Document of
The World Bank

FOR OFFICIAL USE ONLY

Report No: 51061-IN

PROJECT APPRAISAL DOCUMENT

ON A

PROPOSED CREDIT

IN THE AMOUNT OF SDR 115.9 MILLION
(US$175 MILLION EQUIVALENT)

AND A

PROPOSED LOAN

IN THE AMOUNT OF US$175 MILLION

TO

REPUBLIC OF INDIA

FOR A

DAM REHABILITATION & IMPROVEMENT PROJECT

June 2, 2010

Sustainable Development Department
Agriculture and Rural Development Unit
India Country Management Unit
South Asia Region

CURRENCY EQUIVALENTS

(Exchange Rate Effective October 2009)

Currency Unit = Indian Rupee (Rs.)
Rs. 48.00 = US$1

FISCAL YEAR
April 1 – March 31

ABBREVIATIONS AND ACRONYMS

CDSO	Central Dam Safety Organization	LA	Loan Agreement
CPMU	Central Project Management Unit	M&E	Monitoring and Evaluation
CWC	Central Water Commission	MIS	Management Information System
DAMAP	Dam Planning and Management Action Plan	MTR	Mid-Term Review
DHARMA	Dam Health and Rehabilitation Monitoring Application	MoWR	Ministry of Water Resources
DRIP	Dam Rehabilitation and Improvement Project	NCB	National Competitive Bidding
DRIF	Dam Rehabilitation and Improvement Fund	NCDS	National Committee on Dam Safety
DSO	Dam Safety Organization	NLSC	National Level Steering Committee
DSP	Dam Safety Project	O&M	Operation and Maintenance
DSRP	Dam Safety Review Panel	PAD	Project Appraisal Document
EiC	Engineer-in-Chief	PD	Project Director
EMP	Environmental Management Plan	PIP	Project Implementation Plan
ESMF	Environmental and Social Management Framework	PMF	Probable Maximum Flood
FMECA	Failure Mode Effect & Criticality Analysis	PMU	Project Management Unit
GAAP	Governance and Accountability Action Plan	PRA	Portfolio Risk Assessment
IA	Implementing Agency	RBPS	Risk Based Profile System
IBRD	International Bank for Reconstruction and Development	RTDAS	Real Time Data Automation System
ICB	International Competitive Bidding	SBD	Standard Bidding Document
ICOLD	International Commission on Large Dams	SEB	State Electricity Boards
		SDSO	State Dam Safety Organization
ICR	Implementation Completion Report	SPF	Standard Project Flood
IDA	International Development Association	SPMU	State Project Management Unit
IMD	India Meteorological Department	WRD	Water Resources Department

Vice President:	Isabel M. Guerrero
Country Director:	N. Roberto Zagha
Sector Director/Manager:	John H. Stein/Simeon Ehui
Task Team Leader:	Joop Stoutjesdijk

INDIA

Dam Rehabilitation & Improvement Project

CONTENTS

INDIA

DAM REHABILITATION AND IMPROVEMENT PROJECT

PROJECT APPRAISAL DOCUMENT

SOUTH ASIA

SASDA

Date: June 2, 2010 Country Director: N. Roberto Zagha Sector Manager: Simeon Kacou Ehui	Team Leader: Joop Stoutjesdijk Sectors: Irrigation and drainage (50%); Flood protection (30%); General public administration sector (20%) Themes: Water resource management (40%); Natural disaster management (40%); Other environment and natural resources management (20%)
Project ID: P089985 Lending Instrument: Specific Investment Credit and Loan	Environmental category: Partial Assessment

Project Financing Data

[X] Loan [X] Credit [ ] Grant [ ] Guarantee [ ] Other:

For Loans/Credits/Others:
Total Bank financing (US$m.): 350.00
Proposed terms: IBRD Loan: Variable Spread Loan (VSL), repayment in 30 years, including 5 years grace; IDA Credit (Regular Terms), repayment in 35 years, including 10 years grace.

Financing Plan (US$m)

Source	Local	Foreign	Total
Borrower/Recipient	87.50	0.00	87.50
International Bank for Reconstruction and Development (IBRD)	116.85	58.15	175.00
International Development Association (IDA)	116.85	58.15	175.00
Total:	321.20	116.30	437.50

Borrower:
Department of Economic Affairs (DEA), Ministry of Finance, Government of India.

Responsible Agency:
Central Water Commission under the Ministry of Water Resources and Four Participating States (Kerala, Madhya Pradesh, Orissa, and Tamil Nadu).
Contact email: dir-drip-cwc@nic.in

Estimated disbursements (Bank FY/US$m)									
FY	2011	2012	2013	2014	2015	2016	2017		
Annual	10.00	46.00	78.00	86.00	79.00	43.00	8.00		
Cumulative	10.00	56.00	134.00	220.00	299.00	342.00	350.00		

Project implementation period: Six years. Start - January 1, 2011 End - December 31, 2016
Expected effectiveness date: January 1, 2011
Expected closing date: December 31, 2016

Does the project depart from the CAS in content or other significant respects? ***Ref. PAD A.3.***	[ ]Yes [X] No
Does the project require any exceptions from Bank policies? ***Ref. PAD D.7.***	[ ]Yes [X] No
Have these been approved by Bank management?	[ ]Yes [ ] No
Is approval for any policy exception sought from the Board?	[ ]Yes [X] No
Does the project include any critical risks rated "substantial" or "high"? ***Ref. PAD C.5.***	[X]Yes [ ] No
Does the project meet the Regional criteria for readiness for implementation? ***Ref. PAD D.7.***	[X]Yes [ ] No

Project development objective ***Ref. PAD B.3, Technical Annex 3***
The project development objective is to improve the safety and operational performance of selected existing dams in the territory of the participating states.

Project description *[one-sentence summary of each component]* ***Ref. PAD B.4., Technical Annex 4***

1. Rehabilitation and Improvement of Dams and Associated Appurtenances. Comprehensive rehabilitation and improvement of 223 dam and appurtenant structures in four states (Kerala, Madhya Pradesh, Orissa, and Tamil Nadu). In addition, hydrological assessments, preparation of asset management plans and emergency preparedness plans, development of emergency warning systems, public awareness campaigns, and floodplain mapping will be carried out.

2. Dam Safety Institutional Strengthening. To support and strengthen the Dam Safety Organization (DSO) at national level in the Central Water Commission (CWC) and DSOs and Water Resources Departments (WRD) in each of the four participating states, as well as the State Electricity Boards (SEB) in Kerala and Tamil Nadu. DSOs will become effective organizations that can take the lead in overseeing that dams remain safe from a structural and operational point of view. Dam managers will be assisted with the development of appropriate skills and modern tools to adequately operate and maintain dams.

3. Project Management. To provide support to CWC and State DSOs, WRDs, and SEBs with the management and implementation of the project.

Which safeguard policies are triggered, if any? ***Ref. PAD D.6., Technical Annex 10***
OP 4.01 - Environmental Assessment; OP 4.10 - Indigenous People; OP 4.11 - Physical Cultural Resources; OP 4.12 - Involuntary Resettlement; OP 4.37 - Safety of Dams; OP 7.50 - Projects on International Waterways.

Significant, non-standard conditions, if any, for (***Ref. PAD C.6.)***:

Board presentation: None.

Loan/credit effectiveness: None.

Covenants applicable to project implementation:

CWC shall maintain at all times during project implementation a Project Management Unit (PMU) within the Dam Safety Rehabilitation Directorate's regular structure, led by a project director and assisted by adequate professional and administrative staff in numbers and with experience and qualifications agreed to between the Borrower/Recipient and the Bank/Association, with functions and responsibilities and resources agreed to between the Borrower/Recipient and the Bank/Association, including, inter alia, the responsibility of said unit to coordinate and monitor the carrying out of the Project.

Each state shall maintain at all times during project implementation a State Project Management Unit led by a project director and assisted by adequate professional and administrative staff in numbers and with experience and qualifications agreed to between the respective Participating State and the Bank/Association, operating under terms of reference agreed to between the respective Participating State and the Bank/Association.

The project shall be carried out in accordance with a project implementation plan, satisfactory to the Bank/Association, containing, inter alia, specific provisions on detailed arrangements for the carrying out of the Project, including the procurement, financial management and disbursement requirements, the Environmental and Social Management Framework (ESMF) and the Governance and Accountability Action Plan (GAAP). Provision of the project implementation plan shall not be amended, deleted or waived without the prior written agreement between the Borrower/Recipient and the Bank/Association.

The Central PMU and each State PMU shall prepare and furnish to the Bank/Association for its review and approval by 31 December of each year until completion of the Project, commencing on December 31, 2010, an annual work plan and budget for implementation of the project for the following fiscal year and proceed thereafter to carry out said annual work plan taking into account the Bank/Association's comments thereon.

Project funds shall not be used to increase the design storage capacity of a reservoir.

The Dam Safety Organization within the Central Water Commission and the Dam Safety Organization in the Water Resources Department of each participating state shall be maintained at all times during project implementation.

The Central Water Commission shall employ a management and engineering consulting firm, not later than June 30, 2011, to provide assistance with Project management, including assistance to the Central Project Management Unit in its day to day functioning and its liaising with the State Project Management Units.

Within twelve (12) months after the Effective Date, the Central Project Management Unit shall cause the management and engineering consulting firm referred to above to put into operation a system of quarterly review of internal controls (under terms of reference agreed to between the Recipient and the Association).

A. STRATEGIC CONTEXT AND RATIONALE

1. Country and sector issues

1. Water resources development is a major area of focus for the central and state governments in order to exploit and manage India's limited water resources. India ranks third in the world after China and the United States in terms of number of dams. The dams have played a key role in fostering rapid and sustained agricultural and rural development and growth, which have been key priorities for the Government of India (GoI) since independence. Irrigated agriculture has been a major pillar of the government's strategy to achieve these priority goals and to ensure food security.

2. Rainfall, which occurs mainly in intense and unpredictable downpours within short monsoon seasons, is of high temporal and spatial variability and does not meet year-round irrigation and other water demands. Over the last fifty years, India has invested heavily in infrastructure necessary to store surface runoff in reservoirs formed by large, medium, and small dams with associated appurtenances. At the end of 2008, there were about 4,700 completed large dams in India, with another 390 under construction[1]. The total storage capacity of these dams, half of which are more than 25 years old, is about 283 billion cubic meters. The reservoirs formed by the large dams are either single- or multi-purpose, including water supply, power generation, flood control, irrigation, and/or recreation. Most of the dams were constructed and are maintained by the state governments, with Water Resources Departments (WRD) responsible for operation and maintenance (O&M) on behalf of the states[2]. A few public organizations such as the Damodar Valley Corporation, Mumbai Municipal Corporation, and State Electricity Boards also own and operate dams. Besides the large dams, there are tens of thousands of medium and small dams in the country that have been constructed by various agencies.

3. Considering the rapid developments downstream of dams, current flood protection levels are often far below acceptable standards, causing serious risks. High safety standards for large dams are imperative to prevent failure that would cause devastating environmental and property damage, economic hardships, and, in the worst case, loss of life. An ever-increasing number of people are living and working in areas that would be liable to sudden floods in the event of a dam failure. In rural areas the property at risk is affected by increasing values of buildings, irrigation and drainage facilities, and other infrastructure. Similarly, in urban areas, the value of property, buildings, and infrastructure at risk has also significantly increased and will continue to increase due to urban expansion, industrialization, and improved standards of living.

4. Many large dams are ageing and have various structural deficiencies as well as shortcomings in operation and monitoring facilities. In most states, budgets for dam O&M are part of the larger budget for irrigation system maintenance, which is typically decided on the basis of irrigated area rather than need-based. In practice, irrigation canal maintenance tends to

---

[1] The International Commission on Large Dams (ICOLD) defines a large dam as one more than 15 m high, or more than 10 m high and either more than 500 m long or with a reservoir volume more than one million m^3 or with a maximum flood discharge greater than 2,000 m^3 or with difficult or unusual features.

[2] The name Water Resources Department is used throughout this document. This is the correct department name in Madhya Pradesh and Orissa. In Kerala the correct name is Irrigation Department and in Tamil Nadu there is a Water Resources Organization (under the Public Works Department).

get priority over dam maintenance, which has allowed deterioration of many dams. Allocations for dam O&M need to be more in line with need-based assessments, but India has yet to adopt modern asset management planning to guide the efficient operation and especially maintenance of dams. Most large dams are high-hazard[3], and dam safety assurance is necessary to reduce risks and help assure sustainability and full operational capacity of existing storage through early identification and rectification of problems. Action is therefore required to: (i) ensure rehabilitation and modernization of dams to bring them back to full standard of safety and operation; (ii) develop and implement adequate O&M programs; (iii) ensure regular review of the status of the dams, both by the operator and by independent review panels, to examine problems relating to sustainable O&M of dams; and (iv) formulate standards and guidelines and asset management systems to minimize future risks of dam failures.

5. Availability of adequate, timely, and reliable hydrological and meteorological data is increasingly necessary for dam safety risk assessments, seasonal water allocation planning and dam operation, and forecasting and developing early warning systems to protect the public from floods and dam failures. Enhancement of staff capacity as well as modern physical and analytical infrastructure for monitoring and analyzing hydrometric data and detecting and forecasting flood hazards are needed as well.

6. The National Committee on Dam Safety (NCDS) has recommended that the design floods for large dams be mandatorily reviewed, taking account of new guidelines and the latest available meteorological data on storms. Depending on the height of the dam and the volume of the reservoir either the Standard Project Flood (SPF) or Probable Maximum Flood (PMF) should be used. Except for the more recent ones, dams were typically not designed for either the SPF or PMF. In fact many older dams seem to have been designed only for a design flood that occurs once every hundred years, which is highly insufficient for large high-hazard dams. The Central Water Commission (CWC) is therefore requiring that an updated hydrological assessment for each existing large dam is carried out by the states and approved by CWC[4]. If the required design flood exceeds the current spillway capacity either structural (e.g. enlargement of spillways) or non-structural measures (e.g. better reservoir management) are to be implemented.

7. Based on a resolution adopted during a conference of State Irrigation Ministers, held in New Delhi in July 1975, the Dam Safety Organization (DSO) was established within CWC in July 1979. This organization has been responsible for creating awareness on dam safety in the country, developing unified dam safety procedures, and providing technical support to states. The DSO is also acting as the secretariat of the NCDS.

8. States and dam-owning organizations that have significant number of dams have constituted State Dam Safety Organizations (SDSO), typically within WRDs[5]. All dams in a

---

[3] High-hazard is a term used by a majority of dam safety programs. While the definition varies slightly from place to place, in India it generally refers to a substantial potential loss of life and high property damage if failure of a high-hazard dam occurs.

[4] CWC is functioning under the Ministry of Water Resources (MOWR). The Commission is entrusted with the general responsibilities of initiating, coordinating, and furthering in consultation with state governments schemes for control, conservation, and utilization of water resources throughout the country.

[5] DSOs are in existence in almost all states with large dams. The exact name of the organization varies sometimes. For example, in Kerala a Dam Safety Authority (DSA) has been established with similar functions as the DSOs in other states.

state are under the jurisdiction of the SDSO concerning arrangements for inspections of dams, analysis of information from inspections, and preparation of reports and recommendations regarding the safety status of dams and remedial measures to be undertaken to improve their safety. Regular inspections of dams have to be carried out by the dam operators and inspection reports have to be forwarded to the SDSO for review. SDSOs also carry out inspections on a regular basis to confirm the accuracy of the inspection reports. The capacity to carry out effective dam safety assurance programs varies from state to state due to staffing levels, training, degree of experience, and procedures. Almost all SDSOs continue to be independent units to ensure separation of regulatory and monitoring functions and operational functions. Several SDSOs face a shortage of staff, capacity, office space and equipment, and operating budgets, which limits their ability to adequately carry out their roles and to strongly make the case to senior management in state governments of the importance of dam safety and the need for sufficient resources.

9. The National Water Policy (April 2002) has a section on safety of hydraulic structures. It indicates that there should be proper organizational arrangements at the national and state levels for ensuring the safety of storage dams and other water-related structures. The guidelines on the subject should be periodically updated and reformulated. There should be a system of continuous surveillance and regular visits by experts. The Policy also states that dam safety legislation may be enacted to ensure proper inspection, maintenance and surveillance of existing dams and also to ensure proper planning, investigation, design and construction for safety of new dams.

10. CWC is developing a comprehensive National Dam Safety Act (first drafted in 2002, updated in 2008), the draft of which is ready for review and approval by the government before submission to the parliament. All states with DSOs are already now in general compliance with the provisions outlined in the draft Dam Safety Act, in that there are regular inspections of all large dams and there are functional independent dam safety review panels (DSRP).

2. Rationale for Bank involvement

11. The project is consistent with the World Bank Group Country Strategy for the Republic of India, FY2009-2012 (Report No. 46509-IN; November 14, 2008), which focuses, inter alia, on development of infrastructure and support for the poorer states. Based on its long involvement in the water sector and experience with the institutions involved both at the center and in the states, the Bank[6] is well placed to assist India in developing the institutional framework required to support and implement India's existing regulations and procedures in dam safety. In addition, the Bank has much global and regional experience to support dam rehabilitation and improvement operations.[7]. This experience will be used for the proposed comprehensive rehabilitation of the project dams, using latest techniques, development of monitoring systems,

[6] The reference to Bank in this PAD means International Bank for Reconstruction and Development (IBRD, for the loan) and International Development Associations (IDA, for the Credit).

[7] The India Dam Safety Project (DSP; Loan 3325-IN and Credit 241-IN), implemented between 1991 and 1998 at a cost of US$86 million, was the first stand-alone project dedicated to dam safety. Since DSP, the Bank has financed several dam safety projects with a more modern approach in Armenia, Romania, Indonesia, Sri Lanka, and several other countries. The Bank has accumulated much international and regional experience in such projects to make it an effective partner in dam safety, which is internationally recognized.

using state-of-the-art instrumentation and software, and development of asset management systems. This comprehensive rehabilitation will be different from the piecemeal repair efforts currently undertaken by the operators of the dams that do not lead to optimizing the operation of dams, while at the same time guaranteeing their safety.

12. Considering the large number of dams in India, this project will act as a pilot, showing how to return dams to fully operational and safe condition in a technically and financially sustainable manner, in addition to building the needed capacity to monitor the performance of dams. The proposed project support will be a departure from current practices whereby the main focus is solely on dam operation during flood events, without much consideration of downstream impact. With increasing economic development and population downstream of dams, a more holistic approach to dam safety will be developed with the assistance of the project. The Bank is also well placed to link the project activities to issues related to climate change and disaster management, which are becoming important fields of work. Optimization of water storage is important, not only to satisfy a growing population and the rapidly developing economy, but also to be ready for possible negative impacts of climate change (both more serious flood and drought events). Similarly, the Bank's experiences with disaster risk management can assist the state governments with a better management of the dams and flood waters.

13. The project is closely linked to the Bank's water resources strategy that recognizes that: (i) water resources development and management are central to sustainable growth and poverty reduction; (ii) the Bank needs to assist countries in developing and maintaining appropriate stocks of well-performing hydraulic infrastructure; and (iii) the Bank's water assistance must be tailored to a country's specific circumstances and be consistent with the overarching country strategies.

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

3. Higher level objectives to which the project contributes

15. The Dam Rehabilitation and Improvement Project (DRIP) will contribute to the borrower's objective of sustainable economic growth and reduction of poverty through improved reliability of water resources for irrigation, hydro-electric power generation, flood alleviation, and potable and industrial water supplies.

B. PROJECT DESCRIPTION

1. Lending instrument

16. The lending instrument is a combination of a Specific Investment Credit and Loan. This is an appropriate instrument, given that the project is well-defined and can be implemented over a finite time period. This is typically not a quick-disbursing lending instrument, and engagement with the participating states over a longer period will provide opportunities for comprehensive

rehabilitation and improvement of dams and development of sufficient institutional capacity to operate and maintain dams in a sustainable manner.

17. The total project cost is estimated at US$437.50 million, 80 percent of which will be financed through an IBRD loan of US$175 million and an IDA credit of US$175 million equivalent (SDR 115.9 million), with the balance to be financed by the Ministry of Water Resources and the participating states.

2. Program objective and Phases

18. Not Applicable.

3. Project development objective and key indicators

19. The project activities will focus not only on the rehabilitation and improvement of dam structures, but will also address shortcomings in maintenance and provide for improvements in operation of the dams. This will in turn help to keep dams safe, respond to changing water demands, and keep the downstream population safe from floods. The project will thus address dam system management in a holistic manner.

20. The project development objective (PDO) is to improve the safety and operational performance of selected existing dams in the territory of the participating states. It is expected that especially the institutional development activities will lead to an improvement in the system-wide management approach to all dams in the participating states, over and above the focus on the selected dams covered by the project.

21. The PDO will be achieved through rehabilitation and improvement of dams and improvement in central and state-level institutional capacity to sustainably manage dam safety administration and operation and maintenance. Key performance indicators to measure the achievement of the PDO include:

- Number of project dams with: (i) the ability to safely cater for design floods; and (ii) acceptable stability and seepage. Dams are thus returned to full operational conditions, with reduced risk of failure;
- Number of project dams with need-based O&M plans operationalized. Specific measurements to measure this indicator include availability of detailed operation and maintenance manuals, regular inspections, and development of information technology and analytical tools to generate, collect, evaluate, monitor, and disseminate data on dam safety and operations;
- Number of project dams with basic dam safety facilities in place;
- Percentage of required budget per state for adequate O&M of dams; and
- Number of project dams where emergency response plans have been prepared and disseminated to the population.

4. Project components

22. DRIP will include investments targeted towards: (i) physical and technical dam rehabilitation and improvement; and (ii) managerial upgrading of dam operation and maintenance, with accompanying institutional reforms and strengthening of regulatory measures pertaining to safe and financially-sustainable dam operations. DRIP will aim at assuring the full reservoir capacity of project dams, achieving effective utilization of the stored water, and managing and monitoring the long-term performance of the dams.

23. The proposed interventions will be implemented initially in four states, namely Kerala, Madhya Pradesh, Orissa, and Tamil Nadu, and at the central level through the Central Water Commission[8]. In each of the states the Water Resources Department will participate, while in Kerala and Tamil Nadu the State Electricity Board will also participate in the project activities.

24. The project has three components:

a. *Rehabilitation and Improvement of Dams and Associated Appurtenances,* focusing on structural and non-structural measures at 223 project dams, many of which are more than 25 years old. The number of dams proposed for inclusion in the project is based on proposals received from the four participating states. The states have done a review of the status of their dams and have determined those dams that are most in need of rehabilitation and improvement in order to guarantee their future safety and operational capacity. It was agreed that the states have an option to substitute a few of the currently selected dams with other dams, if it is found that these dams have higher needs. The proposed interventions will include, but not be limited to, such works as: treatment of leakage through masonry and concrete dams and reduction of seepage through earth dams; improving dam drainage; improving the ability to withstand higher floods, including additional flood handling facilities, as required by the hydrological assessments, accompanied by structural strengthening of dams; non-structural measures to cater for higher design floods in case structural measures are physically not feasible; rehabilitation and improvement of spillways, head regulators, draw-off gates and their operating mechanisms, stilling basins, and downstream spillway channels; improving approach roads; improving office and housing accommodation; and improving dam safety instrumentation. The project will also support hydrological assessments and specialized consulting services, e.g. for the design of state-of-the art, but affordable instrumentation. In addition, preparation and implementation of asset management plans, emergency preparedness plans, emergency warning systems, public awareness campaigns, and floodplain mapping will be included in all states. Operators of dams, state design organizations, and engineering cells in WRDs and SEBs will provide design services and day-to-day construction supervision. Consulting services for the more complicated design and third-party supervision services and specialized tasks will be recruited to assist WRDs and SEBs, as needed.

[8] Project preparation was conducted with five states, including Chhattisgarh that proposed the inclusion of 20 of its 265 large dams. However, in March 2010, well after project appraisal, the state decided not to participate in a Bank-funded project. The funds that were proposed for Chhattisgarh have been moved to an unallocated category.

b. *Dam Safety Institutional Strengthening*, focusing on regulatory and technical frameworks for dam safety assurance. The activities to be carried out will include, but not be limited to, targeted training nationally (especially at the National Water Academy in Pune) and internationally to Dam Safety Organizations at Central (CDSO) and State (SDSO) level to become effective organizations that can take the lead in ensuring that dams remain safe from a structural and operational point of view; in-country and external training of staff of WRDs and SEBs to assist with the development of appropriate skills and modern tools to adequately operate and maintain dams; attendance at dam safety courses; study tours, and linking with foreign country agencies that have advanced dam safety programs such as the United States and Switzerland; operation of independent dam safety review panels, comprising experts in relevant disciplines; development of capacity to carry out reservoir sedimentation studies; development of Management Information Systems (MIS) and other programs to capture and analyze data for long-term planning and guiding of dam operations; support to the further development within CWC of the Dam Health and Rehabilitation Monitoring Application (DHARMA) program that will allow a systematic presentation and interpretation of data for effective monitoring of the health of dams; support to the revision of existing guidelines on dam safety and preparation of new guidelines, as needed; and training in hazard and vulnerability assessment and dam-break analysis.

c. *Project Management.* The overall responsibility for project oversight and coordination will rest with the Dam Safety Rehabilitation Directorate in the CDSO of CWC. This Directorate will act as the Central Project Management Unit (CPMU). The Directorate will be assisted by a management and engineering consulting firm. Each state will establish a Project Management Unit (SPMU) attached to the WRD Chief Engineer's (CE) office in charge of the SDSO. This Unit will have direct responsibility for the coordination and management of the project at state level.

State	No of large dams in state	No of DRIP dams	Rehabilitation and improvement (US$M)	Institutional Strengthening (US$M)	Project Management (US$M)	Total Project Base Costs (US$M)	Contin-gencies (US$M)	Total Project Cost (US$M)
Kerala	54	31	42.17	7.19	2.71	52.07	6.26	58.33
Madhya Pradesh	906	50	54.28	2.09	1.50	57.87	7.66	65.53
Orissa	163	38	22.16	2.99	2.14	27.29	3.49	30.78
Tamil Nadu	108	104	125.97	4.84	4.19	135.00	20.31	155.31
CWC				5.48	18.63	24.11	3.39	27.50
Unallocated Resources								100.05
Total		**223**	**244.58**	**22.59**	**29.17**	**296.34**	**41.11**	**437.50**

Note: Total project base cost excludes unallocated resources.

25. In order to cater for the possible future involvement of some more states, GoI requested to include a lump sum amount of about US$100 million as unallocated resources. These resources could be used during project implementation for cost overruns, rehabilitation of additional dams in one or more of the four states, or for urgent works or institutional needs in other states. For example, during appraisal CWC received a request from Karnataka State for development support for dam improvement and management related to the October 2009 floods.

Such support would fit well within the scope of DRIP and requests could be considered during project implementation.

5. Lessons learned and reflected in the project design

26. Dam safety is primarily for the protection of people and economic assets, in addition to the direct protection of dams and associated works. The project therefore does not only address the physical issues related to dam structures, but also flood mapping, development of emergency response plans, installation of warning systems, and development of comprehensive dam operation plans.

27. An important lesson learned from Bank-supported dam safety programs, including the India Dam Safety Project, is the importance to be given to institutional strengthening. Engineers that are directly in charge of dams must have adequate training and experience. One of the conclusions of DSP was that a separate cadre of dam engineers should be established and that training in dam safety should be institutionalized so that engineers in WRDs routinely receive dam safety training. Frequent rotation of experienced staff away from dam-related work should be minimized. Institution building is a long process, especially when it involves organizations at multiple levels, establishing new work methods, and upgrading technical expertise. The project has a component on institutional development that includes manpower development, training, and upgrading of organizations at central and state level, including support to the actual operational staff at dams. The project will also review and enhance the program offered at the National Water Academy in Pune and assist in the development of an improved curriculum for engineers and others involved in dam safety issues and dam operation and maintenance.

28. Another lesson from previous dam safety operations, again including DSP, is that rehabilitation and modernization proposals should be based on a thorough assessment of dams according to an appropriate risk assessment and be documented in inspection documents that describe dam safety and structural issues. In India, the annual dam inspection reports serve as the starting point. Solutions should not only focus on structural measures, but also on non-structural remedial measures to ensure dam and reservoir sustainability and to maximize the safety of population and property downstream of the dams. High quality of design and construction of dam remediation works are indispensable and must be achieved by using qualified and experienced government staff and consultants. The project design includes the requirement to carry out a comprehensive review and rehabilitation of the dams and, when needed, introduce non-structural measures, for example propose optimum reservoir operating rules where it is impracticable to increase spillway capacity to cope with increased design floods.

29. A clear understanding of the assets of the dams will allow putting in place effective mechanisms for sustaining the level of O&M and dam safety achieved at the end of the project. The project will develop asset management plans for the project dams so that a better justification can be made to government for adequate O&M budget. Operational manuals will be prepared or updated for the project dams to optimize their operation and minimize dam safety problems.

30. New techniques and equipment will be tailored to the existing level of capacity, the need for specific facilities, and available funds for maintenance. This will be accompanied by training programs so that sophisticated equipment that is installed at dams or in catchment areas does not deteriorate for lack of use or maintenance.

31. Dam safety review panels will be advisory in function and provide an opinion on studies and designs. The panels do not have to approve these, as that would mean an additional layer in the approval process for which there are established systems in the states. Selection of panel members will be made very carefully to ensure that those selected are authorities in their field and are capable of reaching sensible conclusions quickly.

32. The Bank has experience with implementing multi-state projects. Some of the main advantages include: (i) sharing of good practices, knowledge gained by states, and project documents will enhance the implementation of the project in all states; (ii) the introduction of some sense of competition between states; (iii) central services can be optimized to benefit more than one state; and (iv) in case of non- or under-performance of one state, funds can be transferred to better performing states, if and when needed. However, multi-state projects also provide some risks during project implementation considering the wide spread of activities. The services of management and engineering consultants, the introduction of a template that summarizes each individual dam proposal, and the fielding of an experienced and senior task team are some of the measures that are proposed to allow the project to be implemented satisfactorily by the states and CWC and to allow the Bank to adequately review the implementation of the project.

6. Alternatives considered and reasons for rejection

33. Thirteen states were initially interested to participate in the project. This large number of states would have made project implementation and supervison difficult. The number of participating states was reduced to a more manageable four based on certain criteria, including: (i) the proposed package of dams by a state should include a substantial number of large dams with urgent dam safety and technical issues; (ii) states that share certain water sources (rivers) are preferred as that will increase synergies between states; and (iii) a state should have a sufficiently adequate basic institutional set-up with regard to dam safety. It was agreed with central government that at a later stage other states may join the program, for which an amount of unallocated resources is available under DRIP.

34. Some states proposed to combine dam rehabilitation with new development works. Given the gravity and urgency of addressing public safety related to existing dams, it was agreed that the project focus will be on rehabilitation of existing dams and that all the project funds will be used for this purpose.

35. A challenge fund mechanism, managed by a private financial institution, with possibilities for co-financing and replenishment by other donors, commercial banks, and other institutions, was considered during project preparation as an innovative feature to handle dam rehabilitation, retrofitting, and improvements under a long-term programmatic framework. Such proposed Dam Rehabilitation and Improvement Fund (DRIF) would have been very similar to the line of credit fund under the Tamil Nadu Urban Development Fund and could have assisted in maximizing benefits from existing dam assets while ensuring their safety. Besides rehabilitation and improvement works, DRIF could have supported tourism, fisheries, and small hydropower. There were considerable reservations from the MOWR and some states regarding this mechanism, at least for now, as dams were viewed as important structures in the public domain. It was found difficult to persuade states to divert incremental revenue from potential tourism, fisheries, and hydropower investments to improve the allocation for O&M of the dams.

It was agreed to drop the DRIF mechanism as a possible project component, but to continue the dialogue with MOWR and the participating states for its possible set-up with interested states during project implementation.

C. IMPLEMENTATION

1. Partnership arrangements

36. None has been determined.

2. Institutional and implementation arrangements

37. The organizational structure for day-to-day project coordination and management of DRIP consists of a Project Management Unit (PMU) at the central level in CWC and one State level PMU for each of the four participating states. The exception may be in Kerala where the SEB is interested in setting up a small PMU, attached to its own dam safety organization. However, this still has to be considered and approved by State Government. The PMUs will be established in the CDSO and the SDSOs. All PMUs will be staffed with qualified government staff, supplemented with consultants so that the needed technical, safeguard, monitoring and evaluation (M&E), and fiduciary (procurement and financial management) capacity is available. A multi-disciplinary management and engineering consulting firm will assist CWC with the overall implementation of the project.

38. The Dam Safety Rehabilitation Directorate in CWC will serve as the CPMU, with the director of the directorate designated as the project director (PD). The CPMU will be charged with the overall coordination of the project activities and the liaison with the states. In particular, the CPMU will provide support to SDSOs and their SPMUs and facilitate and guide the implementation and monitoring of project activities, ensuring synergy and coordination among activities and state-level agencies implementing these activities, facilitating training and knowledge sharing, and preparing consolidated progress and other project reports.

39. SDSOs, through the SPMUs, will have overall responsibility for the coordination of the project activities at state level, both technically and qualitatively, will monitor the physical and financial progress, and summarize the implementation of the progress and submit reports to the CPMU in a format generated for a MIS. The SPMUs will coordinate the work of Chief Engineers of the WRDs and other owners of dams.

40. The responsibility for implementation of works at the project dams will rest with the WRD in each state and with the SEB in Kerala and Tamil Nadu, which means that there will be six implementation agencies at state level. The Tamil Nadu Agricultural Engineering Department may get involved in a limited way, not necessarily as an implementing agency, for the execution of catchment area treatment works at 2 out of the 104 project dams in that state. The activities that will benefit CWC directly will be implemented by CWC. CEs will have overall responsibility for the investigation, design, and day-to-day supervision of the rehabilitation works at each dam. They will thus provide day-to-day organization of the implementation of the works, based on annual work plans and budgets to be reviewed and agreed by the respective SPMU, the CPMU, and the World Bank. Executive Engineers (EE) of WRD and SEB, under the supervision of CEs, will be responsible for preparing detailed designs and

bidding documents. The offices of the CEs will have to obtain the approval of these from SPMU and CPMU, and the World Bank only as necessary for complicated rehabilitation proposals. The EEs who are based in the district or zone where a project dam is located will be responsible for procurement and the execution of the works. Day-to-day construction supervision will be conducted by the EE and his staff and direct quality assurance of the works will be ensured through WRDs' quality control units. As many dams will have to be addressed at the same time, especially from the second year onwards, for which the needed manpower and technical capacity may not be available in WRDs, consulting firms and individual specialists will be recruited as needed to assist with the implementation of the dam rehabilitation and improvement program.

41. Third-party construction supervision and quality control arrangements will be put in place through CWC, with extensive assistance of the management and engineering consulting firm that will be attached to the CPMU. This consulting firm will also provide management and technical advice to CWC, WRDs, SEBs, and SDSOs, provide support to procurement, safeguards, and financial management, including periodic reviews of the internal control systems, and assist with the monitoring of the physical and financial progress and the governance and accountability action plan (GAAP). Considering the long time needed to recruit a major consultancy, it is expected that project implementation will start before the management and engineering consulting firm has mobilized. This is not seen as a major constraint, as the works on dams that are expected to start during the initial phase of project implementation do not have complicated works and the implementation structure is in place within CWC and the state implementing agencies to work on the small number of dams during the initial project months. CWC has engineers at central and regional level to provide technical support to the states. Until CWC's management and engineering consulting firm is in place the regional engineers of CWC will carry out third-party construction inspections. There are three CWC regional offices to cover the four states: one office in Tamil Nadu for that state and Kerala, one office in Madhya Pradesh, and one in Orissa.

42. An important feature of project management will be a standard template form to be filled by the concerned EE, under the supervision of the CE, during the investigation and preliminary design stage for each dam. The template will provide the basic parameters of each dam, and detailed information on technical, environmental, social, and all implementation-related aspects. Based on this template and additional information, as needed, the SPMU will provide for a first-level screening of each dam and the proposals for its rehabilitation. After signing off on the form, the SPMU will send it to the CPMU, which with the assistance of the staff of the consulting firm will carry out a second-level screening. A web-based MIS will be maintained that will capture the salient information from the templates. The World Bank Task Team will receive and review each template after review by CPMU. The template and the MIS will allow an early identification of those dams with complicated features and/or where major issues can be expected, and based on the review of the templates a final categorization of each of the dams will be made. Those that have no major technical, environmental, or social issues can have the designs finalized and tendered. Those that are complicated or where there may be major issues will require a detailed site inspection by SPMU, CPMU, and World Bank staff and may require the preparation of detailed technical reports and site-specific environmental assessments (EA) and environmental management plans (EMP). Additional supervision efforts for these dams will be made available, both through CPMU and the World Bank Task Team.

43. A National Level Steering Committee (NLSC) is already in place for oversight on dam safety assurance and rehabilitation, and disaster management. The NLSC is headed by the Secretary MOWR, and includes senior representatives of CWC and participating states. A separate Technical Committee (TC) is also in place to provide technical input to NLSC, coordinate with implementing committees of respective state governments, and review progress of development projects. The TC is chaired by Member (Design and Research) of CWC, and includes Engineer-in-Chiefs of Irrigation, Water Resources, and Power Departments of participating states. The Chief Engineer, CDSO, is also a Member of the TC and acts as its secretary. The NLSC and TC will provide strategic supervision and directions for the successful implementation of DRIP, including the provision of a platform for dispute resolution at any time during project implementation.

3. Monitoring and evaluation of outcomes/results

44. Monitoring and evaluation activities related to the project will be the direct responsibility of the PMU of each state by utilizing its own staff and contracting out M&E functions to consultants. Monitoring project progress and achievements will entail a process for reviewing continuously and systematically the various project implementation activities. The objectives of the M&E are to: (i) measure input, output, and outcome indicators (see Annex 3); (ii) provide information regularly on progress towards achieving desired results and to facilitate reporting to the state and central governments and the Bank; (iii) alert managers, both in government and the Bank, to actual or potential problems in implementation so that timely adjustments can be made; and (iv) provide a process whereby the PMUs can reflect and improve on performance. Furthermore, a good baseline, comprising a description of the current conditions, will have to be prepared for every dam, which will be done during the investigation and design stage.

45. The results of relevant M&E activities will be reported in the quarterly and annual progress reports that will be prepared by the SPMUs and submitted to the CPMU, which in turn will compile quarterly and annual reports for the overall project. These reports will cover the progress of the works on dams, the institutional activities, training, and special studies, as well as updates of the performance indicators, the procurement plans, etc. A section of the progress reports will be devoted to issues identified during project implementation and strategies and actions to be taken to resolve such issues to avoid that they negatively affect progress. The fourth quarterly report of each calendar year will be an annual report, providing information of the progress during the past year and an approved annual work plan and budget for the next year.

4. Sustainability

46. The project design examined key factors influencing the sustainability of project activities and outcomes and the project includes measures to enhance the likelihood of sustainability of dam O&M. Currently there is inadequate funding for dam maintenance in all the involved states, which has led to the deterioration of the dam structures. The National Water Policy stipulates the need for adequate maintenance of hydraulic infrastructure. The awareness to provide the needed maintenance of dams is growing in the states, as dams are increasingly seen as critical pieces of infrastructure to manage the limited water resources. The 2009 drought, followed by serious flooding in several parts of the country, has strengthening this awareness further. The project intends to build on this and increase further the knowledge of the

importance of adequate funds for maintenance and repairs and build the ownership in the states about this.

47. From the technical sustainability perspective, the project will support capacity and skill building of the dam operating agencies to improve asset inventories and quality of construction and rehabilitation works. An effective mechanism, with the support of experienced consultants and dam safety review panels, will be established under the project to ensure that technical designs and quality of project activities are in line with international good practice. This will include the preparation or updating of dam operational manuals to effectively operate the dams in future.

48. The project will support the use of asset management systems to establish dam-specific needs-based O&M systems that aim to ensure that sufficient funds are available for the dedicated use by the dam operator so that all dam O&M needs can be afforded. Asset management systems determine in a systematic way the maintenance and related budget needs, both annually and longer-term, and monitor in a transparent manner the actual versus planned maintenance expenditures. The results can easily be publicly disclosed. The results of the asset management plan (i.e. a fully costed maintenance plan) can be forwarded by WRDs to Finance Departments as part of their annual budget request. Rather than having the funds for dams incorporated in overall budgets for irrigation system O&M, it is proposed to include in WRDs' budget separate line items for the aggregate number of large dams in view of the importance of adequately maintenance of dams.

49. From the institutional sustainability perspective, the project will have a strong institutional strengthening element. The aim of the project activities will be to build the capacity of the implementing agencies in risk assessment and dam portfolio management, modern engineering design and construction quality control, social and environmental management, dam safety codes of practice, dam operation and risk-based maintenance, safety monitoring and inspection, and emergency preparedness planning.

5. Critical risks and possible controversial aspects

50. The main risks associated with the project and proposed mitigation measures are summarized in the table below.

Risks	**Risk Mitigation Measures**	**Risk Rating with Mitigation**
To project development objective		
Sufficient O&M budget may not be allocated for dam safety.	The project will develop asset management systems to assess the specific O&M needs of dams that will allow implementing agencies to calculate need-based dam O&M expenditures. A transparent understanding of the O&M needs will aid the discussions with Finance Departments to create non-fungible budget lines. It is realized that O&M funding in many sectors in India, including the water sector, is often insufficient. The implementation of the proposed risk mitigation measures (see also Section C.4. on	S

Risks	Risk Mitigation Measures	Risk Rating with Mitigation
	Sustainability) are expected to make a convincing case for the allocation of sufficient budget, but there remains a substantial risk that full results will not be achieved.	
Institutional capacity may not be adequate to implement effective dam safety assurance.	Institutional capacity and staff skill development for dam safety management will be an important part of the project, mostly in-built to project planning, design and implementation processes.	M
To Project outputs		
Poor collaboration among and especially within the implementing agencies may affect the timely delivery of outputs and outcomes.	Several measures have been incorporated into the project design to ensure collaboration, including strengthening DSOs to enable them to act as project management units, and assignment of the activities of all project components as much as possible with the regular units of WRDs and SEBs of the states rather than creating specialized units. CWC and its CPMU will provide overall coordination of the project activities for the benefit of all state implementation agencies.	M
Technical capacity of implementing agencies is insufficient for satisfactory project implementation.	Most implementation agencies, but not necessarily the divisions/units that will participate in the project, have experience with implementation of bank-funded projects. The capacity will be strengthened by consultants at state level, CWC and its consultants, and DSRPs.	M
Low construction quality due to lack of interest by capable contractors to undertake civil works.	Problems with attracting qualified contractors have affected the performance under several large-scale irrigation projects. DRIP works are concentrated around a dam within a confined place and does not have scattered small construction activities over a large area as at the lower-order systems under irrigation projects. As such contract management will be easier. To reduce the risk as much as possible works will be packaged in an appropriate manner to make the contracts attractive for qualified contractors. Implementation of proper procurement processes and contract management will be a main focus of implementation support by the Bank's Task Team. Independent third-party consultants will be appointed, attached to CPMU, to oversee and ensure adequate design and construction quality norms. It is likely that through these efforts the risk can be rated Moderate as implementation progresses, but this will be decided during Bank implementation review missions.	S
Costs overruns.	Price and physical contingencies have been included in the overall cost estimates. There is also an amount of	M

Risks	Risk Mitigation Measures	Risk Rating with Mitigation
	unallocated funds that can be used for cost overruns. Other measures to be taken include adequate investigations and robust designs, procurement through competitive bidding, and inputs of competent consultants for construction supervision.	
Overall risk rating		S[9]

H-High, S-Substantial, M-Moderate, N-Negligible

6. Loan/credit conditions and covenants

51. There are no conditions for effectiveness. Key covenants during project implementation include:

- CWC shall maintain at all times during project implementation a Project Management Unit (PMU) within the Dam Safety Rehabilitation Directorate's regular structure, led by a project director and assisted by adequate professional and administrative staff in numbers and with experience and qualifications agreed to between the Borrower/Recipient and the Bank/Association, with functions and responsibilities and resources agreed to between the Borrower/Recipient and the Bank/Association, including, inter alia, the responsibility of said unit to coordinate and monitor the carrying out of the Project.

- Each state shall maintain at all times during project implementation a State Project Management Unit led by a project director and assisted by adequate professional and administrative staff in numbers and with experience and qualifications agreed to between the respective Participating State and the Bank/Association, operating under terms of reference agreed to between the respective Participating State and the Bank/Association.

- The project shall be carried out in accordance with a project implementation plan, satisfactory to the Bank/Association, containing, inter alia, specific provisions on detailed arrangements for the carrying out of the Project, including the procurement, financial management and disbursement requirements, the Environmental and Social Management Framework (ESMF) and the Governance and Accountability Action Plan (GAAP). Provision of the project implementation plan shall not be amended, deleted or waived without the prior written agreement between the Borrower/Recipient and the Bank/Association.

- The Central PMU and each State PMU shall prepare and furnish to the Bank/Association for its review and approval by 31 December of each year until

[9] The overall risk rating is between Moderate and Substantial. At the moment a Substantial rating is given, but if the measures to put in place fully acceptable construction arrangements and O&M funding arrangements are successful the overall risk rating would be reduced to Moderate.

completion of the Project, commencing on December 31, 2010, an annual work plan and budget for implementation of the project for the following fiscal year and proceed thereafter to carry out of said annual plan taking into account the Bank's comments thereon.

- Project funds shall not be used to increase the design storage capacity of a reservoir.

- The Dam Safety Organization within the Central Water Commission and the Dam Safety Organization in the Water Resources Department of each participating state shall be maintained at all times during project implementation.

- The Central Water Commission shall employ a management and engineering consulting firm, not later than June 30, 2011, to provide assistance with Project management, including assistance to the Central Project Management Unit in its day to day functioning and its liaising with the State Project Management Units.

- Within twelve (12) months after the Effective Date, the Central Project Management Unit shall cause the management and engineering consulting firm referred to above to put into operation a system of quarterly review of internal controls (under terms of reference agreed to between the Recipient and the Association).

D. APPRAISAL SUMMARY

1. Economic and financial analyses

52. The economic rationale of dam rehabilitation and safety is foremost the protection of human lives. However, conversion of this protection into economic analysis is precarious. Further benefits relate to: (i) avoidance of direct physical damage to private and public assets downstream of the dam at risk; (ii) avoidance of the large indirect negative multiplier effects on various sectors of the economy downstream of the dam, irrigated agriculture being the main driver of the local economy; and (iii) avoidance of replacement of the dam.

53. The primary beneficiaries are both urban and rural communities of about 25 million people directly dependent on the 223 reservoirs for their water supply and livelihood, as well as all downstream communities who could be placed at physical and/or operational risk if dam safety is compromised.

54. It is difficult to estimate the probability of failure of any given dam. Experience from other countries suggests that a comprehensive program like DRIP can reduce the probability of failure (POF) of a dam by at least one order of magnitude. Calculations that seek accurate probability figures generally fail because of the complexity of the risk structure, unless a large number of historical data on dams is available. Therefore, the analysis for DRIP follows the advised practice of making an overall assessment of POF based on a risk reduction by 0.1 (i.e. one order of magnitude) between the with/without project alternatives (WIP/WOP), followed by sensitivity analysis adopting risk reduction ratios of 0.5 and 0.8. During project implementation a more analytical-based analysis will be carried out for a select number of dams, using portfolio risk assessment (PRA) techniques that would allow determining variability in the probability

(risk) of failure and grouping dams into specific risk categories, as well as using historical data to attempt to determine specific probability of failure.

55. Adopting guidance from average international values, the rate of POF of the aggregate 223 dams has been assumed at 70 percent in a 20-year period in the WOP alternative. With project interventions, the rate of POF has been assumed to reduce to 7 percent. The analysis for DRIP included only annual net incomes from agricultural production and electricity generated from hydropower dams and replacement costs of houses at the extent of 30 percent (see Annex 9 for detailed assumptions). The base level of the economic rate of return (ERR), undertaken in 2009 constant prices, is estimated at 37 percent.

56. Sensitivity analysis has been undertaken, assuming other ratios of POF, cost overrun, and delays and/or reduction in benefits. At the assumed rates of risk reduction at 0.5 and 0.8, the results show that the ERR would reduce to 35 and 32 percent, respectively. The threshold level of an ERR of 12 percent is met when the rate of risk reduction is 1.69. ERRs would still be above the level of opportunity cost of capital of 12 percent, ranging from 33 percent when project costs overrun by 20 percent, and 24 percent with a combination of 20 percent cost overrun and 2 years delayed benefits.

57. The cash flow for DRIP over a 20-year period has been prepared in 2009 constant prices in order to assess and illustrate the fiscal impact and the incremental financial burden from DRIP to CWC and the concerned four states. During the loan/credit repayment period, including the grace periods, the annual interest charges and principle payment would amount to about Rs. 725 million (including Rs. 514 million for the four states, based on the current amount that is expected to be borrowed by each of the states). In addition, the four states would have to incur annual incremental O&M cost of Rs. 435 million after rehabilitation of all the dams, which is about 5 percent of the overall O&M budget of the WRDs in the four states.

2. Technical

58. Rehabilitation and improvement of dams and appurtenant structures will focus on structural and non-structural measures. In addition, hydrological assessments, sediment management, and other measures required to improve the safety and operation of the dams will be carried out. Support will also be provided for the preparation of asset management plans, flood plain mapping, emergency preparedness plans, and emergency warning systems. Dam safety institutional strengthening will focus on the regulatory and technical frameworks for dam safety assurance, including policy formulation, training and support to DSOs, WRDs, and SEBs to develop appropriate skills and modern design and operational tools; dam status inventory and updating to a Geographic Information System (GIS) platform; technical training in hazard/vulnerability assessment and dam break analyses; and development of emergency action plans.

59. Appropriate technologies will be used for the design and construction of the needed physical interventions. It will be ensured that final designs are sound, suitable for local conditions, and that the proposed works will serve the intended purpose and will be sustainable with acceptable level of O&M requirements. Based on a review of the proposed works at a number of dams, it is clear that works of similar nature have been carried out in India, which gives support to the expectation that the rehabilitation program can be implemented without major difficulties.

3. Fiduciary

60. *Procurement.* The CPMU in the Dam Safety Rehabilitation Directorate in CWC will have overall responsibility for project oversight and coordination, assisted by a management and engineering consulting firm, which will include procurement expertise. The WRDs in the four states and the SEBs in two states will be responsible for procurement of the activities in the states. This will be coordinated and overseen by the SPMUs, which will have procurement cells with the needed capacity.

61. For procurement of works following national competitive bidding (NCB), the Bank's bidding document as agreed with the GoI task force and as amended from time to time will be used. For procurement following international competitive bidding (ICB) and for consultant services, the Bank's standard bidding documents and standard requests for proposals will be used. For all contracts to be financed by the loan/credit, the different procurement methods or consultant selection methods, estimated costs, prior review requirements etc., are agreed between the Borrower and the Bank in the Procurement Plan. The Procurement Plan will initially cover the first 18 months of project implementation and will be updated by each state at least annually or as required to reflect the actual project implementation needs and improvements in procurement capacity. As indicated in Annex 8, given the capacity of the implementing agencies, the overall risk of procurement is considered substantial.

62. *Financial Management.* For financial management (FM), including fund flow, accounting, and internal control framework of the project, the country systems will be followed. The existing FM arrangements in CWC and WRDs in the four participating states are adequate and have the potential to satisfactorily meet the FM fiduciary requirements. However, certain areas such as contract management, internal audit, and compliance to audit findings will need to be supplemented or strengthened through specific measures to meet the Bank's fiduciary requirements. Since it is proposed to use the extant government FM procedures that are contained in various documents such as the State Public Works Department (PWD) Manual, Central Public Works Account Code, and General Financial Rules of respective states and CWC, the FM arrangements for DRIP have been documented in a FM Manual, which standardizes the policies, procedures, and reporting formats to be followed.

63. The CPMU will have a coordinating role in financial management of the project. There will be a full-time finance staff at least of the rank of Assistant Accounts Officer. The disbursement of credit/loan funds will be based on quarterly Interim Unaudited Financial Reports (IUFR) in formats agreed with the Bank. Based on satisfactory IUFRs with regard to the previous releases, funds will be released on quarterly basis. Periodic review of the internal control system by the management and engineering consulting firm will strengthen the internal control framework of the project. The SPMU in the WRD in each state will have a finance team led by a Finance Officer deputed from the State Finance Department. External audits will be conducted by the Comptroller and Auditor General (C&AG) at the center and by the respective State AGs in the four participating states, according to the standard terms of reference for audits as agreed between the Bank and the C&AG and DEA for the audit of Bank-financed projects. The CPMU will compile the project audit reports of all the implementing agencies (seven in number, including CWC) and submit a compiled set of audit reports to the Bank within six months from the end of each financial year. Considering the overall FM risk rating of the portfolio in the irrigation sector in India and the risks perceived at this stage from the FM

perspective on account of the geographical spread of the project, FM risk is rated as Substantial (for details refer to Annex 7).

4. Social

64. An Integrated Environmental and Social Assessment (ESA) was commissioned by CWC during project preparation in order to rationalize and streamline the task of environmental and social management of dam rehabilitation. This assessment covered a sample of ten dams in Gujarat, Maharashtra, Madhya Pradesh, and West Bengal. The assessment included inspection of the selected dams and stakeholder consultations at dam and basin levels to get views on the proposed project interventions. Based on this, the assessment identified key social and environmental issues, analyzed alternatives, and prepared an Environmental and Social Management Framework (ESMF).

65. The ESMF identifies the potential environmental and social impacts of possible dam rehabilitation activities, the possible mitigation measures, and the responsible entities for implementation of the mitigation measures and their monitoring. The ESMF will be used for screening of all project dams to be able to segregate them into low, medium, and high categories in terms of their potential social and environmental impacts. This categorization will facilitate appropriate management decisions for each project dam. Several standard screening forms have been developed as part of the ESA and are documented in the ESMF.

66. The ESMF outlines the entitlement framework for resettlement and rehabilitation (R&R) of project-affected people and the strategies to address issues related to tribal, gender, participation, and communication. In the unlikely case that dam rehabilitation requires land acquisition and/or R&R, the framework specifies how to deal with these issues. The ESMF also describes the process to be followed for the preparation of a Resettlement Action Plan (RAP) in the event this may be required.

67. Although the project does not envisage adversely impacting tribal (indigenous) people, OP 4.10 on Indigenous People has been triggered to address the eventuality that a dam is in or near a tribal area and the rehabilitation works may affect tribal populations. The ESMF provides for the procedure for the preparation of an Indigenous People's Development Plan (IPDP) that will include a process map for implementation and informed consultations with affected communities leading to broad-based community support for the intervention. Significant impact on livelihood systems as a result of the project interventions is not expected, but if needed this will be covered in the IPDP. A specific gender strategy has also been documented in the ESMF. The tribal development strategy and the gender strategy are especially important for the development of downstream warning systems and emergency response plans to be prepared with involvement of all stakeholders, so that it can be ensured that those living downstream of dams are aware of the warning systems and are targeted in response planning exercises.

68. It is recognized that adequate capacity for understanding and addressing social issues under the project has to be developed. Capacity to deal with social issues at the state level will be developed through training programs, exposure trips, experience-sharing workshops, and documenting and disseminating good practices. The management and engineering consulting firm that will assist the CPMU will have social and environmental specialists. The SPMUs will appoint government officials and/or individual consultants who will be responsible for ensuring effective mainstreaming of social issues as identified in the ESMF. Monitoring and evaluation

programs will cover social development outputs under the project, as described also in the ESMF. This information will be compiled at the CPMU level in regular progress reports.

5. Environment

69. The ESMF is designed to assess the environmental impacts of the interventions undertaken for each dam. The approach is based on a screening exercise at each dam that will identify environmental issues, and the subsequent development of a mitigation plan for enhancing the positive impacts of the interventions and mitigating any negative impact as much as possible.

70. The ESMF includes a sequenced plan for environmental screening, impact assessment, mitigation, monitoring, and evaluation, to be carried out at the various stages of the dam rehabilitation cycle, along with the details of the expected outputs and the responsibilities for each activity. The ESMF starts at the planning stage for each dam, thereby allowing for the environmental issues to be identified through a screening process as described in the ESMF. Since the scope of the physical works to be funded under DRIP is limited to rehabilitation and improvement of existing dams, the environmental impacts of the project interventions are not expected to be significant. There will be no change in overall reservoir volumes and structural changes upstream and downstream of project dams are not envisaged. Construction phase interventions may produce impacts on the communities in proximity of the dams, but the ESMF provides for addressing construction phase interventions, while the needed specifications will be introduced in the technical specifications of the bidding documents. There may be some dams which are near protected areas, but construction management plans will take this into account. As a rule, activities inside protected areas, such as borrow pits and building access roads, will not be allowed. If indeed the rehabilitation and improvement of a specific dam is within a protected area it will be ensured that an (partial) Environmental Management Plan (EMP) will be prepared. The same will apply for dams that have other major environmental issues, e.g. related to desilting. No new dams will be constructed under DRIP.

71. Since the ESMF is based on the ESA conducted for a sample of ten dams in four states and a tentative list of activities proposed by each participating state, there is a possibility that some environmental and social aspects that have not been identified and addressed in the ESMF may arise during implementation. Therefore, the ESMF is envisaged as a living document and will be updated from time to time, depending upon the experiences gained during project implementation.

72. Based on the screening criteria described in the ESMF, each dam will be categorized, depending on the sensitivity of the level of intervention required. Three standard screening forms (SC1 to SC3 included in the ESMF) will be used. Two additional forms (SC4 and SC5 in the ESMF) will be used to develop, as needed, specific environmental mitigation measures for a dam that has negative environmental or social impacts. The relevant implementation staff, under the guidance of CEs, will for each dam incorporate in the summary document/template referred to in Section C.2 the essential elements from the environmental and social screening forms and will summarize the salient information on environmental and social aspects of each dam. The SPMU will carry out a first-level screening of each template, before submission to the CPMU. Based on the review of the templates, a final categorization of each dam will be made. For Category A projects, components have major environmental/social impacts that require a specific

environment management plan (EMP) for implementation of mitigation measures. This EMP is to be incorporated in the bidding document for the contractor and implementing agency to follow during implementation, as well as post-implementation. It is to be approved by the CPMU and World Bank. For Category B projects, components have moderate environmental/social impacts and certain precautionary measures have to be followed by the contractor and the project authorities to minimize impacts during implementation as well as post-implementation. For Category C projects, components have negligible or no environmental/social impacts and as such no mitigation measures are proposed for these activities. The environmental management and mitigation activities will be included in the specifications and conditions of the civil works contract and will have to be appropriately costed by the contractor.

73. As part of the monitoring and evaluation cell in the SPMU, one or more officers adequately trained in environmental and social issues will be appointed (with designation Assistant Engineer (ESMF)) to review screening forms, EMPs, and other related documents, and monitor the compliance with the agreed procedures. Adequate reporting will be made in progress reports about the compliance with the ESMF. The management and engineering consulting firm that will assist the CPMU with the implementation of the project will include an environmental specialist with appropriate terms of reference that relates to environmental and social compliance. Some of the proposed relevant tasks are: provision of formal and on-the-job training of project staff at district/zonal, state, and central level to ensure that there is full awareness about environmental and social issues and the implementation of the ESMF; provision of guidance and support to collect the needed data at the investigation stage to determine the environmental and social impacts, including whether stand-alone EMPs are required; setting up and monitoring a reporting system that will show in a transparent way whether there are any social and environmental issues related to the rehabilitation of the dams as well as the proposed mitigation actions, as required; and as part of the third-party construction supervision efforts, ensuring that actions agreed to minimize environmental impacts are being implemented.

74. In addition to the internal environmental monitoring and evaluation of the proposed works at dams, the ESMF also stipulates environmental audits to be conducted at regular intervals by experts. The frequency of the audits will depend to a large extent on the seriousness of identified environmental (and social) issues, and will be mutually agreed between CPMU and World Bank.

75. The ESMF envisages environmental capacity building at various levels to make sure that all staff involved in the project is aware of the ESMF and how to address environmental and social issues for each dam. Capacity building will be ensured through training programs and workshops. Staff that manages dams will be trained in the environmental assessment and screening related to project activities. This will involve understanding of baseline environmental and social conditions, analysis and assessment of project impacts on the environment and stakeholders, segregating of significant impacts, identification of mitigation and enhancement measures, and development of EMPs. At state level, senior engineers of WRDs and SEBs will be targeted to create awareness for the understanding and appreciation of the relevance and importance of environmental issues in general, as well as those specific to the dam related activities. The staff will also be exposed to the application of the ESMF to enable them to effectively supervise the environmental and social management activities. Finally, senior level officials will also be identified in the SPMUs and DSOs to be given exposure to environmental

and social issues of projects, similar to those given to the senior engineers at the state level. The ESMF has estimated a budget for the proposed training and awareness activities.

6. Safeguard policies

Safeguard Policies Triggered by the Project	Yes	No
Environmental Assessment (OP/BP 4.01)	[X]	[ ]
Natural Habitats (OP/BP 4.04)	[ ]	[X]
Pest Management (OP 4.09)	[ ]	[X]
Physical Cultural Resources (OP/BP 4.11)	[X]	[ ]
Involuntary Resettlement (OP/BP 4.12)	[X]	[ ]
Indigenous Peoples (OP/BP 4.10)	[X]	[ ]
Forests (OP/BP 4.36)	[ ]	[X]
Safety of Dams (OP/BP 4.37)	[X]	[ ]
Projects in Disputed Areas (OP/BP 7.60)	[ ]	[X]
Projects on International Waterways (OP/BP 7.50)	[X]	[ ]

76. *Environmental Assessment.* The project activities are not expected to have significant adverse environmental impacts as physical interventions will be in the nature of rehabilitation and improvement of existing assets. However, due diligence will be applied for each dam to ensure that in the unlikely event of any adverse impact, appropriate mitigation measures will be put in place in accordance with the ESMF. The knowledge base and institutional capacity for WRD and SEB staff to address relevant environmental and social issues will be strengthened.

77. *Physical Cultural Resources.* Since the constructional activities at dams will not be known a priori, there is a possibility that due to excavation work property of historical, cultural, or religious importance may be found. In such case, a 'chance find procedure' will be followed, i.e. specific steps will be followed by the contractor and the implementing agency to secure the found property before the contracted works can proceed.

78. *Involuntary Resettlement.* None of the activities at the project dams is expected to result in involuntary resettlement, as dam heightening will not be supported. Some land may have to be acquired in case of spillway enlargement, but it is not expected that this will involve resettlement of people or acquiring private land. Large floods may cause short-duration increases in reservoir water levels, but these events will not be different from the without-project situation. Nevertheless, the reservoir boundaries will be inspected for each dam and due diligence will be applied in each case where there is a risk for temporary flooding to ensure that appropriate actions are taken. The most likely intervention would be the installation of a simple warning system, e.g. gauging rods with different colors to indicate reservoir heights during flood conditions. People can also be informed with increased reliability about possible flooding along the reservoir areas as part of early warning systems.

79. *Indigenous Peoples.* Since the location of all the dams to be rehabilitated is not fully known at the moment, there is a possibility that some dams are located where tribal populations reside. The ESMF describes the need to have adequate provisions for supporting consultation with tribal people.

80. *Safety of Dams.* This project is designed to improve the safety of dams. To achieve this, the provisions of the OP will be followed.

81. *Projects on International Waterways.* DRIP will only deal with rehabilitation and improvement of existing dams, and will not enlarge the reservoir storage capacity nor finance new structures. A second project component will focus on improvement in dam management. DRIP will not cause an adverse change to the quality or quantity of river water flows. None of the agreements with riparian countries requires notification for the kind of activities planned under the project. It has been determined by Bank management that the proposed project falls under the exception to the notification requirement of paragraph 7 (a) and (b) of OP 7.50.

7. Policy Exceptions and Readiness

82. There are no policy exceptions.

83. CWC has set up a Project Management Unit with six professional staff and needed support staff. In each of the four participating states teams have been set up that have been engaged in the preparation of the project and that are forming the core of each of the State Project Management Units. In each of the states, the rehabilitation and modernization needs for a number of dams have been designed and costed. The works at these dams will commence soon after project effectiveness. As such the project is ready for implementation as there is sufficient project management capacity in place and first-year rehabilitation and improvement works have been identified and vetted.

Annex 1: Country and Sector or Program Background

INDIA: Dam Rehabilitation & Improvement Project

84. Water resources development is a major area of focus for the central and state governments in order to exploit and manage India's limited water resources. It has played a key role in fostering rapid and sustained agricultural and rural growth and development, which have been key priorities for the Government of India since independence. Irrigated agriculture development has been a major pillar of the government's strategy to achieve these priority goals and to ensure food security.

85. Rainfall, which occurs mainly in intense and unpredictable downpours within short monsoon seasons, is of high temporal and spatial variability and does not meet year-round irrigation and other water demands. Over the last fifty years, India has invested heavily in critical infrastructure necessary to store surface runoff in reservoirs formed by large, medium, and small dams with associated appurtenances. India now ranks third in the world in terms of number of dams, after China and the United States. There are currently about 4,700 completed large dams in India, with another 390 under construction. The total storage capacity of these dams is about 283 billion cubic meters or 15 percent of the 1,869 billion cubic meters annual runoff in India. Almost half of the large dams are more than twenty-five years old. Most dams are constructed and maintained by the state governments, with Water Resources Departments responsible for the O&M on behalf of the states. A few other public organizations such as the State Electricity Boards, Damodar Valley Corporation (a multi-purpose water management organization, with headquarters in Kolkata, West Bengal), and Mumbai Municipal Corporation also own and operate dams. In addition, several private sector operations own and operate dams for power, industrial water supply, and irrigation. Several government agencies, such as Madhya Pradesh's Water Resources Department, are actively promoting private sector involvement in dam development, particularly in retrofitting with hydropower generation facilities.

86. Poor maintenance of dams and associated structures, due primarily to lack of financial resources and lack of systematic assessment and monitoring, has resulted in deteriorated structures. In some cases this has been made worse by poor quality of construction. There are currently inadequate regulatory mechanisms to ensure safe and sustainable operation of dams. There is a need to strengthen the O&M institutions, together with modernized data acquisition and a transparent knowledge base necessary to operate and maintain dams in a safe and sustainable manner. Also, awareness programs and disaster management strategies need to be systematically developed and supplemented.

87. High safety standards for large dams are imperative to prevent failure that would cause devastating property and environmental damage, economic hardships, and, in the worst case, loss of life. A systematic Dam Safety Assurance for large dams in India is warranted as:

- Many dams are 25 or more years old and safety assurance of these dams is a major concern, as developed cities and townships exist and an ever-increasing number of people are living and working in areas that would be liable to sudden flood in the event of a dam failure. In rural areas the property at risk is affected by increasing values of crops, buildings, irrigation and drainage facilities, and other infrastructure. In urban areas, the value of property, buildings, and infrastructure at risk has also significantly increased and will continue to increase due to urban expansion, industrialization, and improved standards of living;

- Many of the large dams are high-hazard, with some already now deemed unsafe, which leaves them increasingly susceptible to failure; and
- Funding for dam safety assurance has been insufficient during the last decades, which in turn increases the risk of dams becoming high-hazard ones.

88. Vulnerability and risk assessments of dams are actions that may result in urgent needs to: (i) upgrade and modernize many dams; (ii) develop disaster preparedness and management plans; (iii) manage the reservoirs and watersheds, including providing real-time data automation systems (RTDAS) for efficient reservoir operation; (iv) enhance dam safety management and operation and maintenance skills and the capacities of the dam owning agencies; and (v) strengthen the states' institutional arrangements for dam safety assurance.

89. Dam failures are typically caused by factors of age, construction deficiencies, inadequate maintenance, extreme weather or seismic events, and wrong operation. A total of 30 dam failures have been reported in India during the last 90 years, with the first one taking place in 1917 and the last one in July 2007. There is no systematic recording of the number of casualties or the financial damage caused by these dam failures. Failure of a dam can have disastrous consequences: for example, failure of a 15 m high gravity dam can cause a wave moving downstream at 50 km/hour in the first 10 or 15 km.

90. It is almost certain that not all dam failures have been reported, especially those occurring during the first part of the last century. Of the total reported cases, more than 75 percent involved earth dams, which is expected as almost 90 percent of the large dams in India is earthen. In 60 percent of the reported cases the failure was caused by breaching of the dam body, while in 25 percent of the cases it was caused primarily by overtopping. With regard to concrete or masonry gravity dams, the latter is particularly vulnerable due to the fact that masonry is a weaker material than concrete with low tensile strength and high perviousness. These weaknesses are usually accentuated by the aging process, with water percolation through the dam body is the main factor of aging. Water can dissolve the cementitious component of mortar in masonry, resulting in a loss of material with three main consequences: (i) a decrease in the relative density of the material; (ii) a decrease in its mechanical strength; and (iii) a decrease in water tightness. Masonry dams account for 80 percent of the failures of gravity dams worldwide and poor quality of water tightness has been responsible for 50 percent of such failures.

91. CWC's Guidelines for Safety Inspection (1987) identify three hazard categories that are summarized in the table below. It is noted that these guidelines do not indicate the likelihood of failure.

Category	Loss of Life	Economic Loss
Low	None expected (non-permanent structures for human habitation)	Minimal (undeveloped to occasional structures or agriculture)
Significant	Few (no urban development and no more than a small number of inhabitable structures)	Appreciable (notable agriculture, industry, or structures)
High	More than few	Excessive (extensive community, industry, or agriculture)

92. Dams should be systematically analyzed using widely accepted international methods for dam Portfolio Risk Assessment (PRA). The risk profiles of dams can be deduced according to their safety deficiencies determined by for example the United States Bureau of Reclamation's Risk Based Profile System (RBPS) method to identify those structures that represent the greatest risk to the public. The concept of the RBPS is based on the product of Failure Index and the Loss of Life Factor (consequences). The method characterizes the risk associated with individual loading conditions such as hydrologic/hydraulic, seismic, or static (normal) loads, and can be used to sum the total risk imposed by a given structure. The probability of failure of a structure or the risk of loss of life can be portrayed in the form of "Failure Index" (= Load x Response) for the hydrologic-hydraulic, seismic, and static cases. This is the foundation for the RBPS. These three cases are viewed as being the primary categories of how dams can fail, but the operation and maintenance level is also included in quantitative assessment. The RBPS assesses a dam by assigning a maximum of 1000 points (static = 300; hydrologic=300; seismic =300; and O&M=100) to any structure. The higher the point total, the greater the potential risk associated with a given dam.

93. Implementation of such a comprehensive risk assessment program will better guide the needed dam safety assurance program. This is necessary to reduce risk and help ensure sustainability and full operational capacity of the large stock of dams in India, which is why this kind of assessment is of interest to the country in general and CWC in particular, and DRIP can assist with its introduction. Based on the detailed assessments, action can then be planned to: (i) ensure rehabilitation and modernization of dams to bring them back to full standard of safety and operation; (ii) develop and implement adequate maintenance programs; (iii) ensure regular review of the status of the dams, both by the operator and by independent review panels, to examine problems relating to sustainable O&M of dams; and (iv) formulate standards and guidelines and asset management systems to minimize future risks of dam failures.

94. Flood handling facilities of many dams are inadequate since they were designed based on lower standards. As a result many dams may not be able to safely release high floods. The National Committee on Dam Safety has recommended that the design floods for large dams be mandatorily reviewed, taking account of new guidelines and the latest available meteorological data on storms. Depending on the height of the dam and the volume of the reservoir either the Standard Project Flood or Probable Maximum Flood should be used. CWC is therefore

requiring that an updated hydrological assessment for each large dam is carried out by the states and approved by CWC. If the required design flood exceeds the current spillway capacity either structural (enlargement of spillways) or non-structural measures are to be implemented. To assist the states, CWC has prepared new flood hydrology standards and an atlas of probable maximum precipitation for the country. This atlas is one of the tools to reassess design floods at dams, which often results in substantial increases in the design flood inflow. However, rather than relying on general data in atlases the availability of adequate, timely, and reliable hydrological and meteorological data is increasingly necessary for dam safety risk assessments, seasonal water allocation planning and dam operations, and forecasting and development of early warning systems to protect the public from floods and dam failures. There is need for support for the enhancement of staff capacity as well as for physical and analytical infrastructure for monitoring hydrometric data and detecting and forecasting flood hazards.

95. Sedimentation in some reservoirs has impacted on the storage capacity, thus limiting economic benefits of these investments. However, as desilting of reservoirs is expensive and the deposit of silt can have environmental impacts, desilting would only be carried out in exceptional circumstances when the regained reservoir volume would have a high economic impact.

96. Based on a resolution adopted during the first conference of the State Irrigation Ministers, held in New Delhi in July 1975, the Dam Safety Organization was established within CWC in July 1979. The DSO has been responsible for creating awareness on dam safety in the country, developing unified dam safety procedures, and providing technical support to states. In 1987, GoI issued the 'Guidelines for Safety Inspection of Dams' which set out standards in accordance with the dam safety philosophy of the ICOLD. The National Committee on Dam Safety with membership of the states and organizations having significant number of large dams was set up in 1987.

97. All states and dam-owning organizations that have significant number of large dams have constituted State Dam Safety Organizations within WRDs. All dams in a state are under the jurisdiction of the SDSO, concerning arrangements for inspections of dams, analysis of information gathered during inspections, and preparation of inspection reports and recommendations regarding the safety status of dams and remedial measures to be undertaken to improve their safety. Regular inspections of dams have to be carried out by the dam operators and inspection reports have to be forwarded to the SDSO for review. SDSOs also carry out inspections on a regular basis to confirm the accuracy of the inspection reports. The capacity to carry out effective dam safety assurance programs varies from state to state due to staffing levels, training, degree of experience, and procedures. Almost all SDSOs continue to be independent units to ensure separation of regulatory and monitoring functions and operational functions. Several SDSOs face a shortage of staff, capacity, office space and equipment, and operating budgets, which limits their ability to adequately carry out their roles and to strongly make the case to senior management of state governments of the importance of dam safety and the need for sufficient resources.

98. The National Water Policy (April 2002) has a section on safety of hydraulic structures. It indicates that there should be proper organizational arrangements at the national and state levels for ensuring the safety of storage dams and other water-related structures. The guidelines on the subject should be periodically updated and reformulated. There should be a system of continuous surveillance and regular visits by experts. The Policy also states that dam safety legislation may be enacted to ensure proper inspection, maintenance, and surveillance of existing

dams and also to ensure proper planning, investigation, design, and construction for safety of new dams.

99. CWC is developing a comprehensive National Dam Safety Act, the draft of which is ready for review and approval by the government before submission to the parliament. Two states have already acted on an earlier draft Act and have approved dam safety legislation. Bihar passed a State Dam Safety Act in 2006 and Kerala has dam safety legislation included in the Irrigation Act of 2003. Andhra Pradesh and West Bengal passed resolutions to observe any Dam Safety Act that is enacted by the national parliament. These resolutions have allowed CWC to proceed with the development of the National Dam Safety Act. Madhya Pradesh has indicated that it would adopt national legislation once it is enacted, but does not yet have any formal resolution concerning this. Orissa and Tamil Nadu have prepared draft legislation, but this has not yet been approved by the cabinets, as they are awaiting the final draft of the National Dam Safety Act. Nevertheless, states with DSOs are already now in general complying with the provisions outlined in the draft Dam Safety Act, in that there are regular inspections of all large dams and there are functional independent dam safety review panels (DSRP).

Annex 2: Major Related Projects Financed by the Bank and/or other Agencies

INDIA: Dam Rehabilitation & Improvement Project

Project Name	Approval date	Status	Loan Size (US$M)	Project Summary	Related sector issues	IP Rating	DO Rating	OED rating (completed project)
Hydrology Project Phase II (Ln. 4749-IN)	July 19, 2004	Active	106	To promote the sustained and effective use of hydrologic information systems by all potential users concerned with water resources planning and management, both public and private, thereby contributing to improved productivity and cost effectiveness of water related investments in 13 states and 8 central agencies.	Systematic collection, quality control, sharing, and use of hydrologic information, development of decision support systems for water resources planning and real-time operational support.	MS	MS	
Madhya Pradesh Water Sector Restructuring Project (Ln. 4750-IN)	September 7, 2004	Active	396	To improve productivity of water for sustainable growth and poverty reduction in selected river basins (Chambal, Sindh, Ken and Tons) of Madhya Pradesh.	Institutional reforms in water resources management as well as for irrigation service delivery, and improvement and modernization of physical assets.	MU	MS	
Maharashtra Water Sector Improvement Project (Ln. 4796-IN)	June 23, 2005	Active	325	To strengthen the state's capacity for multi-sectoral planning, development and sustainable management of the water resources; and to improve irrigation service delivery and productivity of irrigated agriculture.	Selective improvement in dam safety works in 291 dams.	S	MS	
Tamil Nadu Irrigated Agriculture Modernization and Water Bodies Restoration and Management Project (Cr. 4255-IN/Ln. 4846-IN)	January 23, 2007	Active	Cr. 150 Ln. 335	In selected sub-basins increase irrigated agriculture productivity in an integrated water resources management framework.	Rehabilitation of irrigation canal systems, restoration and revival of tank (small dam) systems, integration of water and agricultural services delivery.	MS	S	

Project Name	Approval date	Status	Loan Size (US$M)	Project Summary	Related sector issues	IP Rating	DO Rating	OED rating (completed project)
Orissa Community Tanks Management Project (Cr.44990-IN and Ln. 75760-IN)	September 30, 2008	Active	112	For selected tank-based producers to improve agricultural productivity and development of water user associations to manage tank systems effectively.	Restoration of tank systems and more effective and efficient use of water for agricultural and other purposes.	MS	S	
Dam Safety Project (Cr. 2241-IN and Ln. 3325-IN)	May 14, 1991	Closed	153	To assist four states (Madhya Pradesh, Orissa, Rajasthan, and Tamil Nadu) with the rehabilitation of 33 large dams and the development of DSOs.	Dam safety.	S	S	MS
Hydrology Project (Cr.2774-IN)	August 22, 1995	Closed	142	To assist GoI and nine states with the development of comprehensive easily-accessible hydrologic information systems using common standards, processes and procedures. The project financed improved hydrological and hydro-meteorological data networks and data processing systems, TA and institutional strengthening.	Hydrological knowledge base development.	S	S	S
Orissa Water Resources Consolidation Project (Cr. 2801-IN)	December 19, 1995	Closed	291	To improve the planning, management and development process for the state's water resources; increase agricultural productivity through investments to improve existing schemes and to complete viable incomplete schemes, enhance WRD's institutional capability with regard to water management.	Reorganize WRD; capacity building and involvement of WUAs in rehabilitation and O&M.	S	S	S

Gujarat Emergency Earthquake Reconstruction Project (Cr.36370-IN)	May 2, 2002	Closed	443	To assist with a program of rehabilitation and reconstruction in the areas affected by the Gujarat earthquake of January 26, 2001, including restoration of housing and public buildings, restoration of basic infrastructure in the roads and irrigation sectors, and development of an institutional framework to allow better disaster mitigation and risk management for future natural disasters.	Rehabilitation and strengthening of 225 earth dams of different size to withstand future earthquakes and cyclonic storms.	S	S	S

Annex 3: Results Framework and Monitoring

INDIA: Dam Rehabilitation & Improvement Project

Results Framework

PDO	Project Outcome Indicators	Use of Project Outcome Information
To improve the safety and operational performance of selected existing dams in the territory of the participating states.	Number of project dams with the ability (structural or non-structural) to safely cater for design floods. Number of project dams with acceptable stability and seepage. Number of project dams with basic dam safety facilties in place. Number of project dams with need-based O&M plans operationalized. Percentage of required budget per state for adequate O&M. Number of project dams where emergency response plans have been prepared and disseminated to the population.	To regularly review the results of the project interventions and use best practices in design, rehabilitation, and operation of other dams.
Intermediate Outcomes	**Intermediate Outcome Indicators**	**Use of Intermediate Outcome Indicators**
Component 1 - Rehabilitation and Improvement of Dams and Associated Appurtenances		
Dam flood hydrology reviewed and approved, and decision made on how to deal with design floods. Potential dam safety hazards reduced.	Number of project dams with revised dam flood hydrology assessed and actions agreed to address changes in design parameters. Number of project dams for which necessary remedial measures have been reviewed and addressed.	Project monitoring and, as needed, remedial measures taken to improve project design and implementation.

Sustainable arrangements for effective and safe dam operation and maintenance in place. Acceptable emergency response plans in place.	Number of project dams for which asset management plans have been prepared. Number of project dams with updated and approved dam operation manuals. Number of emergency response plans prepared and approved by the responsible authorities.	
Component 2 - Dam Safety Institutional Strengthening		
DSO offices strengthened and staff trained and able to carry out mandated functions adequately. Dam operational staff trained in proper O&M of dams.	Number of DSO offices. Number of project dams with adequately trained staff that can implement the approved operation manuals.	Project monitoring and, as needed, remedial measures taken to improve project design and implementation.
Component 3 – Project Management		
Project implementation continuously rated satisfactory by both central and state governments and the World Bank.	Satisfactory project management capacity within implementing agencies enhanced and project implementation schedules, measured through performance of annual work plan and budget, adhered to. Fiduciary, safeguard, and GAAP activities satisfactory implemented.	Project monitoring and, as needed, remedial measures taken to improve project implementation.

Arrangements for results monitoring

		Target Values						Data Collection and Reporting		
Project outcome indicators	**Baseline**	**YR 1**	**YR 2**	**YR 3**	**YR 4**	**YR 5**	**YR 6**	**Frequency and Reports**	**Data Collection Instruments**	**Responsibility for Data Collection**
• Number of project dams with the ability (structural or non-structural) to safely cater for design floods.	60	60	60	80	100	140	200	Annually. Project progress reports, mid-term evaluation report, project impact studies, implement-tation completion report.	General project monitoring, impact surveys. Case studies.	PMU staff, led by M&E cell, external evaluation teams.
• Number of project dams with acceptable stability and seepage.	100	100	100	110	150	175	200			
• Number of project dams with basic dam safety facilities in place.	100	100	100	110	150	175	200			
• Number of project dams with need-based O&M plans operationalized.	50	50	50	50	75	100	150			
• Percentage of required budget per state for adequate O&M.	50	50	50	60	60	70	80			
• Number of project dams where emergency response plans have been prepared and disseminated to the population.	0	0	0	0	20	40	60			

		Target Values						Data Collection and Reporting		
Project outcome indicators	**Baseline**	**YR 1**	**YR 2**	**YR 3**	**YR 4**	**YR 5**	**YR 6**	**Frequency and Reports**	**Data Collection Instruments**	**Responsibility for Data Collection**
Component 1 - Rehabilitation and Improvement of Dams and Associated Appurtenances.								Project annual reports.	General project reporting, design reports, field visits, information from state implement-ting agencies.	PMU staff, line departments, electricity companies.
• Number (cumulative) of project dams with revised dam flood hydrology assessed and actions agreed to address changes in design parameters.	0	25	100	175	223					
• Number of project dams for which necessary remedial measures have been reviewed and addressed.	0	0	0	25	100	175	223			
• Number of project dams for which asset management plans have been prepared.	0	0	0	20	80	140	180			
• Number of project dams with updated and approved dam operational manuals.	0	0	0	20	80	140	180			
• Number of emergency response plans prepared and approved by the responsible authorities	0	0	0	20	40	60	80			
Component 2 - Dam Safety Institutional Strengthening.								Project annual reports.	General project reporting, design reports, field visits, information	PMU staff, line departments, electricity companies.
• Number of DSO offices strengthened to carry out mandated functions adequately.	0	0	0	2	4	4	4			

Project outcome indicators	Baseline	Target Values						Data Collection and Reporting		
		YR 1	YR 2	YR 3	YR 4	YR 5	YR 6	Frequency and Reports	Data Collection Instruments	Responsibility for Data Collection
• Number of project dams with adequately trained staff that can implement the approved operation manuals.	50	50	50	50	75	100	150		from state implement-ting agencies.	
Component 3 – Project Management • Satisfactory project management capacity within implementing agencies enhanced and project implementation schedules, measured through performance of annual work plan and budget, adhered to.	N/A	Satis-factory PMU Perfor-mance	Satis-factory PMU Perfor-mance	Satis-factory PMU Perfor-mance	Satis-factory PMU Perfor-mance	Satis-factory PMU Perfor-mance	Satis-factory PMU Perfor-mance	Semi-annual reports by line agencies, World Bank aide memoires.	Project review missions.	Line agencies, World Bank.
• Fiduciary, safeguard, and GAAP activities satisfactory implemented.	N/A	Satis-factory	Satis-factory	Satis-factory	Satis-factory	Satis-factory	Satis-factory			

Organization of Monitoring and Evaluation

100. The M&E team in each SPMU, under the overall coordination and supervision of the CPMU, will be responsible for overseeing the development and implementation of survey instruments associated with the project, covering internal performance monitoring, monitoring surveys, and special studies, as well as the management and coordination of all monitoring and evaluation activities. The M&E team will liaise closely with the WRD project engineers on the planning of project activities. The internal monitoring activities will involve the rationalization, coordination, and compilation of summaries and further analysis of the progress reporting carried out by the coordinators of each project component. As needed, the M&E teams will be assisted by external consultants, for example for impact studies.

101. The data for monitoring and evaluation will be drawn from internal project documents and records, secondary data sources where available, and from custom-designed surveys and studies, using both interviews and participatory techniques as appropriate. In the PAD the indicators have been aggregated for the entire project. The CPMU will also monitor the achievement of state-specific indicators. It is also noted that the baseline and target data is based on preliminary investigations and may be refined during project implementation if more accurate information and data becomes available.

Annex 4: Detailed Project Description

INDIA: Dam Rehabilitation & Improvement Project

102. DRIP will focus on investments targeted towards: (i) physical and technical dam rehabilitation and improvement; and (ii) managerial upgrading of dam operation and maintenance, with accompanying institutional reforms and strengthening of regulatory measures pertaining to safe and financially sustainable dam operations. DRIP will thus aim at assuring the full reservoir capacity of project dams, achieving effective utilization of the stored water, and managing and monitoring the long-term performance of the dams.

103. The proposed interventions will initially be implemented in four states, namely Kerala, Madhya Pradesh, Orissa, and Tamil Nadu, and at the central level through the Central Water Commission. The number of dams to be included in each of the four participating states is summarized below. It is possible that during project implementation a few dams will be substituted by dams that are found to have higher priority for rehabilitation and improvement. The dams in Kerala include 19 dams managed by the WRD and 12 managed by the Kerala State Electricity Board (some of these dams are in reality dam complexes with more than one dam body, but for the purposes of DRIP such complex is considered as one dam). In Tamil Nadu 66 dams are managed by the WRD and 38 by the Tamil Nadu Electricity Board. Most dams are single purpose, either for irrigation or for hydro-power, but some are used for both and some also for potable water supply or flood control.

State	Number of large dams	Number of dams Proposed under DRIP
Kerala	54	31
Madhya Pradesh	906	50
Orissa	163	38
Tamil Nadu	108	104
Total	**1,231**	**223**

Component 1: Rehabilitation and Improvement of Dams and Associated Appurtenances (US$378.4 million, included unallocated amount)

104. Each dam implemented under DRIP will be for dam rehabilitation and improvement and will be selected by the concerned state in accordance with the following main criteria:

1. The states have carried out a review of the status of dams and have determined those dams that are most in need of rehabilitation and improvement in order to guarantee their future long-term sustainable dam safety and operation;
2. The proposed activities at a dam shall have been approved by the responsible CE of WRD or SEB and the head of the DSO of the state where the dam is located, and, where necessary, by CWC's CPMU, for example when changes to the design flood or structural changes to dams are proposed;
3. The proposed activities at a dam shall be in accordance with all relevant Bank safeguard policies, including OP 4.01 – Environmental Assessment; OP 4.12 - Involuntary

Resettlement; OP 4.37 - Safety of Dams; and OP 7.50 - Projects on International Waterways;

4. As needed as per mandate of dam safety review panels, all necessary reviews must have been completed and the review panel's recommendations must have been discussed with the CE and senior staff of WRDs and DSOs.

105. On the basis of proposals received from the participating states, typical problems commonly observed in dams that need remedial works include: (i) under-designed spillways; (ii) seepage boils and leakage downstream of earth dams; (iii) deformity and erosion of upstream and downstream slopes, including slope sloughing/slips, and erosion of abutments and settlement and cracks along dam crests; (iv) excessive seepage through masonry dams; (v) cracks and pitting in concrete and masonry spillways and outlet gate structures and erosion of energy dissipation systems and spill channels; and (vi) malfunctioning of dam monitoring instruments due to aging as well as lack of maintenance. Therefore, DRIP will include, but not be limited to, such works as:

1. Treatment of leakage through masonry and concrete dams and reduction of seepage through earth dams and their foundations;
2. Improving internal and external dam drainage, including toe drains and installation of seepage measuring devices;
3. Structural strengthening of dams to withstand higher earthquake loads[10];
4. Remodeling earth dams to safe, stable cross-sections;
5. Improving the ability to withstand higher floods, as required by the hydrological assessments, including enlargement of spillways, head regulators, and draw-off gates;
6. Non-structural measures to cater for higher design floods in case structural measures are physically not feasible;
7. Repair to damaged spillways, stilling basins, and downstream spillway channels;
8. Improving dam safety instrumentation (pore water pressure gauges, automatic water level recorders, data loggers, climate stations, etc.) to monitor and record structural behavior, displacements, seepage and related hydro-meteorological and seismic factors to forewarn dam operators of possible risks, as well as provision of software for analyzing and evaluating data generated by the dam instruments;
9. Improving communications between dams and control offices, as well as with civil authorities in flood plains downstream of the dam; and
10. In few cases enhancement in tourism potential and environmentally friendly interventions such as fish ladders.

106. The procedure for calculation of flood flows and volumes for spillway capacities at dams is detailed in Bureau of Indian Standard (BIS) IS-11223 (1985) 'Guidelines for Fixing Spillway Capacity', revised in 1991 and in 2004. The IS classifies the inflow design flood according to

[10] Following an earthquake in 1993 and the report of the Deuskar Committee in 1997, seismic zones have been revised, causing the seismic parameters of some dams to become more severe.

size, using the static head at full reservoir level (FRL) and gross storage behind the dam as described in the next table.

Classification	Gross storage (Mm^3)	Head at FRL (m)	Inflow flood (cumecs)
Small	0.5 to 10	7.5 to 12	100 year flood
Intermediate	10 to 60	12 to 30	Standard Project Flood (SPF)
Large	Greater than 60	Greater than 30	Probable Maximum Flood (PMF)

107. Many dams, especially the older ones, have computed design floods that are inadequate according to the new standards. Moreover, downstream conditions have changed with many developments taking place during the last few decades. A review of the information readily available at the stage of project preparation indicates that out of 177 project dams with enough information, 82 should be designed for the PMF, 90 for SPF, and 5 for the once in 100 year flood. Comparing this to the current capacity shows that only 46 dams (26 percent) appear to have adequate spillway capacity, 83 have inadequate capacity, and 48 have very inadequate spillway capacities.

108. Under DRIP, before any rehabilitation and improvement works are undertaken on a dam, the design flood for the reservoir shall be calculated in accordance with IS-11223 (as revised), using the most appropriate available data. This calculation will require the approval of CWC. The rehabilitation works or operational procedures (non-structural methods of coping with design floods) proposed under DRIP will have to ensure the safety of the dam and reservoir with this design flood.

109. Owing to topographical and/or structural constraints, it is often found difficult to increase the capacity of an existing spillway to suit the revised design flood. In such cases, routing trials can be carried out for identification of lower reservoir levels during the flood season. Even this, in some cases, is found to be costly and unviable in terms of loss of power and irrigation benefits. Other options that can be considered for the safe operation of the reservoir include: (a) pre-release of water at maximum rate on 24-hour warning of a flood; (b) lowering the spillway crest level and using fuse gates or other spillway control systems; (c) building flood control retention basins upstream; (d) developing an emergency action plan; and (e) controlled overtopping of the dam. For each dam under DRIP the best option for the safe release of floods will have to be determined. Dams will also need a new or updated reservoir operational manual that reflects the developed solutions.

110. In order to accommodate the revised design flood magnitudes, there may be cases where the dam height (but not spillway height, so there will be no increase in reservoir capacity) may have to be increased if freeboard is not sufficient to allow temporary heightening of the reservoir level. In such a rare event an adequate public warning system must be in place to warn people who live around the reservoir. Increasing of a dam height so as to increase the storage volume or head will not be considered under the project.

111. If the maximum water level in the reservoir were temporarily to be increased during peak floods, structural stability analysis must be made to ensure the stability of the dam against the increased water load, and the safety of the structure must be confirmed. In the event of the revised design flood exceeding the spillway capacity (with normal freeboard) by more than 50

percent, a dam break analysis, inundation map, and emergency action plan must be prepared. A comprehensive warning system will also have to be put in place, and an awareness campaign will be conducted, in accordance with the emergency action plan.

112. Before any rehabilitation and improvement works are undertaken on a dam in a seismic active zone, the stability of the dam shall be checked using the latest seismic parameters applicable to the location of the dam. The works proposed under DRIP will have to ensure that the dam and reservoir will be safe under the specified seismic conditions. It will not be necessary to carry out separate studies for the formulation of 'site specific seismic parameters' of the identified dams. However, inputs from studies available for recent dams constructed in same geological locations shall be taken into consideration for finalization of the seismic parameters of project dams.

113. The operational status of existing instruments, if any, will be reviewed. To the extent necessary and practicable new instruments will be provided and existing instruments replaced in the dams included in DRIP. Appropriate systems will also be put in place for record-keeping and analysis of such instrumentation data.

114. For each dam included in DRIP a comprehensive history of the dam will be compiled during the time of design of the interventions, including a description of construction problems, geological conditions, as-built drawings, design calculations, details of any modifications made, and records of performance, including inflows and outflows, reservoir levels, rule curves, seepage, leakage, movement, settlement and pore pressures.

115. Apart from structural deficiencies, many dams lack basic safety facilities, such as: (i) flood marking; (ii) all weather access roads and roads for access to sections of the dams; (iii) critical equipment for O&M and for emergency situations; and (iv) provision of low-voltage electrical supplies in inspection and drainage galleries, improved lighting and security for external areas, standby generators for emergency operation of spillway gates, and inspection launches. The project will address such basic deficiencies as well.

116. In addition to rehabilitation and improvement activities, the component will also finance hydrological assessments and specialized consulting services, e.g. for the design of state-of-the art, but affordable instrumentation. In addition, preparation of operational manuals, including standard operating procedures for emergency action plans, asset management plans, emergency preparedness plans for downstream areas, emergency warning systems, public awareness campaigns, and floodplain mapping using satellite imagery and other tools will be included for most dams in all four states. Operators of dams and design organizations and engineering cells under WRDs and SEBs will provide design services and day-to-day construction supervision. Consulting services for design and supervision services will be recruited to assist WRDs and SEBs, as and when needed. The project will assist with the development of capacity to carry out reservoir sedimentation investigations and studies. Finally, it will support independent dam safety review panels, comprising experts in relevant disciplines. All four states already have independent panels in place, with their establishment based on government orders.

Component 2: Dam Safety Institutional Strengthening (US$25.2 million)

117. Important elements of institutional strengthening for future dam safety assurance will require establishment of uniform codes of practice and mandatory dam safety inspection and safety assurance practices; establishment of comprehensive dam safety regulations;

institutionalizing sustainable dam safety and O&M funding mechanisms and arrangements; skill and capacity building of technical and operational staff that works at dams; and strengthening and better equipping of the dam safety agencies as well as other institutions that have dam safety and operation roles. The project will support such institutional strengthening activities for DSOs, cells of WRDs and SEBs that deal with dams, CWC's DSO and Hydrology Section, and other agencies, as needed. This will result in enhanced public safety of large dams, improved operational efficiency of the dams, and sustainable institutional arrangements for effective dam safety management and O&M. The project support will include, but not be limited to:

- Targeted training and support with provision of office equipment and vehicles, and development of sufficient office space to CDSO and SDSOs to become effective organizations that can take the lead in ensuring that dams remain safe from a structural and operational point of view. Activities shall be carried out in accordance with staff development plans prepared by the CPMU and SPMUs;
- Targeted training of staff, as well as support with provision of office equipment, vehicles, and essential office space for WRDs and SEBs, to develop appropriate skills and modern tools to adequately operate and maintain dams, including the evaluation and interpretation of data and actions to be taken based on the results of the data analysis. As an example, the Potential Failure Mode Assessment (PFMA) developed by the US Federal Energy Regulatory Commission is an effective training tool for dam operators;
- Attendance at dam safety courses; study tours, and linking with country agencies that have advanced dam safety programs, such as the United States and Switzerland;
- Institutionalizing portfolio risk assessment techniques, as a minimum for the major project dams, using tools such as the United States Bureau of Reclamation Risk Based Profile System or the Failure Mode Effect and Criticality Analysis for electro-mechanical and hydraulic control systems;
- Development of Management Information Systems and other programs to capture and analyze data for long-term planning and guidance of dam operations. This will require collection and compilation of basic information for al dams, including historical data on the operation of dams through analysis of operational data as well as collection of historical O&M budgets;
- Support to the continued development within CWC of the Dam Health and Rehabilitation Monitoring Application (DHARMA) program that will allow a systematic presentation and interpretation of data for effective monitoring of the health of dams. The main focus of the support will be on the development of remaining modules and operationalizing the program;
- Revision of existing guidelines for: (i) safety inspection of dams, including standard proforma for periodical inspections; (ii) computing of inflow, outflow, and storage; (iii) dam operation and maintenance; (iv) hazard categorization of large dams; and (v) development and implementation of emergency action plans. Formulation of new guidelines for: (i) review of subsurface geological conditions of existing dams; (ii) environmental impact assessment studies of existing dams; (iii) dam-break analysis; (iv) sedimentation studies in existing reservoirs; (v) monitoring and improvement of dam health; (vi) site-specific seismic parameter studies; (vii) instrumentations in large dams:

and (viii) risk analysis of dams. Each participating state will have a unified code of practice and procedures for dam safety assurance and hazard rating of all reservoirs and dams, as well as a system whereby independent trained and skilled professionals inspect and report on all large dams at specified time intervals;

- Provision of software for hydrological, hydraulic, and structural analysis of dams under different operational regimes and for dam break analysis. Training in the use of these software as well as training in hazard and vulnerability assessment and dam-break analysis; and
- ISO 9001 certification for the DSO-CWC for Quality Management System.

118. Besides regular inspections of dams, other key elements of the safety surveillance of dams include:

- Retention of records of characteristics and dimensions of important dams;
- Hazard rating of all reservoirs and dams in accordance with internationally recognized criteria;
- Retention on site of a comprehensive Reservoir Operating Record Book;
- Adoption of written Standing Operating Procedures (SOP) covering normal operation, actions to be taken in an emergency, and training of staff in use of these procedures; and
- The commissioning of independent inspections of each dam at predetermined intervals by experts, and commitment to implement any recommendations that the experts may make in the interest of dam safety.

Component 3: Project Management (US$33.9 million)

119. The overall responsibility for project oversight and coordination will rest with the Dam Safety Rehabilitation Directorate in CWC's DSO that will act as the Central Project Management Unit. The Director of the Directorate will be the Project Director (PD), and will be assisted by the staff of his directorate, individual consultants, and a management and engineering consulting firm that will provide a team of consultants for managerial, technical, fiduciary, safeguards, and M&E support. The firm will have extensive experience according to international practices in project management, dam design practices, and construction supervision. The scope of the services will include assisting the PD with the day-to-day responsibilities of project management and implementation, comprising: (i) planning and management of the project, including monitoring physical and financial progress, and preparing annual work plans and regular progress reports; (ii) vetting of hydrological analyses and advising on the options to cater for the increased design floods, where applicable; (iii) ensuring designs of engineering works are technically sound; (iv) providing third-party construction supervision and quality control to ensure works are implemented to internationally acceptable standards; and (v) advising on dam safety institutional strengthening measures.

120. Each state will appoint a State Project Director (SPD) and Project Management Unit attached to the Chief Engineer in charge of the Dam Safety Organization at state level. The SPD and his team of government staff and consultants will have direct responsibility for the coordination and management of the project at state level.

121. Incremental operating costs of the CPMU and SPMUs will be financed under the project, based on annually approved budgets and works plans.

Annex 5: Project Costs

INDIA: Dam Rehabilitation & Improvement Project

122. The project cost of DRIP is expressed in 2009 constant prices, based on the average unit prices prevailing during the last year of project preparation. Unit prices in Indian Rupees have been converted to US Dollar at the average official exchange rate of Rs. 48 = US$1.0. Costs of civil works are based on unit rates and estimates of quantity of works, instrumentation, and auxiliary works as determined by WRD staff based on recent dam inspection reports and detailed investigations of a sample of dams, as well as on recent tenders. Unit prices of equipment and materials are based on prices quoted by local and foreign suppliers. Rates of national staff salaries and national and international consultants are based on prevailing national and international consultant rates. Physical contingencies of 20 percent are included only in the cost of civil works. Price contingencies are based on the forecasted annual rates of local and foreign inflation and devaluation, and are applied to all works, goods, and services.

123. The total project cost of DRIP is estimated at Rs. 21,000 million (US$437.50 million), including total base cost of Rs. 19,026 million (US$396.4 million), and price contingencies of Rs. 1,973 million (US$41.1 million). This amount includes the front-end fee for the loan amounting to US$437,500. The total project base cost includes Rs. 13,617 million (US$283.7 million) of local costs and Rs. 5,409 million (US$112.7 million) foreign exchange costs. The project cost summary by state/CWC and by components is shown in the next tables. The figures in these cost summaries may slightly differ from the original submissions by the states on account of conversion factors and rounding off.

124. GoI initially requested to include a lump sum amount of about US$43 million as unallocated resources that can be used during project implementation for cost overruns, rehabilitation of additional dams in one or more of the four states, or for urgent works or institutional needs in other states. For example, during appraisal CWC received a request from Karnataka State for development support related to the recent floods. Such support would fit well within the scope of DRIP and such requests could be considered during project implementation. After appraisal, the state of Chhattisgarh decided not to participate in DRIP. The appraised amount for Chhattisgarh was added to the unallocated resources, which now amount to US$100.05 million.

State	No of large dams in state	No of DRIP dams	Rehabilitation and improvement (US$M)	Institutional Strengthening (US$M)	Project Management (US$M)	Total Project Base Costs (US$M)	Contin-gencies (US$M)	Total Project Cost (US$M)
Kerala	54	31	42.17	7.19	2.71	52.07	6.26	58.33
Madhya Pradesh	906	50	54.28	2.09	1.50	57.87	7.66	65.53
Orissa	163	38	22.16	2.99	2.14	27.29	3.49	30.78
Tamil Nadu	108	104	125.97	4.84	4.19	135.00	20.31	155.31
CWC				5.48	18.63	24.11	3.39	27.50
Unallocated Resources								100.05
Total		**223**	**244.58**	**22.59**	**29.17**	**296.34**	**41.11**	**437.50**

Component	Rs. M			US$ M		
	Local	Foreign	Total	Local	Foreign	Total
Component 1: Dam Rehabilitation and Improvement	8,278.07	3,461.75	11,739.82	172.46	72.12	244.58
Component 2: Institutional Strengthening	824.65	259.46	1,084.11	17.35	5.24	22.59
Component 3: Project Management	1,152.86	247.29	1,400.15	24.02	5.15	29.17
Total Component Cost (base)	**10,255.58**	**3,968.50**	**14,224.08**	**213.66**	**82.68**	**296.34**
Physical Contingencies have been incorporated in the above costs.					-	-
Price Contingencies			1,973.50			41.11
Unallocated Resources (lump sum)	3,361.75	1,440.75	4,802.50	70.03	30.02	100.05
Total Project Cost	**13,617.33**	**5,409.25**	**21,000.08**	**283.69**	**112.70**	**437.50**

Note: price contingencies are not broken up in local/foreign costs.

125. The IBRD loan and IDA credit will each finance US$175 million, 80 percent of total project cost. The Government of India and the participating states will finance the remaining US$87.50 million.

Annex 6: Implementation Arrangements

INDIA: Dam Rehabilitation & Improvement Project

126. The project will be implemented over a period of six years commencing around January 2011 until the end of 2016. The main project participants will be CWC, WRDs in four states, and State Electricity Boards in two states. The DSO of CWC will be responsible for overall project coordination and management, the DSO of the WRD in each state will be responsible for overall project coordination and management at state-level and the direct implementation of component 2, and engineering units in WRDs and SEBs will be responsible for the implementation of the rehabilitation and improvement works at each dam.

127. The direct responsibility for overall project oversight and management will rest with the Project Director in the Central Project Management Unit in the Dam Safety Rehabilitation Directorate of the Dam Safety Organization in CWC. The PD will be accountable to the Chief Engineer (DSO) in CWC, who in turn will be accountable to the Chairman CWC and Secretaries in MOWR and DEA for the overall utilization of loan and credit funds and overall compliance with the provisions of the loan and financing agreements signed between the GoI and the Bank/Association, as well as the project agreement signed between the states and the Bank/Association. The CPMU will provide support to SDSOs and their SPMUs and facilitate and guide the management and monitoring of project activities, ensuring synergy and coordination among activities and state-level agencies implementing the project activities, facilitating training and knowledge sharing, and preparing consolidated reports. The CPMU will also extend to the states technical advice and guidance for the formulation of comprehensive proposals for complicated dams. To assist with the management and implementation of the project, CWC will recruit a management and engineering consulting firm.

128. In each participating state the day-to-day project coordination and management will be carried out by a state project management unit to be set up under the CE who has responsibility for the state DSO. Each SPMU will be headed by a full-time director and will have a multi-disciplinary team of specialists and support staff. In each participating state, the SPMU will be responsible for: overall project planning, management, and coordination; monitoring and evaluation; arranging for timely and quality resources and technical assistance to support the WRDs and SEBs; overall procurement administration, contract management, financial management, and budget planning and control; planning and management of training and study tours; assurance of technical standards and quality of project inputs and outputs; environmental and social safeguard compliance; grievance and complaint handling; financial, technical, social, and environmental auditing; and liaison on all project-related matters with CWC, WRD and SEB management, World Bank, and other interested governmental and non-governmental groups.

129. The staffing of the SPMUs will typically include (see end of this Annex for an organogram): project director, technical specialists (engineer, hydrologist, etc.), procurement specialist, financial management specialist and accountants, training specialist, M&E specialist, environmental specialist, social specialist, IT specialist, communication specialist, as well as support staff.

130. The actual rehabilitation and improvement works at each dam will be carried out by the owner of the dams, i.e. WRDs or SEBs. As an example the setup of the WRD in Tamil Nadu is described here. There are a number of Chief Engineers, including the CE for O&M with overall

responsibility for dams in the state and overall management responsibility of the DSO, the CE for design, research, and construction supervision that includes four regional quality assurance units, and four CEs for the Chennai, Trichy, Pollachi, and Madurai Zones. The CE in each zone has 5 Superintendent Engineers (SE) under his management responsibility. A SE has at least 3 Executive Engineers (EE) under him, each EE has at least 3 Assistant EEs (AEE), and an AEE has typically 3 Assistant Engineers (AE) under him/her. With regard to dams, depending on the size and complexity of a dam there is at least one (often more) AE stationed permanently at a dam site to manage the O&M of the dam.

131. The WRDs and SEBs will take the lead responsibility for the design and day-to-day construction supervision of the works at each dam. This implementation will be carried out through the relevant technical divisions/units that have O&M responsibility for a particular dam, with the assistance of design divisions of WRDs, as needed, for more complicated works. The Secretary of Water Resources in each state will assign existing staff and if necessary re-deploy staff/skills to the concerned units to carry out the project activities. Specialized skills and staff not available within the departments will be hired as local and international consultants for deployment within the divisions/units. Also as many dams will have to be addressed at the same time, especially from project year two onwards, for which the capacity may not be available in WRDs or SEBs, consulting firms and individual specialists will be hired as needed to assist with the design work and construction supervision.

132. Chief Engineers in WRDs and SEBs will provide the overall day-to-day organization of the implementation of dam rehabilitation and improvement works, based on approved annual work plans and budgets. The CEs will arrange for detailed design, preparation of bidding documents, obtain the approval of SPMU, CPMU, and the Bank, as necessary, and arrange for procurement of the works through Executive Engineers (EE) that are responsible for the area where the dam is located. The CEs will have overall responsibility for the day-to-day construction supervision and quality of the works through the EEs and staff that is posted at a particular dam site and WRD's independent quality control units. The officers involved in the execution of works and quality control are to be fully trained about bidding documents, construction supervision arrangements, and quality control by the time a design is completed.

133. Participating states already have independent dam safety review panels, comprising several specialists with typically at least one out-of-state expert, although at the moment the panel in Kerala comprises independent state experts only. During project implementation each of the panels shall be strengthened to consist of three or more independent experts with expertise in various technical fields relevant to the safety aspects of dams, with at least one out-of-state expert. The functions of the DSRP during the project will be different from the regular 10-year review of large dams currently conducted by the panels. The primary purpose of the panel during the project is to review and advise the borrower on complicated design and construction matters related to dam safety and other critical aspects of project dams, its appurtenant structures, the catchment area, the area surrounding the reservoir, and downstream areas.

134. The CEs will liaise closely with the PD of the SPMUs to ensure project implementation is carried out in a satisfactory manner. This liaison will include the review of the annual work plan on a regular basis through monthly physical and financial progress reports prepared by the CEs; regular review of implementation procedures; and coordination of the specific technical training and institutional development needs that support the participating agency's capacity building needs.

135. To assist with the implementation of the project, CWC will recruit a management and engineering consulting firm to provide support to: the management of the project, including procurement, safeguards, financial management, and periodic reviews of the internal control systems; third-party construction supervision and quality control; technical advice to CWC, WRDs, SEBs, and SDSOs; and monitoring of the physical and financial progress and the implementation of the governance and accountability action plan. The consultants that provide third-party construction supervision and quality control will report to the CPMU. However, their findings and reports will also be shared at the same time with SPMUs to ensure that early action can be taken on identified problems.

136. Considering the long time needed to recruit a major consultancy, it is expected that the project implementation will start before the management and engineering consulting firm has mobilized. CWC has already set up a Project Management Unit with six professional staff and support staff. The unit has so far done an effective job coordinating the project preparation and it has the capacity to manage the project during the early days of implementation.

137. With regard to third-party construction supervision and quality control, it has been assessed that there is sufficient capacity in place within CWC to provide oversight on the relatively small number of dams that will commence in project year one (see next Table).

Annual Distribution of Dams for Rehabilitation

State	2011	2012	2013	2014	2015	2016	Total
Kerala	10	9	12				31
Madhya Pradesh	7	18	25				50
Orissa	5	14	19				38
Tamil Nadu	17	37	33	17			104
Total per year	**39**	**78**	**89**	**17**	**0**	**0**	**223**

138. The actual rehabilitation works will typically take two years, but in some cases where there are substantive works on the upstream side of the dam it can take longer, as works will be season-specific when reservoir levels are low. From the table above it can be seen that for three states the number of dam rehabilitations to start by the implementing agencies during year one varies from 5 to 10, which is well within the capacity of the WRDs and SEB (in the case of Kerala). As indicated above, each dam has a dedicated team of engineers in place, typically with one or more AEs working at the dam site under the overall management of EEs. Unlike engineering staff working on irrigation schemes where they have a large command area to cover, engineers at dams are working on a specific site, which will make it easier to design the rehabilitation works and to provide day-to-day construction supervision.

139. Kerala and Tamil Nadu have two implementing agencies each. The number of dams per implementing agency for Kerala is 5 each in year 1, while for Tamil Nadu it is slightly higher. As Tamil Nadu is well prepared for this program it has been assessed that the number of proposed dams for year one is within the capacity of both the Tamil Nadu WRD (12 dams) and SEB (5 dams).

140. Most of the first year dams have already draft designs, bill of quantities, and cost estimates. Dams with the easier works have been selected, so that they were within the design

and supervision capacity of the WRD and SEB engineers. For the first year dams it was agreed that until the consulting firm is in place the regional engineers of CWC will carry out third-party construction supervision and quality control. There are three CWC regional offices to cover the four states: one office in Tamil Nadu for that state and Kerala; one office in Madhya Pradesh; and one office in Orissa. The engineering teams in these offices already now have responsibility to supervise the implementation of some centrally-sponsored schemes, so third-party supervision is known to them and part of their mandate.

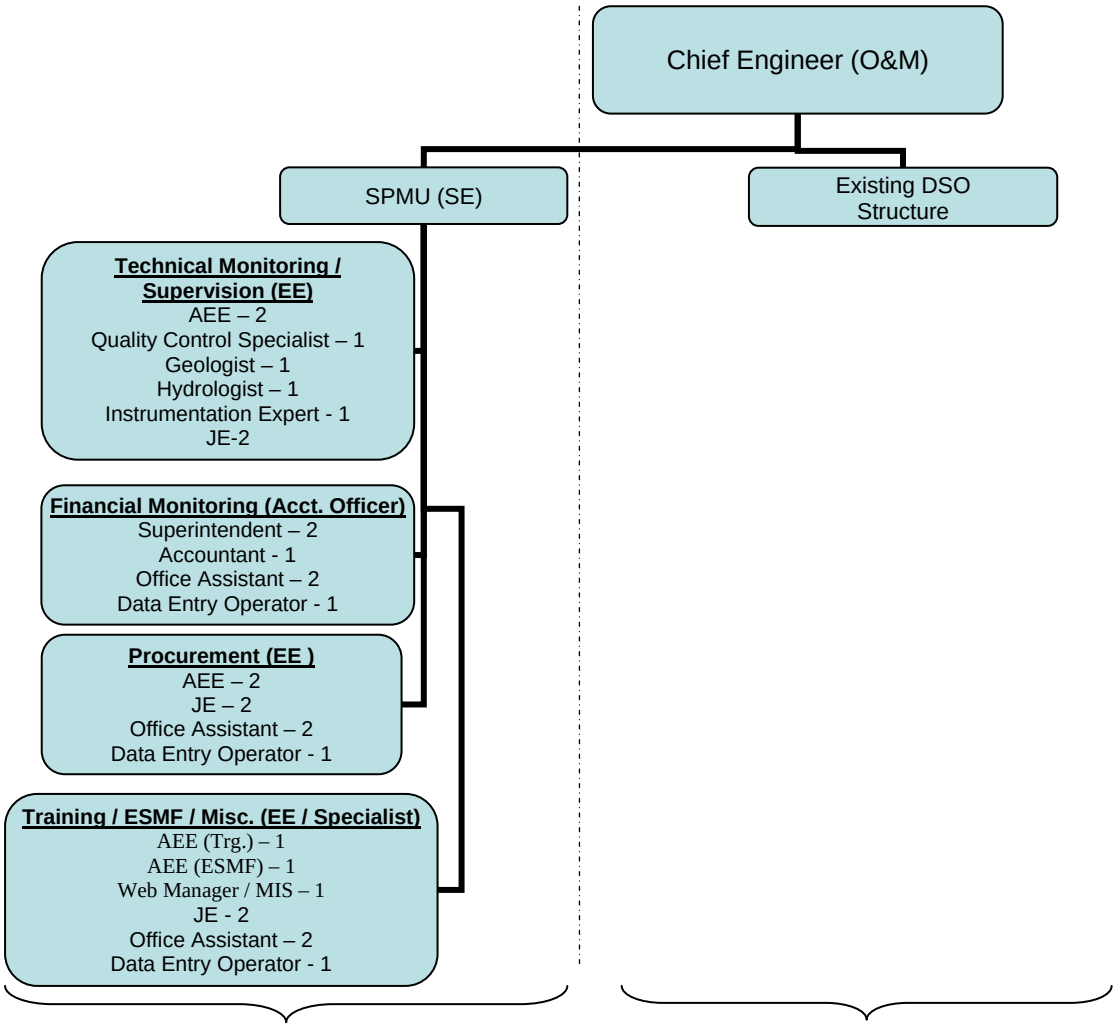
141. Based on the prevailing experience that it typically takes a year to recruit consultants, they will likely be in place around mid-2011. During the second part of 2011 the workload will increase substantially as many dams will be under design, while an increasing number of dams will be under implementation. At that time more technical support will be needed as attention will also shift to more complicated design works. It is therefore important that the consulting firm is in place latest by mid-2011 so that the consultants can start providing the needed technical advice. It is also during the second part of 2011 that the number of dams under construction is so large that third-party construction supervision may be beyond the capacity of CWC's regional offices, but by that time the consulting firm should have set up its own third-party supervision and quality control structure. A covenant has been added to the legal agreements that the latest date of mobilization of the management and engineering consulting firm would be June 30, 2011.

142. An important feature of project management will be a standard template form to be filled by the concerned EE, under the supervision of the CE, during the investigation and preliminary design stage for each dam. The template will provide the basic parameters on each dam and summary information on technical, environmental, social, and implementation-related aspects. The SPMU will review each template and provide for a first-level screening of the status with the dam and the proposals for rehabilitation. After signing off on the form, the SPMU will send it to the CPMU, which will carry out a second-level screening. A web-based MIS will be maintained by the CPMU that will capture the salient information from the templates. The World Bank task team will receive and review each of the templates as well. The templates and the MIS will allow an early identification of those dams where major issues can be expected, and based on the review of the templates, a final categorization of each of the dams can be made. Those dams that have no major technical, environmental, or social issues can have the designs finalized and tendered. Those where there may be major issues will require a detailed site inspection by CPMU and World Bank staff and may require the preparation of detailed technical reports and site-specific environmental assessments (EA) and environmental management plans (EMP). Additional supervision efforts for these dams will be made available as well.

143. A National Level Steering Committee is already in place for oversight on dam safety assurance, rehabilitation, and disaster management. The NLSC is headed by the Secretary MOWR, and includes senior level representatives of CWC and participating states. A separate Technical Committee (TC) is also in place to provide technical input to NLSC, coordinate with implementing committees of respective state governments, and review progress of development projects. The TC is chaired by Member (Design and Research (D&R)) of CWC, and includes Engineer-in-Chiefs of Irrigation, Water Resources, and Power Departments of participating states. The Chief Engineer, CDSO, is also a Member of the TC and acts as its secretary. The NLSC and TC will provide the strategic supervision and direction for the successful

implementation of DRIP, including the provision of a platform for dispute resolution at any time during project implementation.

Typical set-up of a SPMU



Notes:

- The structure above shows the proposed typical setup of a State Project Monitoring Unit under the State Dam Safety Organization. The strength of staff may be increased or decreased depending on the number of projects handled under DRIP.
- The existing DSO setup will continue with its work of dam safety monitoring for all dams in the state.
- Only the establishment and operational costs of SPMUs will be considered incremental cost, which will form part of DRIP costs.
- The SPMUs will be mainly entrusted with the task of project coordinating, management, and monitoring. The detailed functions concerning hydrological analysis, designs, investigation, execution of rehabilitation measures etc. will be carried out by the dam owner's existing departments (WRD or SEB).
- Any outsourcing for strengthening of SPMU and WRD functions is costed as part of DRIP.

Annex 7: Financial Management and Disbursement Arrangements

INDIA: Dam Rehabilitation & Improvement Project

Summary Financial Management Assessment

144. The financial management (FM) arrangements of the project will be adequate to account for and report sources and uses of project resources and meet the Bank's fiduciary requirements, subject to compliance with the financial management framework detailed in this Annex.

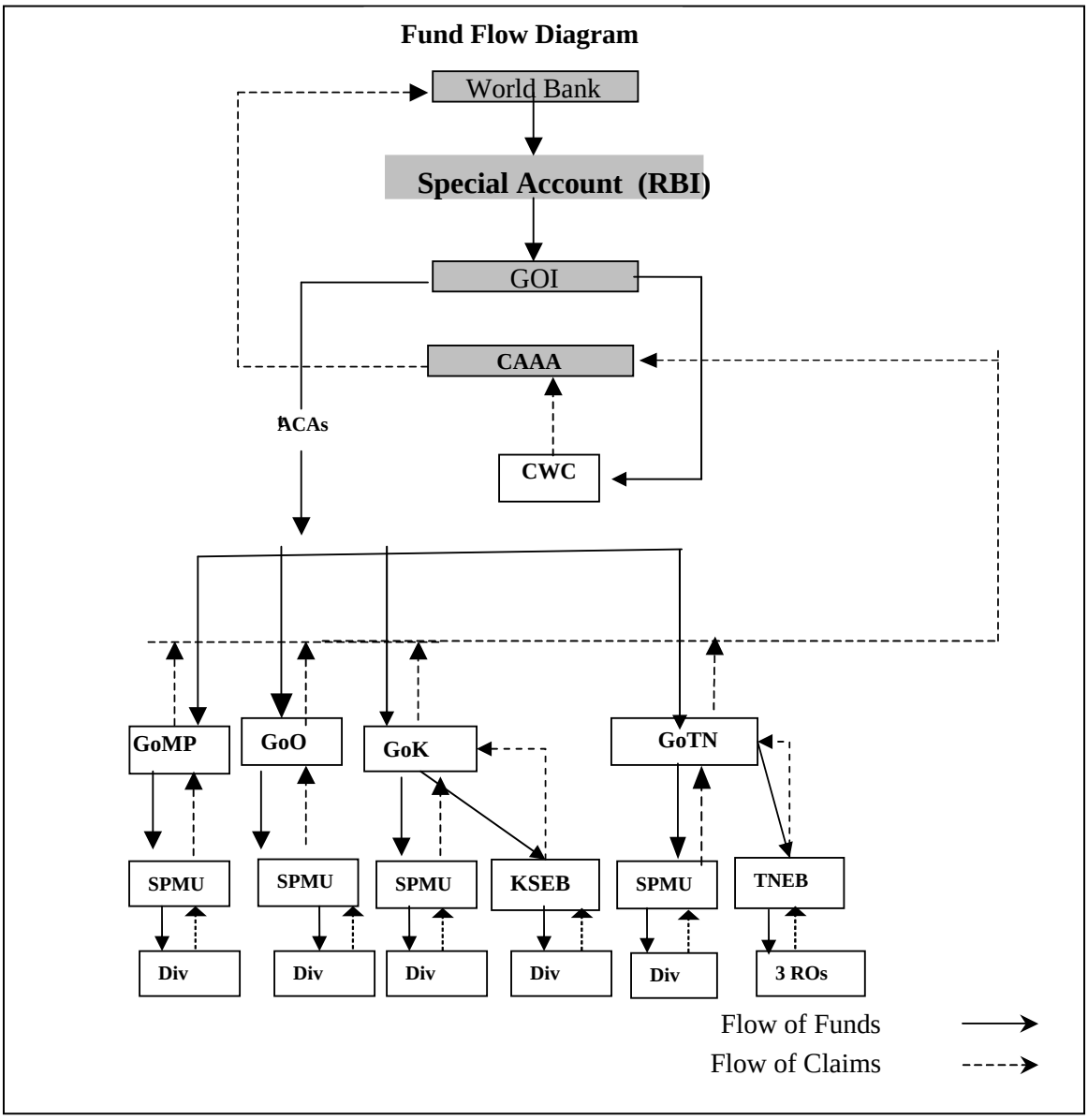
145. For financial management, i.e. for fund flow, accounting, and internal control framework of the project, the country systems will be followed. The existing FM arrangements in CWC and WRDs in the four participating states are exhaustive and adequate, and have the potential to satisfactorily meet the fiduciary requirements. However certain areas such as contract management, internal audit, and compliance to audit findings will need to be supplemented or strengthened through specific measures to meet the Bank's fiduciary requirements. Since it is proposed to use the extant Government FM procedures that are contained in various documents such as the State Public Works Department (PWD) Manual, Central Public Works Account Code, and General Financial Rules of respective States and of the Central Government for CWC, FM arrangements for DRIP have been documented in a concise Financial Management Manual (FM Manual). The FM Manual will help standardize the procedures and reporting formats to be followed by all implementing agencies.

146. The CPMU in the Dam Safety Directorate of the CWC will have a coordinating role in financial management of the project. There will be a full-time finance staff at least of the rank of Assistant Accounts Officer in CWC. Periodic reviews of the internal control system by the management and engineering consulting firm that will be assisting CPMU will further strengthen the internal control framework of the project. The SPMU in each state will have a finance team led by a Finance Officer deputed from the State Finance Department. External audits will be conducted by the Comptroller & Auditor General (C&AG) for CWC and by the respective State Auditor Generals (AG) in the four participating states, according to a standard audit TOR agreed between the Bank, C&AG, and the DEA for audits of Bank-financed projects. Audit reports will be submitted to the Bank within six months from the end of each financial year.

147. The disbursement of funds will be based on quarterly Interim Unaudited Financial Reports (IUFR) in formats agreed with the Bank. Based on satisfactory IUFRs with regard to the previous releases, funds will be released on quarterly basis.

148. Considering the overall FM risk rating of the portfolio in the Irrigation Sector in India and the risks perceived at this stage from the Financial Management perspective based on the geographical spread of the project, FM risk is rated as Substantial.

Fund Flow



149. The project funds, including counterpart funds, are proposed to be budgeted under the Plan Budget of the WRDs of the participating states under a separate budget line and accessed through the existing Letter of Credit (LoC) mechanism followed in the WRD across the four participating States. The system is well established in the participating States with LoC authorization available on a monthly or quarterly basis. Similarly for CWC, project funds will be budgeted as a separate budget line under CWC in the budget of MOWR and accessed through the existing treasury system.

150. In Kerala, as per existing procedure, LoCs are authorized after the work has been executed and bills approved, and the time lag between the requisition by the Divisions and receipt of Order passed by the Finance Department is typically 1-2 months. However, it was confirmed by the Dam Safety Organization that in case of Externally-Aided Projects (EAP) and

Centrally Sponsored Projects the time lag is only 2-3 weeks. This procedure will be assessed on a regular basis during project implementation.

151. In Kerala and Tamil Nadu funds are also proposed to flow to the Kerala State Electricity Board (KSEB) and Tamil Nadu Electricity Board (TNEB), respectively. These are autonomous bodies which operate through separate bank accounts outside the government treasury. Nevertheless, funds will be routed to KSEB and TNEB through the respective State Government.

152. As per the projected work plan about 223 dams will be rehabilitated under the project. An estimated 39 dams will be taken up in the first year of implementation involving flow of funds to about 30 divisional offices/units, apart from the four SPMUs. Tamil Nadu will have about 45 percent (17 dams) of the total number of dams being taken up for rehabilitation across the four states in the first year of implementation.

Accounting and Financial Reporting

153. For project accounting the mainstream government system will be followed. Accounting system propounded by the Comptroller & Auditor General of India and contained in the Central Public Works Accounting (CPWA) Code read with the respective State Public Works Departmental Code will be followed for project accounting by WRDs and CWC. It is largely a cash basis single entry system of accounting. For each state, the state and divisional offices of WRD will be the two key accounting centers where funds will be spent. Accounts of WRDs are closed and submitted to the AG on a monthly basis.

154. The two electricity boards follow accrual-based double entry system of accounting. The accounting system followed by the boards is defined in their respective Finance Manuals based on the Electricity Supply Annual Accounts Rules.

155. The project will be using web-based financial reporting software developed as part of the Hydrology II Project for monthly reporting of component-wise expenditure, amount claimed, and scheme-wise contract details. The software is already operational and being used by WRDs of all four participating states. This software with some customization will facilitate periodic reporting to the CPMU in CWC and consolidation of data of all the implementing agencies.

Internal Control Framework

156. The State PWD Manual, CPWA Code, State Financial Rules read with departmental circulars (including those issued by the Finance Department) constitute the internal control framework in the WRDs. Similarly, in CWC the General Financial Rules of GoI, the CPWA Code together with departmental circulars constitute the internal control framework. Some of the key internal controls are:

- Approval of transactions in accordance with the prescribed delegation of administrative and financial powers mandated;
- Making expenditure only if there is a specific budgetary provision in the departmental demand for grants or authorization from the Finance Department;
- Executing the work as per the duties assigned in the respective State Works Departmental Code or through office orders of competent authority;
- Verification and recording of transactions as per prescribed procedure and monthly rendering of accounts to and reconciliation with AG and the Treasury;

- Check measurement of works[11];
- Inspections of works by an authority one level higher in the organizational structure of the implementing agency[12];
- Third-party monitoring of quality of construction; and
- Review of Internal Controls.

157. In the state electricity boards, the financial controls framework is elaborated in Finance Manuals. The internal controls include definition of duties, a detailed Delegation of Powers of Officers of the respective boards, accounting processes including formats to be used and records to be maintained, and procedures such as physical verification and reconciliation and valuation of stocks and fixed assets.

158. The mainstream control framework of the state and central agencies will be followed for the project with emphasis on improvement in areas where weaknesses exist. A review of the AG audit reports of the WRDs revealed control weaknesses in contract management. Although the rules and guidelines are robust and adequate, implementation is often slack. The project will have a system of quarterly review of internal controls under agreed terms of reference by the management and engineering consulting firm to verify whether the internal controls as laid down in various rules and codes are operating effectively and whether timely corrective measures are being undertaken to address departures or non-compliances. These internal financial review reports will be submitted to the Bank.

External Audit

159. External audits of the state implementing agencies will be conducted by the respective State AG. CWC will be audited by the C&AG. The audit will be conducted according to standard Audit TOR agreed for audit of Bank-financed projects. The CPMU will be entrusted with the responsibility of following up with the states to ensure timely submission of audit reports. The CPMU will compile the audit reports of all four WRDs, the two SEBs, and CWC, and submit a compiled set of audit reports to the Bank within six months from the end of each financial year. The following audit reports will be monitored.

Audit Report	Implementing Agency	Due date
Compiled Project Financial Statements	CWC, Kerala, Madhya Pradesh, Orissa, and Tamil Nadu WRDs, Kerala and Tamil Nadu SEBs	September 30
Special Account Reconciliation	DEA/GOI	September 30

160. One of the most serious concerns is that despite widespread knowledge of control weaknesses there is limited response from implementing agencies by way of timely remedial

[11] Provided in the OPWD Code - Chapter 2 (Duties of Officers), read with Appendix II (Record of Measurement), Appendix XV (Review of Measurement Books by DAO), and Appendix XXX (Important points to be seen during scrutiny of MBs).

[12] Provided in OPWD Code – Chapter 2 (Duties of Officers).

actions on the findings of audits. This will need to be improved by continued follow-up and monitoring of resolution of audit observations both at the state level as well as by the CPMU.

161. A Committee, chaired by the Engineer-in-Chief, WRD of each participating State, and having representation of the State Finance Department as well as field-level engineers, will consider the key findings of both external and internal audits and monitor timely action on these findings by the implementing agencies of the respective States.

Disbursements

162. The project will be financed by an IDA Credit and IBRD Loan in 50:50 ratio. Funds from the Bank will be made available to the participating state governments (through the GoI) under the standard terms of on-lending between GoI and the States. The Bank will provide an initial advance to the Designated Accounts, which will be distributed among the states in the ratio of their respective share of project costs, excluding the unallocated amount. US$10 million will be deposited in the Designated Accounts (US$5 million each in the IDA and IBRD account) as initial advance at effectiveness. This initial ceiling could be increased to a maximum of US$50 million (US$25 million each in the IDA and IBRD account) based on the needs of the project. Every quarter the balance in the Designated Accounts will be replenished to the extent of amount spent out of this advance as evidenced by the quarterly interim unaudited financial reports furnished by the project in pre-agreed formats. The basis of preparation of the quarterly statements will be the respective state AG's accounting system with the exception of the electricity boards, which are autonomous bodies and maintain their own accounts outside the State Consolidated Funds. This will enforce discipline and ensure that the State WRDs are regular and timely in submission/reconciliation of accounts with the AG. The Bank will finance 80 percent of the project expenditures under a single disbursement category comprising works, goods, consultants' services, training, and incremental operating costs. Of the total reimbursable expenditures (i.e. 80 percent of the total expenditures) half will always be financed out of the IDA credit and half out of the IBRD Loan.

Staffing

163. The overall responsibility of project oversight and coordination will rest with the CPMU. It will have a coordination and oversight role in follow-up, consolidation and submission of quarterly interim unaudited financial reports; follow-up, compilation and timely submission of audit reports; ensuring timely clearance and submission of claims/IUFRs; follow-up with the respective SPMUs for timely resolution of audit observations, etc. CPMU will have a finance desk which will be led by an officer in the rank of Assistant Accounts Officer.

164. In each participating state the project will be managed by an SPMU. The finance function in the SPMU will be led by a Finance Officer, who will be supported by a team of accountants, office assistants, and data entry officers. In the regular divisions of the WRDs the accounting function is headed by a Divisional Accounts Officer appointed by the state AG, who is supported by an accountant and divisional cashier. It should be ensured that there is a full-time Divisional Accounts Officer in every division of the WRD where dams are being rehabilitated. Since the WRDs in all four participating states have implemented the Hydrology Project I and/or are currently implementing the Hydrology II Project, some staff in each of the departments is familiar with Bank requirements. Nevertheless, the CMPU will arrange training of finance staff of all the participating units, more frequently in the first year and then at periodic intervals.

Risk Matrix

165. The risks that can be perceived at this stage from the perspective of Financial Management are:

Risk	Risk Mitigating Measures	Risk Rating
Due to wide geographical spread of the project covering CWC, WRDs in four states and two SEBs, coordination and oversight functions will pose a challenge.	To strengthen coordination and oversight functions, CWC will hire a consultancy firm for providing implementation support. The FM team at CWC will be strengthened by bringing in a dedicated finance staff at the rank of Assistant Accounts Officer. Quarterly financial reviews will be conducted by the management and engineering consulting firm under agreed terms of reference to identify the weak areas and help resolve issues in a timely manner.	M
Since this project will involve execution of a large number of civil works contracts, efficient contract management will be crucial. The C&AG Audit Reports of the participating states and electricity boards indicate lapses in contract management. This, together with the geographical spread of the project, will pose challenges for supervision.	Third party construction supervision and quality monitoring arrangements will be built into the project design. Quarterly financial reviews will assess whether the financial controls are operating as intended. Irregularities and non-compliances will have to be attended to by the implementing agencies in a timely manner.	S
There can be lack of uniformity in financial reporting among the various implementing agencies.	To bring about uniformity in policies, procedures and reporting formats, a comprehensive standard Financial Management Manual will be used by all implementing agencies. The web-enabled financial reporting software which is fully operational in the Hydrology II Project will be used for financial reporting by all agencies.	M
There is a risk that all audited financial statements may not be furnished to the Bank on time, which leads to the risk of discontinuation of disbursements to the defaulting States.	The finance desk of the CPMU will be entrusted with the duty of following up with the participating States to get their audits conducted on time so that audit reports could be furnished to the Bank within the due date.	S
Overall risk rating		S

H - High, S - Substantial, M - Medium, N – Negligible

Bank's Supervision Strategy

166. Considering the geographical spread of the project covering rural areas in four states, the task team's financial management specialist will involve short-term consultant assistance for providing implementation support for the project's financial management functions. Implementation support has to be provided through continuing interaction and coordination with the CPMU and the SPMUs. The internal and external audit reports will serve as important tools for fiduciary assurance. Therefore timely review of the audit reports and close follow-up of actions taken on the audit observations will be crucial. Another critical aspect is working closely with the CPMU to develop a training calendar so that training of the finance staff is conducted on a periodic basis to ensure consistency in performance and to overcome the problem associated with frequent transfer of staff. Two full review and support missions with field visits will be undertaken every year. The coverage for field visits will be decided depending on expenditure incurred, risk perceptions based on audit findings, etc.

Annex 8: Procurement Arrangements

INDIA: Dam Rehabilitation & Improvement Project

A. General

167. Procurement for DRIP will be carried out in accordance with the World Bank's "Guidelines: Procurement under IBRD Loans and IDA Credits" dated May 2004, revised October 2006, and "Guidelines: Selection and Employment of Consultants by World Bank Borrowers" dated May 2004, revised October 2006, as well as the provisions stipulated in the legal agreements. For each contract to be financed by the Loan/Credit, the procurement method or consultant selection method, the need for pre-qualification, estimated costs, prior review requirement, and timeframe are agreed between the Borrower and the Bank in the Procurement Plan. The General Procurement Notice (GPN) was published on May 4, 2009.

168. The major procurement in the project will be of civil works for an estimated 223 dams in the four participating states of Kerala, Madhya Pradesh, Orissa, and Tamil Nadu. The procurement will be carried out by the WRD in each state. In addition, procurement will be carried out by the SEBs in Kerala and Tamil Nadu. Limited procurement will also be carried out by the Dam Safety Organization in CWC. In each participating state the day-to-day project coordination and management will be carried out by the state level project management unit, while a central project management unit in CWC will take care of overall project management and coordination, including oversight of procurement to be carried out by participating states.

169. Procurement capacity assessment studies for various entities and procurement post reviews of projects in India have identified issues such as weak procurement organization, delays in finalization of annual procurement plans, poor quality of procurement plans, ambiguous and incomplete specifications for equipment, delays in procurement decisions, piece-meal procurement by implementing entities, poor or no quality assurance and inspection of goods, low capacity of procurement personnel, absence of post-award reviews, and weak complaint handling mechanisms. The above issues will have to be minimized through a number of procurement risk mitigation measures that are discussed below in detail. The procurement complexity for DRIP arises because of decentralized procurement in a number of division/district level implementing units spread across four states. Decentralized procurement without adequate procurement capacity is also a risk.

170. The Bank's Standard Bidding Documents (SBD) will be used for procurement of works and goods that follow ICB procedures. For procurement of works and goods following NCB procedures, model bidding documents agreed with the Government of India with updated fraud and corruption (F&C) clauses as per latest Procurement Guidelines will be followed. Consulting services will be procured following Standard Request for Proposals (RFP) documents.

171. *Procurement of Works.* Civil works in four states under this project will include, but not be limited to, treating leakage through masonry and concrete dams and reduction of seepage through earth dams and their foundations; improving dam drainage; improving the ability to withstand higher floods; structural strengthening of dams; and rehabilitation and improvement of spillways, head regulators, draw-off gates and their operating mechanisms, stilling basins, and downstream channels. It is envisaged that only few works wil be procured through ICB and that most of the works will be procured following NCB procedures. The bidding document for the rehabilitation and modernization of Gomukhi Nadhi Dam in Tamil Nadu has been reviewed by

the Bank. It is the intention that this document will become as much as possible the standard document to be used for procurement of works following NCB by all the participating states.

172. *Procurement of Goods.* Goods procured under this project will include dam monitoring instrumentation, communication equipment, computers, software, and office equipment. ICB, NCB, and Shopping methods are all expected to be used.

173. *Selection of Consultants.* A firm of consultants will be selected by the CWC for management and engineering support. Other consultants will be recruited to assist CWC, WRDs, and SEBs, as needed, for specific design tasks, hydrological reviews, dam safety reviews, dam-break analyses, and other tasks such as preparation of emergency action plans. Consultancy services required to be procured under the project will be listed in the procurement plan, and it is expected that various methods, including but not limited to Quality and Cost-Based Selection (QCBS), Quality-based Selection (QBS), Fixed Budget Selection (FBS), Least Cost Selection (LSC), Selection Based on Consultants Qualifications (CQS), and Single Source Selection (SSS) will be used. Where appropriate, Individual Consultants (IC) will also be hired.

174. The project envisages that certain services are likely to be sourced from Government-owned Entities (see table below). In view of the eligibility criteria such services will be not funded by the Bank, but shall be financed from the implementing agencies' counterpart funds.

Description of likely Consulting Services	**Name of Government-owned Entity**
For investigation of construction materials, soil testing, etc.	Central Soil and Material Research Station (CSMRS)
For geotechnical investigation	Geological Survey of India (GSI)
For getting topo-sheet, GTS benchmarking, etc.	Survey of India
For model studies	Central Water and Power Research Station (CWPRS)
For satellite imagery and related analysis work	National Remote Sensing Agency (NRSA)
For networking and software development	National Informatics Centre (NIC)

B. Assessment of the agency's capacity to implement procurement

175. Based on information made available by CWC, WRDs, and SEBs an assessment of the capacities of the implementing agencies to implement procurement actions for the project was conducted. All agencies are already procuring works and goods on regular basis following PWD manuals and have also handled or are currently handling Bank procurement. However, the present staff in these states and CPMU entrusted with the procurement for DRIP is not yet fully conversant with the Bank procurement procedures and requires further training and capacity building. Based on the assessment carried out, it is observed that some of the procurement procedures followed by the states are at variance with the Bank Procurement and Consulting Guidelines. The main differences are briefly mentioned below:

- WRDs and SEBs are using their own tender documents which have several deviations compared to the Bank documents and procurement system;
- Exemption is allowed for certain classes of bidders in depositing the bids and performance securities;

- Multiple envelope system is followed in bidding;
- Some of the states accept price negotiations;
- Bidding documents are issued to registered contractors only; and
- Some states provide only 14 days time for bid submission against the Bank's requirement for minimum 30 days required for NCB and six weeks required for ICB;

176. The overall responsibility for project implementation at state level, including that for procurement, rests with the respective SPMU. Each SPMU will typically include a project director who will be supported by a number of engineers of varying seniority. Each SPMU envisages at least one procurement specialist at the level of Executive Engineer who will be assisted by one or more Asistant Executive Engineer and/or Junior Engineers. CEs in WRDs and SEBs will have direct responsibility for detailed design, preparation of bidding documents, obtaining the approval of SPMU, CPMU, and the Bank, as necessary, and arranging for procurement and the execution of the works through Executive Engineers that are responsible for the zone where the dam is located.

177. The overall responsibility for project oversight, including procurement arrangements, will rest with the project director in the CPMU. The CPMU will provide support to SPMUs, WRDs, and SEBs, and facilitate and guide the management and monitoring of project activities. CWC shall recruit a management and engineering consulting firm not later than June 30, 2011 to provide assistance with project management and implementation to the CPMU, SPMUs, and implementing agencies. The request for Expresssion of Interest for this consultancy has been published on May 28, 2010. The management and engineering consulting firm attached to CPMU will have various specialists, including one or more procurement specialists with experience in Bank Procurement for overall coordination with CWC and SPMUs and for provision of guidance on procurement matters. The specialists will facilitate uniformity and consistency in the procurement procedures and documents of all implementing agencies. For prior review cases, CPMU in CWC will carry out a quality check on all procurement documents that are prepared by WRDs and SEBs and then forward the same with its recommendations to the Bank for its prior review. Contracts above a defined value but below the Bank's thresholds for prior review will be prior reviewed by CPMU (see below under Section on Prior Reviews). Such contracts will be subject to post review by the Bank.

C. Procurement Risk Mitigation

178. The procurement risk in the project before recommended mitigation measures has been rated as high. This considers the involvement of multiple entities in procurement, lack of prior experience in Bank procurement processes, and the need to augment the procurement capacity of CWC and SPMUs. Based on the capacity assessment, a number of mitigation measures have been proposed, some of which have already been implemented during project preparation. The overall residual risk, with mitigation measures, is rated substantial. The procurement risks and mitigation measures are presented in the table below.

Risk/ Risk Factors	Rating	Mitigation Measures	Residual Risk
Multiple implementing	High	CDSO in CWC has constituted a CPMU at central level. CWC will be hiring a management and	Substantial

agencies (CWC, WRDs and SEBs), with procurement in states at district/zone level pose risk of inadequate coordination and oversight.		engineering consulting firm that will also have one or more procurement experts on its team. Each state will have a SPMU, with responsibility for overall coordination. It will have procurement specialists to provide guidance to the field staff on procurement matters. CPMU will facilitate uniformity and consistency in the procurement procedures and documents of all implementing agencies. For prior review cases, CPMU will carry out quality check on all procurement documents to be prepared by the implementing agencies in states and then forward the same with its recommendations to the Bank for prior review. It has also been agreed that contracts above a defined value but below the agreed prior review thresholds will be prior reviewed by CPMU. These contracts will be subject to post review by the Bank.	
Low capacity in CWC and states in Bank procurement.	Substan-tial	Some states (Madhya Pradesh, Orissa, and Tamil Nadu) have already provided training on Bank procurement to their staff at specialized training institutes. SPMU in Kerala will also provide procurement training to their officers. Two days procurement training workshop was conducted by the Bank in 2009. Refresher training workshops will be conducted by the Bank during early stages of implementation. WRD and SEB in Tamil Nadu organized a three days training on Bank Procurement in February 2010, by inviting PMU staff from another Bank-funded project to serve as trainers.	Moderate
Inconsistencies in procurement systems of implementing agencies with respect to Bank Guidelines and SBD, including purchase preference, bid security exemptions, two/three envelope system, and price negotiations.	High	Procurement to be carried out in accordance with Bank Guidelines. Use of Bank SBD and model bidding documents as agreed with GOI task force, including conditions for NCB. The Procurement Manual is available in draft and will be finalized by July 2010. It describes the procurement procedures for guidance of implementing agencies.	Moderate

Probability of staff handling procurements being transferred.	High	Transfer of procurement staff after they have undergone training is a possibility. It is expected that states agree that trained procurement staff will normally not be transferred during the project implementation phase.	Substantial
F&C risk in procurement	High	Measures to improve competition such as broad-based technical specifications, realistic post qualification criteria, appropriate contract packaging (lot sizes), etc., and Oversight by CPMU in CWC. Disclosure of bidding and award details as per Bank guidelines. Training in detecting F&C indicators.	Moderate
Overall Risk	**High**		**Substantial**

Agreed Procurement Arrangements

179. For contracts to be financed by the Bank, the different procurement methods or consultant selection methods, the need for prequalification, estimated costs, prior review requirements, and time frame are agreed between the Borrower and the Bank in the procurement plan. The procurement plan will be updated at least annually or as required to reflect the actual project implementation needs and improvements in institutional capacity. It will also be available in the project's database and on the Bank's external website. The procurement plans for procurement to be taken up during the first 18 months of project implementation have been prepared.

180. Goods estimated to cost less than US$300,000 equivalent per contract and works estimated to cost less than US$10 million may be procured under contracts awarded on the basis of National Competitive Bidding procedures as per paragraph 3.3 and 3.4 of the Procurement Guidelines and the following additional conditions:

- Only the model bidding documents for NCB agreed with the GOI Task Force (and as amended from time to time) shall be used for bidding;
- Invitations to bid shall be advertised in at least one widely circulated national daily newspaper, at least 30 days prior to the deadline for the submission of bids;
- No special preference will be accorded to any bidder, either for price or for other terms and conditions, when competing with foreign bidders, state-owned enterprises, small-scale enterprises or enterprises from any given state;
- Except with the prior concurrence of the Bank, there shall be no negotiation of price with the bidders, even with the lowest evaluated bidder;
- Extension of bid validity shall not be allowed without the prior concurrence of the Bank: (a) for the first request for extension if it is longer than four weeks; and (b) for all subsequent requests for extension irrespective of the period (such concurrence will be considered by the Bank only in cases of *Force Majeure* and circumstances beyond the control of the Purchaser/Employer);

- Re-bidding shall not be carried out without the prior concurrence of the Bank. The system of rejecting bids outside a pre-determined margin or "bracket" of prices shall not be used in the project;
- Rate contracts entered into by Directorate General of Supplies & Disposals (DGSD) will not be acceptable as a substitute for NCB procedures. Such contracts will be acceptable however for any procurement under Shopping procedures; and
- Two or three envelop system will not be used.

181. Goods and works which meet the requirements of paragraph 3.6 of the World Bank procurement guidelines may be procured following Direct Contracting procedures.

182. Shopping procedures shall be in accordance with the requirements of paragraph 3.5 of the World Bank procurement guidelines.

183. If a contract comprises several packages, lots or slices, the aggregate value of the contract determines the applicable threshold amount for procurement and also for the review by the Bank.

184. The following methods of procurement shall be used for procurement of goods and works under the project.

Category	Method of Procurement	Threshold (US$ Equivalent)
Goods, IT equipment, and non-consultant services	ICB	>300,000
	NCB	300,000 or less
	Shopping	Up to 30,000
	Direct Contracting	As per para 3.6 of the guidelines, with prior agreement of the Bank
Works and Supply and Installation	ICB	> 10,000,000
	NCB	10,000,000 or less
	Shopping	Up to 30,000 carried out through a qualified local contractor, and after inviting a minimum of three quotations in response to a written invitation with a minimum of 15 days notice period.
	Force Account	wherever agreed and with prior agreement with the Bank

185. For all procurement of consultancy services, the Bank's Standard RFP will be used as a basis. Consultant Services may be procured under contracts awarded on the basis of Quality- and Cost-based Selection in accordance with the provisions of Section II of the Consultant Guidelines. Services which meet the requirements set forth in paragraph 3.2 of the Consultant Guidelines shall be procured under contracts awarded on the basis of Quality-based Selection in accordance with the provisions of paragraphs 3.1 through 3.4 of the Consultant Guidelines. Shortlists of consultants for services estimated to cost less than US$500,000 equivalent per contract may be composed entirely of national consultants in accordance with the provisions of paragraph 2.7 of the Consultant Guidelines.

186. Services to cost less than US$200,000 equivalent per contract may be procured on the basis of Consultants' Qualifications (CQ) in accordance with the provisions of paragraphs 3.1,

3.7, and 3.8 of the Consultant Guidelines or Least-Cost Selection (LCS) in accordance with the provision of paragraphs 3.1 and 3.6.

187. Services for tasks in circumstances which meet the requirements of paragraph 3.9 and 3.10 of the Consultant Guidelines for Single Source Selection, may, with the Bank's prior agreement, be procured in accordance with the provisions of paragraphs 3.9 through 3.13 of the Consultant Guidelines.

188. Services for assignments that meet the requirements set forth in paragraph 5.1 of the Consultant Guidelines may be procured under contracts awarded to individual consultants in accordance with the provisions of paragraphs 5.2 and 5.3 of the Consultant Guidelines. Under the circumstances described in paragraph 5.4 of the Consultant Guidelines, such contracts may be awarded to individual consultants on a sole source basis.

D. Procurement Review Requirements

Prior review by Bank

189. Procurement decisions subject to prior review by the Bank are as stated in Appendix 1 to the Procurement Guidelines. For prior review cases, the CPMU will carry out a quality check on all procurement documents prepared by the SPMUs and then forward the same with its recommendations to the Bank for prior review. In addition, contracts above the equivalent of a defined value but below the agreed prior review thresholds will be prior reviewed by the CPMU. These contracts will be subject to post review by the Bank.

Prior Review Threshold for Procurement of Goods and Works

Procurement Method	**Prior Review Threshold**	**Prior Review by CPMU at CWC** (to be reviewed at regular intervals)	**Remarks**
Goods, IT Systems, and Non Consulting Services	All contracts (c) with value >US$500,000	US$200,000<c<US$500,000	In addition, the first contract irrespective of the value for both ICB and NCB for goods, IT Systems, and Non Consulting Services of each implementing agency will be subject to Prior Review by the Bank.
Works, Supply & Installation	All contracts with value >US$5,000,000	US$1,000,000<c<US$5,000,000	In addition, the first contract irrespective of the value for both ICB and NCB for Works and Supply & Installation of each implementing agency will be subject to Prior

			Review by the Bank.
Direct Contracting	All contracts irrespective of value	NIL	

Prior Review Threshold for Consultancies

Selection Method	Prior Review Threshold	Prior Review by CPMU at CWC	Remarks
Competitive Methods (Firms)	> US$100,000	US$50,000<ct<US$100,000	In addition, the first contract irrespective of the value for each method of section (QCBS Time Based, QCBS-Lump sum, QBS, FBS and Least Cost) of each implementing agency will be subject to Prior Review by the Bank.
Single Source (Firms)	All single source contracts shall be subject to prior review by the Bank, irrespective of value	NIL	
Individual Consultants	> US$50,000	US$25,000<c <US$ 50,000	In addition, the first contract irrespective of the value of each implementing agency will be subject to Prior Review by the Bank.

190. All contracts not covered under prior review by the Bank will be subject to post award review during implementation review missions and special post review missions by independent consultants that will be appointed by the Bank.

191. Invitation for Bids for goods and equipment for all ICB contracts and advertisement for calling of Letters of Expression of Interest (EoI) for short listing of consultants for services costing more than US$200,000 equivalent will be published in UNDB and dgMarket as well as the Borrower's website. Invitation for Bids for all NCB contracts will be published as per the agreement with the Bank. Award details for procurement of goods and services will also be

made available on UNDB Online and dgMarket as per paragraph 2.6 of procurement guidelines and paragraphs 2.28 of consultancy guidelines.

192. In order to effectively deal with any complaint received from a contractor/supplier, a complaint handling mechanism will be used. If a complaint is received prior to award of the contract, the complaint shall be taken into account while considering the award of the contract. If after contract award a protest or complaint is received from bidders, it will be examined and if necessary, the contract award will be reconsidered.

E. Frequency of Procurement Supervision

193. Given the large volume of works, geographical spread, and general risks involved, the Bank's implementation review missions will be conducted at least twice a year. In addition to the review missions, the Bank will also carry out an annual ex-post review of procurement that is below the prior review thresholds.

F. Details of the Procurement Arrangements Involving International Competition

1. Goods, Works, and Non Consulting Services

(a) List of contract packages to be procured following ICB and direct contracting during the first year of project implementation.

1	2	3	4	5	6	7	8	9
Ref. No.	**Contract (Description)**	**Estimated Cost (US$ million)**	**Procurement Method**	**P-Q**	**Domestic Preference (yes/no)**	**Review by Bank (Prior / Post)**	**Expected Bid-Opening Date**	**Comments**
1	Chanpatha Dam in MP	11.3	ICB (works)	No	No	Yes	October 2010	

2. Consulting Services

(a) List of consulting assignments with short-list of international firms.

1	2	3	4	5	6	7
Ref. No.	**Description of Assignment**	**Estimated Cost (US$ million)**	**Selection Method**	**Review by Bank (Prior / Post)**	**Expected Proposals Submission Date**	**Comments**
1	Mangement and engineering consulting firm, attached to CWC	20.5	QCBS	Yes	October 2010	

Annex 9: Economic and Financial Analysis

INDIA: Dam Rehabilitation & Improvement Project

A. Introduction

194. The proposed project will: (i) support physical improvements of an estimated 223 dams; and (ii) strengthen institutional capacity of DSOs, WRDs, and SEBs for sustainable dam operation and maintenance and monitoring of dam safety. The project will target physical and technical dam improvements, and managerial upgrading of dam operation, management and maintenance, with accompanying institutional reforms and strengthening of regulatory measures pertaining to safe and financially-sustainable dam operations. Large dams with substantial need for rehabilitation and improvements are included and appropriate institutional mechanisms for their safe operation will be developed.

195. The economic rationale of dam rehabilitation and safety is foremost the protection of human lives. However, conversion of this protection into economic analysis is precarious. Further benefits relate to: (i) avoidance of direct physical damage to private and public assets downstream of the dam at risk; (ii) avoidance of the very large indirect negative multiplier effects on the various sectors of the economies downstream of the dams, irrigated agriculture being the main driver of those local economies; and (iii) avoidance of replacement of the dam and reservoir.

196. The primary beneficiaries are both urban and rural communities of about 25 million people dependent on reservoirs for their water supply and livelihood, as well as all downstream communities of the 223 project dams who could be placed at physical and/or operational risk if dam safety is compromised.

Economic Analysis

197. It is difficult to estimate the probability of failure of any given dam. Experience suggests that a comprehensive program like DRIP can reduce the probability of dam failure (POF) at least one order of magnitude from the existing conditions. Calculations that seek accurate probability figures generally fail because of the complexity of the risk structure, unless a large number of historical data on the portfolio is available. Therefore, the analysis for DRIP follows the practice of making an overall assessment of POF based on a risk reduction by 0.1 (i.e. one order of magnitude) between the without/with project alternatives (WOP/WP). In judging the results one should keep in mind that the primary objective of dam safety programs is protecting human lives, and preventing the huge multiplier effects that would be induced in various sectors of the economy by the catastrophic consequences of a major dam failure. During project implementation a more analytical-based analysis will be carried out for a select number of dams, using portfolio risk assessment (PRA) techniques that would allow determining variability in the risk of failure and grouping dams into specific risk categories, as well as using historical data to attempt determining specific probability of failures.

198. Adopting guidance from average international values, the overall rate of POF of 223 dams has been assumed at about 70 percent over a 20-year period in the WOP alternative. With project interventions, the rate of POF has been assumed to reduce to about 7 percent. To be conservative, the extent of assets losses has been taken at 10 percent and loss of farm incomes at 30 percent. Reduction of potential losses has been assumed to accrue in year 4 and thereafter. In

addition, project costs in the economic analysis include physical contingencies. Local costs have been adjusted to border prices by using a Standard Conversion Factor (SCF) of 0.9. Incremental O&M costs, estimated at 5 percent of the costs of rehabilitation works, have been included in the analysis. The final main assumption is that economic prices of traded commodities have been based on the averaged 2010-2015 world prices, forecasted by the World Bank, adjusted to farm gate prices, while non-traded commodities and services have been adjusted by a SCF of 0.90.

Reduction of Dam Failure Rate

Probability of Failure (percent)		
	Without Project	With Project
Average per dam, per year (1/6,400 chance WOP)	0.0156	0.00156
Portfolio of 223 project dams, per year	3.48	0.348
Portfolio of 223 dams in 20 years	69.6	6.96

199. The base level of the economic rate of return (ERR), undertaken in 2009 constant prices, is estimated at 37 percent (see Table below). Sensitivity analysis has been undertaken assuming other ratios of POF, cost overrun, and delays in benefits. At the assumed ratios of WP/WOP POF at 0.5 and 0.8, the results show that ERRs would reach 35 percent and 32 percent, respectively. The threshold level of an ERR of 12 percent is met when the ratio of POF is 1.69. ERRs would be at 33 percent, 27 percent, and 24 percent when project costs increase by 20 percent, benefits delay by 2 years, and with a combination of 20 percent cost overrun and 2 years delayed benefits, respectively. The results of ERRs and NPV are summarized below.

ERR, NPV, and Sensitivity

	DRIP	
	ERR (%)	NPV (Rs.M)
Base case	37	41,430
Sensitivity Analysis		
WP/WOP Dam Failure Ratio (0.5)	35	33,508
WP/WOP Dam Failure (0.8)	32	25,101
WP/WOP Dam Failure Ratio (1.69)	12	-
Project Cost +20%	33	38,754
Benefits Delayed 2 Years	27	26,097
Project costs +20%, Benefits delayed 2 years	24	23,422

Financial Analysis

200. The cash flow for DRIP over a 30 year period has been estimated in 2009 constant prices in order to assess and illustrate the fiscal impact and the incremental financial burdens from DRIP to the CWC and the concerned four states. The results will be instrumental to enable GoI and the states to prepare the necessary budgets to cover annual incremental expenses. For this analysis, the project costs include physical contingencies, taxes, and price contingencies.

201. Of the total project cost of Rs. 21,000 million (Rs. 14,878 million for four states and Rs. 6,122 million for CWC), the loan/credit and government contributions will be 80:20, with an IBRD loan and IDA credit of Rs. 16,800 million (Rs. 11,902 million for four states and Rs. 4898 million for CWC, including the unallocated funds) and CWC/states contributions amounting to Rs. 4,200 million, including Rs. 2,976 million for the four states excluding the unallocated funds. The incremental fiscal burden will be as presented in the table below. During the loan/credit repayment period, including grace periods, annual interest charges and principal payment will amount to Rs. 725 million, including Rs. 514 million for the four states, based on the current amount that is expected to be borrowed, i.e. excluding the unallocated amount. In addition, the four states will have to incur annual incremental O&M cost estimated at Rs. 435 million.

Total Cost of DRIP, IBRD Loan and Incremental Annual Expenses (Rs. M)

	Orissa	Tamil Nadu	Kerala	MP	CWC	Total
DRIP Total Cost	1,478	7,455	2,800	3,145	6,122	21,000
Loan/Credit (80%)	1,182	5,964	2,240	2,516	4,898	16,800
State Contribution (20%)	296	1,491	560	629	1,224	4,200
Annual Loan Repayment and Interest Charges	51	257	98	109	210	725
Inc. O&M	35	227	82	91	-	435
Total Annual Inc. Expenditure	86	484	180	200	210	1,160

202. The major assumptions used in the financial analysis are:

(i) The analysis has been undertaken in 2009 constant prices. Project costs included physical contingencies, taxes, and price contingencies;
(ii) Total project cost is estimated at Rs. 21,000 million, and IBRD/IDA to Government financing ratio is 80:20 (Rs. 16,800 million loan/credit and Rs.4,200 million government contribution);
(iii) Loan/credit repayment periods are as per information provided in the datasheet; and
(iv) Incremental O&M budget have been estimated at 5 percent of dam rehabilitation and improvement cost.

Annex 10: Safeguard Policy Issues

INDIA: Dam Rehabilitation & Improvement Project

203. Management of environmental and social impacts is an integral and important component of dam rehabilitation and improvement activities. Environmental and social issues relevant to the proposed dams under DRIP have been given due emphasis in project design. In this context, an environmental and social assessment (ESA) of a sample of dam rehabilitation activities was commissioned by CWC in accordance with the relevant national policies and World Bank policies/guidelines.

204. Ten representative dams in the States of Gujarat, Madhya Pradesh, Maharashtra, and West Bengal were selected for the ESA and for the development of an Environmental and Social Management Framework (ESMF) focusing on mitigation of potential adverse impacts and enhancement of benefits. A study of the environmental and social conditions related to rehabilitation works was carried out for each of the 10 representative dams. The proposed rehabilitation and improvement activities were analyzed and a list of activities was developed which are generally applicable to all dams under DRIP (see Annex 4 for the major activities). Through a scoping and screening exercise, the ESMF identifies the environmental and social impacts of each of the relevant rehabilitation activities, the possible mitigation measures, and the responsible entities for implementation of the mitigation measures and their monitoring. The ESMF elaborates especially on those activities which may have potential environmental and social impact during the construction and/or subsequent operation stages. The ESMF will be used for screening of all dams to segregate them into low, medium, and high categories in terms of their potential environmental and social impacts. A few key aspects that were identified during the environmental and social assessment of the sample of dams are summarized below in more detail.

205. Negative changes in water allocation upstream and downstream of project dams as a result of the project activities are not expected. The configuration of the dams will not change (no change in dam height, spillway crest level, etc.). For dams where the reservoir area is at the moment kept below full supply level for safety reasons, the rehabilitation works will allow a complete filing up afterwards, giving a positive impact through more water availability. Negative changes in overall water regime are therefore not expected. O&M manuals will be updated and instructions for optimizing the water delivery regime will be included.

206. Although catchment area rehabilitation was identified as an issue for some dams, addressing catchment management issues in a holistic way will not be carried out under the project, as it will involve many institutions, stakeholders, and a set of complex socio-economic issues. The proposed project interventions at the dams do not have any negative impact on the catchment areas, so it will not worsen the situation. If for the sustainability of rehabilitation and improvement of a dam, some catchment area treatment is seen as essential it can become part of the specific dam interventions, which is likely be the case for a small number of dams especially in Tamil Nadu.

207. There is a possibility that the current ESMF has not identified all major environmental and social aspects which may arise during project implementation. Therefore, the ESMF is envisaged as a living document that will be updated from time to time depending upon the

feedback from engineers, consultants, and monitoring and evaluation teams of the states, as well as input of third-party monitoring teams.

208. Based on the screening criteria described in the ESMF, each dam will be categorized, depending on the sensitivity of the level of intervention required. Three standard screening forms (SC1 to SC3 depicted in ESMF) will be used. Two additional forms (SC4 and SC5 in the ESMF) will be used to develop as needed specific environmental mitigation measures for a dam that has negative environmental or social impacts. The template referred to in Section C.2 will summarize the information on environmental and social aspects of each dam. The relevant implementation staff, under the guidance of CEs, will for each dam incorporate in the template the essential elements from the environmental and social screening templates. The SPMU will carry out a first-level screening of each template, before submission to the CPMU. Based on the review of the templates, a final categorization of each dam will be made. For Category A projects, components have major environmental/social impacts that require a specific environment management plan (EMP) for implementation of mitigation measures. This EMP is to be incorporated in the bidding document for the contractor and implementing agency to follow during implementation, as well as post-implementation. It is to be approved by the CPMU and World Bank. For Category B projects, components have moderate environmental/social impacts and certain precautionary measures have to be followed by the contractor and the project authorities to minimize impacts during implementation as well as post-implementation. For Category C projects, components have negligible or nil environmental/social impacts and as such no mitigation measures are proposed for these activities. Additional supervision efforts will be provided for the dams with major environmental or social issues, as identified during the investigation and pre-feasibility studies and as described in the template. The environmental management activities will be included in the specifications and other conditions in the civil works contract and will have to be appropriately costed by the contractor.

209. In general, construction phase interventions, such as improvement of access roads, labor camps, silt disposal, and other ancillary temporary infrastructure may produce impacts on the communities in proximity. The ESMF does provide for addressing construction phase interventions, including how to deal with labor camps. The screening will determine any major issues related to construction phase interventions that are identified at the investigation and pre-design phase. For example, in the rare instance there will be reservoir desilting, the design will have to determine the amount of silt and will have to prepare a specific plan where the silt will be deposited. It suffices for the ESMF to identify this as an environmental issue to be addressed during design and construction.

210. There are readily available, well-developed environmental specifications from other projects and such specifications will be included in the technical specifications of each tender document. The contractor will have to factor costs related to the implementation of environmental mitigation aspects in his bid. Site engineers will be instructed to supervise the compliance with the technical specifications, including the environmental clauses. As part of the third-party construction supervision and quality control, consultants will ensure compliance as well.

211. There may be some dams which are near protected areas. As a rule, activities inside protected areas, such as borrow pits and building access roads, will not be allowed. Construction management plans will take into account the protected areas. If indeed the rehabilitation and

improvement of a specific dam is within a protected area, this will be described in the template and it will be ensured that a (partial) EA/EMP will be prepared.

212. For some dams the water levels in the reservoir will have to be brought down to facilitate repairs of the upstream face or carry out other upstream works, which may temporarily disrupt release schedules. This is an aspect that will be taken into account during the design phase of the dam works. The technical guidance is that all alternative technological options which do not require or reduce reservoir draw-down will be taken into account. If it is unavoidable, the needed works will be planned during one or more periods when the reservoir is at its lowest level, which is typically after the Rabi irrigation season and before the monsoons. The disruption to the water users will thus be minimal. In the worst case, the project will conduct a communication strategy to inform the water users about temporary changes in water supply.

213. As part of the monitoring and evaluation cell in the SPMUs, one or more officers designated as Assistant Engineer - ESMF will be appointed and trained to engage in addressing environmental and social issues. These officers will review EMPs and other related documents, and will monitor the compliance with the agreed documents. Adequate reporting will be made in progress reports about the compliance with the ESMF. This information will be compiled forall states at the CPMU level in regular progress reports. The CPMU will be supported by a multi-disciplinary management and engineering consultant team that will include environmental and social specialists. The terms of reference include tasks related to environmental and social compliance. Some of the relevant tasks of the consultants include: provide formal and on-the-job training to project staff at district, state, and central level to ensure that there is full awareness about environmental and social issues and the implementation of the ESMF; provide guidance and support to collect sufficient data at the investigation stage to determine the environmental and social impacts, if any, including whether stand-alone Environmental Assessments and Environmental Management Plans are needed based on the outline provided in the ESMF; set up and monitor a reporting system that will show in a clear and transparent way whether there are any social and environmental issues related to the rehabilitation of the dams and the mitigation actions; provide guidance and support to the implementation of adequate monitoring of social and environmental parameters; and as part of the third-party construction supervision efforts, ensure that actions agreed to minimize environmental impact are being implemented.

214. In addition to the internal environmental monitoring and evaluation of the sub-projects, the ESMF stipulates environmental audits to be conducted by external experts at regular intervals. The frequency of the audits will depend to a large extent on the seriousness of identified environmental and social issues and will be mutually agreed between CPMU and the World Bank.

Disclosure

215. The following process of disclosure of the ESA and ESMF took place.

- Each state disclosed ESA/ESMF documents through a paper advertisement informing the public at large that DRIP is being taken up and that the ESA/ESMF is available for comments from the general public;
- The advertisement informed stakeholders that a copy of the ESA/ESMF for DRIP is available in the offices of concerned Executive Engineers, local administration offices where dams are located, as well as on the implementing agencies' websites at state level;

- The documents are available on the website of CWC;
- The advertisement invited feedback from interested stakeholders; and
- Feedback received from various stakeholders was compiled and commented upon by each state before forwarding the same to CWC for inclusion as an annex of the final ESA report.

Institutional Strengthening

216. The ESMF envisages environmental capacity building at various levels, which will be ensured through training programs and workshops supported by the project. Staff that manages dams will be trained in environmental and social assessments related to project activities. This will involve understanding of baseline environmental and social conditions, analysis and assessment of project impacts on environmental and social aspects; segregating of significant impacts; identifying mitigation and enhancement measures, and development of specific environmental and social management plan. At state-level senior engineers in WRDs and SEBs will be targeted to create awareness for the understanding and appreciation of the relevance and importance of environmental and social issues in general, as well as specific to dam related activities. This senior staff will also be exposed to the objectives and application of the ESMF to enable them to effectively supervise the ESMF activities. Finally, officials in the SPMUs and DSOs will be given exposure to environmental and social issues, similar to those given to the engineers at the state level. The ESMF has included a budget provision for training activities for each SPMU on environmental and social aspects, including the actual ESMF implementation.

Safeguard Policies

[x] Environmental Assessment (OP/BP 4.01)

217. The project activities are not expected to have significant adverse environmental impacts as physical interventions are expected to be in the nature of rehabilitation and improvement of existing assets. However, due diligence will be applied for each dam to ensure that in the unlikely event of any adverse impacts, appropriate mitigation measures will be put in place in accordance with the ESMF. The knowledge base and institutional capacity to address relevant environmental and social issues will be strengthened.

[x] Natural Habitats (OP/BP 4.04)

218. The project physical activities will only focus on existing dams and are not expected to lead to any conversion of existing natural habitats or impact any critical or semi-critical ecosystems. Nevertheless the conditions of the OP will be checked for dams near protected natural habitats.

[ ] Pest Management (OP 4.09)

Not applicable.

[x] Involuntary Resettlement (OP/BP 4.12)

219. None of the activities at dams is expected to result in involuntary resettlement, as dam heightening will not be supported. The only risk can occur when large floods have to be released that will result in a short-duration increase in reservoir water levels, but this situation will not be different from pre-rehabilitation events. In such cases the reservoir boundaries will be inspected and due diligence will be applied in each case where there is a risk for temporary flooding to

ensure that appropriate actions are taken. The most likely intervention will be the installation of a warning system, e.g. using gauging rods with different colors. As the project is putting in place better systems to measure rainfall in the catchment areas, people can also be informed with increased reliability about possible flooding along the reservoir areas as part of the early warning system.

220. Considering the annual flood events there are limited opportunities to encroach on silted areas within the reservoir. Desilting of reservoir areas will not be a major activity under the project. There are only requests for possible desilting of a few State Electricity Board dams and these are in remote areas where there is no encroachment. However, in the unlikely event that the remedial works at a dam require land acquisition or resettlement, OP 4.12 on Involuntary Resettlement has been triggered. The ESMF already details the process to be followed for the preparation of a Resettlement Action Plan (RAP) in the event this may be required. Spillway floods will not change as a result of project interventions.

221. Some land may have to be acquired in case of spillway enlargement, but it is not expected that this will involve resettlement of people or acquiring private land.

[x] Indigenous Peoples (OD 4.20)

222. OP 4.10 on Indigenous Peoples has been triggered to address the eventuality that a dam is in a tribal area and affects tribal populations. The ESMF provides the procedure for preparation of an Indigenous People's Development Plan following the requirements of OP 4.10 that will include a process map for implementation, which includes free, prior, and informed consultations with affected communities leading to broad-base community support for the intervention. Significant impact on livelihood systems as a result of the project interventions is not expected, but as needed this will be covered in the Plan.

[ ] Forests (OP/BP 4.36)

223. No forests are involved as the activities are related to rehabilitation and modernization of existing dams.

[x] Safety of Dams (OP/BP 4.37)

224. The project is designed to improve the safety of dams. To achieve this, the provisions of the OP will be followed.

[x] Physical Cultural Resources (draft OP 4.11 - OPN 11.03)

225. Some dams may have cultural property associated with them (e.g. temples, idols on the dam) that may be impacted by dam strengthening activities. Potential cultural property issues cause this OP to be triggered. Depending on the significance of the property and likely impacts, the ESMF shall trigger the requirement of a Cultural Property Management Plan. A plan will be developed to include screening, mitigating, and enhancing affected sites, as well as include chance finds procedures for civil works contracts, i.e. specific steps will be followed by the contractor and the implementing agency to secure the found property.

[ ] Projects in Disputed Areas (OP/BP/GP 7.60)*

226. The project will not undertake rehabilitation of dams in disputed areas.

[x] Projects on International Waterways (OP/BP/GP 7.50)

227. DRIP will deal with rehabilitation and improvement of existing dams, and will not enlarge the reservoir storage capacity nor finance new structures. A second project component will focus on improvement in dam management. DRIP will not cause an adverse change to the quality or quantity of river water flows. None of the agreements with riparian countries requires notification for the kind of activities planned under the project. It has been determined by the Bank that the proposed project falls under the exception to the notification requirement of paragraph 7 (a) and (b) of OP 7.50.

Annex 11: Governance and Accountability Action Plan

INDIA: Dam Rehabilitation & Improvement Project

228. There is increasing recognition of the importance of governance as an integral part of any development effort to reduce poverty and promote growth. Corruption and weak governance lead to leakage of resources away from intended uses and beneficiaries, and risk poor outcomes and ultimately unsustainable development impacts. Beyond the "development dividend" that is obtained, both donors and recipients have a direct interest in ensuring good governance and controlling corruption. The Bank has a fiduciary obligation, enshrined in its Articles of Agreement, to ensure that Bank funds are used for their intended purpose.

229. The project will put in place the needed elements for a governance and accountability framework so as to improve project governance and implementation and reduce the risk of corruption. This involves institutionalizing monitoring and feedback, and holistic disclosure of project information that encourages greater participation in project oversight. It also involves enhancing fiduciary controls. A risk assessment analysis has been undertaken to identify corruption and implementation risks.

230. The potential key governance risks for the project relate to the following:

- The project processes may not detect and address problems related to transparency and accountability and may not facilitate full information flow (compliant with India's Right to Information (RTI) Act);
- Lack of adequate safeguards may cause violation of norms and/or corruption;
- Weak or ineffective complaint and grievance handling mechanism may affect transparency and contribute to corrupt and manipulative practices;
- Weaknesses in procurement management system and financial management system could result in mismanagement of bidding and spending of funds; and
- Weak implementation arrangements, including but not necessarily limited to insufficient allocation of budgetary resources for operation and maintenance activities (a governance risk common across all infrastructure related projects) may adversely affect project processes and results.

231. Failure in these areas can compromise project outcomes by weakening and/or undermining: (i) project targeting and the delivery of intended benefits; (ii) the quality of goods and services delivered; and (iii) project sustainability.

232. The project response to these perceived risks is to have a comprehensive strategy to address governance and accountability issues, which rests on four pillars explained below. The strategy will be operationalized in the form of a Governance and Accountability Action Plan (GAAP) to ensure that funds are used effectively and efficiently under the project, while key stakeholders are enabled to give feedback and their grievances are addressed in a responsive and accountable manner. The GAAP lists the steps to be taken in a time-bound manner in this regard. Overall, the expected results from the project's governance and accountability strategy and its action plan are that: (i) the roles and responsibilities of key stakeholders are clearly defined; (ii) there is adequate oversight of project processes and decision-making mechanisms;

(iii) the appropriate allocation and use of funds by project functionaries and contractors are clearly outlined along with sanctions for misuse; and (iv) key stakeholders, especially beneficiaries, can easily report problems and have grievances addressed in a timely and appropriate manner.

233. The project's governance and accountability strategy is built on four pillars:

1. **Communication, Consultation, and Information Disclosure.**
   a. *Suo moto* disclosure of general information in compliance with right to information, according to the RTI Act;
   b. Communication of additional information on demand;
   c. Building up "demand side" of governance through communication, consultation, and awareness building.
2. **Enhanced Monitoring.** Independent monitoring and evaluation by external, third-party M&E agencies.
3. **Grievance Redressal System.** An effective system to respond to issues of mis-management, corruption, and other problems that may be identified during implementation.
4. **Risk and Vulnerability Mapping and Mitigation.** Assessing each project process with regard to key categories of risks and design of suitable mitigation measures.

PILLAR 1: COMMUNICATION, CONSULTATION, AND INFORMATION DISCLOSURE

234. Stakeholders will be provided with the requisite information on the basis of which they can ask questions, identify problems, and recommend and/or demand remedies. Information disclosure arrangements are founded on ensuring compliance with India's Right to Information Act, which establishes the citizens' "right to know". Such arrangements lay the foundation for appropriate communication, consultation, and information disclosure regarding project activities, thereby enabling citizens and stakeholders to potentially influence project problems and/or remedies regarding near-term project implementation and long-term sustainability.

235. **RTI Act and *Suo Moto* Disclosure of Information**. *Suo moto* literally means 'on its own motion' or without external prompting or explicit demand, and India's Right to Information Act (2005) calls for this level of proactive information sharing on the part of the public sector. The Right to Information Act mandates timely response to citizen requests for government information. It is an initiative taken by Department of Personnel and Training, Ministry of Personnel, Public Grievances and Pensions to provide a RTI Portal Gateway to the citizens for quick search of information, besides access to RTI related information/disclosures published on the web by various Public Authorities under the government of India as well as the State Governments. This will promote transparency and accountability within the public sector. Under the Act, public authorities are bound to respond to information requests within a stipulated time. Beyond responses, the Act shifts the information paradigm to one of *suo moto* provision of information. DRIP will publicly display information on websites related to, inter alia, the allocation of investment and O&M funds, the release of funds, expenditures, and progress on financial and physical aspects of project implementation. At specific dam sites, information related to contracts and progress with their implementation will be available in the dam offices and will be displayed through notice boards.

236. **Disclosure of Information on Demand**. The present mechanism under the RTI Act will be applicable for disclosure of information related to the project. Under the Act, all authorities covered must designate a Public Information Officer (PIO). Any person may submit a request to the PIO for information in writing, by paying Rs. 10. It is the PIO's obligation to provide information to citizens of India who request information under the Act. If the request pertains to another public authority (in whole or part) it is the PIO's responsibility to transfer/forward the concerned portions of the request to a PIO of the other within 5 days. In addition, every public authority is required to designate Assistant Public Information Officers (APIOs) to receive RTI requests and appeals for forwarding to the PIOs of their public authority. The citizen making the request is not obliged to disclose any information except his name and contact particulars. For DRIP each PMU will designate one of its staff as Public Information Officer.

237. **Document Management and Dissemination System.** To manage both proactive and on-demand responses to requests for information, DRIP will manage a document management and dissemination system that will ensure quality standards for accuracy and presentation are met on each document. This will be coordinated by the CPMU.

238. All queries and responses will be classified according to task and/or project components and appended to a Frequently Asked Questions (FAQ) file which will be readily available to project functionaries and online for all states. The training and monitoring cells in the PMUs will be responsible for managing the disclosure system. They will assign each request to the appropriate team expert. Documentation of queries and responses will help different states' units in promptly replying to queries in future. Such a mechanism will also educate all the project functionaries about the apprehension and queries which the general public may have about the project.

239. **Building the Demand Side of Governance**. A Central Information Commission and State Information Commissions have been constituted to enforce the RTI Act. If a public authority does not provide the requested information or provides incomplete information within the stipulated time, the information seeker can approach any of these Commissions, as the case may be, for issuance of directives to the concerned authority to provide the information.

PILLAR 2: ENHANCED MONITORING

240. Institutional strengthening to enhance technical capacity, quality assurance and proper oversight of project decision-making and implementation at central and state level is essential to the effectiveness and efficiency of DRIP. For timely and qualitative implementation, the project will have an internal monitoring and management system so that all project activities can be reviewed at regular intervals. DRIP will also have independent organizations to do monitoring and evaluation of project activities. External M&E to be carried out by the management and engineering consulting firm or other consultants will concentrate on generating an un-biased view of project performance in terms of achieving established milestones and adhering to the recommended processes and quality parameters within the purview of the overall project scope and objective. The proposed external M&E system will focus mainly on two broad activities, namely concurrent implementation monitoring and impact evaluation. The third-party consultants will also be involved in regular monitoring of project activities.

PILLAR 3: GRIEVANCE REDRESSAL SYSTEM

241. The project will utilize the existing mechanism for redressal of grievances in different states and the center. Grievances will be addressed by SPMUs and by the CPMU if it refers to an issue related to the management of a SPMU. Depending on the nature and severity of complaint (mismanagement, corruption), a team of inquiry will be constituted by the PD to look into the matter. On the basis of the report of the inquiry team, necessary action will be taken, and the same will be communicated to the complainant.

PILLAR 4: RISK AND VULNERABILITY MAPPING AND MITIGATION

242. During the design of the project various project processes have been assessed with respect to major categories of risks and vulnerabilities. The issues outlined in the critical risks section of the PAD and in the Risk Identification Worksheet will be monitored through DRIP's MIS, the external monitoring agencies, and auditors.

243. During implementation review missions, the Bank Task Team along with project management will jointly agree on the governance-related issues that need further analysis and then initiate independent evaluations, if needed and as mutually agreed. This will be done on a regular basis depending on the gravity of issues, and the frequency of these external evaluations will be decided accordingly.

GAAP Matrix

244. In order to implement the above strategy, the GAAP matrix below summarizes the problems to be addressed, key actions to be taken, the date by which they are expected to be taken, and the authority responsible for taking the action.

245. It is important to note that the GAAP is a "living" action plan which will be monitored and reviewed periodically. Based on the implementation stages of the project, different action points may be included in the GAAP later, in consultation with project management.

Anticipated Problem	Action To Be Taken	Deadline for Action	Responsible Party
1. Designing project processes to support better accountability and transparency			
The project processes will not detect and address problems related to transparency and accountability and will not facilitate compliance with Indian regulations on right to information.	Ensure that DRIP business processes are in line with RTI Act roles and responsibilities for public authorities.	Within 3 months of project effectiveness.	PMUs
	Develop systems and procedures to implement right to information aspects, including websites and newsletters by CPMU, and transparency boards by implementing agencies.	Within 6 months of project effectiveness.	PMUs, WRDs, and SEBs
	Conduct training on RTI for project staff (PMUs, DSOs, WRDs).	To be completed within 6 months following effectiveness, with refresher knowledge sharing and training for new staff as needed at regular intervals.	CPMU
	Disclose regularly on websites updated information as prescribed by the RTI Act.	Continuously during project implementation.	PMUs
	Maintain proper case database at project level and use it to enhance public disclosure, aimed at progressively bringing down caseload.	Continuously during project implementation.	PMUs
2. Strengthening preventive actions against corruption			
Inadequate safeguards in PMUs may cause violation of norms and corruption.	Empower project staff and beneficiaries to report instances of corruption by clearly describing channels for reporting, responsibilities of the project to address allegations of corruption, and by clearly communicating project's "zero tolerance policy" for corruption at any level.	Within 3 months of project effectiveness.	PMUs
	Clearly communicate project activities, rules, and potential benefits through websites and other communications channels.	Within 3 months of project effectiveness.	PMUs
	Carry out monitoring studies to track implementation progress and identify areas of deviation missed by standard project monitoring.	Intermittently during project implementation, with special emphasis during the mid-term review (MTR).	PMUs

Anticipated Problem	Action To Be Taken	Deadline for Action	Responsible Party
3. Strengthening complaint and grievance handling system at the project level			
Any weakness in complaint and grievance handling mechanism may affect transparency and contribute to corrupt and manipulative practices.	Finalize and test computerized system for registering, tracking, and monitoring of complaints.	Within 9 months of project effectiveness.	PMUs
	Devise criteria to segregate complaints in order of seriousness and disposal of cases in specified timeframe by designated authorities.	Within 9 months of project effectiveness.	PMUs
	Maintain an updated database on complaints received and action taken for suo moto public disclosure or in reference to application received under RTI Act.	Continuously during project implementation.	PMUs
4. Strengthening project procurement management system			
Procurement management system may result in mismanagement of bidding and spending of funds.	Project will have a transparent procurement policy based on established best practices and strict compliance with agreed Bank procedures.	Upon project effectiveness.	PMUs
	Procurement plans and policies and bidding documents posted on project website.	From project effectiveness onwards.	PMUs
	Clearly outline the criteria and processes for disqualification of bidders who engage in misrepresentation or other fraudulent and corrupt practices.	Upon project effectiveness.	PMUs
5. Strengthening project financial management system			
Any weakness in financial management may result in inadequate transparency and accountability in financial transactions.	The financial management plan will describe clearly the procedures to ensure that funds are used only for the intended purposes in an efficient and economical way as per budget approvals.	Upon project effectiveness.	PMUs
	Enforce financial management safeguards and generate financial progress reports in the prescribed format, capturing relevant parameters as laid down in the project implementation plan.	Throughout project implementation.	PMUs
	Regular financial (and procurement) audits to be conducted and deviations from established plan/procedures, if any, should be explained in stipulated timeframe.	Annually starting one year after project effectiveness.	PMUs

Anticipated Problem	Action To Be Taken	Deadline for Action	Responsible Party
	Project review missions to review FM (and procurement) progress and inquire about any identified instances of corruption and how they have been addressed.	At least twice yearly during implementation review missions.	PMUs, World Bank
	Besides statistics on funds spent, financial reports shall reflect efficiency and economy achieved in the process.	Quarterly, starting 3 months after effectiveness.	PMUs
6. Strengthening systems and processes for project management			
Any weakness in implementation arrangements may adversely affect project processes and results.	Recruit adequate number of qualified staff in each PMU.	Within 6 months of effectiveness.	PMUs
	Regular monitoring and evaluation activities to inform governments and the Bank on implementation progress in such a manner that project managers can reflect and improve on performance and that senior officials, both in governments and the Bank, are alerted to actual or potential implementation problems, the solving of which will allow for timely adjustments to improve project implementation and to achieve agreed project outputs and outcomes.	Within 9 months of effectiveness. Comprehensive assessment at MTR stage.	PMUs
	Develop a Management Information System, to be linked to M&E activities and online reporting arrangements for quick review and follow-up action.	Within 9 months of project effectiveness. Review effectiveness at MTR stage.	CPMU
7. Quality assurance and sustainability			
Compromise on quality of rehabilitation, asset management, and long-term O&M budgeting may result in non-sustainability of project dams.	Strengthen in-state capacity with consulting engineers and other specialists to design modern and technically sustainable infrastructure. Designs will have to be sound, suitable for local conditions, will serve the intended purpose, and will be sustainable with acceptable level of O&M requirements.	Annual training events combined with ongoing management consulting firm's technology transfer that will be continuously during project implementation.	WRDs, SEBs, PMUs

Anticipated Problem	Action To Be Taken	Deadline for Action	Responsible Party
	Put major focus on construction supervision and quality control by developing bidding documents with clear and detailed specifications, engaging site supervisors, and by engaging consulting teams for third-party construction supervision and quality control.	Continuously during project implementation. Review effectiveness after one year of project implementation and again at MTR stage.	WRDs, SEBs, PMUs
	Develop asset management programs that will determine the needed maintenance requirements and budgets in a clear and transparent manner. To be used for discussions with Secretaries and senior management of Finance and Water Resources Departments to ensure that adequate funds are allocated for dam O&M.	Continuously during project implementation. Target 12th Five Year Plan for O&M allocations.	WRDs, SEBs

Annex 12: Project Preparation and Supervision

INDIA: Dam Rehabilitation & Improvement Project

Project dates

	Planned	Actual
PCN review	09/30/2004	10/1/2004
Initial PID to PIC	10/22/2004	11/09/2004
Initial ISDS to PIC	11/22/2004	11/09/2004
Appraisal	08/03/2009	10/07/2009
Negotiations	10/01/2009	05/31/2010
Board/RVP approval	12/10/2009	
Planned date of effectiveness	12/31/2009	
Planned date of mid-term review	05/01/2012	
Planned closing date	06/30/2016	

Key institutions responsible for preparation

246. The main institutions responsible for project preparation were CWC and Water Resources Departments in the four project states (Kerala, Madhya Pradesh, Orissa, and Tamil Nadu).

247. Bank staff and consultants involved in project preparation.

Name	Title	Unit
Joop Stoutjesdijk	Lead Irrigation Engineer (TTL since 01/08)	SASDA
Srinivasan R. Rajagopal	Water Resources Specialist (earlier TTL)	SASDA
Rabih H. Karaky	Senior Economist	SASDA
N. R. Harshadeep	Sr. Environmental Specialist	SASDI
Musa S. C. Asad	Sr. Institutional Development Specialist	SASDA
Papia Bhatachaarjia	Sr. Financial Management Specialist	SARFM
Varsha Marathe Dayal	Sr. Financial Sector Specialist	SASFP
A.K. Srivastava	Sr. Procurement Specialist	SARPS
Manmohan Singh Bajaj	Sr. Procurement Specialist	SARPS
Yash Gupta	Procurement Specialist	SARPS
Pyush Dogra	Environmental Specialist	SASDI
Shankar Narayanan	Sr. Social Development Specialist	SASDI
Vibhuti Narang Khanna	Program Assistant	SASDA
Lilac Thomas	Program Assistant	SASDA
R.G. Paterson	Engineer	FAO/CP
N.K. Borwanker	Engineer	FAO/CP
T. Lohavisavapanich	Economist	FAO/CP
Kunduz Masylkanova	Economist	FAO/CP
Alessandro Palmieri	Lead Dam Specialist (Peer Reviewer)	OPCQC
Giuseppe Fantozzi	Sr. Operations Officer (Peer Reviewer)	ECSSD

Bank funds expended to-date on project preparation:

1. Bank resources: US$820,000

Estimated Approval and Supervision Costs:

1. Remaining cost to approval: US$20,000
2. Estimated annual supervision cost: US$170,000

Annex 12: Documents in the Project File

INDIA: Dam Rehabilitation & Improvement Project

1. Working Papers on Dam Rehabilitation and Improvement Fund.

2. Procurement Capacity Assessment and Procurement Plans.

3. Environmental and Social Assessment.

4. Environmental and Social Management Framework.

5. Various technical documents and cost estimates prepared by the Central Water Commission, Water Resources Departments of the four participating states, and the Kerala and Tamil Nadu Electricity Boards, including:

    - Govt. of MP, WRD - Sakhya Sagar (Chandpatha Tank) Presentation of Points of Distresses in Chandpatha and Madhav Dam (January 2009) - Chief Engineer, Yamuna Basin, Gwalior;
    - Govt. of Tamilnadu, PWD, Water Resources Organisation, Pollachi Region, Parambikulam Aliyar Project (Aliyar Dam) - DRIP - Detailed Project Report;
    - Govt. of Tamil Nadu, Water Resources Department, Chennai Region - DRIP-Sathanur Dam, Tiruvannnamalai District;
    - Govt. of Tamil Nadu, Water Resources Dept., Madurai Region, Name of work: Rehabilitation and Improvement to Adavinaninarkovil; Reservoir in Sencottai Taluk of Tirunelveli District;
    - Govt. of Tamil Nadu, Water Resources Dept., Name of work: Rehabilitation of Vidur Dam in Tindivanam Taluk in Villupuram District under DRIP; and
    - Bidding document for the rehabilitation and modernization of Gomukhi Nadhi Dam in Tamil Nadu.

6. Various Aide Memoires and supporting documents prepared by Bank missions.

Annex 13: Statement of Loans and Credits

INDIA: Dam Rehabilitation & Improvement Project

			Original Amount in US$ Millions						Difference between expected and actual disbursements	
Project ID	FY	Purpose	IBRD	IDA	SF	GEF	Cancel.	Undisb.	Orig.	Frm. Rev'd
P101650	2010	A. P. RWSS	0.00	150.00	0.00	0.00	0.00	146.42	0.00	0.00
P102549	2010	Tech Engr Educ Quality Improvement II	0.00	300.00	0.00	0.00	0.00	286.00	0.00	0.00
P102771	2010	IIFCL - India Infras Finance Company Ltd	1,195.00	0.00	0.00	0.00	0.00	1,192.01	0.00	0.00
P110051	2010	Haryana Power System Improv Project	330.00	0.00	0.00	0.00	0.00	302.21	-26.97	0.00
P110371	2010	Sustainable Urban Transport Project	105.23	0.00	0.00	0.00	0.00	105.23	0.00	0.00
P071250	2010	Andhra Pradesh Municipal Development	300.00	0.00	0.00	0.00	0.00	299.25	0.00	0.00
P116020	2010	Banking Sector Support Loan	2,000.00	0.00	0.00	0.00	0.00	1,995.00	0.00	0.00
P115566	2010	POWERGRID V	1,000.00	0.00	0.00	0.00	0.00	988.00	-12.00	0.00
P096021	2010	AP Road Sector Project	320.00	0.00	0.00	0.00	0.00	319.20	0.00	0.00
P096023	2009	Orissa State Roads	250.00	0.00	0.00	0.00	0.00	235.36	0.66	0.00
P100101	2009	Coal-Fired Generation Rehabilitation	180.00	0.00	0.00	0.00	0.00	179.55	12.00	0.00
P094360	2009	National VBD Control&Polio Eradication	0.00	521.00	0.00	0.00	0.00	404.69	31.69	0.00
P100735	2009	Orissa Community Tank Management Project	56.00	56.00	0.00	0.00	0.00	103.57	0.30	0.00
P093478	2009	Orissa Rural Livelihoods Project	0.00	82.40	0.00	0.00	0.00	73.46	3.22	0.00
P102331	2009	MPDPIP-II	0.00	100.00	0.00	0.00	0.00	87.66	-13.56	0.00
P112033	2009	UP Sodic III	0.00	197.00	0.00	0.00	0.00	192.60	-3.18	0.00
P095114	2008	Rampur Hydropower Project	400.00	0.00	0.00	0.00	0.00	290.82	41.82	0.00
P102547	2008	Elementary Education (SSA II)	0.00	1,350.00	0.00	0.00	0.00	740.48	-142.49	0.00
P101653	2008	Power System Development Project IV	1,000.00	0.00	0.00	0.00	0.00	374.68	-160.99	18.35
P096019	2007	HP State Roads Project	220.00	0.00	0.00	0.00	0.00	195.63	55.65	0.00
P071160	2007	Karnataka Health Systems	0.00	141.83	0.00	0.00	0.00	67.63	-6.41	0.00
P090768	2007	TN IAM WARM	335.00	150.00	0.00	0.00	0.00	381.54	122.20	0.00
P090764	2007	Bihar Rural Livelihoods Project	0.00	63.00	0.00	0.00	0.00	53.09	-2.69	0.00
P090592	2007	Punjab Rural Water Supply & Sanitation	0.00	154.00	0.00	0.00	0.00	134.93	100.48	0.00
P090585	2007	Punjab State Roads Project	250.00	0.00	0.00	0.00	0.00	139.73	19.33	0.00
P099047	2007	Vocational Training India	0.00	280.00	0.00	0.00	0.00	193.85	20.70	0.00
P075060	2007	RCH II	0.00	360.00	0.00	0.00	0.00	208.83	113.17	0.00
P075174	2007	AP DPL III	150.00	75.00	0.00	0.00	0.00	76.61	-77.33	0.00
P102768	2007	Stren India's Rural Credit Coops	300.00	300.00	0.00	0.00	0.00	287.38	188.58	0.00
P078538	2007	Third National HIV/AIDS Control Project	0.00	250.00	0.00	0.00	0.07	166.51	130.27	0.00
P083187	2007	Uttaranchal RWSS	0.00	120.00	0.00	0.00	0.00	100.92	60.28	0.00
P078539	2007	TB II	0.00	170.00	0.00	0.00	0.00	90.69	-19.42	0.00
P100789	2007	AP Community Tank Management Project	94.50	94.50	0.00	0.00	0.00	170.77	47.14	0.00
P079708	2006	TN Empwr & Pov Reduction	0.00	120.00	0.00	0.00	0.00	59.88	29.09	0.00
P079675	2006	Karn Municipal Reform	216.00	0.00	0.00	0.00	0.00	168.05	102.39	0.00

			Original Amount in US$ Millions						Difference between expected and actual disbursements	
Project ID	FY	Purpose	IBRD	IDA	SF	GEF	Cancel.	Undisb.	Orig.	Frm. Rev'd
P083780	2006	TN Urban III	300.00	0.00	0.00	0.00	0.00	174.98	120.73	9.38
P078832	2006	Karnataka Panchayats Strengthening Proj	0.00	120.00	0.00	0.00	0.00	59.59	-48.98	0.00
P086414	2006	Power System Development Project III	400.00	0.00	0.00	0.00	0.00	16.52	-63.48	0.00
P092735	2006	NAIP	0.00	200.00	0.00	0.00	0.00	154.89	59.72	0.00
P093720	2006	Mid-Himalayan (HP) Watersheds	0.00	60.00	0.00	0.00	0.00	28.60	7.21	0.00
P077977	2005	Rural Roads Project	99.50	300.00	0.00	0.00	0.00	70.49	57.95	0.00
P075058	2005	TN HEALTH SYSTEMS	0.00	110.83	0.00	0.00	20.06	8.23	22.91	-0.99
P073651	2005	DISEASE SURVEILLANCE	0.00	68.00	0.00	0.00	0.35	49.34	43.62	0.00
P077856	2005	Lucknow-Muzaffarpur National Highway	620.00	0.00	0.00	0.00	0.00	149.54	102.87	0.00
P073370	2005	Madhya Pradesh Water Sector Restructurin	394.02	0.00	0.00	0.00	6.62	265.97	226.93	0.00
P084632	2005	Hydrology II	104.98	0.00	0.00	0.00	0.00	80.56	73.56	53.04
P084790	2005	MAHAR WSIP	325.00	0.00	0.00	0.00	0.00	195.61	144.28	0.00
P084792	2005	Assam Agric Competitiveness	0.00	154.00	0.00	0.00	0.00	58.55	48.93	0.00
P086518	2005	SME Financing & Development	520.00	0.00	0.00	0.00	0.00	270.08	-128.92	-48.92
P094513	2005	India Tsunami ERC	0.00	465.00	0.00	0.00	0.00	367.82	365.22	-38.48
P050655	2004	RAJASTHAN HEALTH SYSTEMS DEVELOPMENT	0.00	89.00	0.00	0.00	0.00	33.45	29.30	-1.16
P078550	2004	Uttar Wtrshed	0.00	69.62	0.00	0.00	0.00	26.26	2.28	0.00
P082510	2004	Karnataka UWS Improvement Project	39.50	0.00	0.00	0.00	0.00	6.76	6.76	0.00
P076467	2003	Chatt DRPP	0.00	112.56	0.00	0.00	20.06	47.72	54.97	0.00
P073094	2003	AP Comm Forest Mgmt	0.00	108.00	0.00	0.00	0.00	14.62	-5.75	0.00
P071272	2003	AP RURAL POV REDUCTION	0.00	315.03	0.00	0.00	0.00	93.28	-89.63	-24.63
P050649	2003	TN ROADS	348.00	0.00	0.00	0.00	0.00	23.80	23.80	0.00
P067606	2003	UP ROADS	488.00	0.00	0.00	0.00	0.00	74.95	74.95	0.00
P050647	2002	UP WSRP	0.00	149.20	0.00	0.00	40.11	45.42	57.14	0.00
P050653	2002	KARNATAKA RWSS II	0.00	151.60	0.00	0.00	15.04	12.65	0.41	0.00
P050668	2002	MUMBAI URBAN TRANSPORT PROJECT	463.00	79.00	0.00	0.00	0.00	192.29	179.76	192.76
P040610	2002	RAJ WSRP	0.00	140.00	0.00	0.00	25.84	34.54	22.09	0.00
P069889	2002	MIZORAM ROADS	0.00	78.00	0.00	0.00	0.00	2.69	-26.91	-2.94
P071033	2002	KARN Tank Mgmt	32.00	130.90	0.00	0.00	25.07	108.83	48.08	-5.97
P072539	2002	KERALA STATE TRANSPORT	255.00	0.00	0.00	0.00	0.00	76.83	76.83	0.00
		Total:	**13,090.73**	**7,935.47**	**0.00**	**0.00**	**153.22**	**13,557.09**	**2,100.56**	**150.44**

INDIA
STATEMENT OF IFC's
Held and Disbursed Portfolio
In Millions of US Dollars

		Committed				Disbursed			
		IFC				IFC			
FY Approval	Company	Loan	Equity	Quasi	Partic.	Loan	Equity	Quasi	Partic.
2005	ADPCL	39.50	7.00	0.00	0.00	0.00	0.00	0.00	0.00
2006	AHEL	0.00	5.08	0.00	0.00	0.00	5.08	0.00	0.00
2005	AP Paper Mills	35.00	5.00	0.00	0.00	25.00	5.00	0.00	0.00
2005	APIDC Biotech	0.00	4.00	0.00	0.00	0.00	2.01	0.00	0.00
2002	ATL	13.81	0.00	0.00	9.36	13.81	0.00	0.00	9.36
2003	ATL	1.00	0.00	0.00	0.00	0.68	0.00	0.00	0.00
2005	ATL	9.39	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2006	Atul Ltd	16.77	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2003	BHF	10.30	0.00	10.30	0.00	10.30	0.00	10.30	0.00
2004	BILT	0.00	0.00	15.00	0.00	0.00	0.00	15.00	0.00
2001	BTVL	0.43	3.98	0.00	0.00	0.43	3.98	0.00	0.00
2003	Balrampur	10.52	0.00	0.00	0.00	10.52	0.00	0.00	0.00
2001	Basix Ltd.	0.00	0.98	0.00	0.00	0.00	0.98	0.00	0.00
2005	Bharat Biotech	0.00	0.00	4.50	0.00	0.00	0.00	3.30	0.00
1984	Bihar Sponge	5.70	0.00	0.00	0.00	5.70	0.00	0.00	0.00
2003	CCIL	1.50	0.00	0.00	0.00	0.59	0.00	0.00	0.00
2006	CCIL	7.00	2.00	0.00	12.40	7.00	2.00	0.00	12.40
1990	CESC	4.61	0.00	0.00	0.00	4.61	0.00	0.00	0.00
1992	CESC	6.55	0.00	0.00	14.59	6.55	0.00	0.00	14.59
2004	CGL	14.38	0.00	0.00	0.00	7.38	0.00	0.00	0.00
2004	CMScomputers	0.00	10.00	2.50	0.00	0.00	0.00	0.00	0.00
2002	COSMO	2.50	0.00	0.00	0.00	2.50	0.00	0.00	0.00
2005	COSMO	0.00	3.73	0.00	0.00	0.00	3.73	0.00	0.00
2006	Chennai Water	24.78	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2003	DQEL	0.00	1.50	1.50	0.00	0.00	1.50	1.50	0.00
2005	DSCL	30.00	0.00	0.00	0.00	30.00	0.00	0.00	0.00
2006	DSCL	15.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2005	Dabur	0.00	14.09	0.00	0.00	0.00	14.09	0.00	0.00
2003	Dewan	8.68	0.00	0.00	0.00	8.68	0.00	0.00	0.00
2006	Federal Bank	0.00	28.06	0.00	0.00	0.00	23.99	0.00	0.00
2001	GTF Fact	0.00	1.20	0.00	0.00	0.00	1.20	0.00	0.00
2006	GTF Fact	0.00	0.00	0.99	0.00	0.00	0.00	0.99	0.00
1994	GVK	0.00	4.83	0.00	0.00	0.00	4.83	0.00	0.00
2003	HDFC	100.00	0.00	0.00	100.00	100.00	0.00	0.00	100.00
1998	IAAF	0.00	0.47	0.00	0.00	0.00	0.30	0.00	0.00
2006	IAL	0.00	9.79	0.00	0.00	0.00	7.70	0.00	0.00
1998	IDFC	0.00	10.82	0.00	0.00	0.00	10.82	0.00	0.00
2005	IDFC	50.00	0.00	0.00	100.00	50.00	0.00	0.00	100.00
	IHDC	6.94	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2006	IHDC	7.90	0.00	0.00	0.00	0.00	0.00	0.00	0.00

		Committed				Disbursed			
		IFC				IFC			
FY Approval	Company	Loan	Equity	Quasi	Partic.	Loan	Equity	Quasi	Partic.
2006	Indecomm	0.00	2.57	0.00	0.00	0.00	2.57	0.00	0.00
1996	India Direct Fnd	0.00	1.10	0.00	0.00	0.00	0.66	0.00	0.00
2001	Indian Seamless	6.00	0.00	0.00	0.00	6.00	0.00	0.00	0.00
2006	JK Paper	15.00	7.62	0.00	0.00	0.00	7.38	0.00	0.00
2005	K Mahindra INDIA	22.00	0.00	0.00	0.00	22.00	0.00	0.00	0.00
2005	KPIT	11.00	2.50	0.00	0.00	8.00	2.50	0.00	0.00
2003	L&T	50.00	0.00	0.00	0.00	50.00	0.00	0.00	0.00
2006	LGB	14.21	4.82	0.00	0.00	0.00	4.82	0.00	0.00
2006	Lok Fund	0.00	2.00	0.00	0.00	0.00	0.00	0.00	0.00
2002	MMFSL	7.89	0.00	7.51	0.00	7.89	0.00	7.51	0.00
2003	MSSL	0.00	2.29	0.00	0.00	0.00	2.20	0.00	0.00
2001	MahInfra	0.00	10.00	0.00	0.00	0.00	0.79	0.00	0.00
	Montalvo	0.00	3.00	0.00	0.00	0.00	1.08	0.00	0.00
1996	Moser Baer	0.00	0.82	0.00	0.00	0.00	0.82	0.00	0.00
1999	Moser Baer	0.00	8.74	0.00	0.00	0.00	8.74	0.00	0.00
2000	Moser Baer	12.75	10.54	0.00	0.00	12.75	10.54	0.00	0.00
	Nevis	0.00	4.00	0.00	0.00	0.00	4.00	0.00	0.00
2003	NewPath	0.00	9.31	0.00	0.00	0.00	8.31	0.00	0.00
2004	NewPath	0.00	2.79	0.00	0.00	0.00	2.49	0.00	0.00
2003	Niko Resources	24.44	0.00	0.00	0.00	24.44	0.00	0.00	0.00
2001	Orchid	0.00	0.73	0.00	0.00	0.00	0.73	0.00	0.00
1997	Owens Corning	5.92	0.00	0.00	0.00	5.92	0.00	0.00	0.00
2006	PSL Limited	15.00	4.74	0.00	0.00	0.00	4.54	0.00	0.00
2004	Powerlinks	72.98	0.00	0.00	0.00	64.16	0.00	0.00	0.00
2004	RAK India	20.00	0.00	0.00	0.00	20.00	0.00	0.00	0.00
1995	Rain Calcining	0.00	2.29	0.00	0.00	0.00	2.29	0.00	0.00
2004	Rain Calcining	10.00	0.00	0.00	0.00	10.00	0.00	0.00	0.00
2005	Ramky	3.74	10.28	0.00	0.00	0.00	0.00	0.00	0.00
2005	Ruchi Soya	0.00	9.27	0.00	0.00	0.00	6.77	0.00	0.00
2001	SBI	50.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1997	SREI	3.21	0.00	0.00	0.00	3.21	0.00	0.00	0.00
2000	SREI	6.50	0.00	0.00	0.00	6.50	0.00	0.00	0.00
1995	Sara Fund	0.00	3.43	0.00	0.00	0.00	3.43	0.00	0.00
2004	SeaLion	4.40	0.00	0.00	0.00	4.40	0.00	0.00	0.00
2001	Spryance	0.00	1.86	0.00	0.00	0.00	1.86	0.00	0.00
2003	Spryance	0.00	0.93	0.00	0.00	0.00	0.93	0.00	0.00
2004	Sundaram Finance	42.93	0.00	0.00	0.00	42.93	0.00	0.00	0.00
2000	Sundaram Home	0.00	2.18	0.00	0.00	0.00	2.18	0.00	0.00
2002	Sundaram Home	6.71	0.00	0.00	0.00	6.71	0.00	0.00	0.00
1998	TCW/ICICI	0.00	0.80	0.00	0.00	0.00	0.80	0.00	0.00
2005	TISCO	100.00	0.00	0.00	300.00	0.00	0.00	0.00	0.00
2004	UPL	15.45	0.00	0.00	0.00	15.45	0.00	0.00	0.00
1996	United Riceland	5.63	0.00	0.00	0.00	5.63	0.00	0.00	0.00
2005	United Riceland	8.50	0.00	0.00	0.00	5.00	0.00	0.00	0.00
2002	Usha Martin	0.00	0.72	0.00	0.00	0.00	0.72	0.00	0.00

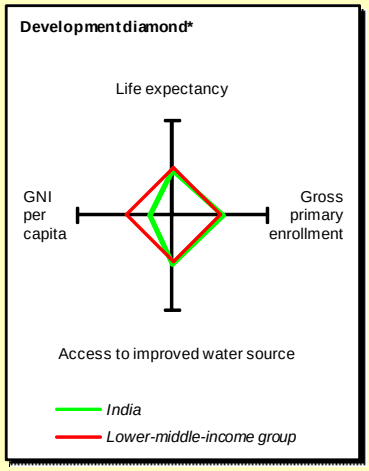
		Committed				Disbursed			
		IFC				IFC			
FY Approval	**Company**	**Loan**	**Equity**	**Quasi**	**Partic.**	**Loan**	**Equity**	**Quasi**	**Partic.**
2001	Vysya Bank	0.00	3.66	0.00	0.00	0.00	3.66	0.00	0.00
2005	Vysya Bank	0.00	3.51	0.00	0.00	0.00	3.51	0.00	0.00
1997	WIV	0.00	0.37	0.00	0.00	0.00	0.37	0.00	0.00
1997	Walden-Mgt India	0.00	0.01	0.00	0.00	0.00	0.01	0.00	0.00
2006	iLabs Fund II	0.00	20.00	0.00	0.00	0.00	0.00	0.00	0.00
	Total portfolio:	**956.52**	**249.41**	**42.30**	**536.35**	**604.74**	**175.91**	**38.60**	**236.35**

		Approvals Pending Commitment			
FY Approval	Company	Loan	Equity	Quasi	Partic.
2004	CGL	0.01	0.00	0.00	0.00
2000	APCL	0.01	0.00	0.00	0.00
2006	Atul Ltd	0.00	0.01	0.00	0.00
2001	Vysya Bank	0.00	0.00	0.00	0.00
2006	Federal Bank	0.01	0.00	0.00	0.00
2001	GI Wind Farms	0.01	0.00	0.00	0.00
2004	Ocean Sparkle	0.00	0.00	0.00	0.00
2005	Allain Duhangan	0.00	0.00	0.00	0.00
	Total pending commitment:	0.04	0.01	0.00	0.00

Annex 14: Country at a Glance

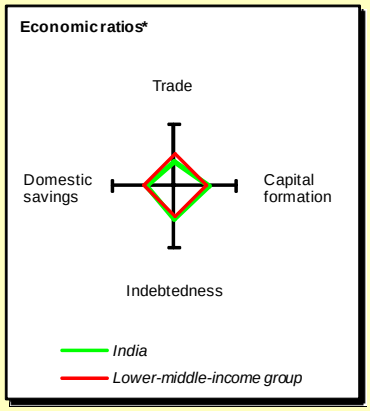
INDIA: Dam Rehabilitation & Improvement Project

POVERTY and SOCIAL	India	South Asia	Lower-middle-income
2008			
Population, mid-year *(millions)*	1,140.0	1,543	3,702
GNI per capita *(Atlas method, US$)*	1,040	986	2,078
GNI *(Atlas method, US$ billions)*	1,186.7	1,522	7,692
Average annual growth, 2002-08			
Population *(%)*	1.4	1.5	1.2
Labor force *(%)*	1.9	2.2	1.6
Most recent estimate (latest year available, 2002-08)			
Poverty *(% of population below national poverty line)*	..	..	..
Urban population *(% of total population)*	29	30	41
Life expectancy at birth *(years)*	64	65	68
Infant mortality *(per 1,000 live births)*	52	59	46
Child malnutrition *(% of children under 5)*	44	41	26
Access to an improved water source *(% of population)*	89	87	86
Literacy *(% of population age 15+)*	66	63	83
Gross primary enrollment *(% of school-age population)*	113	108	109
Male	115	111	112
Female	111	104	106

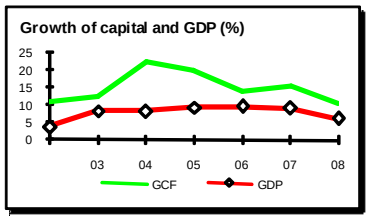


KEY ECONOMIC RATIOS and LONG-TERM TRENDS	1988	1998	2007	2008
GDP *(US$ billions)*	293.1	416.3	1,176.9	1,159.2
Gross capital formation/GDP	23.6	22.6	38.7	39.7
Exports of goods and services/GDP	6.1	11.2	21.2	22.7
Gross domestic savings/GDP	22.2	21.0	35.2	34.3
Gross national savings/GDP	22.0	22.6	38.1	37.6
Current account balance/GDP	-2.9	-1.0	-1.5	-2.6
Interest payments/GDP	1.0	1.2	0.6	0.6
Total debt/GDP	21.0	23.7	17.4	19.9
Total debt service/exports	28.8	20.5	13.0	9.0
Present value of debt/GDP	..	..	..	17.5
Present value of debt/exports	..	..	..	58.5

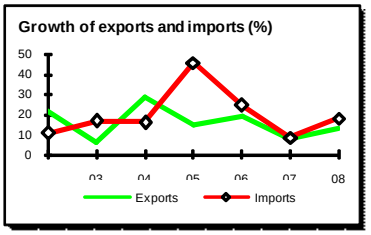
	1988-98	1998-08	2007	2008	2008-12
(average annual growth)					
GDP	5.5	7.2	9.1	6.1	7.3
GDP per capita	3.5	5.6	7.6	4.7	5.3
Exports of goods and services	11.6	15.2	7.5	12.8	5.6



STRUCTURE of the ECONOMY	1988	1998	2007	2008
(% of GDP)				
Agriculture	30.5	26.0	18.1	17.5
Industry	26.2	26.1	29.5	28.8
Manufacturing	16.2	15.5	16.3	15.8
Services	43.4	47.9	52.4	53.7
Household final consumption expenditure	65.8	66.7	54.7	54.1
General gov't final consumption expenditure	12.0	12.3	10.1	11.6
Imports of goods and services	7.5	12.8	24.7	28.0



	1988-98	1998-08	2007	2008
(average annual growth)				
Agriculture	3.1	2.7	4.9	1.6
Industry	6.1	7.6	8.1	3.9
Manufacturing	6.6	7.2	8.2	2.4
Services	7.0	8.9	10.9	9.7
Household final consumption expenditure	5.6	6.0	6.0	3.6
General gov't final consumption expenditure	4.9	4.5	8.4	20.2
Gross capital formation	6.4	12.6	15.6	10.7
Imports of goods and services	13.6	16.1	8.6	17.9



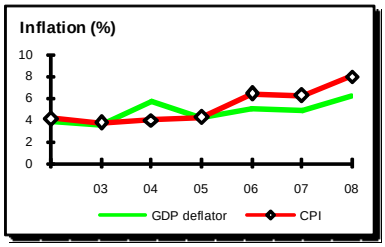
Note: 2008 data are preliminary estimates.

This table was produced from the Development Economics LDB database.

* The diamonds show four key indicators in the country (in bold) compared with its income-group average. If data are missing, the diamond will be incomplete.

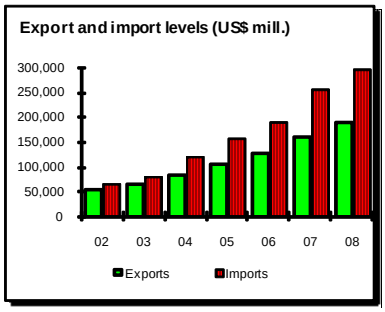
PRICES and GOVERNMENT FINANCE

	1988	1998	2007	2008
Domestic prices				
(% change)				
Consumer prices	11.2	13.1	6.2	8.0
Implicit GDP deflator	8.2	8.0	4.9	6.2
Government finance				
(% of GDP, includes current grants)				
Current revenue	19.0	..	21.9	20.9
Current budget balance	-2.8	..	-3.2	-7.6
Overall surplus/deficit	..	..	-6.0	-9.6



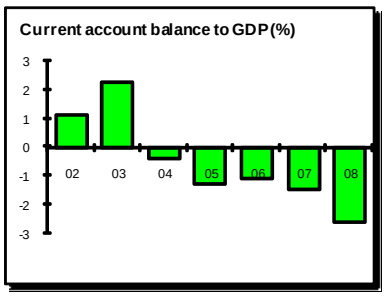
TRADE

	1988	1998	2007	2008
(US$ millions)				
Total exports (fob)	14,257	33,219	159,007	190,000
Tea	435	1,038	1,703	..
Iron	825	893	9,005	..
Manufactures	10,110	25,792	102,943	108,281
Total imports (cif)	23,618	47,544	257,789	296,614
Food	1,304	2,524	4,575	..
Fuel and energy	3,009	6,399	79,641	..
Capital goods	4,803	10,064	58,393	71,237
Export price index *(2000=100)*	..	..	152	161
Import price index *(2000=100)*	..	..	162	182
Terms of trade *(2000=100)*	..	..	93	89



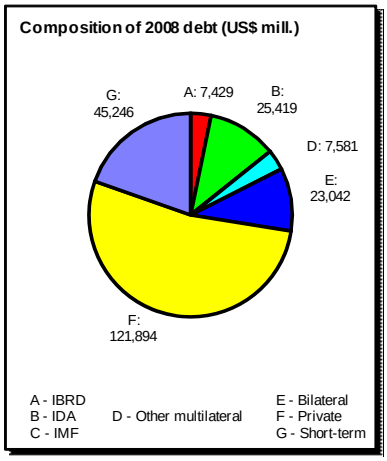
BALANCE of PAYMENTS

	1988	1998	2007	2008
(US$ millions)				
Exports of goods and services	18,210	47,484	256,240	276,408
Imports of goods and services	26,842	58,565	310,301	345,993
Resource balance	-8,632	-11,081	-54,061	-69,585
Net income	-2,519	-3,544	-4,917	-4,511
Net current transfers	2,652	10,280	41,944	44,279
Current account balance	-8,499	-4,345	-17,273	-30,049
Financing items (net)	7,495	8,174	109,437	9,969
Changes in net reserves	1,004	-3,829	-92,164	20,080
Memo:				
Reserves including gold *(US$ millions)*	4,802	32,490	309,287	351,259
Conversion rate *(DEC, local/US$)*	14.5	42.1	40.1	45.9



EXTERNAL DEBT and RESOURCE FLOWS

	1988	1998	2007	2008
(US$ millions)				
Total debt outstanding and disbursed	61,659	98,774	204,992	230,611
IBRD	5,590	7,991	6,680	7,429
IDA	12,186	18,562	25,378	25,419
Total debt service	6,055	12,039	39,036	31,076
IBRD	777	1,377	702	703
IDA	179	423	894	970
Composition of net resource flows				
Official grants	700	490	1,145	1,169
Official creditors	2,661	948	2,565	3,539
Private creditors	5,679	3,187	29,798	11,782
Foreign direct investment (net inflows)	91	2,635	25,127	41,169
Portfolio equity (net inflows)	0	-601	34,986	-15,030
World Bank program				
Commitments	2,648	1,755	3,309	1,200
Disbursements	2,478	1,399	1,805	2,083
Principal repayments	383	1,129	1,050	1,159
Net flows	2,095	270	754	924
Interest payments	573	671	546	514
Net transfers	1,522	-401	208	410



Note: This table was produced from the Development Economics LDB database. 12/9/09

Annex 15: Maps

INDIA: Dam Rehabilitation & Improvement Project

INDIA

DAM REHABILITATION AND IMPROVEMENT PROJECT

PROJECT STATES

163 NUMBER OF LARGE DAMS IN EACH STATE

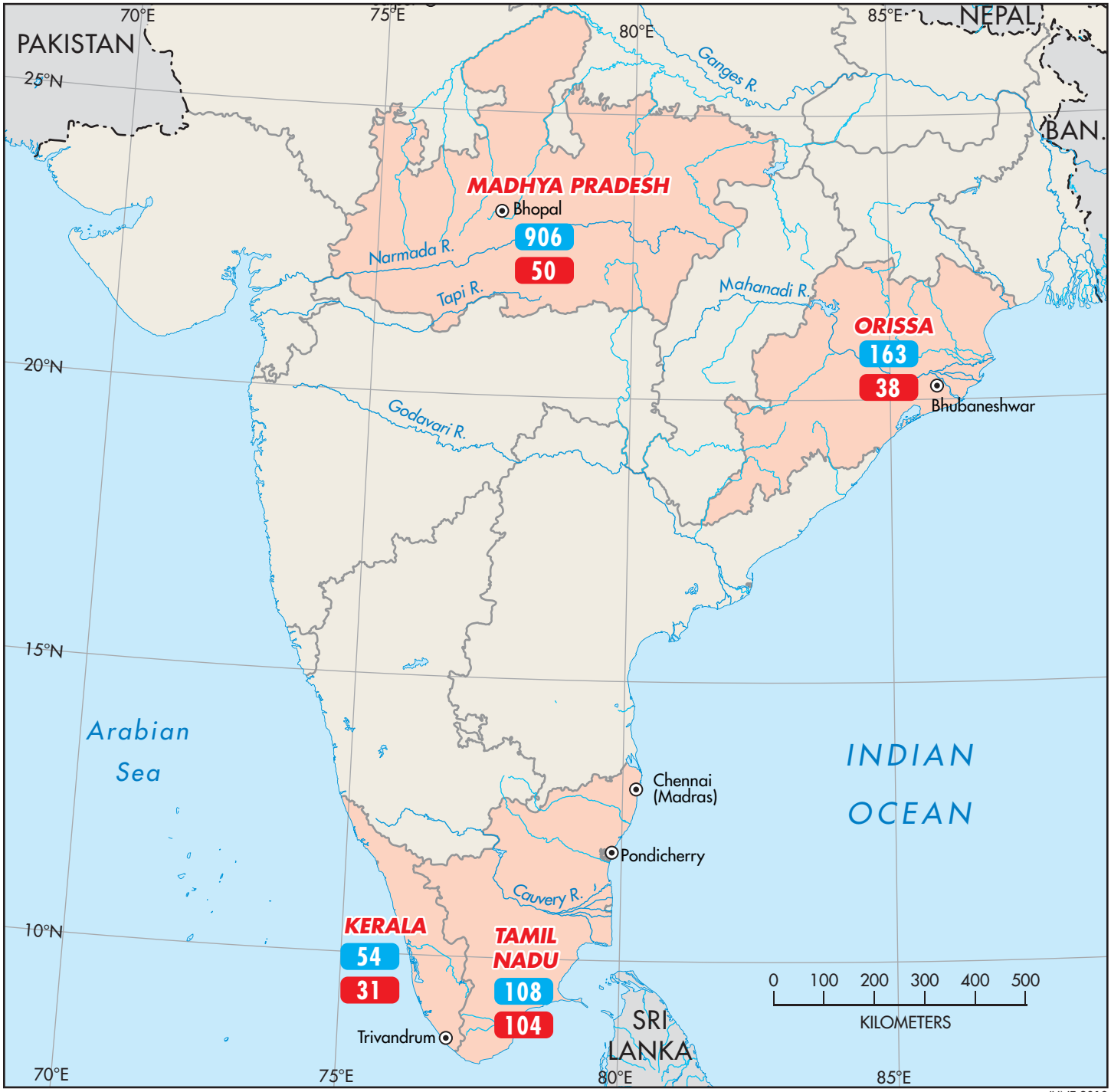
38 NUMBER OF DRIP DAMS

STATE CAPITALS *(shown only in Project States)*

NATIONAL CAPITAL

STATE BOUNDARIES

INTERNATIONAL BOUNDARIES



JUNE 2010