparation and implementation, and complied with covenants and agreements, toward the achievement of development outcomes. The rating has two dimensions: government performance and implementing agency(ies) performance. *Possible ratings for Borrower Performance:* Highly Satisfactory, Satisfactory, Moderately Satisfactory, Moderately Unsatisfactory, Unsatisfactory, Highly Unsatisfactory.



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<p>This report was prepared by Ramachandra Jammi (Task Manager), who assessed the project in January 2008. Soon-Won Pak provided administrative support.</p>
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## Principal Ratings

	<i>ICR*</i>	<i>ICR Review*</i>	<i>PPAR</i>
Outcome	Satisfactory	Moderately Unsatisfactory	Moderately Unsatisfactory
Institutional Development Impact**	Modest	Modest	——
Risk to Development Outcome	——	——	Moderate
Sustainability***	Likely	Unlikely	——
Bank Performance	Satisfactory	Satisfactory	Moderately Satisfactory
Borrower Performance	Satisfactory	Satisfactory	Moderately Satisfactory

\* The Implementation Completion Report (ICR) is a self-evaluation by the responsible Bank department. The ICR Review is an intermediate IEGWB product that seeks to independently verify the findings of the ICR.

\*\*As of July 1, 2006, Institutional Development Impact is assessed as part of the Outcome rating.

\*\*\*As of July 1, 2006, Sustainability has been replaced by Risk to Development Outcome. As the scales are different, the ratings are not directly comparable.

## Key Staff Responsible

<i>Project</i>	<i>Task Manager/Leader</i>	<i>Division Chief/ Sector Director</i>	<i>Country Director</i>
Appraisal	H. V. Voothuizen	Anthony Cole	Marianne Haug
Completion	Ilham Abla	Mark D. Wilson	Andrew Steer





## Preface

This is a Project Performance Assessment Report (PPAR) for the Indonesia: Dam Safety Project.

The Dam Safety Project was approved on May 31, 1994, for a Loan of US\$55 million (CPL-37420; SCL-3742A; SCPD-3742S). Following slow implementation and the economic crisis of 1998-2000, two loan cancellations were made – US\$8.0 million in August 1998, and US\$11.8 million in December 1999. By the end of the project, US\$35.2 million (64% of the original loan) was disbursed. After three extensions to allow greater progress in both the institutional and physical works components, the project closed on March 31, 2003, two-and-a-half years later than planned.

The report presents the findings of (i) an IEG mission to Indonesia during January 21-31, 2008, including visits to 9 project-assisted dam sites and discussions with Government officials and agencies, project directors and staff, beneficiaries, NGOs, and academia; (ii) discussion with Bank task managers and other staff in Washington and Jakarta; and (iii) review of the project's implementation completion report, appraisal report, loan agreement, and other relevant material. The cooperation and courtesies extended to the IEG mission by all is gratefully acknowledged.

The project was selected because it was one of the first two projects (along with the India Dam Safety Project) to focus exclusively on Dam Safety, which is also the object of the Bank's OP/BP 4.37 on "Safety of Dams" and one of the ten safeguard policies of the Bank. It also provides input to the ongoing IEG Study on the Bank's support for Water Resources Management.

Following standard IEG procedures, the draft PPAR was sent to the borrower for comments before being finalized. In accordance with the Bank's disclosure policy, the final report will be available to the public following submission to the World Bank's Board of Directors.



## Summary

This Project Performance Assessment Report reviews the Indonesia Dam Safety Project, which was approved in 1994 and closed in 2003. This was the first Bank project in Indonesia that was devoted entirely to dam safety and only the second worldwide after the India Dam Safety Project (1991-2000).

Prior to the project, there had been long-standing concerns on the part of the Government and other stakeholders about sustaining the existing dam structures in the country and increasing the efficiency of water use, while making provisions to protect society against potential disasters due to dam failures. At that time, there were no mandatory government regulations or procedures that required on-going monitoring, analysis and evaluation of the safety of dams.

The development objective – *reduce the risk of dam failures in Indonesia* – was challenging because the relevant Government ministries and agencies lacked the institutional, technical, and financial capacity to deal with the immediate as well as long term needs for improving dam safety.

Project implementation was delayed at the beginning due to a late start of training and capacity building activities, and later due to the economic crisis during 1998-2000, as well as organizational changes.

The project succeeded in establishing a basic framework for dam safety – where none existed before – at the central and provincial levels. This was sustained, but with several shortcomings in capacity, staff and budget resources. The main regulatory entities at the center – the Dam Safety Commission and the Dam Safety Unit – need to strengthen their independence and technical capacity. They need to emerge as champions for mainstreaming dam safety concepts, in particular through highlighting the costs and benefits of better dam safety.

Remedial works were carried out at the major Jatiluhur dam, and for 72 other smaller dams and were reported to have produced broadly positive results. Basic dam safety facilities including dam monitoring instruments were installed as planned but their quality and maintenance were not up to expectations, and the equipment has deteriorated since project completion. Overall project Outcome is rated *Moderately Unsatisfactory*. Taking into account recent positive developments in respect of staffing and budget resources, and progress on over-arching regulation, Risk to Development Outcome is rated *Moderate*.

The project design appropriately balanced the immediate need for rehabilitation of dams with the long term need to create a viable institutional framework for dam safety. The Bank demonstrated a good understanding of technical issues and supplemented it with international expertise in creating a sound design for remedial works as well as for institutions and processes required to promote dam safety. However, the Bank

underestimated the time needed to build capacity from a relatively low base. During implementation, it could have done more to impress upon the borrower the need to speed up training and capacity-building activities. On the whole, Bank performance is rated *Moderately Satisfactory*. The Government showed steady commitment to the project by passing enabling legislation ahead of the project, and persisting with the project in spite of the economic crisis. Five years after project completion, the basic institutional framework for dam safety has been maintained, though with shortcomings relating to staffing, capacity and budgetary resources. However, there have been recent positive developments in improving staffing and budget resources, and in finalizing over-arching regulation. The implementing agency performed well in terms of carrying out remedial works, given the reduction in resources and uncertainties faced during the economic crisis. However, the implementing agency could have done more in speeding up the training component and procurement of consultants. Overall Borrower performance is rated *Moderately Satisfactory*.

Key lessons from the project experience are:

- To sustain outcomes in a situation where new concepts and processes are introduced, the focus on institutional development needs to be maintained during the project and beyond. The risk to dam safety in this project remains moderate or substantial/considerable due to relatively lower attention to institutional development vis-à-vis physical activities during implementation and inadequate follow-up thereafter.
- New regulatory institutions require technical expertise and adequate operating budgets to function in a capable and independent manner. In this project, shortage of experienced/qualified staff and inadequate operating budgets contributed to under-performance of the dam safety regulatory unit.
- Building dam safety institutions can be a long process when it requires major changes in organizational attitudes, establishing new work methods, and upgrading technical expertise. In such cases, the Bank should consider an extended commitment through a sequence of projects or through adaptable program lending (APL).
- When new monitoring and reporting procedures are instituted, their purpose should be made clear to all those involved, and appropriate and regular feedback should be given to those originating the data. In this project, there was little systematic analysis or feedback from higher levels on dam level reporting, which progressively affected quality and compliance.
- New techniques and equipment should be tailored to the existing level of capacity; facilities and funds for ongoing maintenance; and site security. Most of the relatively sophisticated instrumentation installed at dams under this project has deteriorated for lack of maintenance.

- Project benefits should be quantified to the extent possible in order to provide clear economic justification for an investment and improve stakeholder support. The main benefit from this project is the prevention of losses from dam failure, which can be difficult to quantify. However, other benefits such as increased water supply are more amenable to being quantified and may well justify the investment.

Vinod Thomas  
Director-General  
Evaluation



## Background

1. Dams are structures for water storage and use in water supply, irrigation, hydropower, and flood control. They play a crucial role in major sectors of economic activity and can contribute to poverty reduction. At the same time, dams can be associated with negative environmental and social impacts including those caused by natural disasters such as floods and earthquakes. Dam Safety concerns itself with the adequacy of the operations and maintenance of dams, and aims to limit their possible adverse impacts on human life, health, property, and the environment, as well as plans for dealing with emergencies<sup>1</sup>. Ensuring dam safety can also improve the efficiency of water resource use, while keeping the dams environmentally and socially sustainable.

2. According to the World Commission on Dams<sup>2</sup> estimates, there are around 45,000 large dams<sup>3</sup> in the world, with the largest numbers in China (22,000), U.S.A (6575), India (4,291), Japan (2675) and Spain (1196).

3. The World Bank has been involved in financing dams and ancillary facilities since the 1960s, though the rate of involvement slowed sharply in the mid-1980s, with the focus shifting towards ancillary facilities. In recent years, there has been greater emphasis on promoting dam rehabilitation and safety. At the beginning of 2008, there were around 70 active projects that contained components relating to dam rehabilitation or dam safety assessment. Of these, three projects<sup>4</sup> (in Sri Lanka, Armenia and Albania) are predominantly concerned with dam safety.

4. In 1977, the Bank issued its first formal policy on "Safety of Dams<sup>5</sup>" that underscored the importance of dam safety arising from inadequate design or natural phenomena. After revisions that incorporated new thinking on dam safety issues, the current version of the Bank's policy was issued in October 2001 (Operational Policy [OP] 4.37, together with Bank Procedure [BP] 4.37). The standards set by this policy are at least as stringent as those recommended by the WCD. OP 4.37 is also one of the ten World Bank "Safeguard Policies" which require that potentially adverse environmental and social impacts of Bank-financed projects involved with dams be identified, mitigated, and monitored.

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1. 2002. Bradlow, D.D., Palmieri A., Salman S.L.A., Regulatory Frameworks for Dam Safety. World Bank.

2. The World Commission on Dams (WCD) was established in 1988 with a mandate to review the development effectiveness of large dams and develop internationally acceptable criteria, guidelines and standards for large dams.

3. Large dams are defined as those having a height of 15 meters or more and/or a reservoir capacity of at least 500,000 cubic meters.

4. Sri Lanka: Dam Safety And Water Resources Planning Project (DSWRPP); Armenia: Irrigation Dam Safety 2 Project; Albania: APL 5 For Albania Dam Safety

5. Operational Manual Statement (OMS) 3.80 (1977)

5. Indonesia is a vast equatorial archipelago of 17,000 islands extending 5,150 kilometers (3,200 miles) between the Indian and Pacific Oceans. The largest islands are Sumatra, Java, Kalimantan, Sulawesi, and Irian Jaya. The country has a per capita Gross National Income (Atlas method) of US\$1420, and a population of around 220 million of which 60% live in Java alone. Lying near the intersection of shifting tectonic plates, Indonesia is prone to the effect of earthquakes and volcanic eruptions.

6. In Indonesia, dams have been constructed since the early 1900s, initially for irrigation purposes, but increasingly as multipurpose dams for irrigation, power generation, and flood control, as well as providing water for major urban centers. Prior to 1965, all dams in Indonesia were planned, constructed and operated by the Ministry of Public Works (MPW). Subsequently, the hydropower facilities were separated from MPW and placed under the State Electricity Corporation (PLN). In 1994, there were about 120 large dams in Indonesia. By 2008, there were 240 dams in the country, 132 of which were “large dams”, of which 106 were owned by MPW, 18 by PLN and 8 by mining corporations. Together they serve about one million hectares of irrigated lands, and generate 6000 GwH (billion watt-hours) of electricity. The majority of the dams are located in Java, which contains the largest proportion of arable land in Indonesia.

7. The Indonesia Dam Safety Project – the project reviewed in this PPAR – was formulated in response to long-standing concerns on the part of the Government about sustaining the existing dam structures and increasing the efficiency of water use, while making provisions to protect society against potential disasters due to dam failures. In particular, at the time of project preparation, it was estimated that the condition of more than 95 large dams owned by the MPW was declining and posed a public safety hazard largely because of insufficient maintenance.

8. At the time of project preparation, there were no mandatory government regulations or procedures that required on-going monitoring, analysis and evaluation of the safety of dams. The core activities of the Directorate General of Water Resources and Development (DGWRD<sup>6</sup>) – the main agency under MPW with the responsibility for managing dams – were focused more on irrigation infrastructure. DGWRD had much lower priority for operational management of the dams. More generally, there was an uneven understanding of the economic, environmental and social dimensions of dam operation. Therefore, the project planned to establish a national regulatory institution for large dam safety assurance under MPW as well as for undertaking remedial works for the 95 large dams owned by MPW and operated by DGWRD or PJTs (River Basin Organizations<sup>7</sup>).

9. The Indonesia Dam Safety Project (DSP) benefited from the experience of the India Dam Safety Project (1991-2000), which was the first Bank project focused exclusively on dam safety. At the end of FY2008, there was no active Bank project with dam components in Indonesia. However, a Dam Operation and Improvement of Safety Project (DOISP) is under preparation, and will essentially be a follow-up to the DSP.

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6. Currently the Directorate General for Water Resources (DGWR)

7. Citarum and Brantas River Basins



The ongoing WISMP (Water Resources and Irrigation Sector Management Program) includes a component to ensure continuity for some dam safety related activities in the intervening period between the DSP and DOISP.

## The Project

### OBJECTIVES

10. The Dam Safety Project's development objective was to *reduce the risk of dam failures in Indonesia* through the following project components, of which the first three were mainly institutional in nature, while the last component related to physical works.
- a) Establishment of *dam safety institutions*;
  - b) *Periodic inspections and safety evaluations* of all large dams;
  - c) Provision of *basic safety facilities* at existing dams where such provisions are now lacking; and
  - d) Implementation of *remedial works* at dams with safety deficiencies.
11. During project implementation, two additional institutional components were added:
- e) A "*Participatory Dam Safety Program*" or "Model Dam" pilot to raise local public awareness and community participation for dam safety; and
  - f) The *Prototype Basin Management Program* to strengthen OMS (operation, maintenance and surveillance) in three selected river basins

The two additional components were added through amendments to the LA. The project components are listed in Table 1 along with the planned and actual costs.

### DESIGN AND QUALITY AT ENTRY

12. The development objective – *reduce the risk of dam failures in Indonesia* – was challenging for several reasons. *First*, the majority of dams in the country were in need of rehabilitation to different extents. *Second*, the institutional, technical and financial capacity for dealing with dam safety issues was weak at all levels of the Government. *Third*, the ministry responsible for dam safety did not have enough separation between its "operator" and "regulator" roles as needed for effective management of dam safety. *Finally*, dam safety was viewed by practitioners in a narrow technical manner. Less attention was paid to the larger economic, environmental and social costs and benefits of securing the safety of dams.

13. In this context the project was designed to balance the immediate need for rehabilitation of dams with the longer term need to create a viable institutional framework, build capacity, and to help all stakeholders understand the wider benefits of securing dam safety.

**Table 1. Project Objective, Components, Planned and Actual Costs**

<b>OVERALL OBJECTIVE: Reduce the risk of dam failures in Indonesia</b>				
<b>Components</b>	<b>Sub-components</b>	<b>Costs (US\$ million)</b>		
		<b>Planned</b>	<b>Actual</b>	<b>%</b>
<i>(a) establishing and strengthening dam safety institutions;</i>	<ul style="list-style-type: none"> <li>Establish a Central Dam Unit in Directorate General of Water Resources and Development (DGWRD); Establish Dam Monitoring Units (DMUs) in 8 provincial water resources agencies; Establish DMUs in 3 MPW-managed project agencies (Jatiluhur Authority; Brantas River Basin Corporation and the Bengawan-Solo Project)</li> <li>Institutional capacity building and operational support to the Dam Safety Commission (DSC), Dam Safety Units (DSU), Central Dam Monitoring Unit (CDMU) and DMUs.</li> <li>Provision of TA (training, seminars, workshops) for DSC and MPW staff.</li> </ul>	3.8	3.2	84
<i>(b) periodic inspections and safety evaluations of all large dams;</i>	<ul style="list-style-type: none"> <li>TA for carrying out remedial works for 93 MPW dams where detailed inspections had identified the need for such works and for upgrading their safety condition (including the Jatiluhur Dam with separate TA for supervision support).</li> </ul>	included in (g)		
<i>(c) provision of basic safety facilities at existing dams where such provisions are now lacking; and</i>	<ul style="list-style-type: none"> <li>Facilities, services and related TA for: carrying out dam surveys and site clearing to obtain information for detailed safety inspections;</li> <li>Provision of communications equipment and facilities;</li> <li>Provision of instrumentation to record data relevant to the structural condition and operational safety of dam structures; and carrying out emergency actions to ensure the safety of a dam.</li> </ul>	7.9	4.7	60
<i>(d) implement remedial works at dams with safety deficiencies.</i>	Remedial works and supervision for Jatiluhur Dam (30 percent of the total component base cost) and 92 small dams.	65.0	41.1	63
<i>(e) "Model Dam"</i>	Incorporate local public awareness on dam safety and community participation in dam maintenance for four pilot dams (Dawuhan, Cenglik, Sermo and Dharma in East, Central, Yogyakarta and West Java, respectively)	included in (g)		
<i>(f) Prototype Basin Management Program</i>	Strengthening operation, maintenance and surveillance (OMS) procedures to promote sustainable dam safety programs for provincial DMUs in three selected basins.	included in (g)		
<i>(g) Project Management Administrative Management Financial Management Participatory program</i>	This component provided funds to cover: (i) the establishment and operation of a central Project Management Unit (PMU) with the necessary facilities and equipment; and (ii) supporting TA (4.7 million) for institutional capacity building assistance to the DSC, DSU, and the DMUs, and technical reviews of activities under the Basic Dam Safety Facilities and Remedial Works components	5.0	5.9	120

14. A new institutional framework for dam safety was designed consisting of a Dam Safety Commission (DSC), Dam Safety Unit (DSU) and a Central Dam Monitoring Unit (CDMU) at the center; Provincial Dam Monitoring Units (PDMU) at the provincial level

with a Dam Monitoring Units (DMUs) in each river basin managed by a Provincial Water Resources Management Unit (Balai PSDA) or by the River Basin Management Office (Balai or Balai Besar Wilayah Sungai - BBWS). The proposed institutional structure is given in Appendix C.

15. The DSC would be a standing committee of diverse experts reporting directly to the Minister of Public Works, and ensuring that all dam related works conformed to regulatory guidelines. The DSU would be the technical agency for overseeing the conduct of dam safety functions all over the country. The “operator” function would be performed by the Central Dam Monitoring Unit (CDMU), which would organize and execute dam safety-related activities under the DSC/DSU’s regulatory oversight. Some separation was to be achieved between the “operator” and “regulator” by locating the DSU and the CDMU under different directorates of MPW, though ideally, DSU as the regulatory unit may have reported to an even higher level. Dam Monitoring Units (DMUs) were to be created in 8 provinces and in two River Basin Organizations.

16. In terms of *capacity-building*, staff of MPW and its Directorate General of Water Resources (DGWR: the implementing agency) would undergo classroom-style and on-the-job training on technical and managerial aspects of dam safety.

17. The framework for *remedial works* complied with the Bank’s OP 4.37 (Safety of Dams), which was commendable since this policy was formalized several years after project effectiveness. The project also provided for installing various *basic dam safety facilities* (BDSF) including dam monitoring equipment, and computer software for data analysis.

18. Two small components were added during the extension period of the project in 2001. These were a *Participatory Dam Safety Program* or “Model Dam” pilot covering four dams to improve dam security and upkeep in cooperation with surrounding communities<sup>8</sup>, and a *Prototype Basin Management Program* to strengthen OMS (operation, maintenance and surveillance) and address the special needs of three selected river basins<sup>9</sup>.

19. Prior to project approval, the Government issued an important enabling Ministerial Decree on Dam Safety (1994). In order to have the remedial works begin within six months of project effectiveness, preparatory actions were taken including drafting of tender documents and pre-qualification of contractors. In contrast, such early preparatory steps do not appear to have been taken for training and capacity building.

20. There were no major risks identified at the time of project preparation with the significant exception of the ability of the borrower and implementing agency to build the required capacity in a relatively short period of two years before the physical works

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8. The “Model Dam” pilot was created in response to a rise in vandalism and looting in the wake of the economic crisis that set in during 1998. The four participating dams were: Dawuhan, Cenglik, Sermo and Darma dams in East and Central Java, Yogyakarta, and West Java, respectively

9. Bengawan Solo in Central and East Java; Citarum basin in West Java; and Lombok island.

components picked up speed. This risk was underestimated, and might have been better recognized if the project preparation team had included an institutional expert with an understanding of the Indonesian context.

## IMPLEMENTATION

21. The project was planned for implementation in six years during 1994-2000. However implementation was slow due to several reasons: (i) initially there were delays on the part of the Government in finalizing the training needs assessment, and later in appointing consultants for technical assistance (TA) activities; (ii) the economic crisis of 1998-2000 greatly reduced the Government's ability to provide counterpart funds, and generally created an atmosphere of uncertainty; and (iii) there were major organizational changes after a new decentralization policy was implemented in 1999, which particularly impacted the new institutions, the DSU and the Central Dam Monitoring Unit, through relocation and reductions in staff.

22. Four years into the project, remedial works had been completed for about 30 out of the targeted 93 dams, leading the Bank and borrower to agree upon canceling remedial works for 25 low priority dams. Institutional development and capacity building also continued to be slow. To allow for greater progress in the physical works and institutional components, the project was extended three times and the project closed on March 31, 2003, two and a half years later than planned. At this time, remedial works were completed for Jatiluhur and 72 other smaller dams; the physical targets for basic dam safety facilities were substantially met; and institutional development and training goals were nominally reached. The Prototype Basin Management Program (Citarum:Jatiluhur; Bengawan Solo; and Nusa Tenggara Barat: Lombok) was designed to address good dam management & safety practices (see para 18), but activity was negligible during the two years that the program was operative due to low budgets and staffing constraints.

23. The total project cost at appraisal was estimated at US\$97.4 million, of which US\$55.0 million was to be financed by the IBRD's loan and US\$42.4 by the Government. During the economic crisis of 1998-2000, the US dollar appreciated more than four-fold relative to the Indonesian Rupiah, and the Government was not able to keep up its counterpart funding. As a result, portions of the loan were cancelled – US\$8.0 million in August 1998, and US\$11.8 million in December 1999. By the end of the project, US\$35.2 million (63% of the original loan) had been disbursed.

## MONITORING AND EVALUATION

24. **Design.** The Staff Appraisal Report (SAR) viewed monitoring and evaluation in terms of outputs tracked by implementation schedules for all activities under the project. The DSU had the responsibility for summarizing the progress against these implementation schedules. It was also expected to evaluate the effectiveness and impact of the dam safety program, but no specific indicators were provided. It is recognized that

the Bank's operational guidelines at the time of project preparation (1994) did not require a logframe to be prepared. There was thus no M&E framework showing a causal chain from activities *to* outputs *to* outcomes.

25. **Implementation.** The DSU prepared progress reports regularly. The end results of implementation in terms of outputs from all activities are comprehensively reported in the project implementation completion report. Mandatory technical audits were carried out by the MPW's Inspectorate General which was a financial rather than a technical entity and therefore did not have the expertise to assess the quality and impact from the outputs.

26. **Utilization.** The feedback from the periodic DSU reports helped to make decisions on revising targets during the project. The findings from the technical audits carried out by the Inspectorate General were of limited use in technical terms for assessing the outcome and impacts from the project. Overall, M&E is rated *modest*.

## Project Evaluation

### RELEVANCE

27. The DSP was highly relevant for addressing the long-standing concerns expressed by the Government about the state of existing dam structures in the country and the efficiency of water use, as well as the inadequate state of institutional, regulatory, technical and financial capacity to deal with these issues. There was a clear need to broaden the focus of the MPW beyond irrigation infrastructure, and to view the importance of dam safety in a larger framework of economic, environmental and social costs and benefits.

28. The project development objective reflected the concerns of most of the Country Assistance Strategies during the 1994-2004 period. These concerns included strengthening public sector management to protect against risk of dam failures; balancing central and provincial responsibilities for development of policy and regulatory systems and standards; more integrated water resources management on a river basin scale; and integrating environmental concerns into water resource management. The relevance of objectives is rated *high*.

29. On the whole, the project design was based on a sound diagnosis of the institutional and rehabilitation needs for dam safety in the country and reflected Government commitment. The project design was based on a good understanding of technical issues and supplemented with international expertise in creating a sound framework for remedial works as well as for institutions and processes required to promote dam safety. Its significant drawback lay in overestimating the ability of the borrower to build the required institutional capacity in a relatively short period of two years before the physical works components picked up speed. Relevance of design is rated *substantial*, and overall relevance is rated *substantial*.

## EFFICACY

30. Institutional development under the project was served by the first three components of the project viz. establishment of dam safety institutions; periodic inspections and safety evaluations of all large dams; provision of basic safety facilities; and the additional component on the Participatory Dam Safety Program.

### *Establishing and strengthening dam safety institutions*

31. **Basic institutional framework.** The basic institutional framework for dam safety was put in place largely as planned. The Dam Safety Commission was constituted<sup>10</sup>; and the DSU and the Central Dam Monitoring Unit were created under different directorates<sup>11</sup> of the DGWR. The status of these units, nearly five years after project completion, is described briefly below:

- **Dam Safety Commission.** The DSC meets periodically to make recommendations directly to the Minister of Public Works on adhering to safety guidelines in carrying out new and existing dam works, based on DSU advice.
- **Dam Safety Unit.** Following DSP closure, the DSU suffered from staff attrition to the extent that, except for review of new dam designs, it became increasingly unable to carry out its regulatory function of dam safety inspections (paras 35 & 49). The DSU presently consists of three sections<sup>12</sup> each headed by a qualified civil engineer and collectively supported by 4 junior technical staff and 13 part-time retired qualified/experienced engineers. Two of the originally planned sections for training and data no longer exist and their functions are notionally distributed across the other units.
- **Central Dam Monitoring Unit.** The CDMU ceased to exist after the project and its functions are since being handled by the Sub-Directorate for Operations & Maintenance (O&M) which has a broader mandate. This reduces the focus on O&M needs for dam safety.
- **Provincial Dam Monitoring Units.** Provincial Dam Monitoring Units (PDMUs) were created in eight provinces with distinct technical and administrative sections. By 2007, all large river basins on Java were redefined as “national River Basin Territories” reporting to the central government. Thus the large dams in these basins were placed under new nationally managed and financed River Territory

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10. The DSC is chaired by the Director General of Water Resources (DGWR) with the Head of the Dam Safety Unit (DSU) as the Secretary and members consisting of representatives of the Ministries of Home Affairs (Civil Defense Agency), Mining and Energy, Industry, and Environment; representatives of professional engineering associations, the Research Institute of Water Resources Development, legal advisor, and the law enforcement agency.

11. The DSU was placed under the Directorate of Rivers, Lakes and Reservoirs and CDMU under the Directorate of Water Resources Management.

12. The existing sections are: (i) Program and Evaluation, (ii) Dam Monitoring and Inspection, and (iii) Review, Data and Information. (see Annex C).

Management Units (Balai Wilayah Sungai or Balai WS: see para 33). Thus, the role of the provincial PDMU and River Territory Management Units became unclear. Over the years, the PDMUs have ceased to be structural units and their functions have been notionally distributed among other staff, leading to a sharp deterioration of capacity for dam safety issues at the provincial level. Two other DMUs that were created in two PJTs or River Basin Corporations – for O&M of MPW’s large infrastructure in the Citarum and Brantas basin-- are still functioning as intended.

- **Data collection, reporting and analysis.** A standardized dam level data reporting format<sup>13</sup> was introduced by the project, and is broadly followed in practice, subject to the state of monitoring and recording instruments. Generally, each dam reports to the provincial Dam Monitoring Unit every 7 to 10 days. After taking note of data that is immediately relevant for dam operations, the provincial Dam Monitoring Units submit consolidated reports to the DSU and the Sub-Directorate (O&M) at the center (see Annex C). But practically no further analysis is done at any level for longer term prioritization or planning, due to lack of capacity. Dam monitoring software (DAMOSY) introduced during the project has not been used since and is now outdated. There has been no significant follow-up on compiling the national inventory of dams and technical drawings/documents, which was started during the project.

32. The dam safety function at the provincial level is affected by an overlap of responsibilities between provincial and central river basin units<sup>14</sup> (Balai PSDA and Balai Wilayah Sungai or WS respectively). This has implications for efficiency of reporting – individual dams in the river basins have to send reports to both Balais; and budget responsibilities – Balai PSDA provides for staff and inspections, but major O&M may or may not come from Balai WS. One possible solution is to have day-to-day activities under Balai PSDA control, while the larger and more complex works are assigned to Balai WS. MPW officials reported that these issues are being sorted out in the larger context of water resource management.

33. **Training and Capacity-Building:** Training began in earnest only in the year 2000 after the delayed preparation of a training needs assessment, and gained focus and scale only by 2001-2002. Ultimately, about 41 training courses covering 1,535 officials were held within the country, and 25 officials attended courses/technical tours abroad. DSU staff reported that the impact of the training has dissipated over time as trained staff have retired or rotated to other positions. The DSU does not have the expertise or budgetary resources to carry out its training function to any extent. New staff have to learn on the job and the units depend on the assistance of retired or outside part-time experts for continuity.

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13. The data covers climatological, hydrological and structural parameters

14. Following the decentralization policy adopted in 1999, central Government Balai WS were established to co-manage substantially the same issues as Balai PSDA in respect of large dams in important river basins.

### ***Periodic Inspections and Safety Evaluations***

34. The DSU performed quality assurance functions during the project under the guidance of international consultants for the Jatiluhur Dam and to a lesser extent for the other project-assisted dams. Presently it is far behind in performing its crucial function of mandatory five-yearly inspections of all large dams to certify their safety or to establish rehabilitation needs. Against a yearly target of at least 30 per year, DSU has performed only 33 such inspections during the five years since project completion, including 7 emergency inspections in the wake of an earthquake and 8 following floods in 2007. Thus, only 18 of these inspections have been scheduled and preventative in nature.

35. A regulatory framework consisting of 23 guidelines for ensuring dam safety was formulated during the project. Five years after project completion 2 out of 23 are still in the draft stage while 6 others need updating. All guidelines are generally available for use as technical references, but few of them have been translated into Bahasa, limiting their utility, especially at the provincial level. The DSU's other important function of certifying compliance with dam safety guidelines for all new dam construction and rehabilitation of existing dams, is occurring at a slow pace<sup>15</sup>. In general, the DSU is constrained by a shortage of staff, inadequate capacity and low budgets in carrying out its functions.

### ***Basic Safety Facilities***<sup>16</sup>

36. A variety of monitoring instruments were installed in 74 out of 88 targeted dams. But in most of the sites, the quality of installation, supervision and operation was below expectations because of inexperienced domestic contractors and consultants that carried out the work. This was exacerbated by poor management support and control, inadequate understanding of the purpose of the instruments, lack of maintenance, and poor site security. During site visits to 9 dams (see list in Annex B), provincial officials at almost all sites reported instances of instrumentation in various stages of disrepair. Sermo dam was a significant exception with most instruments reported to be in working order.

37. Emergency Actions Plans (EAPs) – as a component of basic dam safety facilities – were prepared during the project for 27 dams on the basis of Dam Break Analyses<sup>17</sup>. No further EAPs have been prepared since project completion. MPW officials reported that all dams have arrangements for communicating with the local government, civil

15. At project completion, the DSC/DSU had issued eighteen certifications for new dam designs (public and private), ten certifications for dam impounding, and four certificates for dam operation (including the Jatiluhur Dam). Since then, they have approved 6 new approvals for dam design, 5 approvals for filling and operation, and 18 technical reviews and certifications in process.

16. Basic Dam Safety Facilities are broadly defined as items that assist the operation and maintenance personnel at the dam to assess emergency situations and to respond with timely actions. These include Surveys (key drawings, reservoir capacity surveys); Communications (primary and secondary communication links for operational and flood warning purposes); Instrumentation (Seepage: V-notch weirs; seepage flow recorders; reservoir level gauges and recorders; rain gauges); Site preparation (clearance of dam and surrounding area); Emergency actions (Emergency actions plans).

17. An analysis that provides an estimation of downstream flooding effects following dam failure.



defense and law & order officials in case of an emergency. But these arrangements lack the comprehensive and analysis-based nature of EAPs.

38. There is a shortage of qualified and experienced permanent staff for on-site conduct of basic dam safety facilities and overall management of dam sites. In Jatiluhur Dam, for instance, the 6 permanent technical staff depend on a similar number of part-time retired engineers to assist in their work. The smaller dams have one or two staff assigned on a full-time basis but better qualified/trained persons are needed for this task.

***Participatory Dam Safety Program or “Model Dam” pilot***

39. An assessment of the “Model Dam” pilots in four dam sites by a local university-based team<sup>18</sup> does not yield any conclusive evidence of positive impacts on the dams and the local communities. However, anecdotal evidence from dam staff, beneficiaries and a local NGO<sup>19</sup> point to some favorable impacts on dam upkeep and security, and on beneficiary incomes through agricultural, recreational and micro-business activities. Discussions with university researchers, provincial officials and the local NGOs indicate that this program may require greater technical support, better coordination between Government agencies, and a better incentive framework for beneficiaries.

40. Based on the preceding discussion, each of the components relating to establishing and strengthening safety institutions, periodic inspections, safety evaluations, and the “Model Dam” displayed moderate shortcomings. The component for basic safety facilities showed major shortcomings. Taking these findings into account, the overall efficacy of the institutional development objective served by these components is rated *Modest*.

***Remedial Works and Supervision for Jatiluhur and other Dams***

41. The remedial works carried out for the Jatiluhur dam<sup>20</sup> (which accounted for 30% of the cost for this component) were fully certified for operation in 2003 by the DSU/DSC on the recommendation of an independent panel of international experts. According to MPW and dam officials, subsequent monitoring indicates that the gains from the project have been largely sustained.

42. The remedial works that were carried out for 72 smaller dams were not subjected to the same level of quality assurance as the Jatiluhur dam. The project ICR reports that the quality of remedial works could be considered ‘satisfactory’ in 90% of these dams. But this assessment is not based on formal certification of the quality of remedial works, partly because the DSU did not have sufficient resources, and also because the agency that conducted periodic technical audits (Inspectorate-General of MPW) was mainly geared to perform financial audits. At the 9 dams that were covered in site visits,

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18. Fakultas Pertanian Universitas Sebelas Maret.

19. Mulyarejo Foundation

20. The remedial works at Jatiluhur repairs to the main dam structure, protective works to the Pasir Gombong West and Ubrug dikes, and a study of the movement behavior and stability of its “Morning Glory” intake tower cum spillway.

provincial and MPW officials reported several positive results from remedial works including reduction in seepage and leaks, repaved dam crests, improved slopes of the downstream dam faces, and sediment removal.

43. The efficacy of remedial works and supervision for dams is rated *Substantial*, but barely so, given the relatively less firm evidence on the results for dams other than Jatiluhur. Taken together with the *Modest* efficacy of institutional development under the project, overall efficacy is rated *Modest*.

## EFFICIENCY

44. The project was delayed by two and a half years due to reasons explained in the section on *Implementation*. Final project costs appear commensurate with the revised targets for remedial works. The project SAR did not include any cost-benefit analysis. The project ICR noted that the project's main benefits would be a reduction in the risk of dam failures, but evaluation was not done as "these would be difficult to estimate."

45. At the same time there are a number of direct and indirect benefits from a dam safety program that can possibly be estimated, such as water supply for domestic and industrial use, irrigation, power generation; fisheries and recreation. For instance, the ICR notes that after rehabilitation of the Jatiluhur dam, the water level in the reservoir was first drawn to a minimum level (76 meters) during the 1997 dry season, which could not have been done earlier due to safety considerations. This helped ensure a continuous supply of irrigation water to 200,000 ha of rice fields downstream from the dam, and the value of the crop that was saved is likely to have more than offset the cost of rehabilitation.

46. Taking into account the time overrun and the lack of sufficient evidence for establishing benefits, the project's efficiency is rated *Modest*.

## OUTCOME

47. The project documents do not specify any outcome indicators to assess the overall objective – to *reduce the risk of dam failures in Indonesia*. One approach to assessing the risk of dam failures in the country is to review the safety status of the dams as determined by the latest inspections, but such information is incomplete or outdated. In the assessment of the Dam Safety Commission (DSC) as conveyed orally to the IEG mission, most of Indonesia's dams are operating nominally in a safe manner, though many of them need attention. In the absence of any supporting evidence, the value of this assessment is limited.

48. Five years after project completion, the dam safety institutions established by the project (Dam Safety Commission and DSU at the center; and the provincial DMUs) have been sustained to a large extent. However, they have a long way to go in fulfilling their intended roles. The Dam Safety Commission is performing its regulatory role to a significant extent, but needs to do much more in fostering awareness of dam safety issues

within the Government and among other stakeholders. The DSU needs to improve its credibility as a regulating agency that can provide unbiased and timely assessments of the true status of dams; and guide and train provincial and dam level officials. The impact of provincial DMUs has reduced sharply due to their marginalization in terms of staff and resources. The ability to monitor the health of dams through new instrumentation has improved only marginally due to the poor quality of installation and maintenance. While the remedial works were completed substantially as planned during the project, there has been relatively little remedial and rehabilitation activity since project completion despite pressing needs.

49. On the basis of *Substantial* Relevance, *Modest* Efficacy, and *Modest* Efficiency, the Overall Outcome for the project is rated *Moderately Unsatisfactory*.

## **RISK TO DEVELOPMENT OUTCOMES**

50. At project completion in 2003, Indonesia still experienced the lingering effects of the economic crisis. It appeared likely at the time that the gains made by the project might be eroded due to the Government's inability to provide sufficient resources for dam safety functions. A follow-up Bank project was contemplated, but in the interim, the Bank has included a bridging component in the Water Resources and Irrigation Sector Management Project (WISMP) for financing dam related O&M. While there is general awareness of the importance of dam safety at different levels of the Government, in practice, dam safety issues get lower priority in comparison with irrigation and other water resource management issues. This is reflected in the relative lack of focus on O&M for dam safety at the center and deterioration in capacity at the provincial level, as Dam Monitoring Units have been transformed from structural to functional units with few resources.

51. Five years after project completion, the basic institutional framework for dam safety is broadly in place though it is functioning far below its potential due to shortage of staff, capacity and budget resources. More recently, the Government has abolished its zero-growth policy on civil service staffing which was in place for the last two decades, and has recruited hundreds of new engineers. DGWR has increased budgets both for dam safety and for staff working on dam structural issues. The budget for 2007 has grown to about two-thirds of the required level (para. 49), from less than 20% during 2000-2004. DGWR has finally prepared the pivotal Government Regulation on Dam Safety, which is expected to be issued in early 2009. Though the role of the PDMUs has been partly taken over by the newly established River Basin Management Units of the central government, the monitoring capability at the provincial and local level needs to be re-established. While the current situation is in many respects similar to that which prevailed prior to preparation of the current project (see para 7), taking into account recent positive developments in respect of staffing and budget resources, and progress on over-arching regulation, Risk to Development Outcome is rated *Moderate*.

## **SAFEGUARD COMPLIANCE**

52. The project was appropriately classified in Category B for compliance with the Bank's safeguard policies, mainly to cover the possibility of land acquisition in the course of remedial works as applicable under OP 4.30 (Resettlement). In practice, no such acquisition was needed, and the issue of resettlement of people did not arise.

## **STRENGTHENING COUNTRY SYSTEMS FOR SAFETY OF DAMS**

53. An important objective of the project was to strengthen the institutional and regulatory frameworks for dam safety in Indonesia. The project also sought to strengthen dam safety considerations in the process of bid tendering, construction, O&M and associated works. These efforts are in line with the principal objectives of the Bank's Safeguard OP 4.37 for "Safety of Dams"<sup>21</sup>.

54. The project also introduced a comprehensive set of dam safety regulatory guidelines which brought the country's standards in line with those of the Bank. This can facilitate the Bank's new approach for using Country Systems<sup>22</sup> for environmental and social safeguards in future projects that involve dam safety and rehabilitation.

55. Thus the project has helped to advance the framework of safeguards for safety of dams in the country and to mainstream it to some extent at the central and provincial levels. However, as discussed under the section on *Outcome*, Indonesia has a long way to go in consolidating its dam safety institutions, especially in providing them with adequate resources to function effectively.

## **BANK PERFORMANCE**

56. Project design was appropriate to the country's needs. It balanced the immediate need for improving safety of dams in the country with the need to institutionalize dam safety concepts and processes in the long term. The Bank demonstrated a good understanding of technical issues and supplemented it with international expertise in creating a sound design for remedial works as well as for institutions and processes required to promote dam safety. But, in retrospect, the Bank was optimistic about the

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21. Two important objectives of the Bank's Safeguard policy for "Safety of Dams" (OP 4.37) are to: (i) work with the borrowing countries to strengthen their institutional, legislative, and regulatory frameworks for dam safety programs; and (ii) ensure that the borrower adopts and implements dam safety measures for the design, bid tendering, construction, O&M of the dam and associated works, and to make sure that experienced and competent professionals design and supervise construction

22. In 2005, the Bank launched a Country Systems pilot to explore using a country's own environmental and social safeguard systems, where they are assessed as being equivalent to the Bank's systems, in Bank-supported operations. Key to the approach would be an increased emphasis by the Bank on capacity-building

ability of the Government and implementing agency to respond to training and capacity-building efforts in a short period of two years.<sup>23</sup> The project ICR acknowledges that project preparation should have included an institutional expert with knowledge of the Indonesian legal and regulatory system right in the beginning. On the whole, quality at entry is rated *Moderately Satisfactory*.

57. During the economic crisis, the Bank worked to ease the Government's requirement for counterpart funds through raising the disbursement percentage for civil works from 55 to 80 percent from 1999 onwards. The Bank also showed flexibility in extending the project to enable completion of on-going activities.

58. The Bank's supervision missions appropriately advised the implementing agency to urgently strengthen the capacity of the DSU, if necessary through co-opting experienced engineers from PLN. But the Bank could have done more during the mid-term review to ensure that satisfactory training and quality assurance arrangements were in place before continuing with remedial works and installation of basic dam safety facilities. The Bank's supervision is rated *Moderately Satisfactory*. Overall, Bank performance is rated *Moderately Satisfactory*.

## **BORROWER PERFORMANCE**

59. Government commitment to the project was broadly consistent. An important enabling Ministerial Decree for Dam Safety (1994) was passed ahead of project effectiveness, and the Government persisted with the project during the economic crisis. The current Ministerial Decree is in the process of being replaced by a more comprehensive Presidential Decree that carries greater coverage and authority. The Government has maintained the basic structure of dam safety institutions created during the project, which continue to carry out several important functions, though considerably below their potential.

60. To some extent, the Government could have insulated the new dam safety institutions from the effects of at least two rounds of organizational changes<sup>24</sup>, which resulted in relocation of the units, loss of trained staff, and diluted focus on dam safety issues. It is recognized that the Government has been constrained in providing more staff to the dam safety institutions due to the overall zero-growth policy towards civil service staffing during the last two decades. More recently, the Government has abolished its

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23. The SAR (paragraph 6.3) states that "... there is a relatively small risk that it may take longer than at present anticipated for the new dam safety institutions to become operational and for their staff to be trained to the level required to manage nationwide program ...".

24 In 1999, MPW was split into the Ministry of Settlements and Regional Development (KimBangWil) and a State Ministry for Public Works ((MeNegPu). DSC and the Project Management Unit remained with KimBangWil, while DSU was placed with MeNegPu and several of its staff were transferred out. In 2000, the two ministries were combined into the Ministry of Settlements and Regional Infrastructure (KimPrasWil) within which the present DGWR was located, and the DSU was transferred back to the new ministry, before the current structure as in Annex C emerged.

zero-growth policy, and hundreds of new engineers have been recruited recently. On balance, government performance is rated *Moderately Satisfactory*.” The Government still needs to provide greater budget resources to the dam safety institutions, and increase allocations for dam O&M based on prioritized needs. On balance, government performance is rated *Moderately Satisfactory*.

61. The implementing agency, DGWR, initially tended to focus more on administrative and financial matters than on effective implementation and adherence to its own quality assurance requirements. But this improved significantly towards the end of the project. The ‘training needs assessment’ was delayed, as was the appointment of consultants for technical assistance. During the project, DGWR could have done more to ensure that the DSU was staffed adequately, even if it meant co-opting experienced staff from PLN as suggested by the Bank. Financial management, progress reporting, accounts, audits and procurement were adequate. Implementing Agency performance is rated *Moderately Satisfactory*, but barely so due to the initial delays in training and remedial works. Overall, Borrower performance is also rated *Moderately Satisfactory*, albeit marginally so.

## Lessons

Key lessons from the project experience are:

- To sustain outcomes in a situation where new concepts and processes are introduced, the focus on institutional development needs to be maintained during the project and beyond. The risk to dam safety in this project remains moderate due to relatively lower attention to institutional development vis-à-vis physical activities during implementation and inadequate follow-up thereafter.
- New regulatory institutions require technical expertise and adequate operating budgets to function in a capable and independent manner. In this project, shortage of experienced/qualified staff and inadequate operating budgets contributed to under-performance of the dam safety regulatory unit.
- Building dam safety institutions can be a long process when it requires major changes in organizational attitudes, establishing new work methods, and upgrading technical expertise. In such cases, the Bank should consider an extended commitment through a sequence of projects or through adaptable program lending (APL).
- When new monitoring and reporting procedures are instituted, their purpose should be made clear to all those involved, and appropriate and regular feedback should be given to those originating the data. In this project, there was little systematic analysis or feedback from higher levels on dam level reporting, which progressively affected quality and compliance.
- New techniques and equipment should be tailored to the existing level of capacity; facilities and funds for ongoing maintenance; and site security. Most of the relatively sophisticated instrumentation installed at dams under this project has deteriorated for lack of maintenance.

- Project benefits should be quantified to the extent possible in order to provide clear economic justification for an investment and improve stakeholder support. The main benefit from this project is the prevention of losses from dam failure, which can be difficult to quantify. However, other benefits such as increased water supply are more amenable to being quantified and may well justify the investment.





## Annex A. Basic Data Sheet

### INDONESIA DAM SAFETY PROJECT (L3642-IND)

#### Key Project Data *(amounts in US\$ million)*

	<i>Appraisal estimate</i>	<i>Actual or current estimate</i>	<i>Actual as % of appraisal estimate</i>
Total project costs	97.4	54.9	56
Loan amount	55.0	35.2	64
Co-financing	--	--	--
Cancellation	--	19.8	--

#### Cumulative Estimated and Actual Disbursements

	<i>FY95</i>	<i>FY96</i>	<i>FY97</i>	<i>FY98</i>	<i>FY99</i>	<i>FY00</i>	<i>FY01</i>	<i>FY02</i>	<i>FY03</i>	<i>FY04</i>
Appraisal estimate (US\$M)	4.6	13.8	29.4	41.3	48.6	53.5	55.0	55.0	55.0	55.0
Actual (US\$M)	3.0	7.8	14.8	19.9	23.8	28.7	31.2	33.4	35.2	35.2
Actual as % of appraisal	65	56	50	48	49	54	57	61	64	64
Date of final disbursement:	10/06/04									

#### Project Dates

	<i>Original</i>	<i>Actual</i>
PCD	-	04/07/1993
Appraisal	-	09/27/1993
Board approval	-	05/31/1994
Effectiveness	08/23/1994	08/23/1994
MTR	09/22/1997	09/22/1997
Closing date	09/30/2000	03/31/2003

**Staff Inputs** (Actual/Latest Estimate)

<b>Stage of Project Cycle</b>	<b>Staff weeks</b>	<b>US\$ ('000)</b>
Identification/Preparation	7.0	24.0
Appraisal/Negotiation	49.2	190.8
Supervision	153.6	599.2
ICR	12.0*	32.5
<b>Total</b>	<b>221.8</b>	<b>846.5</b>

**Mission Data**

<b>Date (month/year)</b>	<b>No. of persons</b>	<b>Specializations represented</b>	<b>Implementation status</b>	<b>Development objectives</b>
<b>Identification/ Preparation</b> 1993	4	Team Leader; Procurement./Operations Specialist; Dam Safety Specialist; Senior Engineer		
<b>Appraisal/ Negotiation</b> 1994	5	Team Leader; Procurement./Operations Specialist; Dam Safety Specialist; Institutional/Organization s Specialist; Senior Engineer		
<b>Supervision</b> 11/04/1994	3	Mission Leader; Organization Expert; Dam Engineer	S	S
05/24/1995	3	Agricultural Economist; Dam Engineer; Dam Safety Eng.	S	S
01/30/1996	2	Dam Engineer; Dam Safety Eng.	S	S
08/13/1996	3	Agricultural Economist; Dam Engineer; Dam Safety Eng.	S	S
02/28/1997	3	Agricultural Economist; Dam Engineer	S	S
10/03/1997	4	Agricultural Economist; Dam Engineer; Civil Engineer; Dam Safety Engineer	S	S
12/10/1998	3	Civil Engineer; Water Resources Engineer	U	S
05/13/1999	3	Team Leader; Civil Engineer; Water Resources Engineer	S	S
11/19/1999	3	Team Leader; Civil Engineer; Water Resources Engineer	S	S
11/19/1999	2	Team Leader; Civil Engineer	S	S
12/08/2000	2	Team Leader; Civil Engineer	S	U
12/08/2000	1	Dam Safety Expert	S	U
04/21/2001	3	Task Team Leader; Civil Engineer; Dam Safety	S	S

<i>Date (month/year)</i>	<i>No. of persons</i>	<i>Specializations represented</i>	<i>Implementation status</i>	<i>Development objectives</i>
09/12/2001	3	Institution Specialist Task Team Leader; Civil Engineer; Team Assistant	S	S
09/12/2001	3	Mission Leader; Civil Engineer; Dam Safety Institution Specialist	S	S
12/12/2001	3	Team Leader; Civil Engineer; Dam Safety Institution Specialist	S	S
05/31/2002	3	Team Leader; Dam Safety Institution Specialist; Dam Safety Expert	S	S
<b>ICR</b>				
09/13/2002	5	Team Leader; Dam Safety Institution Specialist; Dam Safety Expert; Procurement Specialist; Community Development Specialist	S	S

### Other Project Data

Borrower/Executing Agency:

#### FOLLOW-ON OPERATIONS

<i>Operation</i>	<i>Credit no.</i>	<i>Amount (US\$ million)</i>	<i>Board date</i>
Indonesia Dam Operational Improvement and Safety Project (DOISP)	--	--	12/16/08 (R)



## Annex B. List of Dams Sites visited and Organizations/Departments consulted

### Dam Sites visited

S. No.	DAM	Province	Type	Height (meters)	Length of Crest (m)	Gross Reservoir Capacity (1000 cu.m)
1	Jatiluhur	W. Java	Rockfill	100	1225	3,345,000
2	Cengklik	C. Java	-	9.0	2000	11,173
3	Delingan	C. Java	Earth	27	886	3,970
4	Sermo	Yogyakarta	Rockfill	58		
5	Telogo Pasir	E.Java	-	-	2250	3,050
6	Dawuhan	E.Java	-	9.7	947	5,430
7	Saradan	E.Java	-	9.5	843	1,990
8	Batujae	W.N. Tenggara	Rockfill	16	1,100	25,000
9	Pengga	W.N. Tenggara	Earth	33.5	673	27,000

### Organizations and Offices consulted

#### Indonesia

Directorate-General of Water Resources, Ministry of Public Works

Director, River Lakes and Reservoirs, DGWR

Dam Safety Unit

Dam Safety Commission

Balai PSDA and Balai WS and Dam Site Office Staff of the 9 Dams listed above

Study Team for "Model Dam" from Universitas Sebelas Maret

Mulyarejo Foundation

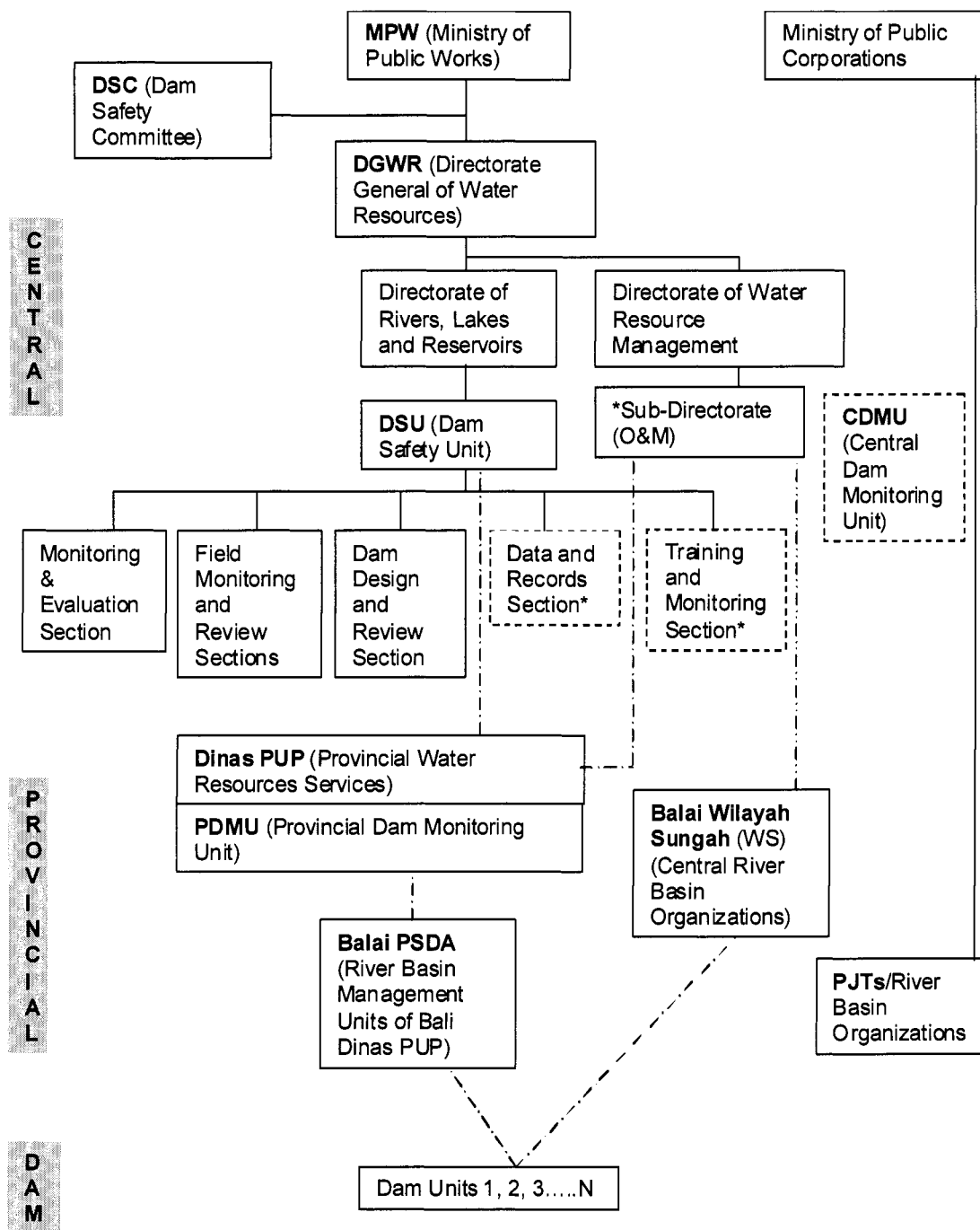
#### World Bank

Project Task Team Leader and Water Sector Team, World Bank Country Office, Jakarta

East Asia Rural Development, Natural Resources & Environment Division, World Bank, Washington D.C.



# Annex C. Dam Safety Institutions and Data Reporting Relationships



• Units do not presently exist

• Since Jan 2008, the Sub-Directorate of O&M is under the Directorate of Rivers, Lakes and Reservoirs.

----- Data Reporting Relationship





## Annex D. Borrower Comments

FROM :DIT. SDW

FAX NO. :0217261292

Mar. 30 2009 16:30 P1



**D E P A R T E M E N P E K E R J A A N U M U M**  
**D I R E K T O R A T J E N D E R A L S U M B E R D A Y A A I R**  
 Jl. Pattimura No.20 Kebayoran Baru Jakarta Selatan 12110 Telp. 7396616 Fax. 7208285

Jakarta, March 27, 2009

Ref: HL-01-02-Da/192

To:

Monika Huppi  
 Manager Sector Evaluation Division  
 Independent Evaluation Group  
 The World Bank

**Re : INDONESIA Dam Safety Project (CPL-37420; SCL-3742A; SCPD-3742S) Draft  
 Project performance Assessment Report**

Dear Madame,

Concerning the World Bank's letter dated March 5, 2009, for the above mention subject, we hereby send you our explanation to the achievement of the important component of the Dam Safety Project.

### 1. Remedial Works.

During the Dam Safety Project, 73 dams had been rehabilitated, consisting of one big of Jatiluhur dam and 72 smaller dams. In our opinion, the completion of remedial works and supervision of Jatiluhur dam contribute the significant positive impact to the national program. After remedial works of Jatiluhur dam which is has very high hazard classification, the physical risk of failure of this dam was significantly reduced. As additional benefit, the services of Jatiluhur dam after remedial works to continuously supply of 224.000 ha irrigation area, supply of raw water of 16 m<sup>3</sup>/second to Jakarta city, and power supply of 110 MW, concluded the high achievement to the whole project.

### 2. Performance of Dam Safety Commission (DSC) and Dam Safety Unit (DSU)

Upon the effectiveness of Dam Safety Project, the Dam Safety Commission and Dam Safety Unit, were supported to meet the main goal as independent body in charge with making recommendations to the Minister of Public Works on dam safety issues. We agree to the Bank that lack of engineer appointed as staff to DSU making less performing its five-yearly inspections of all large dams to certify their safety or to establish rehabilitation needs. However until the end of the year 2008, the DSU have already finished eighteen certifications for new designs, thirteen certifications for dam impounding, fifteen certifications for dam operation, and now seventeen certifications of dam under process. We therefore concluded that, even though with the limitation of technical staff assigned to DSU, the performance of DSU to support DSC has been rated satisfactory. And to catch up the target, we will give an attention to strengthen the DSU.

### 3. Dam Monitoring Unit and The Government's Efforts to Strengthen the Operation and Maintenance of Dams

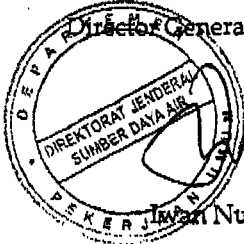
The establishment of Central dam Monitoring Unit (CDMU) and Dam Monitoring Unit (DMU) were meet the target as stated in the Staff Appraisal Report of Dam Safety Project. Even though the performance is slightly below the expectation, two other DMUs that were created in two PJTs for O&M of MPW's large infrastructure in the Citarum and Brantas basin as mention in Bank's letter are still functioning as intended. The government is fully committed to providing ongoing support to strengthening the CDMU/DMU, and preparation of adequate O&M budget for dams.

We also inform you the government's effort to clearing the role of the provincial DMU and River Territory Management Units through provision of Director General Water Resources Letter no UM 01 03-Da/08 dated January 9, 2009 subjected the application of Memorandum of Understanding (MOU) between BBWS/BWS (National River Basins Organization, under the control government) and Provincial Water Resources Office. Based on this MOU, continuation of O&M of dams would be gradually become better.

Based on the above comment, we therefore concluded that the overall Dam Safety Project is rated satisfactory, and we hope that this explanation will be reflected as positive impact to the final report to Board of Executive Directors of the World Bank.

Yours sincerely,

Director General of Water Resources



Iwan Nursyirwan Diar

CC:

1. Minister of Public Works
2. Secretary General of Public Works
3. Deputy Chairman, Infrastructure Bappenas
4. Director of Water Resources and Irrigation Bappenas
5. Director of Programming Guidance Directorate General of Water Resources
6. Director of Rivers, Lakes and reservoirs Directorate General of Water Resources
7. Head of Dam safety Unit Ministry of Public Works