

**DAM REHABILITATION AND IMPROVEMENT PROJECT
(DRIP) II
(Funded by World Bank)**

**ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT
Executive Summary**

February 2020

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Dam Rehabilitation and Improvement Project (DRIP-2)

EXECUTIVE SUMMARY

OF

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT

1. Introduction

India has more than 5400 large dams with a storage capacity of about 300 billion cubic meters which are crucial of water security and India's continued economic growth and poverty reduction. Most of the dams have been constructed and managed by State government. The performance of these dams is steadily declining, largely due factors like: age of dams; damaged structures; inadequate instrumentation and monitoring; outdated reservoir operation practices; inadequate regulatory and operational safety measures. The Government of India (GOI) initiated Dam Rehabilitation and Improvement Project (DRIP) to overcome such structural, electro-mechanical and instrumental weaknesses.

GOI had undertaken support from World Bank for DRIP-I project for about 223 dam's rehabilitation which is under implementation since 2010. The Project aims to rehabilitate and improve dams and associated appurtenances, and to strengthen institutions. GOI has proposed to expand the reach of DRIP by bringing in additional States and dams. The proposed Dam Rehabilitation and Improvement Project phase -2 (DRIP – 2) would continue to invest in structural improvements but gives much greater emphasis to establishing sustainable mechanisms for financing regular Operations and Maintenance (O&M) and dam rehabilitation, and to enhancing State capabilities to manage these critical assets through institutional strengthening and reform. The proposed project would cover 18 States – Andhra Pradesh, Bihar, Chhattisgarh, Goa, Gujarat, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Manipur, Meghalaya, Odisha, Punjab, Rajasthan, Tamil Nadu, Telangana, Uttarakhand, Uttar Pradesh, and West Bengal and two central agencies (Central Water Commission and Bhakra Beas Management Board).

Environmental and social risk assessment is essential requirement as per Environmental and Social Framework of the World Bank. The Executive Summary is based on the ESIA's prepared for 10 dams located in the state of Rajasthan and Manipur states. Additionally, 9 more rehabilitation proposals were also referred to assess the nature of projects and activities and potential risks.

2. Project Description

In line with the project development objective (PDO) of increasing safety of selected dams and strengthen institutional capacity for dam safety in participating States, the DRIP-II project will cover the following three components:

Component 1: Institutional Strengthening (US\$ 40 million): This component supports further strengthening of dam safety management in the country through institutional modernization. A major focus of activities under this component will be increasing the oversight of dam safety by developing dam safety guidelines and by strengthening the capacity of various dam safety actors to carry out the regulatory functions defined in the proposed Dam Safety Bill which has been passed by the Lok Sabha (Lower House of Parliament).

Component 2: Risk-informed Asset Management and Sustainable Financing (US\$ 25 million): This component supports identifying long-term funding needs for dam safety based on asset management

and risk assessment financing for dam safety. This component would focus on: (i) improving the efficiency of public financing; (ii) generating alternative revenue streams Alternative revenue streams that could be developed include tourism and water recreational activities, fisheries, and other innovative schemes such as floating solar panels; and (iii) establishing financing arrangements for dam safety (e.g., dedicated budget lines).

Component 3: Rehabilitation of Dams and Appurtenant Structures (US\$ 200 million): This component supports improving the safety of dams through structural and non-structural interventions. Structural measures could include measures for seepage reduction (e.g., grouting, geomembranes), hydrological and structural safety measures (e.g., additional spillways, fuse plugs), enhancing the reliability of operational facilities (e.g., gates), rehabilitating foundation deficiencies, strengthening dam concrete/embankment structures, and improving basic dam facilities (e.g., access roads). Non-structural measures could include standardized dam safety instrumentation, monitoring, assessment and reporting protocols for dam health; flood forecasting and early warning systems; integrated reservoir operations including streamflow forecasting for climate resilient dam management; preparation and implementation of EAPs; preparation and implementation of sediment management plans; and revised operational rule curves to account for climate change.

Component 4: Project Management (US\$ 15 million): This component will ensure effective implementation of project activities and monitoring and evaluating project implementation progress, outputs and outcomes. The component will support: (i) establishment of the Central Project Management Unit (CPMU), which will oversee and coordinate activities of the implementing agencies of the project, supported by a Engineering and Management Consultant (EMC), which is currently being procured; (ii) establishment and operations of State level Project Management Units (SPMUs) within State implementing agencies, which can hire experts in various fields as and when needed on a contractual basis; (iii) setting up of a monitoring and evaluation system; and (iv) establishment of a Quality Assurance and Quality Control system. This component will also finance consultancies, as well as related material, office equipment and incremental operating costs. The project will provide investment and technical support for the establishment of a Management Information System and Information and Communication Technology systems.

3. Potential Environment and Social Impacts from Project Activities

Nature of activities completed in more than 200 dams under DRIP-I provided an understanding that most of the activities of rehabilitation were local and dam specific except one or two dams wherein spillway construction or sediment management works were undertaken as major intervention. Experience clearly indicated that impacts on Environment and Social was low to moderate in most of these schemes. The nature of activities under DRIP II are also expected to be like DRIP -I and hence shall result in the similar level of risk/impacts. DRIP II is likely to cover about 300 dams and thus far Bank has approved rehabilitation proposals of 10 dams, from states of Rajasthan and Manipur. Rehabilitation proposals submitted majorly relate to minor civil work, electro-mechanical and instrumental work confined to existing Dam area itself. In addition, nine more proposals are with Bank and yet to be approved. Based on the analysis of 19 rehabilitation proposals, these works can be grouped into following type:

- Project confined to Dam area with minor Civil Repair/ Electromechanical/ Instrumental/SCADA work: 19 out of 19 Dams
- Project involving Major civil work like spillway, tunneling extending even beyond dam area: None out of 19 Dams
- Project Involving Tourism Activities extending Beyond Dam area: None approved yet

The potential risk from the proposed project activities/interventions are analyzed as follows:

- i) **Minor Civil Repair Work Confined to Dam Area:** These activities involves activities such as Resetting of Disturbed Rip-Rap, cleaning/reaming of drainage holes in dam body foundations, repairs of parapet wall, repair of damaged spillway, repair of downstream training wall, repair of road: These construction activities involves pressure grouting, cement concrete work, construction material transportation, etc. which is expected to cause moderate risk to Air quality, noise levels and water quality. Risk to other component of environment are expected to be low unless there is locational sensitivity. Also, as these activities are on the dam body or within dam premises and far away from habitations, there is no interface with communities or any social risk or impact.
- ii) **Painting work to Dam Body:** This will involve generation of empty containers and some paints waste. It will have potential of soil contamination due to disposal of empty containers with contaminants that may result in impacts to fishing activity by downstream communities. However controlled disposal will minimize this risk. Working at height will and exposure to paints have potential of Occupational health and safety risk. Low impact is anticipated on ecology, fish or aquatic life.
- iii) **Electro- mechanical /Instrumentation improvement, SCADA Work, Safety measures (Siren, Lighting):** These activities involve most of replacement of electro-mechanical system or in-situ repair work. It is likely to generate some waste which can be sold off for recycle. As such potential risk to Physical, ecological and social is low to moderate from these activities.
- iv) **Major Civil Work like Additional Spill Way/Tunnelling, Training Structure extending beyond dam area:** These activities will involve major civil construction, which would need natural resources water, quarry material, cutting of trees, impacts on land, tribals, cultural property, SEA/SH, etc. These activities are likely to have high risk to air, water quality, noise levels, biodiversity, Occupational health and safety, social risks. These activities may high risk to Fish and aquatic life of dam water body also. There may be possibility that one or two such dams may be proposed in future.
- v) **Tourism /Solar/Fisheries/ Water Recreation:** These are activities which are to be taken up after dam repair work. The risk will depend on nature of enhancement activities undertaken and risk may vary from low to high. These will be firmed up based on finalization of activities proposed and separate ESIA for such activities would be conducted.

Table 1 below analyses potential environmental and social risks for the overall project likely to be envisaged due to proposed rehabilitation activities.

Table 1: Analysis of Potential Environmental and Social Risks of the project (By type of activities and interventions)

Project Activity	Risk Assessment											
	Environment Risks						Social Risks					
	Air, water, noise, land use, Soil, Resource use	Pollution downstream and upstream	General Ecology	Protected Area (Wild Life Sanctuaries, National Park and other natural habitat even if not protected)	Other RET species (flora and fauna) outside protected areas (to be determined by area specific surveys during ESIA)	Fish and Aquatic life within dam water body	Land	Tribal	Labor	Cultural heritage	SEA/SH	OH and Safety to Labour/Community
Civil (within Dam Boundary)	M	L	M	L	M	L	L	L	M	L	L	H
Electro Mechanical	M	L	M	L	M	L	L	L	M	L	L	H
Instrumental SCADA, surveillance	L	L	M	L	M	L	L	L	L	L	L	M
Painting	M	L	M	L	M	L	L	L	M	L	L	H
Road work	M	L	M	L	M	L	M	M	M	M	M	M
Safety measures (Siren, Lighting)	L	L	M	L	M	L	M	M	M	M	M	L
Major Civil Work like Additional Spill Way	H	L	H	L	S	L	H	H	H	H	H	H
Major Hydraulic Structure (tunnelling)	H	L	H	L	S	L	H	H	H	H	H	H
Major Civil Work extending beyond Dam Area Like training Structure	M	L	M	L	M	L	H	H	H	H	H	H
Additional activities for Tourism /Solar/Fisheries/ Water recreation enhancement	H	L	H	L	S	L	S	S	S	S	S	M

Project Activity	Risk Assessment											
	Environment Risks						Social Risks					
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Risk level: L- Low (No Impact), M- Moderate, S-Substantial H- High)

Note: Legacy issues especially w.r.t community impacts are to be studied separately and those might increase the risk ratings of dams.

4. Summary of Ten (10) ESIA prepared

4.1 Approach : Under DRIP-II, Environment and Social Impact Assessment (ESIA) is to be taken for each dam. Currently, ESIA is carried out for 10 dams with the following objectives:

- i. To identify, evaluate and manage the environment and social risks and impacts of the project in a manner consistent with the ESSs;
- ii. To adopt mitigation hierarchy i.e. a) anticipate and avoid risks and impacts; b) minimize or reduce risks and impacts to acceptable levels, if not avoidable; c) where significant residual impacts remain, compensate for or offset them, where technically and financially feasible options;
- iii. To help identify differentiated impacts on the disadvantaged or vulnerable and to identify differentiated measures to mitigate such impacts, wherever applicable;
- iv. To assess the relevance and applicability of environmental and social institutions, systems, laws, regulations and procedures in the assessment, development and implementation of projects, whenever appropriate; identify gaps, if any exist, and
- v. To assess borrower's existing capacity, gaps therein, and identify areas for enhanced capacity towards management of E&S risks.

4.2 E&S Risks and Impacts:

As per the scope of the DRIP-II project, the project shall cover 18 states, located in mountainous, flat and coastal terrain area of the country. Most of mountainous area of the country is in seismologically high active zone and are rich in biodiversity. Similarly, coastal areas are also rich in terrestrial and aquatic ecology. Plain areas have large habitation, forests areas prone to flood and scheduled -V areas having dominant tribal population.

In the first instance ESIA's have been completed in ten dams located in the states of Rajasthan and Manipur. While one state Rajasthan is in the desert ecology with flat terrain and other Manipur has hilly terrain, is in the north eastern part of India. The dams in Manipur are located seismologically high active zone.

The baseline indicators of air and noise quality levels are observed to be within the acceptable level since there are no anthropogenic sources of air and noise. The water quality also found reasonably good for all the schemes. The extent of forests varies across the states. Rajasthan state has lowest level of forest in the country. Avifauna activity are observed in all the dams however extent of species and activity vary from dam to dam. Fishing Activities are prevalent in most of the dam area. None of the 10 dams are located close to protected area. Some of the dam areas itself as conservation area for the protection of specific species. Two of the dams are located in the tribal areas. Ten ESIA's indicate type of activities to be undertaken in each dam and it clearly suggests that activities are concentrated within dam area and impacts are also localised and are from low to moderate.

Stakeholders consultation was undertaken at 10 dams as part of ESIA preparation. The Dam rehabilitation projects were found having wider acceptability with no issue of concern. No legal pending issues are found at either of the dams.

A locational specific environmental and social sensitivity analysis is carried out considering 10 dams (10 where ESIA is carried out which is given at Table 2 below). As per the analysis, none of the schemes is located in protected area. None of the projects has social or cultural sensitivity which may get affected.

Table 2 Project Specific Locational Sensitivity for 10 Dams where ESIA completed

Environmental and Social sensitivity	Rajasthan	Manipur	Remark
In Protected area (Wild Life Sanctuaries, National Park and other natural habitat even if not protected)	0	0	Jawai dam is in proximity to declared conservation areas of the state ¹ . It is an old dam and no intervention has been proposed inside the conservation area.
with social sensitivity	0	0	Two dams viz. Mahi Bajaj Sagar and Som Kamla Amba fall in Scheduled Areas ² (Activities / interventions are on the dam structure and no activities proposed outside the dam
Cultural or Archaeological sensitivity	0	0	Bisalpur dam has a protected Monument, partially submerged behind dam called Bisaldeo temple, a monument of National Importance as designated by Archaeological Survey of India (ASI) ³ but no project activity or intervention are proposed close to this monument.
Legacy issues	2	0	Matrikundia Dam- there were submergence of downstream farm lands from dam releases. Currently the case for compensation is under judicial review. Chappi Dam – During construction, 25 years ago. there was a non-fatal accident. Family members expect a job when the project starts.
No locational sensitivity	8	2	

The table: 2: clearly shows all interventions proposed in the ten dams are not locational sensitive and have no impact on these sensitive locations.

The nature of rehabilitation work proposed under 10 approved schemes for which ESIA has been carried out covers (i) Structural Rehabilitation work such as : Resetting of disturbed U/s Rip- Rap, Cleaning/reaming of drainage holes in dam body foundations, repair of parapet walls, repair of damaged spill way crest, repair of downstream training wall, repairs and improvement of existing access roads etc. , (ii) Basic Facilities improvement such as renovation of view point , installing lightening arrester at dam, providing lightening to Drainage gallery (iii) Dam instrumentation , SCADA, Surveillance systems. No land acquisition and impact on physical and ecological environment has been observed in the ESIA. Most of the work activities/ interventions proposed are within dam structure except in case of Bisalpur, where extension of downstream protection wall has been proposed. All dams almost have similar kind of rehabilitation works with Low to Moderate impacts.

4.3. Environmental and Social Risks and Mitigation

Environmental and Social risks for 10 Dams are found of moderate category. The most of the schemes where ESIA is undertaken will involve labour involvement for works and their stay at site for a period of ranging from some months to about 3 years, use of resources such as water and power during construction, pollution generation from storage and handling of material, generation of waste,

¹ Conservation Reserves are declared for the purpose of protecting landscapes, seascapes, flora and fauna and their habitat.

² 2 Scheduled Areas are areas in India with a preponderance of tribal population subject to a special governance mechanism wherein the central government plays a direct role in safeguarding cultural and economic interests of scheduled tribes in the area.

³ ASI has carried out restoration and maintains the temple. No construction activity is proposed in the vicinity of the temple and also temple will not be accessible to labour working on construction work

use of paints and other chemicals for construction activities, transportation of raw material, etc. In addition, labour intensive work always involves risks of accidents such as working at heights, working on upstream body of dam, underground activities, etc. The project is likely to involve direct labor, contract labor and community workers.

No significant risk is anticipated on air quality, water quality, noise level and resource use. All such risk and impacts are anticipated to be localised and moderate in nature. Risk is associated on soil quality due to disposal of muck, however this risk is minimised with proposer planned and controlled disposal of muck. Risk to bio-diversity, flora and fauna is negligible. No direct and indirect risk are either anticipated in the dams which are also located close conservation reserve areas since no project activities are planned in these areas. However, influx of migrant labour over a period of about 3 years near reserve can lead to indirect impacts such as cutting of trees for cooking and space heating, hunting of wildlife for food and game, etc. The ESIA also indicates no impacts on tribal or land.

4.4 Applicability of Environmental Standards and Mitigation

Based on above assessments applicability analysis of WB Environmental and Social framework was also carried out for 10 projects. The following seven standards are found applicable.

ESS1: Assessment and Management of Environmental and Social Risks and Impacts

ESS2: Labour and Working Conditions

ESS3: Resource Efficiency, Pollution Prevention and Management

ESS 4: Community Health and Safety

ESS6: Biodiversity Conservation and Sustainable Management of Living Resources (applicable in some dams)

ESS 7: Indigenous Peoples/Sub-Saharan African Historically Underserved Tradition Local Communities (applicable only in some dams only)

ESS 10: Stakeholder Engagement and Information Disclosure

To minimise such risks identified an ESMP has been prepared which will specify the types of plans that need to be prepared as required under each Standard. These include: Labour Management Procedure, OHS Measures, GBV Risk Mitigation Guidelines in accordance with overall GBV framework, Resource Efficiency and Pollution Prevention Measures; Biodiversity Conservation guidelines, Tribal Development Plan, and Procedures for Stakeholder Engagement in accordance with the overall Stakeholder Engagement Framework for the project and Contractor's ESMP (C-ESMP). In addition to these plans, Environmental, Social, Health and Safety (ESHS) and Sexual Exploitation and Abuse (SEA) /Sexual Harassment (SH) related provisions will be included in the bid-documents

4.5 Monitoring and Reporting

State Project Management Unit (SPMU) will prepare a monitoring, reporting and budgeting requirement to implement above plans and measures, which will be approved by Central PMU located at Central Water commission's head quarter (CPMU – CWC). SPMU will prepare a quarterly monitoring report and submit to CPMU - CWC.

5. ESCP Provisions

The project will have an ESCP which will be part of legal agreement with all participating states and Implementing agencies (IAs). ESIA will be carried out for all each dam proposed under the project covering all proposed structural and non-structural interventions, to assess potential E&S risks and impacts in accordance with Terms of reference.

The ESIA carried out in accordance with ESS 1 will ascertain the relevance and applicability of each ESS 2-8 and 10. Issues and risks identified will be addressed through the ESMP which will specify the types of plans that need to be prepared as required under each Standard. These are likely to include: Labour Management Procedure, OHS Measures, GBV Risk Mitigation Guidelines in accordance with overall GBV framework, Resource Efficiency and Pollution Prevention Measures; Biodiversity Conservation Plan or guidelines, Tribal Development Plan, Resettlement Action Plan, and Procedures for Stakeholder Engagement in accordance with the overall Stakeholder Engagement Framework for the project and Contractor's ESMP (C-ESMP). In addition to these plans, Environmental, Social, Health and Safety (ESHS) and Sexual Exploitation and Abuse (SEA) /Sexual Harassment (SH) related provisions will be included in the bid-documents. In the event tourism activities, towards additional revenue generation are taken up, then as stated in the Environment and Social Commitment Plan (ESCP), activity specific ESIA will be conducted for these sub-components before invitation of bids for such works. Each state and IA will prepare an ESCP in agreement with the Bank that cover the material measures and actions that are required for the project to achieve compliance with the ESSs over a specified timeframe. It will consider the findings of the environmental and social assessment, the Bank's environmental and social due diligence and the results of engagement with stakeholders. ESCP will clearly spell out the plans to be prepared with time frame and responsibility. Besides, based on the findings, the ESCP will clearly list down the implementation arrangements including implementation, monitoring and grievance redressal mechanism and capacity building activities as identified.