

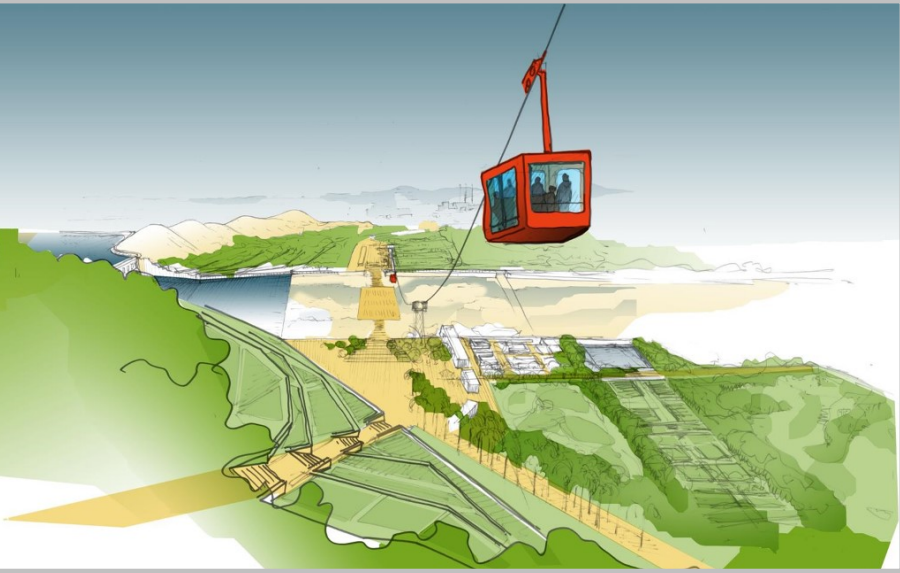
Rehabilitation and Improvement Measures

Commonly observed rehabilitation requirements include: treatment of leakage through masonry and concrete dams and reduction of seepage through earth dams, improving dam drainage, improving the ability to withstand seismic forces and higher floods, including additional flood handling facilities, as required by the hydrological reassessment following current standards , accompanied by structural strengthening of dams, non-structural measures to cater for higher design floods in case structural measures are not feasible, rehabilitation and improvement of spillways, head regulators, draw-off gates and their operating mechanisms, stilling basins and downstream spillway channels, improving dam instrumentation for enhanced dam safety .

A range of activities relating to the rehabilitation and improvement of dams have been undertaken in compliance with the project workflow: Design Flood Review, Dam Safety Review Panel Inspection, Approval of Project Screening Template (PST) and Procurement Process for Award of Work.

The implementation of the project has commenced in all Implementing Agencies. The status of approval of Project Screening Templates and award of contracts, is summarized in Figure 1.

Out of targeted 250 dams, Design Flood Review have been carried out for 208 dams, with results of the review summarized in Figure 2. Project has been slow in initial phase owing to complex project preparation process. However, the project is picking up as indicated by the progress in Award of rehabilitation works brought out in Figure 3.



People-Inclusive Rehabilitation Approach Proposed for Hirakud Dam, Orissa



Third Party Construction Supervision, Amaravathi Dam, Tamil Nadu

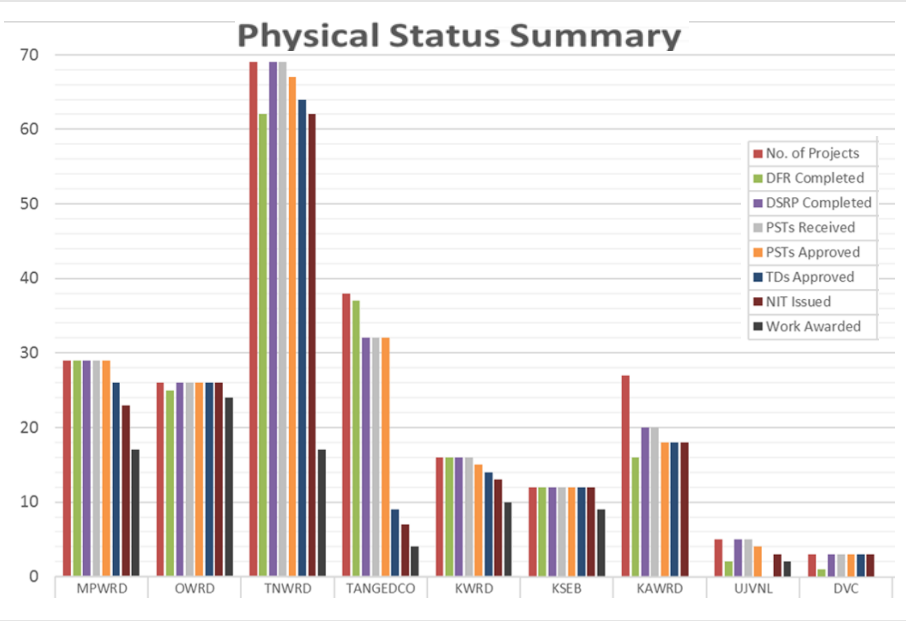


Figure 1 : Physical Status Summary as on end of December 2015

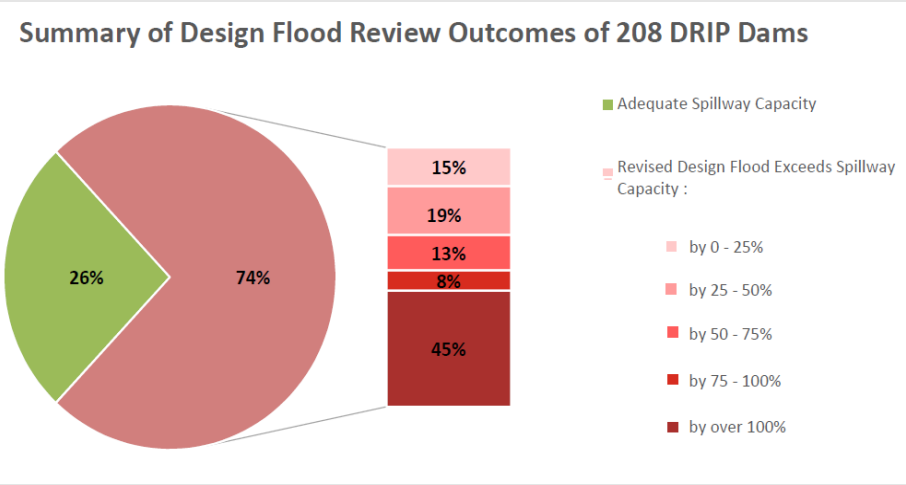


Figure 2 : Design Flood Review Summary as on end of December 2015

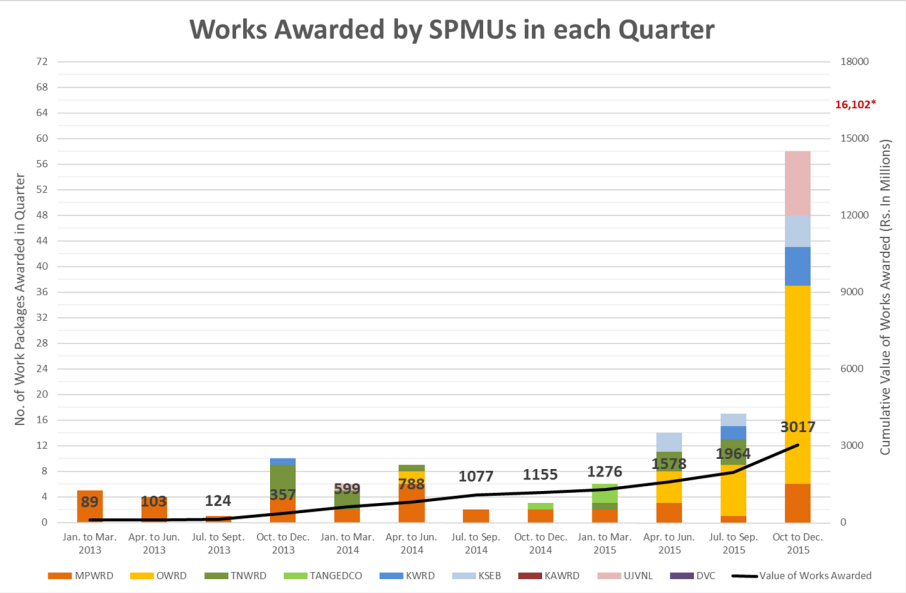


Figure 3 : Works Awarded per Quarter as of end of December 2015

Institutional Strengthening Measures

Activities targeted for improving capacities of dam owning agencies include:

- Training in different aspects of dam safety and DRIP implementation
- Preparation of Guidelines related to Dam Safety and Design Review
- Establishment of Quality Management Systems in Central Dam Safety Organisation (CDSO) leading to ISO 9001:2008 certification
- Development and maintenance of the DRIP website for wider dissemination of knowledge related to dam safety
- Development of a software solution for dam asset management— namely, the Dam Health and Rehabilitation Monitoring Application (DHARMA)

About 1500 officials from the IAs have been trained on different aspects of DRIP implementation in the training programs organized by the CPMU so far. Several knowledge-sharing visits have been organized with the participating states for gaining first-hand experiences of dam distress conditions and remedial technologies available at hand.

To provide a forum for sharing knowledge and experience of experts in solving real-life problems faced by dam safety professionals, First National Dam Safety Conference was organized in Chennai during 24-25 March 2015. About 280 delegates registered and 50 technical papers were submitted for the Conference. The Second National Dam Safety conference is being held in Bengaluru during 12-13 January 2016.



First National Dam Safety Conference, Chennai, Tamil Nadu, March 2015

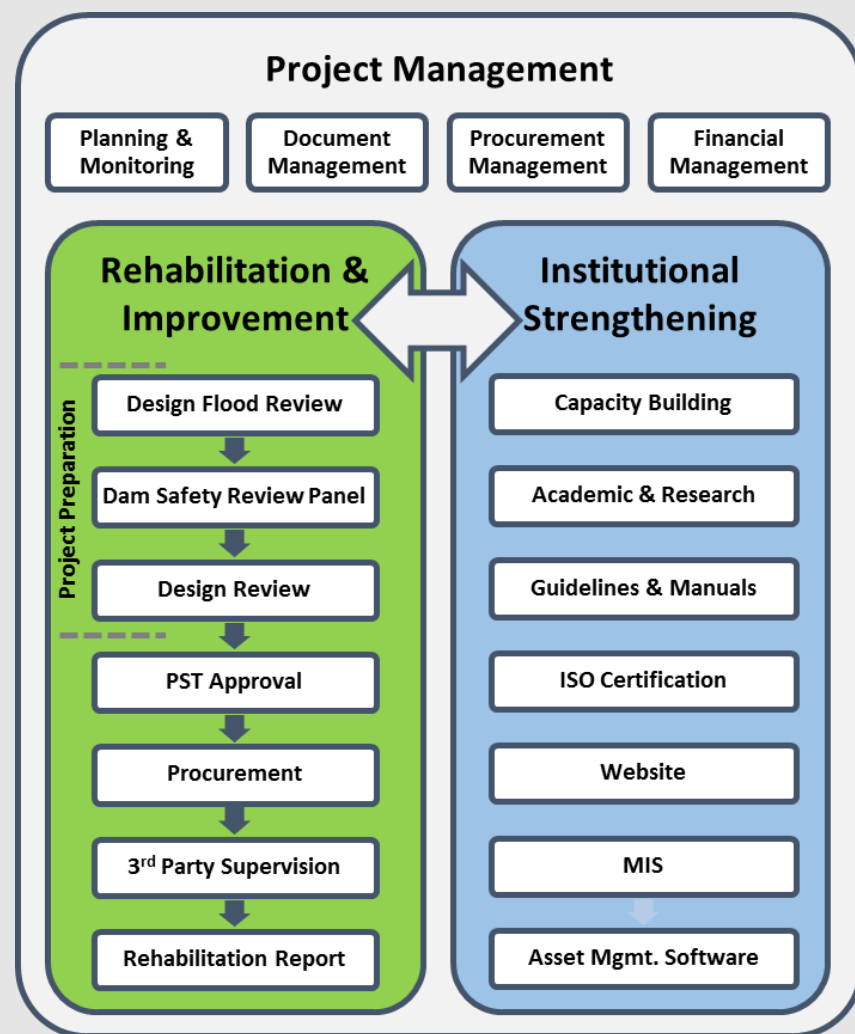
Implementation of DRIP

Overall responsibility for supervision and coordination of implementation of projects under DRIP rests with the Central Project Management Unit (CPMU), created in Dam Safety Rehabilitation Directorate, of Central Water Commission. Egis EAU (France) is providing the Engineering and Management Consultancy support to CPMU to coordinate and supervise the Project Implementation.

The Implementing Agencies for Dam Rehabilitation and Improvement Project are the respective dam owning agencies in the participating States. Nine Implementing Agencies are : Madhya Pradesh Water Resources Department (MPWRD), Odisha Water Resources Department (OWRD), Tamil Nadu Water Resources Department (TNWRD), Tamilnadu Generation and Distribution Corporation Ltd. (TANGEDCO), Kerala Water Resources Department (KWRD), Kerala State Electricity Board (KSEB), Karnataka Water Resources Department (KAWRD), Damodar Valley Corporation (DVC) and Uttarakhand Jal Vidyut Nigam Limited (UJVNL).

The day-to-day management of the Dam Rehabilitation and Improvement Project at State level is being supervised by the State Project Management Units (SPMUs) / Implementing Agencies, with the CPMU assuming an overall management role.

The day-to-day construction supervision and quality assurance activities are coordinated by the concerned Implementing Agencies while third-party construction supervision and quality control support is provided by the CPMU Consultant.



Components of Dam Rehabilitation and Improvement Project

Project Review of DRIP

Central Project Management Unit reviews the adequacy and compliance with best engineering practices and monitors the project progress. The World Bank periodically reviews the progress in the implementation of DRIP through its Review Missions; seven Bank Review Missions have been completed so far.

The Technical Committee, under chairmanship of the Member, Design & Research, Central Water Commission meets periodically for guiding and expediting the pace of project implementation. To date, thirteen meetings of the Technical Committee have been held.

In addition, National Level Steering Committee (NLSC) for DRIP constituted under the Ministry of Water Resources, Ganga Rejuvenation & River Development also reviews the status of implementation of DRIP and provides policy guidelines; NLSC met twice in 2015.



Thirteenth Technical Committee Meeting, Ranchi, Jharkhand, December 2015

Other Achievements of DRIP

Concerted efforts are being made to bring in new technology interventions in the areas of upstream surface treatments for seepage control, treatment for block joints, dam instrumentation and hydro-mechanical equipments.

Project has also carried out a detailed investigation of the unusual behaviour of Idukki Arch dam involving site / laboratory investigations and FEM (Finite Element Method) analysis leading to optimal rehabilitation proposal.

Many of the DRIP dams are substantially old and require special attention for mitigating their current distress. Krishna Raja Sagar dam in Karnataka is one such case where rehabilitation of Vishweswariah type gates is being undertaken with minimum modification of the civil structure. The prestigious Hirakud dam, across the Mahanadi River in Odisha has significant issues related to safe passage of design flood, its mitigation is being undertaken by creation of additional spillway capacity while adopting people inclusive approach towards dam safety.

With the realization of the need for building upon the 'resilience factor' for dam safety, especially in view of threats posed by climate change, all Implementing Agencies of the Project have agreed to develop Emergency Action Plans (EAP) for each of their DRIP dams. A new approach is being followed under DRIP for the effective and efficient development of EAPs of over 200 dams in the short available window of the Project.

Desiltation of the reservoirs, an activity usually avoided, is also being covered under the scope of the Project, and four of the reservoirs in Tamil Nadu are being targeted for desiltation activity. Comprehensive silt modelling study has been completed in the case of three reservoirs (Kundah Palam, Pillur, and Papanasam) and tender documents have been prepared for taking up the works. Special arrangements for preventing the movement of boulders in one of the Himalayan project (Maneri Bhali Stage II) are also under consideration.

Quality Management System was developed and implemented in Central Dam Safety Organization (CDSO) and ISO 9001: 2008 certification of CDSO obtained from the Bureau of Indian Standards. CBIP Award 2016 for promoting Health and Safety of Large Dams under DRIP has been received by Central Water Commission.

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Dam Rehabilitation & Improvement Project



Central Water Commission

DAM REHABILITATION AND IMPROVEMENT PROJECT

There are about 4,900 large dams in India and about 300 are under construction. In addition, there are several thousands smaller dams. All of these dams are vital for ensuring the water security of the country in a sustainable manner and regulating water during the rainy season to prevent floods.

In April 2012, the Central Water Commission with loan assistance from the World Bank, embarked on the six year Dam Rehabilitation and Improvement Project (DRIP) at an estimated cost of ₹2,100 crores for assisting the dam owning agencies in rehabilitating select dams.

Most of the dams identified for rehabilitation under DRIP today are composite dams (Masonry or Concrete Gravity plus Earthen Embankment); and majority of them are more than 25 years old. Many of these are facing various structural deficiencies as well as shortcomings in the operation and monitoring facilities. There are also inadequacies in complying with the current design standards and philosophy. These conditions affect the safety of the structures and pose risks to life and properties of people downstream of dam.

Objectives of DRIP

The project development objectives of DRIP are to:

- Improve the safety and performance of selected existing dams and associated appurtenances in a sustainable manner, and
- Strengthen the dam safety institutional setup in participating States as well as in Central Water Commission.

The objectives are to be achieved through investments on rehabilitation and improvement of dams including maintenance, improved management of dam operations and accompanying institutional strengthening and reforms. DRIP shall result in a effective utilization of stored water and improved performance of dams on long-term basis with reduced risk of failure / safety incidents. It will also lead to promotion of new technologies and improvement in capacities for dam safety evaluation and implementation.

The project will contribute to institutional strengthening and project management activities in the Central Water Commission and other participating organizations. In-house capacity building is also proposed to be taken up in nine premier Academic & Research institutes; these institutes in turn would provide expertise in improving dam safety conditions in the country.

