सत्यमेव जयते

ANNUAL REPORT
2022-23

CENTRAL WATER COMMISSION

DEPARTMENT OF WR, RD & GR
MINISTRY OF JAL SHAKTI

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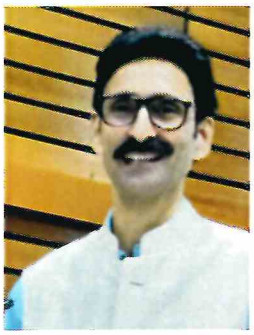
FROM CHAIRMAN'S DESK



It is with great pleasure that I present the Annual Report of Central Water Commission (CWC) for the fiscal year 2022-23. This report provides a comprehensive overview of the functions and activities undertaken by CWC in the water resources sector, both within the country and abroad.

Since its inception as the Central Waterways, Irrigation, and Navigation Commission (CWINC) on April 5, 1945, under the guidance of Dr. B.R. Ambedkar, and subsequent evolution into the Central Water Commission, CWC has played a pivotal role in establishing standards for water resources development, management, and associated fields.

CWC has always worked for providing quality service to the nation in the field of water resources development and management. Further, CWC is committed to provide full support to the State Governments in all aspects related to planning, design, construction, operation and management of water resources projects in an efficient, sustainable and technically sound manner.

During the year CWC has made significant contributions on various fronts, offering essential support and guidance to the Department of Water Resources, River Development, and Ganga Rejuvenation, Ministry of Jal Shakti, on technical and policy matters within the water resources sector. Regular activities of appraisal of Major and Medium Irrigation (MMI) projects and other water resources development schemes, monitoring of MMI and Extension, Renovation & Modernization (ERM) projects, environmental issues related to projects, design of hydraulic structures, hydrological observations and studies and flood forecasting services were successfully carried out during the year.

In line with our enduring vision for the year 2047, marking a century of India's independence, I am happy to inform that we have taken up various new initiatives aimed at redefining the role and enhancing the capabilities of the Central Water Commission. A proactive approach has been adopted towards developing a Short, Medium, and Long Term Action Plan. The Short Term plan, focused on revamping our current operations, emphasizes the realignment of our roles and responsibilities, standardization of processes, capacity building initiatives, and enhanced public awareness activities. Looking ahead to the Medium Term plan, to be achieved by 2030, we aspire to enhance our domain expertise, incorporate cutting-edge technologies, and explore new avenues of work.

However, it is the Long Term plan, set to be realized by 2047, that encapsulates our aspirations for elevating CWC to unprecedented heights. This involves the development of indigenous software and modeling tools tailored to India's unique water resource challenges, integrating advanced technologies such as Artificial Intelligence and Machine Learning, and bolstering our expertise in critical areas such as Extended Hydrological Prediction and Integrated Reservoir Operation.

To facilitate the realization of this vision, we have outlined a series of measures aimed at enhancing our operational capabilities and service delivery. These include publishing basin-wise Trend Analysis

Reports, improving the accuracy of our Flood Advisory, and monitoring water quality in key water bodies. Additionally, we are committed to expanding our expertise in areas such as Urban Hydrology, venturing into new work domains, and establishing a dedicated modeling center to meet future challenges.

The ongoing commitment to innovation and progress within CWC ensures a continuous pipeline of initiatives aimed at addressing diverse challenges and opportunities in water resources management. By continuously expanding its portfolio of initiatives, CWC aims to address evolving water challenges and contribute to India's water security and climate resilience agenda.

Furthermore, recognizing the importance of collaboration and synergy, we have initiated interactions with Water Resources/ Irrigation/ Jal Shakti Departments at the State and UT levels. These engagements aim to enhance cooperation and better align our efforts to meet the diverse water resource needs across the nation. These Interactions have been planned at two levels. Firstly, interaction at Chairman level to be held with State Governments on annual basis to discuss the needs of entire water sector in the State and secondly, interaction at the level of Regional Offices of CWC in collaboration with CGWB, to be held on Quarterly basis in respect of some specific subject matters.

In conclusion, I extend my gratitude to all the officers/officials of CWC and DoWR, RD & GR and also other stakeholders whose support and commitment have been instrumental in these endeavours. The journey outlined in this report is not just a reflection of our past achievements but a testament to our unwavering commitment to shaping a water-secure future for generations to come.

(Kushvinder Vohra)
Chairman
Central Water Commission

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केंद्रीय जल आयोग
CENTRAL WATER COMMISSION

मिशन वक्तव्य

अत्याधुनिक प्रद्योगिकी और सक्षमता का उपयोग करके और सभी पणधारियों का समन्वय करके भारत के जल संसाधनों के एकीकृत और दीर्घकालिक विकास और प्रबंधन को बढ़ावा देना|

Mission Statement

To Promote integrated and sustainable development and management of India's water resources by using state-of-the-art technology and competency and by coordinating all stakeholders.

HIGHLIGHTS OF CWC FOR THE FY YEAR 2022-23

❖ DESIGNS of Water Resource Projects

- CWC provided design consultancy to States / Project Authorities for 92 water resources development projects involving detailed designs and preparation of drawings of various types of hydraulic structures.
- During 2022-2023, many special studies regarding Dam Break Analysis and GLOF have been carried out. Important among them are DBA & EAP of Mullaperiyar Dam (Kerala), Bisalpur Dam (Rajasthan), GLOF study of Upper Siang Multipurpose Project, West Seti Project (Nepal) etc.
- CWC undertook flood routing studies for Pong Dam and prepared a draft report titled 'Report on Restoration of Pong Dam Reservoir Level'.
- Construction of Punatsangchhu-I H.E. Project (Bhutan), Punatsangchhu-II H.E. Project (Bhutan) is in full swing and design & drawings are issued as per the construction schedule of the projects. The no. of construction stage drawing for various projects e.g. Parwan (Raj.), Chelligada (Odisha), Isarda (Rajasthan), Indroka, Ganol (Meghalaya) etc. were issued. In addition, DPR stage drawings were also issued.
- A Memorandum of Agreement (MoA) was signed between CWC and IIT Roorkee for Development of International Centre of Excellence for Dams at IIT Roorkee at the cost of Rs 108.99 Cr.
- Workshop on Rapid Risk Assessment Framework conducted in January 2023, in which 20 officials from CWC and about 60 officials from State IAs participated.
- During the year 2022-23, technical examinations of hydrological aspects of DPRs in respect of 124 projects have been carried out.
- During 2022-23, Technical evaluation of 23 Site Specific Seismic reports has been carried out by CWC.
- Techincal examination of 61 Hydro-Electric projects, 16 Irrigation projects and 9 Multi-Purpose Projects have been carried out.
- During 2022-23, 16 Nos. of draft standards/amendments to IS Codes have been approved by Chairman, CWC.
- Reconstituted the Supervisory committee on Mulla Periyar Dam. The committee inspected and ascertained the overall condition of dam and its appurtenant structures.
- NDSA was established by CWC officers on additional charge basis, 4 regional offices (North, East & North East, West and South) have also been established.
- A National Workshop on Dam Safety Act, 2021 for dam safety governance in India was organized on 16th June 2022 to sensitize all the Central/State Governments, CPSUs, local authorities, company that own, control, operate or maintain a specified dam. NDSA organized meeting-cum workshop in all four Regions in the country ie Coimbatore (Sept 2022), Chandigarh (Sept 2022), Pune (Nov 2022) and Guwahati (Nov 2022).
- The drafts of top priority Regulations on 13 matters listed in Section 54 (2) of DSA, 2021 were prepared by the Sub-committee constituted within Central Water Commission. The same has been forwarded to experts & NDSA members for observations and examination.

❖ RIVER MANAGEMENT in the country

- Carried out hydrological observations at 1543 sites and meteorological observation at 187 sites in different basins spread over the entire country.
- Provided Flood Forecasting Service at 333 flood forecasting stations (including 134 inflow forecasting stations) spread over 20 major river systems in the country. During the flood season 2022, 11558 flood forecasts (6779 level forecast and 4779 inflow forecasts) were issued, out of which 10845(93.83%) forecasts were within prescribed limits of accuracy. Daily flood bulletins and weekly flood news letters were also issued during the flood season.

- Launch of Ensemble Forecasting for all the FF stations of CWC using the National Centre for Medium-Range Weather Forecasting (NCMRWF) real-time ensemble rainfall forecast.
- As on April 2023, 20 River Water Quality Laboratory of CWC had accredition by National Accreditation Board for Testing and Calibration Laboratories (NABL) in the discipline of chemical testing.
- Draft guidelines on 'Salinity Ingress Management Project' approved by D/o WR, RD &GR and circulated to all the coastal states/UTs for their comments/views.
- Proposal on establishing Smart Laboratory for clean river in Varanasi has been approved in September, 2022.
- Organized outreach program at the iconic dam sites under "Azadi Ka Amrit Mahotsav (AKAM)" for promoting Dam Tourism on 04 dams sites i.e Sardar Sarovar, Idukki, Tungabhadra & Maithon dam during the period of report.

❖ WATER PLANNING

- During the year 2022-23, 26 major/ medium irrigation projects and 05 drinking water projects were under appraisal in CWC. 19 projects comprising 08 Major and Medium Irrigation Projects/ Multipurpose Projects and 11 Flood Control Projects were accepted by the Technical Advisory Committee.
- CWC monitored 64 Irrigation projects out of 99 priority projects (106 including phases) + 6 newly included, (including Extension/Renovation/Modernization (ERM) projects) receiving grants under PMKSY-AIBP programme.
- Eight Concept Note/ Preliminary Project Report & one Detailed Project Report (DPR) of externally aided irrigation and multipurpose project have been appraised in CWC during 2022-23.
- Investment Clearance proposal of 4 projects viz. i) Revised Cost Estimate (RCE) of extension, renovation and modernization (ERM) of Loktak Lift Irrigation Project, Phase-I, Manipur ii) Phase-I works of Ghatal Master Plan in Paschim Medinapur and Purba Medinapur districts of West Bengal, iii) RCE of Bodwad Parisar Sinchan Yojana (major irrigation), Maharashtra and iv) RCE of the Jamrani Dam multipurpose project, Uttarakhand were processed and Investment Clearance was recommended in the 17th meeting of Investment Clearance Committee. The 'In Principle consent for preparation of DPR of ERM of Gang Canal Project, Rajasthan' is issued.
- "Reviewing the calculation of Benefit Cost Ratio and Procedure for Revised Cost Estimation (RCE) for Major & Medium Irrigation, Flood control and Multipurpose Projects". The final report was submitted to D/o WR, RD &GR in August 2022.
- Storage positions of 146 important reservoirs, with total live storage of about 178.185 BCM, were monitored on weekly basis.
- A total of 12 Draft Final reports of "Reservoir Sedimentation studies using hydrographic survey" under NHP in Phase-I have been approved, out of which 5 reports are finalized in all respects.
- Finalized the IEWP Action Plan for the second phase with EU and GIZ. The activities such as Water Allocation Modelling, Water Accounting, and fine-tuning other activities were included in the second phase of IEWP.

❖ HUMAN RESOURCE MANAGEMENT/ Capacity Building

- CWC participated as Exhibitor during 2nd Environment and Climate Working Group Meeting of G-20 countries, held during 27-29th March 2023 at Gandhinagar, Gujrat.
- During 2022-23, National Water Academy, CWC, Pune conducted 46 training programmes (36 Residential and 10 online) benefitting officers from Central / State Governments, Central & State PSUs, Academic Institutions, Schools, NGOS, etc with a total number of man weeks to the tune of 14322.
- CWC commenced the implementation of IT tools such as e-HRMS, e-office (SPARROW) for managing of employee service related data.

1 AN OVERVIEW

1.1 HISTORY OF CWC

Central Water Commission (CWC), an apex organization in the country in the field of Water Resources came into existence as "Central Waterways, Irrigation and Navigation Commission" vide Department of Labour Resolution No. DW 101(2) dated 05.04.1945. In the year 1951, it was renamed as "Central Water and Power Commission" (CW&PC) after its merger with the "Central Electricity Commission". Following the changes in the Ministry of Agriculture and Irrigation, in the year 1974, Water Wing of CW&PC was separated as "Central Water Commission", which continues till date. At present Central Water Commission functions as an "Attached Office" of the Department of Water Resources, River Development and Ganga Rejuvenation, Ministry of Jal Shakti and is its main technical arm. It is mainly manned by the officers of Central Water Engineering Services (CWES) cadre, the only organised service of the Ministry of Jal Shakti, Department of Water Resources, River Development and Ganga Rejuvenation.

1.2 ORGANIZATION

CWC is headed by a Chairman, having the status of Ex-Officio Secretary to the Government of India. The work of the Commission is divided among 3 wings namely, Designs and Research (D&R) Wing, Water Planning and Projects (WP&P) Wing and River Management (RM) Wing. Allied functions are grouped under respective wings and each wing is placed under the charge of a full-time Member having the status of Ex-Officio Additional Secretary to the Government of India. Each wing comprising of a number of organizations is responsible for the disposal of tasks and duties falling within the scope of functions assigned to them. Officers of the rank of Chief Engineer, Director/Superintending Engineer, Deputy Director/Executive Engineer, Assistant Director/Assistant Executive Engineer; other technical and Non-technical officers and supporting staff working in headquarter and various regional organizations, assist the members in discharge of necessary responsibilities. There is a separate Human Resources Management Unit headed by a Chief Engineer, to deal with Human Resources Management/Development, Financial Management, Training and Administrative matters of the Central Water Commission. National Water Academy located at Pune is responsible for training Central and State in-service engineers and functions directly under the guidance of Chairman, CWC. Broad duties and responsibility of Chairman and Members are as under:

CHAIRMAN

CWC is headed by a Chairman, with the status of Ex-officio Secretary to the Government of India. Head of the Organization is responsible for overseeing the various activities related to overall planning and development of water resources of the country and management of the Commission as a whole.

MEMBER

The work of the Commission is divided among 3 wings namely, Water Planning and Projects (WP&P) wing, Designs and Research (D&R) Wing and River Management (RM) Wing. Each wing is placed under the charge of a full-time Member with the status of Ex-Officio Additional Secretary to the Government of India

MEMBER (WATER PLANNING & PROJECTS)

Responsible for overall planning and development of river basins, National Perspective Plan for water resources development in accordance with the National Water Policy, techno-economic appraisal of water resources projects and assistance to the States in the formulation and implementation of projects, monitoring of selected projects for identification of bottlenecks to achieve the targeted benefits, preparation of project reports for seeking international assistance, environmental aspects, application of remote sensing technologies in water resources, etc.

MEMBER (DESIGNS & RESEARCH)

Responsible for providing guidance and support in planning, feasibility studies, standardization and designs of river valley projects in the country, safety aspects of major and medium dams, hydrological studies for the projects, coordination of research activities, etc.

MEMBER (RIVER MANAGEMENT)

Responsible for providing technical guidance in matters relating to river morphology, flood management, techno-economic evaluation of flood management schemes, collection of hydrological and hydro-meteorological data, formulation of flood forecast on all major flood prone rivers and inflow forecasts for selected important reservoirs, investigation of irrigation/ hydro-electric/ multipurpose projects, monitoring of major and medium projects with regard to AIBP etc.

The incumbents to the posts of Chairman and Members of Central Water Commission during the year 2022-23 were:

1.	**Chairman, CWC**	Dr. R. K. Gupta (01/04/2022 to 30/11/2022) Sh. J.Chandrashekhar Iyer (01/12/2022 to 31/12/2022) **Sh. Kushvinder Vohra (01/01/2023 and continuing)**
2.	**Member (D&R)**	Sh. J.Chandrashekhar Iyer (01/04/2022 to 30/11/2022) Sh. Navin Kumar (01/12/2022 to 31/01/2023) **Sh. Sanjay Kumar Sibal (01/02/2023 and continuing)**
3.	**Member (RM)**	Sh K. Vohra (Addl Chg.) (01/02/2022 to 25/06/2022) **Sh P M Scott (26/06/2022 and continuing)**
4.	**Member (WP&P)**	Sh K. Vohra (01/04/2022 to 31/12/2022) Sh P M Scott (Addl Chg.) (01/01/2023 to 31/01/2023) **Sh Navin Kumar (01/02/2023 and continuing)**

BROAD FUNCTIONS

CWC is charged with the general responsibility of initiating, coordinating and furthering, in consultation with the State Governments concerned, schemes for the control, conservation and utilization of water resources in the respective State for the purpose of flood management, irrigation, drinking water supply and water power generation. The Commission, if so required, can undertake the construction and execution of any such scheme.

In exercise of the above responsibilities following are the main functions of CWC:

- To carry out techno-economic appraisal of irrigation, flood control and multipurpose projects proposed by the State Governments;
- To collect, compile, analyse and publish the hydrological and hydro-meteorological data relating to major rivers in the country, consisting of stage, runoff, rainfall,

temperature etc.;

- To collect, maintain and publish statistical data relating to water resources and its utilization including quality of water;
- To provide flood forecasting services to all major flood prone inter-state river basins of India through operation of network of flood forecasting stations;
- Monitoring of selected major and medium irrigation projects to ensure the achievement of physical and financial targets. Monitoring of projects under Accelerated Irrigation Benefit Program (AIBP), and Command Area Development (CAD) program are also undertaken;
- To advise the Government of India and the concerned State Governments on the basin-wise development of water resources;
- To undertake necessary surveys and investigations, as and when required, to prepare designs and schemes for the development of river valleys in respect of power generation, irrigation by gravity flow or lift, flood management and erosion control, anti-water logging measures, drainage and drinking water supply;
- To provide Design Consultancy including Hydrological Studies in respect of Water Resources Projects, to the State Governments concerned/project authorities whenever requested for.
- To undertake construction work of any river valley development scheme on behalf of the Government of India or State Government concerned;
- To advise and assist, the State Governments (Commissions, Corporations or Boards that are set up), whenever requested for, in the investigation, surveys and preparation of river valley and power development schemes for particular areas and regions;
- To advise the Government of India in respect of Water Resources Development, regarding rights and disputes between different States which affect any scheme for the conservation and utilization and any matter that may be referred to the Commission in connection with river valley development;
- To impart training to in-service engineers from Central and State Organizations in various aspects of water resource development;
- To initiate studies on socio-agro-economic and ecological aspects of irrigation projects for the sustained development of the irrigation sector;
- To conduct and coordinate research on the various aspects of river valley development schemes such as flood management, irrigation, navigation, water power development, etc., and the connected structural and design features;
- To promote modern tools and techniques such as remote sensing technology for water resources development, flood forecasting and development of related computer software;
- To conduct studies on dam safety aspects for the existing dams and standardize related instrumentation for dam safety measures;
- To carry out morphological studies to assess river behaviour, bank erosion/coastal erosion problems and advise the Central and State Governments on all such matters;
- To promote and create mass awareness on the progress and achievements made by the country in the water resources development, use and conservation.

HEADQUARTERS

There are sixteen organizations, each headed by a Chief Engineer at CWC headquarters, New Delhi. Out of this, eight organizations are under WP&P wing, five organizations are under D&R wing and two organizations are under RM wing. In addition, Human Resources

Management (HRM) Unit headed by Chief Engineer (HRM) is also located at headquarters. The details of the organizations are given in the organogram.

1.3 Regional Offices

In order to achieve better results in the Water Resources Sector and have better coordination with the State Government departments, CWC has established regional offices in the major river basins. It has 14 regional offices, each headed by a Chief Engineer. The offices are located at Bangalore, Bhopal, Bhubaneswar, Chandigarh, Coimbatore, Delhi, Gandhi Nagar, Guwahati, Hyderabad, Kolkata, Lucknow, Nagpur, Patna and Shillong.

1.4 Important Schemes and Programmes

1.4.1 PMKSY - Accelerated Irrigation Benefits Programme

The PMKSY-Accelerated Irrigation Benefits Programme (AIBP) is being implemented by DoWR,RD&GR. Central Water Commission has been assigned with the responsibility to comprehensively monitor the projects receiving Central Assistance.

Government of India launched the Pradhan Mantri Krishi SinchayeeYojana (PMKSY) during 2015 with the motto of 'Har Khet Ko Pani' ensuring access to some means of protective irrigation to all agricultural farms in the country, to produce 'per drop more crop', thus bringing much desired rural prosperity. The ongoing programmes as being implemented by the Government of India, viz Accelerated Irrigation Benefits Programmes (AIBP), Repair, Renovation and Restoration (RRR) of Water bodies and Command Area Development and Water Management (CADWM) have been subsumed in Pradhan Mantri Krishi Sinchayee Yojana (PMKSY).

In order to overcome the bottlenecks faced in completion of project under AIBP, DoWR,RD&GR identified 99 priority projects from amongst the 149 on-going projects as on 01.04.2016 under AIBP for early completion. Under the dedicated funding mechanism i.e. Long Term Irrigation Fund (LTIF), a special window has been created in NABARD which could be utilized by the Central and State Governments to bridge the requirement of funds for completion of the 99 priority projects including CAD works for central assistance as well as state share component. Out of these 99 priority projects, 53 projects have been reported completed and 23 projects have progress more than 90%.

Further details regarding this scheme covered in subsequent chapters.

1.4.2 Special package for drought prone areas of Maharashtra

Government of India has sanctioned a special package for completion of Irrigation Projects to address agrarian distress in Vidarbha, Marathwada and other chronically drought prone areas of Maharashtra during July, 2018. The package consists of 8 Major and Medium Irrigation (MMI) Projects approved by TAC of Erstwhile MoWR, RD & GR and 83 Surface Minor Irrigation (SMI) Projects. The balance estimated cost of projects of Maharashtra to be completed under this package is Rs 13651.61 Cr as on 01.04.2018, with Rs 3831.41 Cr being the Central Assistance (CA) by Government of India. On completion of the balance works of these projects, additional Irrigation Potential of 3.77 Lakh Ha would be created. 1 MMI project and 39 Surface Minor Irrigation (SMI) Projects have been reported to be completed upto March 2023.

Further details regarding this scheme covered in subsequent chapters.

1.4.3 FLOOD MANAGEMENT AND BORDER AREAS PROGRAMME (FMBAP)

A comprehensive scheme titled "Flood Management and Border Areas Programme (FMBAP)" with an outlay of Rs. 3342.00 Cr (FMP-Rs 2642 Cr & RMBA-Rs 700 Cr) for period 2017-2020 with merged components from the existing Flood Management Programme (FMP) and River Management in Border Areas (RMBA) schemes during XII Five Year Plan was approved by the Union Cabinet on 07-Mar-2019 and aimed at completion of the on-going projects already approved under FMP. The scheme was extended till March, 2021.

Approval of FMBAP 2021-2026 vide Cabinet decision dated 19.01.2022 was up to September, 2022 with limited outlay of Rs. 450 Cr. Funding ratio has been kept as 90:10 (for special category States) and 60:40 (for general States) under Flood Management Programme (FMP) component of FMBAP scheme.

Further details regarding this scheme covered in subsequent chapters.

1.4.4 Development of Water Resources Information System (DWRIS)

Central Water Commission is implementing the Plan Scheme "Development of Water Resources Information System (DWRIS)" with an objective to operate a standardized national water information system in the country with provision for data collection, data processing and storage and online data dissemination. The scheme has following four major components:

i. Hydrological Observations Monitoring System
ii. Irrigation Census
iii. Strengthening of Monitoring Unit in CWC
iv. Data Bank and Information System

1.4.5 National Projects

Government of India is implementing the scheme of National Projects since XI Plan with a view to expedite completion of identified National Projects for the benefit of the people. So far, Central Government has declared 16 water resources projects as National Project.

The provision of financial assistance for National Projects has been included in the recently launched PMKSY. The proportion of Central share has now been revised to 60% except in case of projects in eight North Eastern States and three Himalayan States which will continue to obtain central assistance at 90% of the cost of the project.

Further details regarding this scheme covered in subsequent chapters.

1.5 Use of E-Gov in CWC

E-Gov facility is progressively being used in CWC for up-keeping and maintenance of personal records of employees working in CWC. Different modules under this system include e-Office, APAR Management System (APARMS), Sparrow and CWES Bio-data Information System etc. The details of the systems are as under:

1.5.1 Unique Employee ID for employees of CWC

Unique IDs for all employees of CWC working at Head-Quarters as well as field offices are maintained in CWC. This ID is a unique number and serves the purpose of identification of category of service, batch/year of joining, etc. of the employees. The Employee ID is used for generation of salary bills of employees through COMP-DDO software at CWC Head Quarter as well as in various module of Personal Information System.

1.5.2 Use of e-Office in CWC

E-office was launched in CWC in August 2017 by implementing the same in 06 Directorates of CWC. The same has been gradually implemented in other Directorates at CWC-HQ as well as Regional Office.

1.5.3 Use of SPARROW for management of APAR for Group-A Officers

SPARROW has been implemented successfully in CWC for all the CWES Group 'A' officers during the period 2017-18. SPARROW has also been implemented for all the officers of CWES Group 'B' Gazetted and CWES Group 'B' Non-Gazetted during the period 2018-19. Implementation of SPARROW for all the officers of Group C is under process.

1.5.4 APAR Management System (APARMS)

Annual Performance Appraisal Management System (APARMS) is operational in CWC to facilitate proper up-keep and maintenance of records related to APAR of employees of CWC other than CWES Group-A Officers. As per latest guidelines issued by DoPT, APAR of all Government employees are to be communicated to them.

The APARMS is an online system in which each official of CWC can view his/her APAR. Whenever any APAR of individual official is uploaded, a system generated e-mail is sent to the concerned official informing him about the same. For this purpose e-mail IDs of all the employees of CWC has been created and communicated to them. The system can be accessed through link available on the CWC website www.cwc.gov.in. Any employee can access his/her latest APAR by entering the authentication details provided to him.

1.5.5 Implementation of eHRMS (DoPT version) in CWC

eHRMS (DoPT version) Software developed by DoPT is being implemented in CWC along with its customization. Most of the employees have been on-boarded in the portal and major modules will be implemented shortly.

1.5.6 Implementation of AIPR in e-office

Annual Immovable Property Return (AIPR) is being submitted through e-office (SPARROW) in r/o all the Officers (Gr 'A', Gr 'B' and Gr 'C') of Central Water Commission.

1.5.7 Development of 04 portals under DGQI

The work of re-development of 04 portals viz. DHARMA, ePAMS, Budget Management System and Human Resource Development Support System has been awarded in compliance to DGQI guidelines and the work has started as on 31.03.2023.

1.6 Aadhaar Enabled Biometric Attendance System (AEBAS)

The Biometric Based Attendance Management System (BBAMS) was introduced in Central Water Commission Head Quarter, Sewa Bhawan, New Delhi in December, 2010. In view of the guidelines issued by the Government of India, the system has been switched over to Aadhaar Enabled Biometric Attendance System (AEBAS) in association with NIC in December, 2014. AEBAS is also being implemented in Regional Offices of Central Water Commission.

1.7 Central Water Commission Library

The library & Information Bureau, CWC was initially established in Shimla under Central

Board of Irrigation in year 1931. This library was shifted to Central Waterways, Irrigation & Navigation Commission at New Delhi in 1955.

The library & Information Bureau, CWC is one of the most prestigious technical reference library on the subject of Water Resources Engineering and other related subject. The function of the Library and Information Bureau is to develop the extensive information system in the field of Water Resources Development. This library at present have collection of aprox. 79,474 technical books/references along with 1,00,000 journals which is updated with latest publications every year.

The Library is regularly subscribing journals and other publications and the Library stock is arranged in a manner to make retrieval of desired publication fast and easy. The Library is located in a dedicated building.

The work for Modernization and Development of CWC Library is in progress which includes listing of all the available books/reference books on NIC-e Granthalaya portal for easy and remote access and user Friendly search facility to users for available books in public domain for larger benefit. Online Membership/Login/No dues provided at all levels of Officers/staff at CWC HQ. The link of CWC Library has been created on CWC Website has facilitated the listing of the available books in Library.

The Map Record section is also a unit of Library and Information Building. It has collection of approximate eight thousand topo-sheet, state map, rail map, political map etc.

An auditorium, which is a part of Library Building, has been made operational since January 2014. Other facilities in the premises includes conference hall for organizing training, seminar, meeting etc.

1.8 Progressive Use of Hindi in Official Work

A Hindi Section under the control of Central Secretariat Official Language Service, Department of Official Language, M/o Home Affairs is functioning at CWC Headquarter which is working tirelessly to ensure the proper compliance of Officials Language Act, 1963 and other rules and regulation related thereto. Continuous measures are being taken for increasing progressive use of Hindi for official purpose.

The Official Language Implementation Committee of the Commission under the Chairmanship of the Chairman, CWC, has met regularly to review the progress on quarterly basis. Various measures required for progressive use of Hindi are discussed and timely action has been taken on the decisions of the meetings. Workshops have been organized on quarterly basis. Incentive Scheme for Hindi Noting and Drafting has been implemented. Hindi Pakhwada was organized.

The inspection of total 07 regional offices of CWC, New Delhi were carried out by the Second sub-committee of the Parliamentary committee on Official Language. These inspections were highly successful and the efforts made by the organization were duly appreciated by the committee.

Inspections of Field Offices and Headquarter are carried out regularly. Officers have been sent for training on Hindi Language in the Central Hindi Training Institute. As on March 2023, One Hundred twenty (120) Field Offices of CWC have been notified under Rule 10(4) of Official Language Rules, 1976. Further, seventeen (17) Administrative Sections of CWC have been notified under Rule 8(4) of Official Language Rule 1976 to work only in Hindi. Central Water Commission has made all out efforts to achieve the targets fixed by the Department of Official Language in the Annual Programme 2022-23. So far, significant progress has been made in the

implementation of the Official Language Act and Rules in the Commission.

Following initiatives in regard to progressive use of Hindi were undertaken during the year 2022-23:

a) 22 Regional Offices of CWC and 14 Section/Directorates of CWC (Hq) were inspected to review the progressive use of Hindi and also to keep a watch on the compliance of orders, instructions etc. and effective measures were taken for rectifying short- comings noticed during the inspection.

b) As per the Annual Programme of the Department of Official Language four meetings of Official Language Implementation Committee were held and four Hindi Workshops were organized during the year. Further, four Hindi workshops were also organized at Central Water Commission (Headquarter) to generate awareness about the use of Hindi language, the provisions under Official Language Act and incentive schemes for use of Hindi etc.

c) The progress made by all Directorates, Sections and Regional Offices in the implementation of important instructions issued by the Department of Official Language regarding progressive use of Hindi for official purpose, the Official Language Act, 1963 and the Official Language Rules, 1976 have been monitored regularly through the quarterly progress report. Necessary instructions were issued to continue the effective implementation of these rules.

d) "Hindi Pakhwada" was organized from 14 to 29 September 2022. During this period, various competitions like Hindi Noting/Drafting, Translation competition, calligraphy competition for MTS, Hindi Typing competition, Poem Recitation competition for Hindi and non-Hindi officials, Extempore Speech competition for Hindi and non-Hindi officials and Quiz Competition were organized, and total 66 winners were awarded cash prizes and certificates. Prizes and Certificates were also awarded to 10 officials who did their maximum official works in Hindi under the Annual Noting & Drafting Scheme. A sum of Rs. 2, 45,000/- against the allocation of Rs. 2, 50,000/- was spent on this occasion.

e) One Day technical seminar in Hindi was organized in Kochi (Kerala) on 11.11.2022. The Theme of the seminar was "Water Conservation in India". Presentations were given by Technical Officers from commission and regional offices on various sub-themes.

f) Raj Bhasha Shields for the year 2022-23 were awarded to the Field Offices of Central Water Commission situated in regions, A, B and C to Yamuna Besin Organization, New Delhi, Monitoring (central) organization, Nagpur and Krishna and Godavari Besin Organization, Hyderabad respectively. Rajbhasha Shield for Directorates and Sections at Headquarters were awarded to Design and Research Coordination Directorate and Establishment-IX Section for doing maximum work in Hindi during the year.

g) Hindi books were purchased for the Central Water Commission Library as per the targets fixed in the Annual Program of the Department of Official Language.

1.9 Welfare Measures and Incentives

The different welfare measures and incentives that are in existence are given under:

1.9.1 Benevolent Fund

The Central Water Commission Benevolent Fund set up in 1966 aims at providing prompt financial assistance to the deserving members to take care of damages at the time of natural calamities or to meet expenses of medical treatment for their own prolonged illness such as Cancer, TB, etc. and surviving family members of those who died while in service.

The administration of the fund vests in the Governing Body, which comprises of a Chairman, one Honorary Secretary, one Treasurer and 8 Members. The audited accounts are placed before the General Body in the Annual General Body meeting.

1.9.2 Co-Operative Thrift and Credit Society

Department of Irrigation Co-operative Thrift & Credit Society Ltd., has been functioning with its registered office at West Block–I, R.K. Puram, New Delhi since March 1959 for the welfare and benefit of the officers and staff of the Department of Water Resources, River Development and Ganga Rejuvenation, Central Water Commission, Central Soil & Materials Research Station, Department of Power, Principal Pay & Accounts Office of the Erstwhile Ministry of Water Resources and Pay &Accounts Office, Central Water Commission. It provides its member loans to the extent of Rs. 3,50,000/- and emergency loan of Rs. 20,000/- recoverable in 60 and 10 monthly instalments respectively at a rate of interest of 9% per annum. The Society pays gratuity to retiring members and writes off outstanding loans against deceased members from the members' welfare fund. An amount of Rs. 6,09,360/- was paid as gift cheques to members who retired during 2022-23 and loan amount of Rs. 1,45,659/- was waived off/ settled for the members who deceased during 2022-23. The society also awards the meritorious wards of Members of the society for excellence in Class-12th and Class-10th examination. During 2022-23 society cash award was given to 11 children.

1.9.3 Sports and Cultural Activities

Employees of CWC are motivated and encouraged to regularly participate in Sports and Cultural Activities. The main achievements during the year 2022-23 are as under:

- The CWC Hockey team reached the Semi Finals of Inter-Ministry Hockey Tournament 2022-23 .
- Shri R. Suresh, MTS, CWC Library has represented the Central Secretariat Volleyball Team in the All India Civil Services Volleyball Tournament 2022-23 held at Trivandrum, Kerala. The team secured third place in the tournament.
- CWC teams also participated in Inter Ministry Cricket, Football, Chess, Badminton, Table Tennis and Athletics tournaments during 2022-23.

1.10 Employees Strength under various categories

The representation of OBC, SC & ST and PWD (OH/VH/HH) officials in different grades is given in Table 1.1 and Table 1.2

Table 1.1
Representation of OBC, SC & ST Officials in Different Grades (As on 1.1.2023)

Category	No. of Filled Posts	No. of SCs	No. of STs	No. of OBCs
Group A	535	88	32	92
Group B	936	138	76	173
Group C	2608	508	254	635
Total	**4079**	**734**	**362**	**900**

Table 1.2

Representation of PWD (OH/VH/HH) Officials in Different Grades (As on 1.1.2023)

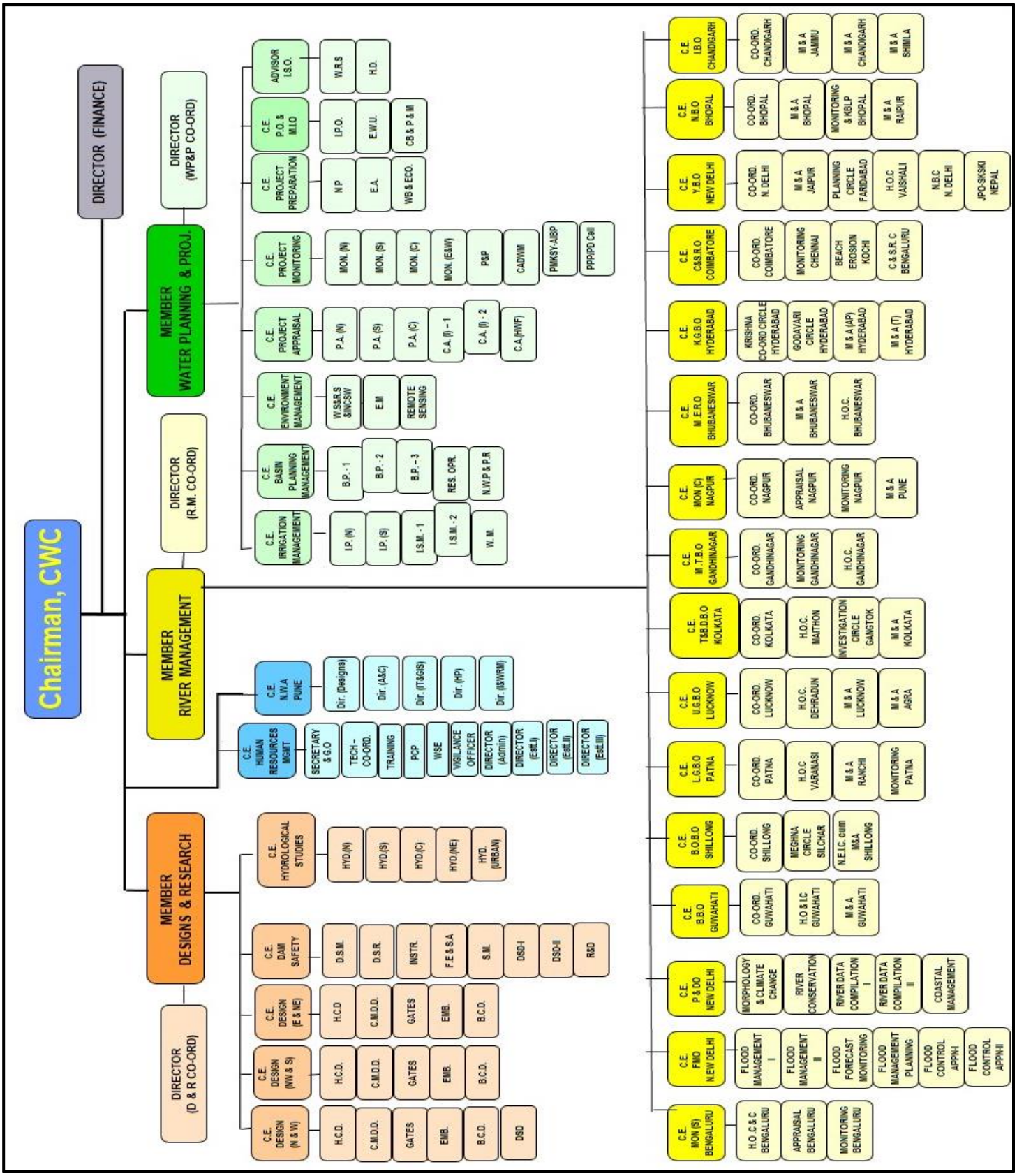
Category	Orthopedic Handicapped (OH)	Visually Handicapped (VH)	Hearing Handicapped (HH)	Total
Group A	10	0	2	12
Group B	18	1	10	29
Group C	17	9	5	34
Total	**45**	**10**	**17**	**75**

1.11 Citizen's Charter for CWC

As per the guidelines issued by Department of Administrative Reforms & Public Grievances (AR&PG), a Task Force under the Chairmanship of Member (WP&P), CWC and Chief Engineer (BPMO), CWC as Member-Secretary & Nodal Officer was constituted for formulating Citizen's Charter for CWC. The Citizen's Charter was finalized with the concurrence of DoWR,RD&GR, MoJS and has been uploaded on CWC website.

1.12 Right to Information Act

The Right to Information Act enacted by Parliament on 15th June, 2005 came into force on the 12th October, 2005 (120th day of its enactment). CWC has implemented the provisions of the Act. Information in respect of Central Water Commission in compliance of Right to Information Act ' 2005 has been put in public domain through its official website at http://www.cwc.gov.in


Chairman, CWC
DIRECTOR (FINANCE)
MEMBER DESIGNS & RESEARCH
DIRECTOR (D & R CO-ORD)
MEMBER RIVER MANAGEMENT
DIRECTOR (R.M. CO-ORD)
MEMBER WATER PLANNING & PROJ.
DIRECTOR (WP&P CO-ORD)
C.E. HUMAN RESOURCES MGMT
SECRETARY & G.O
TECH - CO-ORD.
TRAINING
PCP
WSE
VIGILANCE OFFICER
DIRECTOR (Admin)
DIRECTOR (Estt.I)
DIRECTOR (Estt.II)
DIRECTOR (Estt.III)
C.E. N.W.A PUNE
Dir. (Designs)
Dir. (A&C)
Dir. (IT&GIS)
Dir. (RP)
Dir. (&SWRM)
C.E. HYDROLOGICAL STUDIES
HYD.(N)
HYD.(S)
HYD.(C)
HYD.(NE)
HYD. (URBAN)
C.E. DAM SAFETY
D.S.M.
D.S.R.
INSTR.
F.E & S.A
S.M.
DSO-I
DSO-II
R&D
C.E. DESIGN (E & NE)
C.E. DESIGN (NW & S)
C.E. DESIGN (N & W)
H.C.D.
C.M.D.D.
GATES
EMB.
B.C.D.
DSO
C.E. IRRIGATION MANAGEMENT
I.P. (N)
I.P. (S)
I.S.M. - 1
I.S.M. - 2
W. M.
C.E. BASIN PLANNING MANAGEMENT
B.P. - 1
B.P. - 2
B.P. - 3
RES. OPR.
N.W.P & P.R
C.E. ENVIRONMENT MANAGEMENT
W.S&R.S &M/C/SW
E.M
REMOTE SENSING
C.E. PROJECT APPRAISAL
P.A. (N)
P.A. (S)
P.A. (C)
C.A. (I) - 1
C.A. (I) - 2
C.A.(H/WF)
C.E. PROJECT MONITORING
MON. (N)
MON. (S)
MON. (C)
MON. (E&W)
P&P
CADWM
PMKSY-AIBP
PPP/PD Cell
C.E. PROJECT PREPARATION
N P
E.A.
WB & ECO.
C.E. P.O. & M.I.O
I.P.O.
E.W.U.
CB & P & M
C.E. ADVISOR I.S.O.
W.R.S
H.D.
C.E. P & DO NEW DELHI
MORPHOLOGY & CLIMATE CHANGE
RIVER CONSERVATION
RIVER DATA COMPILATION I
RIVER DATA COMPILATION II
COASTAL MANAGEMENT
C.E. FMO NEW DELHI
FLOOD MANAGEMENT I
FLOOD MANAGEMENT II
FLOOD FORECAST MONITORING
FLOOD MANAGEMENT PLANNING
FLOOD CONTROL APPN I
FLOOD CONTROL APPN II
C.E. MON (S) BENGALURU
H.O. C & C BENGALURU
APPRAISAL BENGALURU
MONITORING BENGALURU
C.E. B.S.O GUWAHATI
CO-ORD. GUWAHATI
H.O & I.C GUWAHATI
M & A GUWAHATI
C.E. B.O.B.O SHILLONG
CO-ORD. SHILLONG
MEGHNA CIRCLE SILCHAR
N.E.I.C. cum M&A SHILLONG
C.E. L.G.B.O PATNA
CO-ORD. PATNA
H.O.C VARANASI
M & A RANCHI
MONITORING PATNA
C.E. U.G.B.O LUCKNOW
CO-ORD. LUCKNOW
H.O.C. DEHRADUN
M & A LUCKNOW
M & A AGRA
C.E. T&B.D.B.O KOLKATA
CO-ORD. KOLKATA
H.O.C. MAITHON
INVESTIGATION CIRCLE GANGTOK
M & A KOLKATA
C.E. M.T.B.O GANDHINAGAR
CO-ORD. GANDHINAGAR
MONITORING GANDHINAGAR
H.O.C. GANDHINAGAR
C.E. MON (C) NAGPUR
CO-ORD. NAGPUR
APPRAISAL NAGPUR
MONITORING NAGPUR
M & A PUNE
C.E. M.E.R.O BHUBANESWAR
CO-ORD. BHUBANESWAR
M & A BHUBANESWAR
H.O.C. BHUBANESWAR
C.E. K.G.B.O HYDERABAD
KRISHNA CO-ORD CIRCLE HYDERABAD
GODAVARI CIRCLE HYDERABAD
M & A (AP) HYDERABAD
M & A (T) HYDERABAD
C.E. C&S.R.O COIMBATORE
CO-ORD. COIMBATORE
MONITORING CHENNAI
BEACH EROSION KOCHI
C & S.R. C BENGALURU
C.E. Y.B.O NEW DELHI
CO-ORD. N. DELHI
M & A JAIPUR
PLANNING CIRCLE FARIDABAD
H.O.C VAISHALI
N.B.C N. DELHI
JPO-SIKSKI NEPAL
C.E. N.B.O BHOPAL
CO-ORD. BHOPAL
M & A BHOPAL
MONITORING & KBLP BHOPAL
M & A RAIPUR
C.E. I.B.O CHANDIGARH
CO-ORD. CHANDIGARH
M & A JAMMU
M & A CHANDIGARH
M & A SHIMLA

2 WATER RESOURCES DEVELOPMENT

2.1 Water Resources in India

CWC has been periodically assessing the country's overall water resources development. The water resources potential of the country, which occurs as a natural runoff in the rivers is about 1999.20 Billion Cubic Meters (BCM). It constitutes a little over 4% of the total river water of the world. However, due to various constraints of topography and uneven distribution over space and time, only about 1123 BCM of the total annual water potential can be used beneficially. This can be achieved by use of 690 BCM of utilizable surface water and 433 BCM through ground water.

Water supply for drinking purpose has been accorded top most priority in water allocation and its various uses, but major utilization is for irrigation purpose. As on 2011-12, Ultimate Irrigation Potential (UIP) estimated for the country is 139.89 Mha, out of which the assessed potential through major and medium irrigation projects is 58.47 Mha. Besides this, an additional irrigation potential of about 35 Mha can be created by inter basin transfer of water from surplus to deficit basins. The Irrigation Potential Created (IPC) in the country, which stood at 12.9 Mha in 1951, has risen to 113.53 Mha by end of XI plan period. Reassessment of UIP, IPC & IPU of the country, project wise for MMI projects, and source wise i.e. Surface and Ground water, for MI projects has been taken up for updating this data and are under progress.

In order to appropriately address the present and future water and food security Government of India has been implementing various measures. The following thrust/priority areas, for further water resources development, have been identified by the Government.

- Improving the overall water use efficiency in irrigation and drinking water supply system;
- Adoption of piped distribution system in place of open canal system to reduce the conveyance water lose
- Command area development by implementing more micro irrigation system and participatory irrigation management;
- Flood management and erosion control using new tools and techniques;
- Protection from coastal erosion by creation of proper costal data collection and management network;
- Dam safety, dam rehabilitation and performance improvement;
- Repair, Renovation and Restoration of existing water bodies use for irrigation, drinking water supply, cultural activities, etc;
- Construction of more minor irrigation structures to achieve the goal of Appropriate regulation and improvement in management of ground water;
- Increasing the ground water availability by various Ground water recharge techniques;
- Inter basin transfer of river water by inter-linking of rivers;
- Improving the rural drinking water supply system and sanitation;

Central Water Commission has been thriving for sustainable development of water resources of the country, by directly and indirectly contributing in achieving the objectives of these thrust/priority areas.

2.2 Highlights of Water Resources Sector

As the variability over space and time of rainfall over the country is well known, the development of water resources for irrigated agriculture received high priority in the different Plan periods. This enabled the achievement of food security and export of surplus food grains. Expansion of irrigation facilities to ensure irrigation water for every agriculture land, along with consolidation of the existing systems, has been the main strategy for increasing production of food grains.

Irrigation water has been provided through major, medium and minor irrigation projects and command area development. Out of UIP of 139.89 Mha, the Irrigation Potential Created till the end of the XI plan period is 113.53 Mha.

2.2.1 Irrigation Potential: Major & Medium Irrigation Sector

The UIP of the country from major and medium irrigation projects is assessed as 58.47 Mha. Irrigation Potential Created in the country from major and medium irrigation projects, which stood at 9.7 Mha in 1951, has risen to 47.97 Mha at the end of XI Plan.

2.2.2 Major and Medium Irrigation Projects

In 1951, during launching of the First Five Year Plan, there were 74 major and 143 medium irrigation projects in the country. As per information provided to Working Group on Major Medium Irrigation & Command Area Development (MMI & CAD) for XII Plan formulation, 406 major, 1135 medium and 259 ERM schemes were taken up during the plan period i.e., from 1951 to end of XI Plan in 2012. Out of this, 231 major, 880 medium and 122 ERM projects have been reported completed by end of XI Plan.

Number of Major, Medium and ERM projects taken up and completed in the pre-plan and plan period are shown in **Fig 2.1, 2.2 and 2.3 respectively**.

Figure 2.1: Major Irrigation Projects Taken Up and Completed (Cumulative)

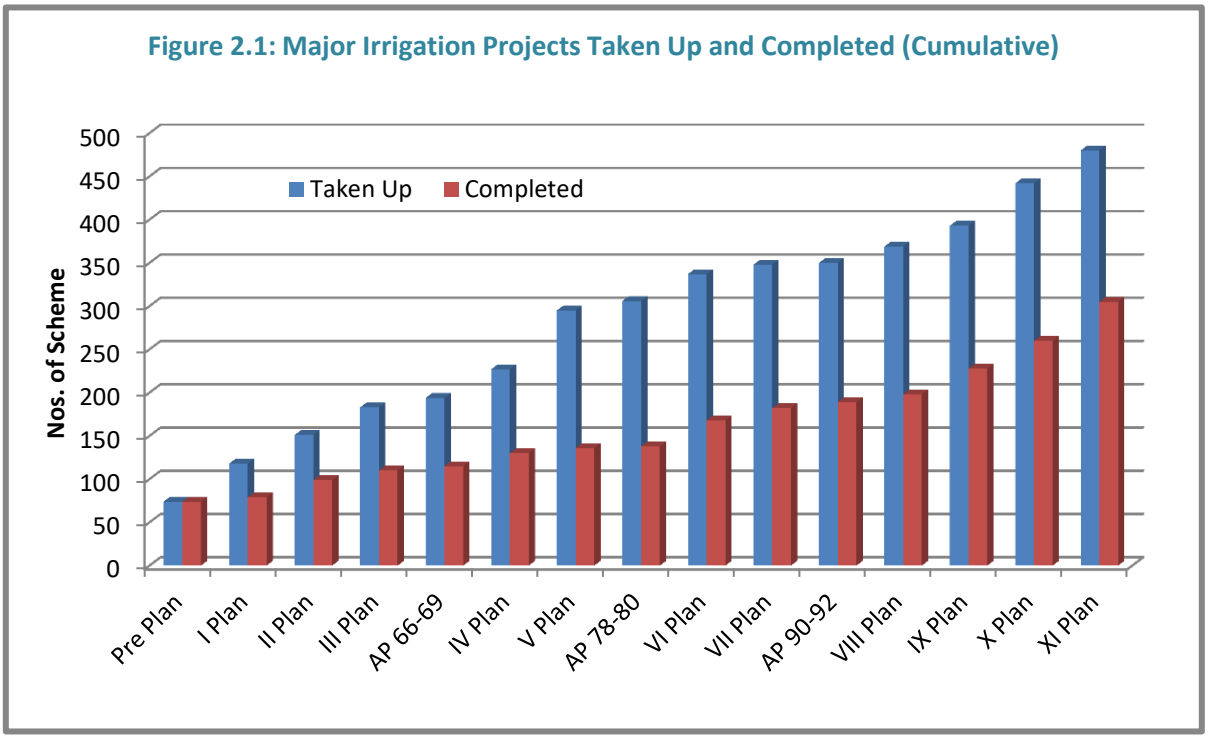


Figure 2.2: Medium Irrigation Projects Taken Up and Completed (Cumulative)

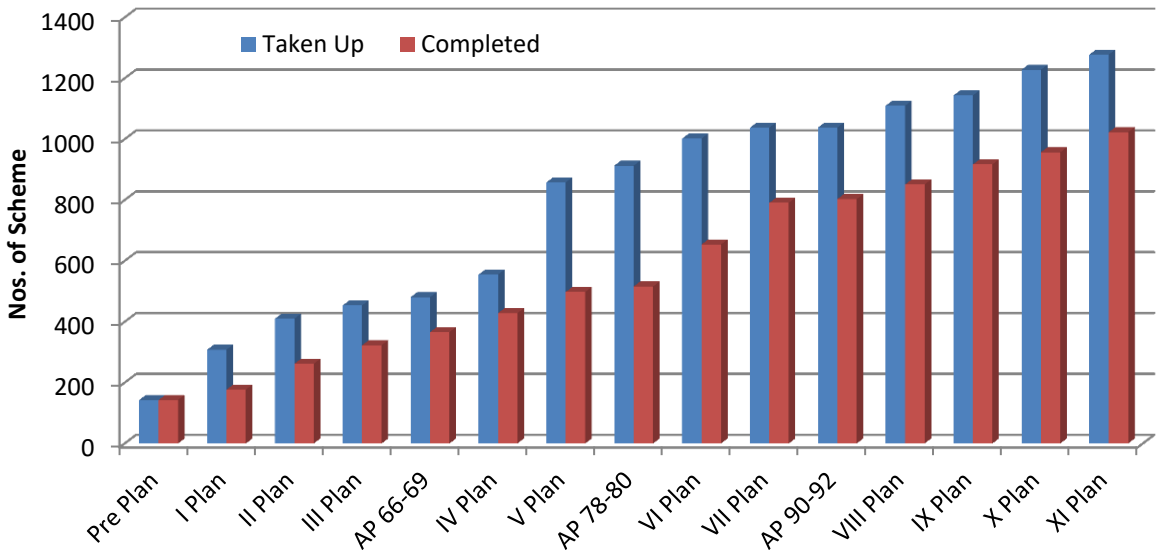
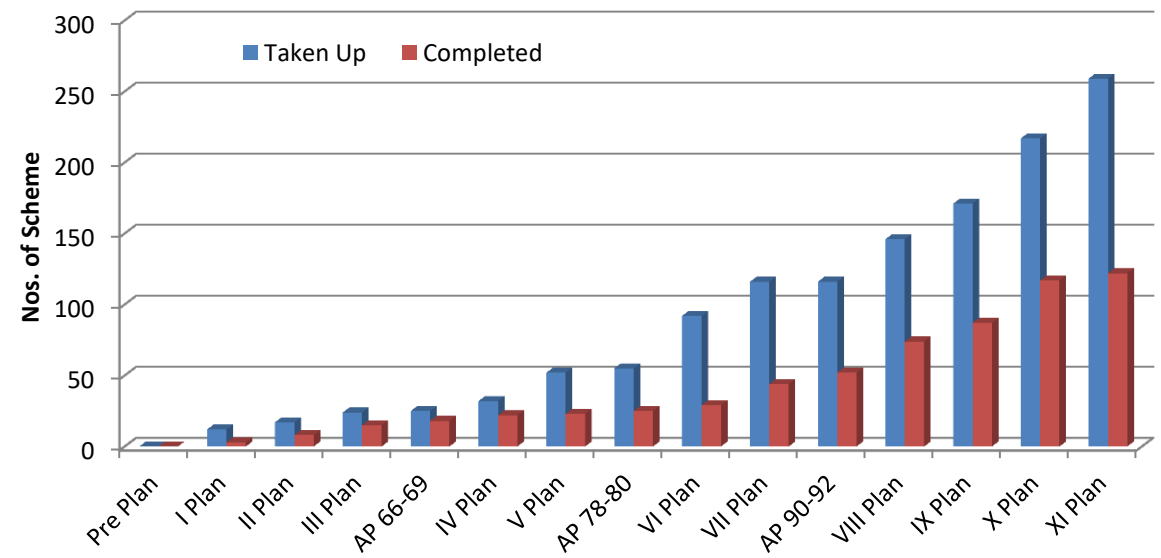


Figure 2.3: ERM Projects Taken Up and Completed (Cumulative)



2.3 Pradhan Mantri Krishi Sinchayee Yojana (PMKSY)

2.3.1 AIBP

The Accelerated Irrigation Benefits Programme (AIBP) was launched by Union Government in 1996-1997, to provide Central Assistance in the form of Loan to State Governments to complete those ongoing irrigation projects which were costing Rs 1000 Crore or above and were in advance stage of completion. Subsequently the AIBP Guidelines were changed from time to time so as to include all categories of projects i.e. Major, Medium and Surface Minor Irrigation

(SMI) Projects to bring a regional balance. From 2005-06 onwards, Central Assistance is provided in form of grant. Since inception altogether 297 Major and Medium Irrigation Projects have been included under AIBP out of which 143 Projects have been completed and five Projects have been deferred, leaving 149 projects as ongoing as on 2015-16. A total sum of Rs 55601.11 Cr was provided to State Governments in the form of Central Assistance till March 2016 for Major and Medium Irrigation Projects under AIBP and an Irrigation Potential of 9089.29 Th. Ha. has been created upto March 2016.

2.3.2 PMKSY-AIBP

Pradhan Mantri Krishi Sinchayee Yojana (PMKSY) was launched by Government of India during the year 2015-16, with an aim to enhance physical access of water on farm and expand cultivable area under assured irrigation, improve on farm water use efficiency, introduce sustainable water conservation practices etc. It is the umbrella scheme with the motto of providing 'HarKhetKoPani' ensuring access to some means of protective irrigation to all agricultural farms in the country, and to produce 'per drop more crop', thus bringing much desired rural prosperity. Under PMKSY-AIBP, a dedicated funding mechanism i.e. Long Term Irrigation Fund (LTIF) has been created in NABARD which could be utilized by the Central and State Governments to bridge the requirement of funds for completion of the priority projects under PMKSY including CAD works for central assistance as well as state share component.

The objective of the scheme is to lead to substantial increase in agricultural production and productivity thereby enhancing farm income. The components of the scheme are: (i) Accelerated Irrigation Benefit Programme (AIBP); (ii) Har Khet ko Pani; (iii) Per Drop More Crop and (iv) Watershed Development.

Har Khet ko Pani (HKKP) component, in turn consists of four sub-components, being Command Area Development (CAD), Surface Minor irrigation (SMI), Repair, Renovation and Restoration (RRR) of Water Bodies, and Ground Water (GW) Development component. However, CAD&WM sub-component of HKKP is being implemented pari-passu with AIBP.

Two major components, namely, Accelerated irrigation Benefits Programme (AIBP) and Har Khet Ko Pani (HKKP) are being implemented by DoWR,RD&GR, Ministry of Jal Shakti. Per Drop

Fig. 2.4: Thoubal Multipurpose Project, Manipur (Project under PMKSY-AIBP)

More Crop (PDMC) component is being implemented by Department of Agriculture, Cooperation and Farmers Welfare, Ministry of Agriculture & Farmers Welfare. Watershed Development (WD) component of PMKSY is being implemented by department of Land Resources, Ministry of Rural Development.

Under the PMKSY-AIBP, Ninety-Nine (99) out of the 149 ongoing Major/Medium Irrigation projects (and 7 phases) spread in 17 States and two Union Territories (Jammu & Kashmir and Ladakh) were prioritised with an estimated balance cost of Rs. 77,595 crore with Central share of Rs. 31,342 crore to complete them in a time bound manner. Out of 99 projects and 7 phases (total -106), 58 MMI projects have been reported as completed upto October, 2023. The Ultimate Irrigation Potential of these 99 projects is 76.03 Lakh Ha., out of which 41.39 Lakh Ha. was created upto March, 2016. Out of balance 34.63 Lakh Ha, additional potential of 25.115 Lakh Ha has been created through these projects during 2016-2023.

2.3.3 EXTENSION OF PMKSY-AIBP

Further in December, 2021, Extension of PMKSY for the period 2021-22 to 2025-26 has been approved by Government of India with an outlay of Rs. 93,068.00 Crore with a Central Assistance of Rs. 37,454.00 Crore. However, approval of Ground Water component under PMKSY-HKKP has been provisionally approved for 2021-22 (extended subsequently for completion of ongoing works and liabilities), as on date, Per Drop More Crop component is now no longer under the PMKSY.

Under the continuing scheme of PMKSY-AIBP, it is planned to provide financial assistance for completion of 60 ongoing Major/Medium Irrigation projects under PMKSY-AIBP, 85 ongoing CADWM projects and financial assistance to new Major/Medium irrigation projects including ERM projects. Seven (07) newly MMI/ERM projects have been included in the scheme during FY 2021-22 to 2023-24 (upto October 2023). The irrigation potential created from the six newly included projects under PMKSY-AIBP during 2021-2023 is 0.403 lakh Ha.

INDIA – LAND AND WATER RESOURCES: FACTS

•	Geographical Area & Location	328.7 M ha Latitude; 8^0 4'N to 37^0 6' N Longitude: 68^0 7'E to 97^0 25' E
•	Population (2011)	1210.19 Million
•	Rainfall Variation	100 mm in Western most regions to 11000 mm in Eastern most region
•	Major River Basin (Catchment Area more than 20,000 Sqkm)	12 Nos. having total catchment area 253 Mha
•	Medium River Basin (Catchment Area between 2000 and 20,000 Sq km)	46 nos. having total catchments area 25 Mha
•	Total Navigable Length of Important Rivers	14464 Km

WATER RESOURCES

•	Average Annual Rainfall (1985-2015)	1105 mm (3880 BCM)
•	Annual Rainfall (2022)	1257 mm
•	Average Annual Water Resources Availability	1999.2 BCM
•	Total Utilisable Water	1128 BCM
•	Estimated Utilisable Surface Water Potential	690 BCM
•	Total Annual Ground Water Recharge (2022)	438 BCM
•	Net Ground Water Availability (2013)	411 BCM
•	Ultimate Irrigation Potential	139.9 Mha
	From Surface Water	76 Mha
	From Ground Water	64 Mha
•	Storage Available Due to Completed Major & Medium Projects (Including Live Capacity less than 10 M.Cum)	253 BCM
•	Estimated Additional Likely Live Storage Available due to Projects Under Construction / Consideration	155 BCM

(Source: Indian Meteorological Department / Basin Planning Directorate, CWC)

LAND RESOURCES

•	Total Cultivable Land	180.112 M ha
•	Gross Sown Area (2021-22)	219.125 M ha
•	Net Sown Area (2021-22)	141.007 M ha
•	Irrigation Potential Created (upto 2012)	113.5 M ha
•	Gross Irrigated Area (2021-22)	120.380 M ha
•	Net Irrigated Area (2021-22)	77.916 M ha

(Source: Land Use Statistics Report of MoA & FW / Project & Planning Directorate, CWC)

HYDRO-POWER

•	Ultimate Hydropower Potential	133410 MW
•	Potential Developed by 31.3.2020 (Installed Capacity of plants above 25 MW)	46850.15 MW

(Source: Central Electricity Authority)

3 RIVER MANAGEMENT

3.1 Systematic Collection and Compilation of Hydrological Data

India has a total geographical area of 329 Mha having an annual precipitation of 4000 BCM with wide temporal and spatial variation. From river basin point of view, India has been divided into 20 river basins. The collection of hydro-meteorological data for all the river basin in a scientific manner is essential for achieving various objectives viz. planning and development of water resources projects, studies related to assessment of impacts due to climate change, water availability studies, design flood and sedimentation studies, flood level/inflow forecasting, solving of International & Inter-State issues, river morphology studies, Reservoir siltation studies, development of inland waterways, research related activities etc.

As on April 2021, Central Water Commission is operating a network of 1543 Hydrological Observation (HO) stations in different river basins of the country to collect (i) water level, (ii) discharge, (iii) water quality and (iv) silt. This includes 717 new stations opened during the XII five year plan. In addition to this, Meteorological parameters including snow observations are also recorded at some key stations. This will help in addressing the data requirement of the country more precisely and in better scientific manner.

The basin-wise distribution of 1543 HO stations is detailed below in Table 3.1.

Table 3.1
Basin-wise number of 1543 Hydrological Observation Stations

Sl.	Name of Basin	No. of Sites
1.	Brahmani-Baitarni Basin	24
2.	Cauvery Basin	54
3.	East Flowing rivers between Mahanadi and Pennar	20
4.	East Flowing rivers between Pennar and Kanyakumari	37
5.	Ganga/Brahmaputra/Meghna/Barak Basin	802
6.	Godavari Basin	140
7.	Indus Basin	61
8.	Krishna Basin	72
9.	Mahanadi Basin	55
10.	Mahi Basin	19
11.	Minor rivers draining into Myanmar and Bangladesh	17
12.	Narmada Basin	71
13.	Pennar Basin	12
14.	Sabarmati Basin	13
15.	Subarnarekha Basin	15
16.	Tapi Basin	40
17.	West Flowing Rivers from Tadri to Kanyakumari	51
18.	West flowing rivers from Tapi to Tadri	22
19.	West flowing rivers of Kutchh and Saurashtra including Luni	18
20.	Areas of Inland Drainage in Rajasthan	0
	Total	**1543**

CWC also operates 187 exclusive meteorological observations stations in various basins in the country.

The basic data collected by field units is processed and validated at the Sub-Division, Division and Circle level and the authenticated data in the form of Water Year Books, Sediment Year Books and Water Quality Year Books are published annually.

Planning & Development Organization at CWC headquarter at New Delhi maintains hydrological data pertaining to all rivers of India. The data is provided to the bonafide users on request by

following a set procedure and as per guidelines for release of data by concerned field Chief Engineer of CWC. Computerized data is now available for all basins after the implementation of the Hydrology Project Phase-I. The users of the data include Central/State Government offices, Public Sector Undertaking and Institutions/Societies working under the direct control of Central/State Governments and IIT's and Research Institutions/Scholars.

3.1.1 Water Quality Monitoring

Central Water Commission is monitoring water quality also at 652 key hydrological observation stations covering all the important river basins of India. Also, water quality samples are being collected from 112 Water Quality Sampling stations. CWC is maintaining a three tier laboratory system for analysis of the physio-chemical parameters of the water. The Level-I laboratories are located at 378 field water quality monitoring stations on major rivers of India where physical parameters such as temperature, colour, odour, electrical conductivity, pH and dissolved oxygen of river water are observed. There are 18 Level–II laboratories located at selected division offices throughout India to analyses 25 nos. of physio-chemical characteristics and bacteriological parameters of water. 5 Level-III laboratories are functioning at Varanasi, Delhi, Hyderabad, Coimbatore and Guwahati where 41 parameters including heavy metals / trace & toxic parameters and pesticides are analysed. As on April 2023, out of 23 laboratories in CWC, 20 laboratories got accredited by National Accreditation Board for Testing and Calibration Laboratories (NABL) in accordance with Standard ISO/IEC 17025:2017 and accreditation of 3 laboratories are under process. Details of NABL Accreditation status of 23 Water Quality Laboratories of CWC are given in the Table 3.2.

Table: 3.2: NABL Accreditation status of Water Quality Laboratories of CWC

Sl.	Name of Laboratory	Level	Location	Organisation	NABL Accreditation Status
1	Upper Brahmaputra Divisional Water Quality Laboratory	II	Dibrugarh	BBO, Guwahati	Non Accredited
2	Middle Brahmaputra Divisional Water Quality Laboratory	III	Guwahati	BBO, Guwahati	Accredited
3	Lower Brahmaputra Divisional Water Quality Laboratory	II	Jalpaiguri	T&BDBO, Kolkata	Accredited
4	Upper Cauvery Water Quality Laboratory	II	Bangalore	MSO, Bengaluru	Accredited
5	Lower Cauvery Water Quality Laboratory	III	Coimbatore	C&SRO, Coimbatore	Accredited
6	West Flowing Rivers Water Quality Laboratory	II	Kochi	C&SRO, Coimbatore	Accredited
7	East Flowing Rivers Water Quality Laboratory	II	Chennai	C&SRO, Coimbatore	Accredited
8	Upper Krishna Divisional Water Quality Laboratory	II	Pune	KGBO, Hyderabad	Accredited
9	Krishna & Godavari River Water Quality Laboratory	III	Hyderabad	KGBO, Hyderabad	Accredited

Sl.	Name of Laboratory	Level	Location	Organisation	NABL Accreditation Status
10	Chenab Divisional Water Quality Laboratory	II	Jammu	IBO, Chandigarh	Accredited
11	Middle Ganga Divisional-II Water Quality Laboratory	II	Patna	LGBO, Patna	Non Accredited
12	Lower Ganga Divisional Water Quality Laboratory	II	Berhampore	T&BDBO, Kolkata	Accredited
13	Mahanadi Divisional Water Quality Laboratory	II	Raipur	MERO, Bhubaneswar	Accredited
14	Eastern River Water Quality Laboratory	II	Bhubaneswar	MERO, Bhubaneswar	Accredited
15	Waingangā Divisional Water Quality Laboratory	II	Nagpur	MCO, Nagpur	Accredited
16	Narmada Divisional Water Quality Laboratory	II	Bhopal	NBO, Bhopal	Accredited
17	Tapi Divisional Water Quality Laboratory	II	Surat	MTBO, Gandhinagar	Non Accredited
18	Mahi Divisional Water Quality Laboratory	II	Gandhinagar	MTBO, Gandhinagar	Accredited
19	Upper & Middle Ganga River Water Quality Laboratory	III	Varanasi	LGBO, Patna	Accredited
20	Himalayan Divisional Water Quality Laboratory	II	Haridwar	UGBO, Lucknow	Accredited
21	Middle Ganga Divisional Water Quality Laboratory	II	Lucknow	UGBO, Lucknow	Accredited
22	Lower Yamuna Water Quality Laboratory	II	Agra	YBO, New Delhi	Accredited
23	National River Water Quality Laboratory	III	Delhi	YBO, New Delhi	Accredited

The water quality data generated is computerized in Database system and disseminated in the form of Water Quality Year Books, Status Reports and Bulletins. The data being so collected are put to various uses viz. planning and development of water resources projects, climate change studies, water availability studies, inter-State issues, research related activities etc.

3.1.2 Water Information Management System (WIMS)

During the Hydrology Project-I, the Central Water Commission had developed suites of software packages viz. Surface Water Data Entry System (SWDES), Hydrological Modelling Software (HYMOS) and Water Information System Data Online Management (WISDOM). These softwares were primarily being used for data entry, primary and secondary data validation, data processing, data storage and dissemination of Hydro-meteorological data. The application software was developed in a stand-alone environment and in the client server environment, integrating GIS, database and various systems software to provide client applications and a limited web service. Out of these, HYMOS software was the proprietary software.

To overcome the drawbacks which were encountered during the running of above

software, Central Water Commission has developed Online Surface Water Information System (e-SWIS) software under the Hydrology Project-II (HP-II). e-SWIS, (web and GIS-based Surface Water Information System) is being implemented in participating Agencies in Hydrology Project II, and potentially in all States and UTs of India. The main objective of development of the new software was to replace obsolete components of existing software, improve its system architecture and add some new components.

Central Water Commission and other Implementing Agencies operate an extensive network of hydrometric and hydro-meteorological measurement stations, from which data are collected on climate, river flows, and water quality. Moreover, seeing the importance of Integrated Information system with the concept of centralized database, which widens scope of data collection due to increase in nos. of agencies, Internet enabled surface water information system (e-SWIS) has been upgraded to Water Information Management System (WIMS) under National Hydrology Project-NHP.

Water Information Management System (WIMS) software is an up gradation and extension of e-SWIS software. WIMS is a web-based open-source software system for managing data entry, primary data validation, data processing, storage for Surface Water and Ground Water Resources. In WIMS data is very secure and only classified users can access the WIMS application. In WIMS, we can manage and create both kinds of station types i.e. Surface Water and Ground Water. WIMS stores all the information of a station for both station type (Surface Water/Ground Water) based on agencies. The user Management Module is the most important module and it can be managed by the Nodal Agency in WIMS. Earlier in e-SWIS software, the Groundwater module functionality feature was not present, but in WIMS Software, Ground Water module functionality is implemented and Ground Water station data can be fed in Ground Water Module.

Another feature of WIMS is telemetry management and live data from INSAT & GPRS.

The benefits of WIMS software are:

- It is based on web application.
- Surface as well as Ground Water data is available in WIMS.
- Telemetry Management is proper.
- Data from State and other implementing agencies coming to WIMS.
- Inclusion of Flood Forecasting and Water Quality Management.
- Easy access to information.
- Automatic backup procedure.
- Complete security control over data and functionality.
- Data can be entered from anywhere.
- Data access will be controlled and restricted to authorized users.
- Data Integration is automatic and there is no need to physically send the data for central depository.

However, all the works related to the development and maintenance of WIMS has been handed over to NWIC on 01.12.2020 on "As is where is Basis"

3.2 Flood Forecasting & Warning Services

Flood forecasting and warning system is most important non-structural measure of flood management, which gives advance knowledge of incoming floods. This plays an important role in reducing flood damage by way of better planning of evacuation and rescue/relief operations. Inflow Forecast also helps in optimum regulations of reservoirs with or without flood cushion.

Flood Forecasting activities made a beginning in 1958 in India in a scientific manner when the erstwhile Central Water and Power Commission (CW&PC) set up a Flood Forecasting Unit (FFU) for issuing flood warnings in the Yamuna at the National Capital, Delhi. This service has since been expanded by CWC to cover almost all major flood prone inter-State river basins of India. At

present there are 333 flood forecasting stations, of which 199 are level forecasting and 134 are inflow forecasting stations on major dams/ barrages, spread over 22 States viz. Andhra Pradesh, Arunachal Pradesh, Assam, Bihar, Chhattisgarh, Gujarat, Haryana, Himachal Pradesh, Jharkhand, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Orissa, Rajasthan, Sikkim, Tamil Nadu, Telangana, Tripura, Uttarakhand, Uttar Pradesh & West Bengal and 3 Union Territories Jammu & Kashmir, Daman and Diu and the National Capital Territory of Delhi. It covers 20 major river systems in the country.

On an average, over 10000 forecasts are being issued every year by Central Water Commission during the flood season. Normally, these forecasts are issued 6 to 48 hours in advance, depending upon the river terrain, the locations of the flood forecasting sites and base stations. For the purpose of flood forecasting, hydrological and meteorological data observed at Hydrological Observation sites are used. A network of wireless stations is used for communication of data. Synoptic weather situations, weather forecast/ heavy rainfall warnings etc. are also being collected from Flood Meteorological Offices (FMOs) of IMD for the purpose.

The flood forecasting services is provided by CWC during a designated flood period in a year in order to cover pre monsoon and post monsoon incidents. The designated flood period was last reviewed in 2013 and accordingly the designated flood period for various basins as given below:

Brahmaputra Basin, Barak, Teesta, Jhelam Basin	1st May to 31st October
All other basin up to Krishna Basin	1st June to 31st October
Basins south of Krishna basin (Pennar, Cauvery and southern Rivers)	1st June to 31st December

Depending upon the water level of the river, Central Water Commission has categorized the flood situations at a station into three different categories namely, Above Normal, Severe & Extreme flood situation. The details are as under, depending upon with reference to warning level, danger level, and highest flood level.

Above Normal: The River is said to be flowing in "**Above Normal**" at any station when the water level of the river touches or crosses the Warning Level, but remains below the Danger Level of the station.

Severe Flood Situation: The River is said to be flowing in "**Severe Flood Situation**" at any station when the water level of the river touches or crosses the Danger Level, but below the Highest Flood Level (HFL) of the station. Orange Bulletin is issued to the user agencies.

Extreme Flood Situation: The River is said to be flowing in "**Extreme Flood Situation**" at any station when the water level of the river touches or crosses the HFL of the station. A special "Red Bulletin" is being issued by the Central Water Commission to the users agencies which contains the details related to the flood situation.

3.2.1 Flood Forecasting Performance during 2022

During the year, the flood forecasting activity began from 1st May 2022. During the flood season of 2022 (May to December), 11558 flood forecasts (6779 level forecast and 4779 inflow forecasts) were issued out of which 10845 (93.83%) forecasts were found within accuracy limit (± 0.15 m for level forecast and ± 20% for inflow forecast). Using the web-based WIMS software, the hydrological data of all Hydrological Observation stations was entered by all Divisions of CWC on real time basis. Based on above data, the current status of the rivers has been monitored on real time basis.

The flood forecast & water level information were made available to common public through the website //ffs.india-water.gov.in on near real time basis. This service was widely followed up by the flood affected people. The appreciations/ suggestions regarding the service were received from various people during the monsoon season.

The methodology based on rainfall-runoff mathematical model is being progressively used for formulating flood forecasts. Using this methodology, 5-day advisory forecasts are being issued by CWC. During flood season, five days flood advisories are available for all the 20 river basins online since June 2017 on the website https://aff.india-water.gov.in/. With the availability of such information on severe storms, CWC is now issuing specific advisories giving district-wise advise on anticipated floods to facilitate early NDRF/SDRF deployment and dam-wise advise for operation of reservoir gates and release of water from reservoir, wherever applicable.

CWC is issuing Daily Flood Situation Reports from May 2022 onwards till December 2022. In addition to reports containing the usual daily rainfall situation, rainfall forecast for the next 5 days, daily flood bulletin for the day and the flood situation and advisories for the next few days, GIS based Map indicating the districts affected by flood and reservoirs having inflow forecasts were also continued. Further the report was sent to all beneficiaries including State Governments as well as general public through Facebook (@CWC official FF), twitter (@CWC official FF) and Whatsapp group.

3.2.2 Significant Flood Situations during 2022

1. During the flood season of 2022, out of 199 level forecasting stations, Extreme Flood Situation was witnessed at 11 stations. Further, 78 more stations, where water level is being monitored by CWC, witnessed Extreme Flood Situation during the period.
2. 95 FF Stations flowed in Severe Flood Situation in the States of Assam, Bihar, Jammu & Kashmir, West Bengal, Tamilnadu, Andhra Pradesh, Telangana, Chhattisgarh, Odisha, Uttar Pradesh, Maharashtra, Jharkhand, Madhya Pradesh, Uttarakhand, Rajasthan, NCT Delhi and Gujarat during the period 1st May to 31st December 2022.
3. 42 FF Stations in Assam, Bihar, Uttar Pradesh, Tripura, West Bengal, Uttarakhand, Maharashtra, Andhra Pradesh, Tamilnadu, Kerala, Odisha, Telangana, Rajasthan and Karnataka flowed in Above Normal Flood Situation during the period 1st May to 31st December 2022.
4. 89 reservoir received inflows above its threshold limit in Andhra Pradesh, Chattisgarh, Gujarat, Karnataka, Madhya Pradesh, Maharashtra, Odisha, Rajasthan, Tamilnadu, Telangana, Jharkhand, Kerala, West Bengal, Uttarakhand and Uttar Pradesh during the period from 1st May to 31st December 2022.

3.2.3 Flood Bulletins

Central Water Commission (CWC) has been issuing Daily Flood Bulletins and Special Flood Bulletins during flood season every year based on the information collected from affected State Governments and field formations of CWC. During the year 2022, 245 daily bulletins (once daily), 621 Orange Bulletins for Severe Flood Situation (every 6 hours) and 555 Red Bulletins for Extreme Flood Situation (every 3hours) were issued by CWC as per Standard Operating Procedure (SOP).

Apart from regular bulletins, CWC also prepared various status notes on occurrence of severe flood events for discussions in NDMA, Erstwhile MoWR, National Crisis Management Committee (NCMC), National Executive Council (NEC) meetings.

3.2.4 Communication System of CWC used for flood forecasting purposes

Various modes of communication namely, wireless, satellite, GSM/GPRS, VSAT, Telephone, Mobile, Fax and Internet were used by CWC for flood forecasting purposes. Since beginning, Central Water Commission has been operating wireless stations covering almost all river basins to transmit and receive manually observed data. Sensor based automatically collected data were transmitted from remote observation stations to Earth Receiving Stations (ERS) through Data Relay Transponder (DRT) of INSAT 3D and from ERS to Central Flood Control Room (CFCR) at CWC headquarter, New Delhi and/or Divisional

Flood Control Room (DFCR) at Divisional offices of CWC through VSAT. Telephone, Mobile, FAX and E-mail are also used at all the DFCR and CFCR (under FFM Directorate, CWC) for transmission of data. The CFCR at FFM Dte, New Delhi operated on 24x7 basis during monsoon. The information regarding Severe and Extreme Flood Situation were also sent to concerned authorities in Erstwhile MoWR, RD&GR, CWC, National Disaster Management Authority (NDMA), Indian Meteorological Department (IMD), National Disaster Response Force (NDRF) etc. through email. The forecast, water level and rainfall information were regularly uploaded on web site http://india-water.gov.in/wims during monsoon season.

3.2.5 Modernization of Flood Forecasting Services

Central Water Commission is making a constant endeavour in updating and modernizing the flood forecasting services. The forecasting of flood involves a number of steps, namely: data observation, collection, transmission, compilation and analysis, formulation of forecasts and their dissemination. To make the flood forecasts more accurate, effective and timely, the modernization activities are being taken up on a continuous basis broadly under following functions:

- Installation of telemetry system for automatic sensor based data collection and satellite based data communication.
- Development of mathematical model for forecast formulation using observed hydrological & hydro-meteorological data & rainfall forecast from IMD.
- Web-based system for forecast dissemination.

3.2.5.1 Installation of Telemetry System

In order to meet the requirement of real-time data collection, automatic data transmission and flood forecast formulation, expeditious data/information dissemination, the Central Water Commission has undertaken modernization of its data collection and flood forecast network.

The installation of Telemetry System with automatic sensor based data collection and satellite based data communication was initiated during IX Plan and it was installed at 55 stations in Chambal and Upper Mahanadi basins under the World Bank aided Dam Safety Assurance and Rehabilitation Project (DSARP) scheme.

During X Plan, telemetry system was installed at 168 stations in six river basins namely, Godavari (63), Krishna (41), Brahmaputra (21), Damodar (20), Yamuna (15) and Mahanadi (8).

During XI plan, telemetry system was installed at 222 stations in seven river basins namely, Indus (4), Ganga (63), Yamuna (25), Narmada & Tapi (76), Mahanadi (36), Brahmaputra (14) and Godavari (4).

Further, during XII Plan, telemetry system was installed at 495 stations in 14 river basins namely, Brahmaputra(67), Yamuna (51), Godavari(25), Pennar(5), Krishna(15), Eastern Rivers(30), Teesta Basin (30), Narmada (12), Ganga(153), Chenab(4), Mahi Tapi (24), Southern River (38), Cauvery (32) and Wainganga(9).

In order to receive and analyse data collected by the telemetry stations, Earth Receiving Stations and Modelling Centres have been installed in various parts of the country during different Plan periods. There are 3 Earth Receiving Stations (ERS) in the country at New Delhi, Jaipur and Burla. A total of **27** Modelling centres have been installed in the country till the end of XII Plan. The data reception from stations all over India is being monitored from Central Flood Control Room at CWC Headquarter, New Delhi.

Upto Mar 2023, 1054 Telemetry stations have been installed and installation of additional 34 stations is under progress.

3.2.5.2 Development and use of Mathematical Model for Flood Forecasting

CWC is currently providing five-day advisory flood forecast on its web portal https://120.57.99.138 by doing pan India rainfall-based mathematical modelling for 20 major river basins of the country covering 199 water level and 134 reservoir inflow forecast stations. This is a major paradigm shift from the conventional Gauge-to-Gauge correlation to a more scientific modelling technique for flood forecasting. The system is totally in-house developed using modelling software's (MIKE 11, ArcGIS etc) generating forecast which is updated every three hours for all the stations simultaneously in automatic mode.

It uses both the hydrologic (rainfall-runoff) and hydrodynamic modelling techniques for real-time water level and inflow prediction in the rivers and reservoirs respectively. This new intervention has not only increased the lead time substantially to 120 hours 95 days) for all the stations but also standardised the forecast duration in a pattern similar to rainfall observation time. The five day advance forecast is generated using various available rainfall data products like forecasted rainfall data GFS (Global Forecast System) provided by IMD (India Meteorological Department), GSMaP (Global Satellite Mapping of Precipitation- JAXA product) & GPM (Global Precipitation Measurement- NASA & JAXA product), as a major input into the system.

3.2.5.3 Web-based system for forecast dissemination

The web based system for dissemination of flood forecast & water level information was operationalized in 2014. The information is available on near real time basis on website https://ffs.india-water.gov.in.

CWC in collaboration with M/s Google Inc has started issuing inundation alerts regarding flood situation in various categories of flood at all the existing flood forecast stations. The alert messages will be available on the dashboard http://g.co/indiafloods. These alerts will also be visible in GPRS enabled android smart phones when they approach the area of flooding.

3.3 FLOOD MANAGEMENT AND BORDER AREAS PROGRAMME (FMBAP)

A comprehensive scheme titled "Flood Management and Border Areas Programme (FMBAP)" with an outlay of Rs. 3342.00 Cr (FMP-Rs 2642 Cr & RMBA-Rs 700 Cr) for period 2017-2020 with merged components from the existing Flood Management Programme (FMP) and River Management in Border Areas (RMBA) schemes during XII Five Year Plan was approved by the Union Cabinet on 07-Mar-2019 and aimed at completion of the on-going projects already approved under FMP. The scheme was extended till March, 2021.

Brief about both components are as under:

3.3.1 Flood Management Program (FMP)

"Flood Management Programme (FMP)" a State Sector scheme amounting to Rs. 8,000 Cr. under Central Plan proposed by Erstwhile MoWR, RD & GR was approved by Government of India during XI Plan (Nov. 2007). The continuation of flood management programme was approved by the Government of India during XII Plan with an outlay of Rs. 10,000 Cr. An outlay of Rs. 2642 Cr. was kept for period 2017-21 under this component.

A total 522 schemes costing Rs 13238.37 Cr were approved during XI Plan (420 projects costing Rs 7857.08 Cr) and XII Plan (102 projects costing Rs 5381.29 Cr). Out of these 522 schemes, 427 schemes have been completed; 64 schemes foreclosed, dropped and shifted (47-foreclosed; 16-dropped & 1 shifted to RMBA component) and 31 schemes are ongoing.

Out of these 31 ongoing schemes; 16, 12 & 3 schemes are being monitored by CWC, GFCC & Brahmaputra Board respectively. Further out of 16 ongoing schemes (for UT of J&K -15 and Laddakh-1), being monitored by CWC, complete Central Assistance has been released for 8 ongoing schemes. These 427 completed schemes have given protection to an area of around 4.99 mha and protected a population of about 53.57 million.

3.3.2 River Management Activities & Works related to Border Areas (RMBA) Component

River Management Activities & Works related to Border Areas (RMBA) started as a Central Sector Scheme with an outlay of Rs 820 Cr in XI plan. The scheme with an outlay of Rs 740 Cr was also continued during XII Plan. An outlay of Rs 700 Cr was kept for period 2017-21 under this component.

Following activities are being taken up under RMBA component of FMBAP:

Sl.	Activity
1	Hydrological observations and flood forecasting on common border rivers with neighbouring countries
2	Investigation of WR projects in neighbouring countries
3	Pre-construction activities for WR projects on common border rivers
4	Grant in aid to states for bank protection /anti erosion works on common border rivers and Union Territories for flood management /anti sea erosion measurers
5	Activities of Ganga Flood Control Commission (GFCC)

3.3.3 FMBAP (2021-26)

Approval of FMBAP 2021-2026 vide Cabinet decision dated 19.01.2022 was up to September, 2022 with limited outlay of Rs. 450 Cr. Funding ratio has been kept as 90:10 (for special category States) and 60:40 (for general States) under FMP component of the schemes.

5 schemes costing Rs 2403.24 Cr (1 each from J&K, Himachal Pradesh, Assam, Manipur & Bihar) has been included under FMP component of FMBAP: 2021-26.

Funds released under the FMP as well as RMBA as grant in –Aid up to March, 2023 is presented in Table 3.3.

Table 3.3: Funds released under FMP and RMBA since XI Plan up to March,2023 (Rs. in crore)

Fund Releases	FMP	RMBA (Grant-in-Aid)	Total
XI PLAN	3566.00	340.41	3906.41
XII PLAN	1307.07	223.20	1530.27
Total (XI+XII)	4873.07	563.61	5436.68
FMBAP 2017-21: FY:2017-18	562.67	159.25	721.92
FMBAP 2017-21: FY:2018-19	428.20	256.48	684.68
FMBAP 2017-21: FY:2019-20	546.02	69.61	615.63
FMBAP 2017-21: FY:2020-21	37.79	42.49	80.28
Total FMBAP 2017-21	1574.68	527.83	2102.51
FMBAP 2021-26: FY:2021-22	239.7539	3.736	243.49
FMBAP 2021-26: FY:2022-23	325.28	88.96	414.24
Total as on date since XI Plan	**7012.78**	**1184.14**	**8196.92**

3.4 Morphological Studies

The study of river morphology and implementation of suitable river training works as appropriate have become imperative for our nation as large areas of the country are affected by floods every year causing severe damage to life and property in spite of existing flood control measures taken by both Central and

State Governments. Problems are aggregating mainly due to severe erosion of river banks and large quantity of silt/sediment being carried and deposited in its downstream reaches. This behaviour of the river needs to be thoroughly understood for evolving effective strategies to overcome the problem posed by it.

Consultancy works for morphological studies of 15 rivers (Ganga, Sharda, Rapti, Kosi, Bagmati, Yamuna, Brahmaputra, Subansiri, Pagladiya, Krishna, Tungbhadra, Mahananda, Mahanadi, Hoogli, &Tapti) by using remote sensing technology was awarded to IITs/NITs under the Plan Scheme "R&D Programme in Water Sector".

The details and status of these studies are given in Table 3.4 below.

Table 3.4: Status of Consultancy works for morphological studies

Sl	Institute	Name of Rivers	Status
1.	IIT Roorkee	Ganga, Sharda, Rapti	Completed
2.	IIT Delhi	Kosi, Bagmati, Yamuna	Under progress
3.	IIT Guwahati	Brahmaputra, Subansiri, Pagladiya	Completed
4.	IIT Madras	Krishna,Tungbhadra	Completed
5.	IIT Kharagpur	Mahananda, Mahanadi, Hooghly	Completed
6.	SVNIT Surat	Tapi	Completed

3.5 Coastal Erosion

Coastlines are dynamic landforms and are constantly subjected to erosion and/or accretion. Coastlines are modified by winds, waves, tides, currents, geomorphology, sediment supply to the coast and anthropogenic activities. Erosion occurs when material being removed, for deposition elsewhere, exceeds the rate of supply finally resulting in the landward shifting of the shoreline. The Indian coastline extends upto a length of about 7516 km (as per NHO). Almost all the maritime States/UTs are facing coastal erosion problem of various magnitudes. CWC is involved in following activities for providing assistance to the States:

3.5.1 Coastal Protection and Development Advisory Committee (CPDAC)

The Coastal Protection and Development advisory Committee (CPDAC) (erstwhile Beach Erosion Board) has been constituted by Erstwhile Ministry of Water Resources, Government of India in April 1995 under the Chairmanship of Member (RM), CWC. The CPDAC has been assigned very wide mandate by Govt. of India ranging from coordination related to Coastal Data Collection, organizing investigation and research in coastal protection, laying down principles in construction techniques of coastal protection measures, review of already executed protection works & evolve improved design condition based on the same and to interact with international agencies for technology transfer in field of coastal protection etc. MoEF & CC is one of the Members of the above Committee.

Till now, 17 meetings of CPDAC have been held. The 17th meeting of CPDAC was held through Video Conferencing on 18th February, 2021 under the Chairmanship of Shri Ranjan Kumar Sinha, Member (River Management), CWC. Finalization of shoreline change atlas of Indian Coast is an important outcome of 17th CPDAC Meeting.

The work for the updation of Shoreline Change Atlas of Indian Coast on time frame of 2004-06 to 2014-16 has been completed by SAC, Ahmedabad and got clearance for release from ISRO HQ. SAC has informed that the shoreline change atlas has been prepared in six volumes based on LISS IV satellite data for 2004-06 and 2014-16 time frame at 1:25000 scale. The updated Atlas was released in August, 2021.

3.5.2 Coastal Management Information System (CMIS)

Considering the importance of collection of data on coastal processes relevant for evolving plans and coastal protection measures, CWC has initiated development of "Coastal Management Information System (CMIS)" under the Plan Scheme "Development of Water Resources Information System (DWRIS)". The CMIS envisages setting up sites along the coast of the maritime States of India for collecting data of relevant coastal processes.

The activity of establishing a Coastal Management Information System is a field of activity wherein experience and expertise is needed. Hence, for implementation and creation of CMIS, it was decided that CWC would suitably associate with the maritime State/UT Governments and Institutes/Agencies who possess similar expertise and experience. In order to hear the views of the maritime State/UT Governments and Expert Institutes/Agencies, a "One day Brainstorming Workshop on Implementation and Creation of Coastal Management Information System (CMIS)" was organized by CWC on 13th May, 2014 at CWC HQ in New Delhi. During the discussions in the work-shop, the preferred implementation model for CMIS was decided to be through signing of a tripartite Memorandum of Understanding (MoU) wherein, CWC would be the 'Project Implementer', the expert agency would be the 'Project Executor' and the concerned State/ UT Government would be the 'Project Facilitator'. Data related to Wave, Tide, Current, Wind, coastal sediment, beach profile, bathymetry, shoreline change etc. are to be collected under this programme.

A) IIT Madras

A tripartite Memorandum of Understanding (MoU) between CWC as project implementer, Indian Institute of Technology, Madras as project executor and States of Tamil Nadu, Kerala and UT of Puducherry as project facilitator for Tamil Nadu, Kerala and Puducherry respectively was signed in October 2016 for establishment of one coastal data collection site in each participating State/UT (Devanari-Tamil Nadu, Karaikal-Puducherry and Ponnani-Kerala) over a period of 2 years which expired in June 2019. All the deliverables enshrined in the MoU were completed and intended targets achieved. All the remaining payments as per MoU were made to IITM, Chennai.

Approval was received from DoWR,RD&GR for the project proposal of IIT Madras for extension of the implementation of Coastal Management Information System (CMIS) in the states of Tamil Nadu, Kerala and UT of Puducherry (CMIS) with an estimated cost of Rs. 4.143 crore for a period of one year. Accordingly, a tripartite Memorandum of Understanding (MoU) was signed in January 2020 between CWC, IIT Madras and the respective states of Kerala, Tamil Nadu and Puducherry Establishment of three nos. of coastal data collection sites (Devanari-Tamil Nadu, Karaikal-Puducherry and Ponnani-Kerala) was completed and sites were taken over from the project executor, IITM, Chennai on 31.05.2021. Data collection was started by CWC from the above sites in the month of June 2021.

B) CWPRS, Pune

CWC explored the possibility of extending CMIS to the other maritime States/UTs and held discussions regarding the same with institutes like National Institute of Oceanography (NIO), Goa, Central Water & Power Research Station (CWPRS), Pune, National Institute of Technology (NIT), Surathkal etc. Consequently, CWPRS Pune had shown interest in taking up the role of Project Executor for Implementation of CMIS at 2 sites, one each in Maharashtra (northern region) and Gujarat (southern region).

Further, CWC made communication with State Govt. of Maharashtra and Gujarat, seeking their concurrence for the implementation of CMIS as per the arrangement of tripartite MoU arrangement.

Consequently, the State Govt. of Gujarat and Maharashtra accorded their concurrence for the

implementation of CMIS in their respective States. The competent authority in DoWR,RD&GR approved a Project Proposal of CWPRS, Pune amounting to Rs.6.96 crore for the implementation of Coastal Management Information System (CMIS) at 2 sites, 1 in Gujarat and 1 in Northern Maharashtra and a tripartite Memorandum of Understanding (MoU) among CWC as project implementer, CWPRS, Pune as project executor and States of Gujarat, and Northern Maharashtra as project facilitator was signed in January 2019 for establishment of one coastal data collection site in each participating State/UT.

Establishment of 2 sites, one at Satpati in North Maharashtra and another at Nanidanti-Motidanti in South Gujarat is in progress under this project.

Fourth PMC meeting for the implementation of CMIS in the State of Maharashtra and Gujarat was held through Video Conferencing on 19.10.2022. The procurements of all the instruments except water and grab sampler have been completed. All the procured instruments are installed or being used for data collection except DWRB units which have been procured in May-2022 and kept at sites. Installation of DWRB has been planned subsequent to obtaining insurance which is being purchased through GeM as per recent directives of the Ministry. Approval for extension of the project period for next 24 months i.e. upto June, 2024 has been obtained by the competent authority. An amount of Rs. 10.15 Lakhs has been made to CWPRS, Pune in March 2023 as part payment of third installment of payment.

C) NIO, Goa

NIO, Goa had also shown interest for taking up the role of Project Executor for Implementation of CMIS at 3 sites, 2 in Goa and 1 in Southern Maharashtra.

A Tripartite MoU for implementation of Coastal Management Information System (CMIS) in Maharashtra (Southern Coast) and Goa at an estimated cost of Rs. 13.77 crore was signed between CWC as Project Implementer, National Institute of Oceanography (NIO), Goa as Project Executer and Govt. of Maharashtra and Govt. of Goa as Project Facilitator on 26th & 27th March 2019.

Establishment of three sites i.e, Tarkali-Malvan in South Maharashtra, Calangute-Baga coast in North Goa and Varca-Benaulium in South Goa is in progress under this project.

Bathymetry, beach profiling, shoreline change, coastal sediment Coastal bed sediments, suspended sediment and beach sediment measurements are being conducted as per schedule. First year balance payment amounting to Rs.371.26 Lakh was made to NIO, Goa in the month of September, 2022 after getting the approval from competent authority in Ministry.

Approval for extension of the project period for next 24 months i.e. upto November, 2024 was obtained from the competent authority Procurement of most of the equipment have been completed under this project except DWRB, Tide gauge and CTD.

A review meeting has been held under the Chairmanship of Member (RM), CWC on 03rd February, 2023 through Video Conferencing for reviewing the progress of the implementation of Coastal management information system (CMIS) at eight CMIS sites with field offices of CWC and expert agencies like CWPRS, Pune & NIO, Goa.

Concurrence has been received from States for the establishment of 12 more CMIS Sites. Proposal for the establishment of 4 new CMIS sites during 2022-23 along with draft Model tender documents has been prepared and submitted for approval of the competent authority in November 2022. The development of online portal for data collected under CMIS is being taken up with NWIC and is under development stage.

3.5.3 Salinity Ingress Management Projects

On the direction of Hon'ble Prime Minister during a review meeting taken on 19.06.2014, a study was taken up by the Erstwhile Ministry of

Water Resources, River Development and Ganga Rejuvenation (MoWR,RD&GR) to examine the issues of salinization of land along the coast in a scientific manner and to suggest suitable remedial measures for same.

Coastal land salinization and salt water ingress are major hazards encountered along the Indian coast which can hamper the rapid socio-economic growth of the coastal states and the economy of the country as a whole. As India has a lengthy sea coast spread over nine states and four union territories, the problem of salinity in coastal areas is a national problem. In coastal regions, which are in close proximity to the sea, salinization may lead to changes in the chemical composition of natural water resources, degrading the quality of water supply to the domestic, agriculture and industrial sectors, loss of biodiversity, taxonomic replacement by halo tolerant species, loss of fertile soil, collapse of agricultural and fishery industries, changes in local climatic conditions, and creating health problems; thus, affecting many aspects of human life and posing major hindrance to the economic development of the region.

A technical committee for providing broad outline of the measures to be taken to arrest or minimize the salinity ingress in the coastal States/Union Territories was constituted under the chairmanship of Chairman, CWC with Chief Engineer, HSO, CWC as Member-Secretary. A Report namely "Problems of Salination of Land in Coastal Areas of India and Suitable Protection Measures" was prepared and submitted in Aug, 2017.

A meeting to discuss the report was held under the Chairmanship of Secretary (WR,RD&GR) on 29th September, 2017. In the meeting it was decided that (i) CWC will prepare necessary guidelines in consultation with CWPRS, CGWB and other technical agencies for preparation of DPR for salinity ingress management projects including funding pattern and eligibility criteria for funding. (ii) CWC will prepare a comprehensive new scheme for salinity ingress management projects based on the DPRs received from the States/UTs as per guidelines prepared by CWC. (iii) A National Centre for Scientific Study of Salinity ingress in Delta regions will be set up as recommended in the report.

Further, a Committee was constituted for (i) preparation of DPR (ii) preparation of new scheme for Salinity Ingress Management Projects & (iii) setting up of National Centre for Scientific Study of Salinity Ingress in Delta Regions.

The draft guidelines for preparation of DPR were finalized and circulated to all the coastal states/UTs in October, 2021 for their comments/views. After several reminders and perusal from DoWR,RD&GR and CWC, the inputs/comments of most of the coastal states/UTs were received except the State of Goa, UT of Puducherry and the UT of Lakshadweep. The draft guidelines have been updated by suitably incorporating comments/views from coastal States/UTs and further recommended to the Ministry in November 2022 for further consideration and obtaining the approval of the competent authority.

3.5.4 Desalination

Desalination refers to any of several processes that remove excess salt and other minerals from water. Water is desalinated in order to be converted to freshwater suitable for human consumption. It is used on many sea going ships and submarines. Most of the modern interest in desalination is focused on developing cost-effective ways of providing freshwater for human use in regions where the availability of freshwater is limited. Large-scale desalination typically uses extremely large amounts of energy as well as specialized expensive infrastructure, making it very costly compared to the use of freshwater from rivers or groundwater. The energy requirement also depends upon the salt content. More salt content requires more energy during desalination process.

A comprehensive report/Status note and way Forward including role of CWC on augmenting water availability by desalination of water has been prepared.

4 BASIN PLANNING

4.1 Basin wise Water Resources Assessment of India (1990-2020) ver 2.0

With a view to address the climate change related issues; the National Action Plan on Climate Change (NAPCC) has been prepared by the Government of India. The NAPCC has laid down the principles and has identified the approach to be adopted to meet the challenges of impact of climate change through eight National Missions namely, (a) National Solar Mission, (b) National Mission for Enhanced Energy Efficiency, (c) National Mission on Sustainable Habitat, (d) National Water Mission, (e) National Mission for Sustaining the Himalayan Eco-system, (f) National Mission for a Green India, (g) National Mission for Sustainable Agriculture, and (h) National Mission on Strategic Knowledge for Climate Change.

One of the strategies identified for implementation under the Comprehensive Mission Document of National Water Mission was - Reassessment of basin-wise water situation under present scenario including water quality by using latest techniques, which inter-alia may include:

- Development or adoption of comprehensive water balance based model,
- Fitting models to basin using current data, and
- Assessment of likely future situation with changes in demands, land use, precipitation and evaporation

To further strengthen the National Water Mission goal, and in continuation of the water availability assessed in 2019, basin wise water availability assessment is undertaken by CWC for the succeeding years up to 2022.

The assessment of water availability in a basin is a complex and critical task that requires sophisticated modelling approaches to understand and predict the dynamics of water resources in response to changing climatic, environmental, and anthropogenic factors. In recent years, Python has emerged as a powerful and versatile programming language for hydrological model development, offering numerous advantages in terms of flexibility, scalability, and extensibility. An in house Water Resources Assessment tool was developed using Python Script. The tool estimates the basin annual model runoff or surplus with precipitation, actual evapotranspiration, land use land cover and soil datasets as major inputs. A snapshot of the tool interface is shown in Figure 4.1.

4.2 United Nations Sustainable Development Goals (SDG)

The 2030 Agenda for Sustainable Development, adopted by all United Nations Member States in 2015, provides a shared blueprint for peace and prosperity for people and the planet, now and into the future. At its heart are the 17 Sustainable Development Goals (SDGs), which are an urgent call for action by all countries - developed and developing - in a global partnership. These 17 goals are further divided into 169 targets. These Goals recognize that ending poverty and other deprivations must go hand-in-hand with strategies that improve health and education, reduce inequality, and spur economic growth – all while tackling climate change and working to preserve our oceans and forests.

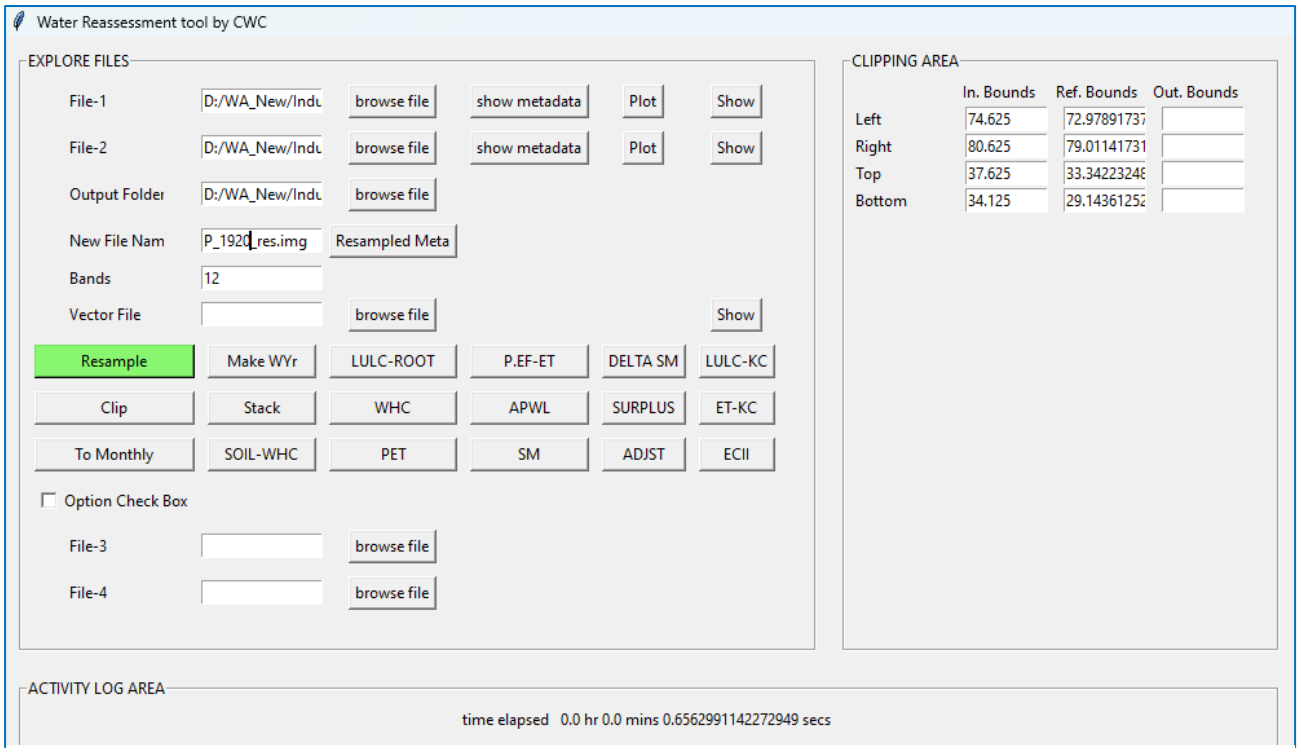


Figure 4.1: Water resources assessment tool interface

Sustainable Development Goal 6 aims to "Ensure availability and sustainable management of water and sanitation for all". The Goal 6 is further divided into 8 Targets. To measure the progress towards these Targets, each target has been further subdivided into Indicators. These Indicators are then reported country wise.

Chief Engineer, Basin Planning & Management Organisation (BPMO), CWC has been designated as Nodal Point by DoWR,RD&GR for country reporting on SDG Indicator 6.4.2, 6.5.1 & 6.6.1 for the Data Drive 2023.

4.3 Extended Hydrological Prediction (Multi Week Forecast)

Extended Hydrological Prediction (EHP) is the prediction of hydrological variables, most commonly the monthly/seasonal flow in a catchment at the time scale of weeks/months ahead. The skillful and reliable forecasts may prove valuable for planning and managing water use, mitigating drought, etc. and are expected to help water managers and users with long lead time, leading to judicious & informed operating decisions and better risk management.

The Extended Hydrologic Prediction (EHP) - Multi Week Forecast Project is a forecasting system being developed and deployed for three basins of India – Yamuna, Narmada, and Cauvery. The consultancy work has been awarded under National Hydrology Project (NHP) and project work started on 01.07.2020. The main objective of the consultancy is to develop tools for multi-week runoff forecast in the selected basins at four key locations in each basin upto four-week. The model (s) for low flow (lean) and high flow (monsoon) season have been developed and being tested at the selected forecast locations.

4.4 India-EU Water Partnership (IEWP)

A joint declaration for India-EU Water partnership (IEWP) was adopted in Brussels in March 2016 during the visit of Hon'ble Prime Minister of India to Brussels. A formal MoU was

signed to encourage and promote IEWP between India and European Union in New Delhi on 07.10.2016 by the Hon'ble Minister of Water Resources of India and Mr. Karmeny Vella, Member of EU for Environment, Maritime Affairs & Fisheries.

As a follow-up action on the MoU, vide its note of 21.02.2017 Erstwhile MoWR, RD&GR formalized working of IEWP and notified Chief Engineer (EMO), CWC as the Team Leader from Indian side. JS(IC&GW), DoWR,RD&GR is the focal point in the Ministry. Director (RS), CWC is Convenor of IEWP from Indian side.

The India-EU Water Partnership (IEWP) Phase-1 concluded on 30th October 2020 and Phase 2 has started from 1st November 2020 for the next three years.

In the IEWP Phase I, the flexible IEWP Action Plan was having Nine Priority Areas for technical implementation. RBM approaches and mechanisms of the European Union were blended with those in India in order to achieve sustainable practices that support the management of Indian River basins. In IEWP Phase I the following documents emerged:

1. Tapi River Basin Management Plan (Report on 5 Key Water Management Issues)
2. Guidance Document for Environmental Flows assessment and implementation In India
3. Assessment of Urban Pollution in the Hindon River Basin including first Recommendations for Measures.
4. Handbook for stable isotope data interpretation in India
5. Protocol for estimating Irrigation Performance in Small and Medium Irrigation Schemes in India, Using Remote Sensing Data
6. National Policy on the Safe Reuse of Treated Water (draft)

In the IEWP Phase II, the horizontal/vertical thematic pillars integrate the nine Priority Areas of the IEWP Phase 1 and aims to further consolidate RBM approaches in practice.

The horizontal/vertical thematic pillars hold four work areas for implementation:

- River Basin Management integrates most of the nine Priority Areas of the IEWP Phase I into one cluster that fosters the holistic management of river basins in India based on EU good practices that are merged with Indian approaches. During Phase II, the Tapi River Basin Management Plan developed during phase I has been further detailed by incorporating the available data and modeling results from SWAT, RIBASIM, etc. The detailed draft Tapi RBM plan was submitted on 02.11.2023. Irrigation and Efficient Water Use (Development of protocol for assessment of Project Irrigation Efficiency in 3 pilot projects namely: Lower Panjara (Maharashtra), Mahuar (Madhya Pradesh), and Golavagy (Telangana).
- Environmental Flows Assessment in Ramganga sub-basin and Mahanadi Delta area.
- Safe Reuse of Treated Water.

The vertical pillars hold cross-cutting issues with all work areas of the horizontal thematic pillars including a facilitated implementation of measures (in the Tapi River Basin). A major thrust will be on providing hands-on training on approaches and methods that will be undertaken in combination with the implementation of individualactivities in all thematic areas. EU Member States and the Indian partners will be further involved towards an improved EU-India Water Policy dialogue.

Horizontal / Thematic Pillar	Vertical / Cross-cutting Pillar				
RIVER BASIN MANAGEMENT Integrating the Thematic Areas	Facilitated implementation of measure	Facilitation towards piloting of EU Technologies	Opportunities for Indian Water Sector and Research / EU Horizon 2020	Trainings and knowledge dissemination	Involve EU and Indian partners to improve EU-India Policy dialogue
Continued Implementation of the RBM Cycle					
Develop/Disseminate RBM toolbox					
Detailing of Tapi RBM Plan and gradual implementation					
Surface water / Groundwater					
Water Quality/Water Quantity/ Monitoring					
Pressure and impact on Basin aims					
IRRIGATION AND EFFICIENT WATER USE					
Development of Project Irrigation Efficiency Protocol					
ENVIRONMENTAL FLOWS ASSESSMENT					
In a selected Ganga Sub-basin involving all relevant stakeholders					
SAFE RE-USE OF TREATED WATER					
Finalization and implementation Support of the National Policy on the safe re-use of treated water					

Figure 4.2: Organisation of the IEWP Phase 2 work areas as basis of a flexible Action Plan

4.5 National Water Policy

The National Water Policy was first adopted in the year 1987. It states that the policy may be reviewed and revised periodically as and when need arises. The National Water Policy was subsequently revised in 2002 and 2012. The "National Water Policy – 2012" was adopted by the National Water Resources Council in its 6th meeting held in December 2012.

Later a Committee was constituted by the Erstwhile MoWR for suggesting roadmap for implementation of National Water Policy - 2012 under the Chairmanship of Dr. S.R. Hashim, Former Chairman, UPSC & Former Member, Planning Commission. The Committee has submitted its report in September, 2013.

Further, in view of the latest issues in water sector, revision of the NWP (2012) has been envisaged by Ministry of Jal Shakti and a committee has been constituted, on 05.11.2019 under the chairmanship of Dr.Mihir Shah, to draft the National Water Policy. The Committee undertook a process of wide-ranging consultations to ensure that the process of drafting the policy is as inclusive as possible and the best possible policy emerges from this process of co-creation.

Ten meetings and Five consultation meetings of the Drafting Committee for revision of National Water Policy were conducted (November, 2019 - October, 2020), in which the consultations were held with the State Governments/ UTs, Central Ministries, Non- Governmental Organisations, Academia and Water Experts from all over the country.

Based on the consultations and deliberations, the Drafting Committee submitted three drafts of National Water Policy on 17.08.2020, 17.10.2020 and 01.11.2020 respectively. The final draft of National Water Policy dated 07.11.2020 has been

submitted by the Drafting Committee to the Ministry of Jal Shakti.

4.6 National Water Framework Bill 2016

The National Water Policy (2012) emphasizes the need to evolve a National Water Framework Law as an umbrella statement of general principles governing the exercise of legislative/executive powers by the Centre, the States and the local governing bodies. Subsequently on 03.07.2012, the Ministry had constituted a Committee under the Chairmanship of Dr. Y. K. Alagh to draft National Water Framework Law. The Committee submitted its Report in May, 2013. The report submitted by Dr. Y. K. Alagh Committee was circulated to the States/ UTs for comments and were also placed before the Forum of Water Resources / Irrigation Ministers of States for wider consultations in its meeting held on 29.05.2013.

Later on 28.12.2015, Erstwhile MoWR,RD&GR constituted a Committee under the Chairmanship of Dr.Mihir Shah to examine the provisions of the draft National Water Framework Bill and suggest changes/ modifications The Committee submitted its Final Report to the Ministry on 18.07.2016 whichwas circulated to all States/UTs and concerned Central Ministries for their comments on the proposed National Water Framework Bill.

Subsequently on 20.01.2017, the Secretary of the Erstwhile Ministry of Water Resources River Development & Ganga Rejuvenation and on 14.03.2017, the Hon'ble Minister of Water Resources River Development & Ganga Rejuvenation has requested all States/UTs to pass suitable resolutions in their State Assemblies in support of the draft National Water Framework Bill, 2016.

The Bill was circulated to States/UTs and the concerned Central Ministries for obtaining their comments. Comments on the draft bill have been received from 11 States viz., Rajasthan, Tamil Nadu, Madhya Pradesh, Kerala, Karnataka, Odisha, Gujarat, Uttar Pradesh, Maharashtra, Bihar and Jharkhand whereas, interim response have been received from 5 States/UTs viz., Uttarakhand, Punjab, Arunachal Pradesh, NCT of Delhi and Lakshadweep. Response from other States / UTs is awaited.

4.7 River Basin Management Bill

DoWR,RD&GR had constituted a Committee on 06.03.2012 under the Chairmanship of Justice (Retd.) T.S. Doabia to study the activities that are required for optimum development of river basin and changes required in the existing River Board Act, 1956 for achievement of the same. The Committee submitted its Report in November, 2012 to the Ministry which includes a draft River Basin Management Bill, 2012. The same was circulated among all States, Union Territories and related Union Ministries by the Ministry.

Subsequently, a Committee under the Chairmanship of Dr.Mihir Shah was constituted on 28.12.2015 by the Ministry to examine the provisions of the draft River Basin Management Bill, 2012 and suggest changes/ modifications therein taking into account inter-alia the emerging challenges in the water sector, reuse of waste water after treatment, the likely impact of climate change on water resources, importance of river restoration/rejuvenation, water contamination issues etc.

DoWR,RD&GR has constituted an Expert Group in the Ministry to further review and finalize the bill. Director (NWP), CWC is representing CWC in the group. A one-day brainstorming session was held to deliberate upon various issues related to River Basin Management Bill, 2018 on 03.06.2019 at VigyanBhawan, New Delhi. Representatives from States/Union Territories, concerned Central Ministries, experts and other officials from Ministry of Jal Shakti, officers from CWC, CGWB, NIH and other officers participated in the deliberations.

The response of Central Water Commission on the comments of States during brain storming session was sent to the Department of Water

Resources River Development & Ganga Rejuvenation on 25.10.2019. Central Water Commission also provided its response on the comments of public/ stake holders which were sent to the Department of Water Resources, River Development & Ganga Rejuvenation on 22.04.2020.

4.8 State Specific Action Plan (SSAP)

Under National Water Mission (NWM), State Specific Action Plans for Water Sector aligned with the State Action Plan on Climate Change to be prepared for all States and Union Territories (UT) (36 Nos.).A Steering and Technical Committees for State Specific Action Plan (SSAP) on Water was constituted in September 2020 having Chief Engineer, BPMO and Director, BP-III, respectively.The main responsibility of these committees is to examine and approve the SSAPs for States / UTs.Comments/views /suggestions on Draft Status Report (DSR) of 21 States/UTs have been offered by BP-III.No. of meetings on DSR of Technical and Steering Committee held for **14** and **11** States/UTs, respectively.

4.9 Joint Operation Committee of Rihand Reservoir

Erstwhile Ministry of Water Resources set up a Joint Operation Committee (JOC) for Rihand Reservoir vide their O.M. No 54/7/92-BM/1172 dated 30.10.1992. The committee consists of members from Uttar Pradesh Jal Vidyut Nigam Limited (UPJVNL), Uttar Pradesh Power Corporation (UPPCL), Water Resources Department, Bihar and Central Electricity Authority. Member (WP&P), CWC is the chairman of the committee.

The 33rd & 34th meetings of Joint Operation Committee (JOC) for the Rihand Reservoir were held on 21.10.2022 & 25.11.2022 respectively under the chairmanship of Member (WP&P), CWC. In the meeting, operation plan for Rihand reservoir for 2022-23 was devised after assessing the water availability in the reservoir, irrigation requirements in Bihar and power to be generated, with a view to meet the requirement of both the states

4.10 Rules Levels of Reservoirs

During the year 2022-23, the operation rules for Tehri, Kalagarh, Bisalpur, Gandhi Sagar, Rana Pratap Sagar, Madikheda, Rajghat, Matatila, Bansagar, Rihand, Kangsabati, Massanjore Reservoirs of the Ganga Basin were developed by CWC. Based on the mathematical simulation studies, performance indices were also derived for these reservoirs.

5 DESIGN AND CONSULTANCY

5.1 General

Design and Research Wing of Central Water Commission plays a pivotal role in the field of design and consultancy for water resources projects. Various units of the Wing are actively associated with design consultancy, technical studies and research & development activities in the water resources sector. In addition to above, technical appraisal of Pre-feasibility and Detailed Project Reports of water resources development projects (Irrigation/ Hydro-electric/ Multi-purpose) prepared by different agencies is also carried out in this Wing. Apart from Irrigation/ Water Resources Department of States and UTs, the Ministries/agencies utilising the above services of CWC include Ministry of External Affairs(MEA), Central Electricity Authority (CEA), WAPCOS, Uttarakhand Jal Vidyut Nigam Ltd. (UJVNL), Tehri Hydro Development Corporation (THDC), National Thermal Power Corporation (NTPC), National Water Development Agency (NWDA), Sardar Sarovar Narmada Nigam Ltd.(SSNNL), Narmada Valley Development Authority (NVDA), Farakka Barrage Project etc. CWC is using and promoting State-of-Art technology for planning and design of water resource projects at par with International Standards. The Design Wing has contributed significantly towards the development of water sector in the country.

Major activities of D&R Wing comprise of:

1. Planning and design of water resources and hydropower projects.
2. Designs of Dams/Weirs, Barrages & Canals, Gates, Power House, etc.
3. Examination and vetting of manufacturers designs/drawings.
4. Technical Appraisal of Pre-feasibility/Detailed Project Reports of Water Resources Projects viz Irrigation, Hydropower and Multipurpose River Valley Projects.
5. Hydrological studies - Water Availability assessment,Design Flood, Rule Curves, etc
6. Glacial Lake Outburst Flood (GLOF) Studies
7. Dam Break Analysis
8. Sedimentation Analysis
9. Instrumentation of Structures
10. Approval of Site Specific Seismic Design Parameters for dams
11. Standardisation- Revision/ Amendments in BIS codes
12. Implementation of provisions of Dam Safety Act, 2021 through National Committee on Dam Safety (NCDS) and National Dam Safety Authority (NDSA)
13. Implementation of Externally Funded Dam Rehabilitation and Improvement Project in 19 States
14. Providing training and capacity building through National Water Academy
15. Providing technical assistance to special problems during and post construction of projects
16. Assisting DoWR, RD&GR, MoJS in various design issues involved in international and trans-boundary projects, especially in implementation of treaties and water sharing agreements with neighboring countries like Nepal, Bangladesh and Pakistan.

5.2 Planning and Design of Water Resources Projects

5.2.1 Details of Design Organisations of CWC

CWC has three design organisations which are responsible for planning and design consultancy

of various components of construction stage Projects, DPR stage projects, rehabilitation measures of water resources projects viz Irrigation, Hydropower and Multipurpose River Valley Projects located in different regions of the country. The various stages of project implementation are (i) DPR preparation for project; (ii) construction of project; (iii) addressing specific problem during construction and operation of project; and (iv) undertaking rehabilitation measures of existing projects under distress. The technical appraisal of PFR/DPR of the projects from design aspects is also carried out by these units. The Organization also keep a watch on latest development/identification of stress areas particularly in Dam Design/ Design of Hydro-Power Projects and identify areas of Research in the sphere of activities and carry out research in house/ by other agencies. Another significant aspect is dealing with Indus Water Treaty (IWT) related issues in Indus basin river system. It also provides services to projects located in other neighbouring countries namely Bhutan, Nepal, Afghanistan, Myanmar, African Countries and Srilanka. Apart from above, they are actively engaged in preparation of IS Codes.

5.2.2 Design Consultancy

During the year 2022-23, CWC had provided design consultancy services to 92 projects at investigation & Planning stage, construction stage and having special problems. Out of these, 87 number of Projects are located in various States in India and 5 number of Projects from Foreign Countries i.e., Bhutan (3), Indo-Nepal (1) and Nepal (1).

The list of projects is given in **Annexure 5.1**.

Salient features / details of services provided to some of the important projects designed/ handled during the year are as follows:

A. Projects at construction stage

1) Phina Sigh Medium Irrigation Project, Himachal Pradesh

The Project is being contructed at tehsil Nurpur in Kangra district of himachal Pradesh on Chaki Khad stream with an irrigation potential of 9946.00 Acres. Forty (40) nos. of construction drawings related to Dams and Appurtenant Hydraulic Structures were vetted; and recommendations/approval were issued. Static and non-linear dynamic analysis of intermediate overflow (Sluice) Block was carried out and based on the results of analysis, Structural design for Dam Intermediate Piers, Sluice Glacis has been done and recommendations issued.

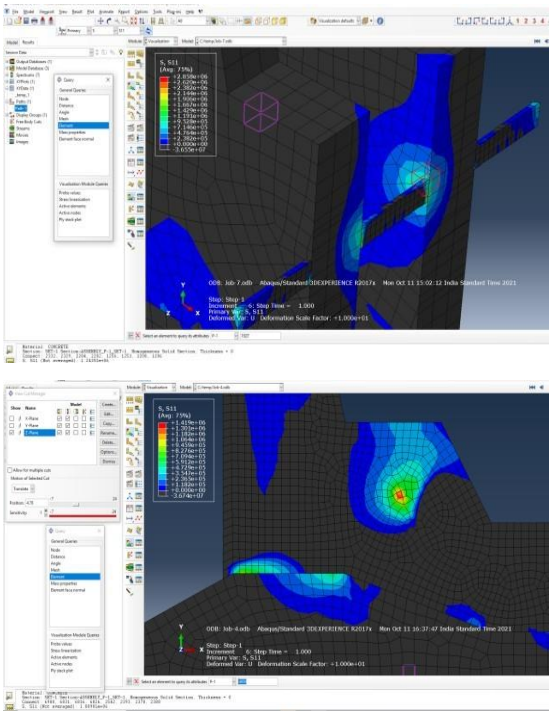


Fig 5.1: Finite Element Model Stimulation of Phina Singh Dam Overflow Section

2) Adi Badri Dam (Revival of Saraswati River), Haryana

The main purpose of the project is revival of Saraswati River, by transferring the water of Somb River to Saraswati River, as a heritage project along with the incidental benefits of Ground water recharge, Flood Control, Fish farming, Recreation/Tourism and Notional irrigation. The Project comprises the construction of the Adi Badri dam and Somb Saraswati

Barrage on Somb nadi and a reservoir surrounded by embankments. The water is proposed to be transferred from the barrage to Saraswati Reservoir by the pipeline, which is later sent to the Saraswati River to maintain a sustained flow of the river during the lean season. The Governments of Himachal Pradesh and Haryana have signed a Memorandum of Understanding (MoU) for the construction of concrete gravity dam in near Yamunanagar for the revival of the Saraswati River. Clearance from CWC on interstate aspects and clearance from Upper Yamuna River Board (UYRB) has been provided. For Planning, Supervising, and monitoring the dam works, Construction Monitoring Committee had also been constituted. CWC has issued Tender (Specification) drawings for the Concrete Gravity Dam and its Appurtenant Hydraulic Structures. Further, Specification drawings for Embankments envisaged on the periphery of the Saraswati Reservoir and Works related to conveyance pipeline from Somb barrage to Saraswati reservoir are under preparation in CWC.

3) Lakhwar M.P.P., Uttarakhand

Lakhwar multipurpose project is proposed to be constructed across River Yamuna, 5 km upstream of Vyasi HEP (120 MW) in Dehradun district of Uttarakhand. It is envisaged to construct a 204.0m high concrete gravity dam at Lakhwar, FRL at EL 796.0m and MDDL at 752.0m with a gross storage of 588 MCM and live storage of 331 MCM of water. The catchment area of Lakhwar dam site is about 2080.0 km2, out of which 60.0 km2 are stated to be above the permanent snow line at EL. 4360.0m. The benefits to accrue from the project include power generation at Lakhwar (300 MW), 33780 ha additional irrigation and 78.83 MCM of water for domestic and industrial purposes. UJVNL has signed a MoU with CWC for providing consultancy for design engineering of the Lakhwar MPP. Tender Drawings for the project were issued by CWC in January, 2022.

4) Punatsangchhu-I H.E. Project, Bhutan

Punatsngchhu- I H.E Project is a bilateral project of Royal Government of Bhutan and Government of India. Punatsangchhu-I H.E. Project envisages construction of a concrete gravity type dam, 130m high above the deepest foundation level and 256.53 m long at the top withan installed capacity of 1200 MW. The spillway section of the dam is 89.125 m comprising of five nos. of sluice spillway bays, each of 9.6 m width with crest elevation at El.1166.0 m to pass simultaneously Probable Maximum Flood of 11500 cumec + GLOF of 4300 cumec. The dam would provide a gross pondage of 24.92 * 10^6 cub. mts. and live pondage of 12.38 * 10^6 cubm between MDDL 1195 m and FRL 1202 m. CWC & CEA are the design consultants for the project. Design and Drawings of civil stuctures have been issued by CWC. In year 2022 - 23, design and drawings for Pothead Yard cable trenches, Oil Water Sump, Downstream Surge Gallery Deck Slab and Bus Duct RCC lining have been issued by CWC. Most of the components viz Desilting Chambers, HRT, Surge Shaft, BVC, Machine Hall, Transformer Hall, D/S Surge Chamber, Pot Head Yard etc are almost complete. Due to pending decisions on construction of Dam/Barrage, the work is on

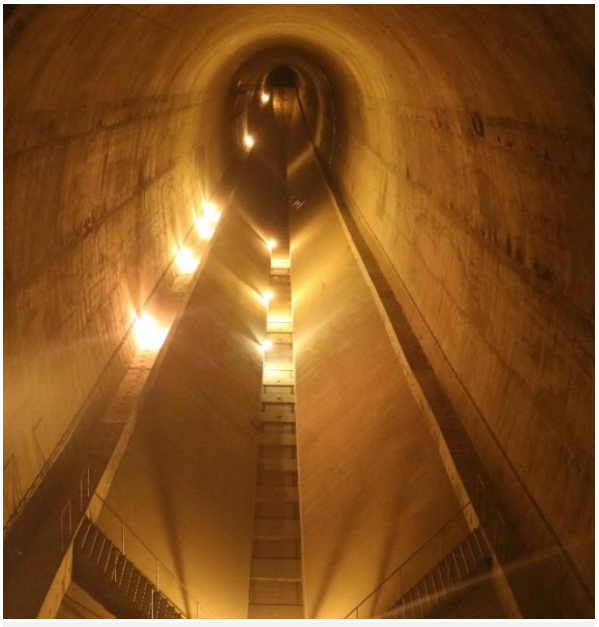


Fig. 5.2: Desilting Chamber

hold at the present Dam site of the project.

5) Punatsangchhu-II H.E. Project, Bhutan

Punatsngchhu-II H.E Project is a bilateral project of Royal Government of Bhutan and Government of India. The Punatsangchhu-II H.E. Project envisages construction of 91m high concrete gravity dam with an installed capacity of 1020 MW. The dam is located 3 km downstream of TRT outfall of PHEP-I. The dam comprises of seven sluice blocks and five non-overflow blocks. The length of the dam is 224.90m. The top of dam is at El.846.00m with FRL at El. 843.00m and MDDL at El.825.00m. Seven sluices of gate size 8m (w) x 13.2m (H) have been provided at EL.797.00m for discharging simultaneously PMF 11723 cumec and GLOF of 4300 cumec. The project has a catchment area of 6835 sq. km (3115 sq. km is snow fed and 3720 sq. km is rain fed). The gross storage capacity of the reservoir formed by dam construction is 7.0 MCM and the live storage capacity is 4.64 MCM.

CWC and CEA are the design consultant for the project. All the construction drawings for the civil components have been issued by CWC. CWC also examines and approves the drawings of Hydro-mechanical works. The project is likely to be commissioned in 2024.

6) Arun-3 HEP (4 x 225 MW), Nepal

Arun-3 Hydro Electric Project is a run-of-river project located on Arun River, a tributary of Kosi in the district of Sankhuwasabha (Eastern Nepal) having a catchment area of 26,747 km2. The design discharge is 344.68 cumecs and shall generate about 3924.03 GWh energy per annum at 90% dependable year. CWC has been engaged as a retainer consultant for the project for which a MoU has been signed in August 2017.

Fig. 5.3: Dam Construction site of Arun-3 HEP

7) Ganol H.E. Project, Meghalaya (22.5 MW)

Ganol small Hydro-Electric Project (3x7.5 MW) situated in West Garo Hills Dist. of Meghalaya is under construction. This project envisages

Fig. 5.4: Punatsangchhu-II Concrete Gravity Dam

construction of 35m high Concrete Gravity Dam, 2.075 km long HRT, 642m long Penstocks and a Power House upstream of Phagugiri Village to Utilize a gross head of about 160m to generate 22.5 MW of Power. CWC is the design consultant for the Project. The Dam Works are almost complete. Drawings of Intake,HRT, Surge Shaft, Penstock, Machine hall Floors at EL 189.40 M & 192.20 M, Draft Tube Piers, Power House First, Second, Third & Fourth Stage Concreting, Tail Race Channel, , Retaining Walls, Roof Truss, Trash Rack, Dam Control Room and Stoplog Parking, etc. have been issued by CWC.

8) Polavaram Irrigation Project, Andhra Pradesh:

Polavaram Irrigation Project is a multipurpose project on Godavari River near Ramayyapeta, Polavaram in West Godavari District, Andhra Pradesh. The project is located 42 Km upstream of Sir Arthur Cotton Barrage on Godavari River. Water from the project is proposed to meet the demands of irrigation, drinking water and power generation. The project envisages irrigation benefits to 4.0 lakh acres in East Godavari, Visakhapatnam districts under Left Main Canal and to 3.2 lakh acres in West Godavari, Krishna districts under Right Main Canal.

In addition to irrigation benefits, generation of Hydropower with installed capacity of 960 MW, water supply for industries in Visakhapatnam and drinking water supply to villages & towns are also envisaged under the project. Further, it is also proposed to release 15 TMC of stored water to downstream existing Sir Arthur Cotton Barrage in lean period and 80 TMC of stored water to be diverted to Krishna River through Right Main Canal.

The project components include:

i) Earth cum rock fill dam in Gap I on left bank of river
ii) Earth cum rock fill dam in Gap II located in main flow channel of Godavari River
iii) Concrete dam in Gap III
iv) Spillway located on RB along with connecting approach channel and spill channel

An Ogee Type Concrete Spillway has been constructed on the right bank for passing of PMF of 50 lakh cusecs with FRL of the reservoir at EL. 45.72 m. The concrete dam comprises of 49 nos. of overflow blocks (including 10 nos. of river sluice blocks), 2 nos. of non-overflow blocks and 2 nos. of key blocks. Spillway with crest level at EL. 25.72m has 48 Nos. of Radial Gates of sizes 16m(W) x 20m(H) with hydraulic hoist arrangement for lifting. There is provision of 10 nos. of river sluices of sizes 2.1m(W) X 3m(H) in the over flow blocks for releasing 15 TMC of water to the downstream.

CWC has been entrusted with the work of vetting the designs & drawings of the Polavaram Irrigation Project submitted by the Project Authority. A Dam Design Review Panel (DDRP) has also been constituted for providing

Fig. 5.5: Polavaram Irrigation Project, Andhra Pradesh

suggestions on the technical issues relating to the planning and design of the project.

CWC has already issued drawings related to Spillway, Stilling basin, Spill Channel, Approach channel, Divide Walls, Training Walls, Gap-III, Bridge, Prestressed trunnion girder, Radial Gates, Sluice Gates & their hoisting arrangements, cofferdams, foundation improvement of ECRF dam, Block out and EM parts, Service Gates & Emergency Gates, Fish ladder Service gates, etc..

9) Parwan Dam Project, Rajasthan

Parwan Dam Project envisages construction of a 38m high concrete dam on river Parwan, a tributary of river Kalisindh, which is a main tributary of river Chambal. The project has a catchment Area of 8242 Km2 & live storage of 462 MCM and caters to a total of 2.01 lakh ha CCA with 60.65% intensity of irrigation targeting annual irrigation of 1,22,166 ha in three districts, viz. Baran (318 villages), Jhalawar (113 villages) and Kota (206 villages). It also includes provision for drinking water supply of 50 MCM for 1821 villages of Baran, Jhalawar & Kota districts, provision of 16 MCM for Shergarh Wildlife Sanctuary and 79 MCM for Chabbra Thermal Power Station and Kawai Thermal Power Station.

The dam is a 396.20 m long gravity dam having of length 299.0 and NOF 97.20m. An Ogee Type Concrete Spillway has been proposed to cater the PMF of 28,948 cumec at FRL of the reservoir at EL. 308.8 m. The MWL of project is 309.30 m. The concrete dam comprises of 15 nos. of overflow blocks (including 2 nos. of river sluice blocks), 4 nos. of non-overflow blocks, 2 composite blocks and 2 nos. of key blocks. Spillway with crest level at EL. 294.6 m has 15 Nos. of Radial Gates of sizes 16m (W) x 14.2m (H) with hydraulic hoist arrangement for lifting. There is provision of 2 nos. of river sluices of sizes 2.0m(W) X 2.0m(H) in the over flow blocks which will additionally work as diverting the water during construction stage.

CWC has approved the drawings for the 15 overflow blocks in the project, 04 NOF blocks, stilling basin, sluice blocks, etc. Total 67 nos.

Fig. 5.6: Parwan Dam, Rajasthan

drawings related to dam and its appurtenant have been issued to project authority.

Further, CWC has also vetted the Design & Drawings of Intake structure with provision of trash rack for tunnel work of RMC, Design/ drawing of pressurised pipe irrigation network, design pertaining to Cardanic Suspension of Hydraulic hoist for radial Gate and Latching arrangement for Stoplog, etc.

10) Krishna Raja Sagara Dam, Karnataka

KRS gravity dam is one of the iconic dams in India, more than 100-year-old, built across the Cauvery River, constructed in stone masonry with lime surki mortar as a binding material. The length of the dam is 2621 m and height is 42.67 m. The construction of dam was completed in 1932 and has been operating since then. The FRL for project had been fixed as EL124.0' with top deck level at EL130.0'. There are altogether 173 sluices

Fig. 5.7: Krishna Raja Sagara Dam- Upstream view- Gates at two level

of different sizes at various levels to serve the intended objective of project.

An MOU for providing consultancy services for vetting of detailed design & drawings related to replacement of 136 gates and 2 no. of cranes by 136 new gates and provision of 136 skid mounted compact hoists at different locations of Krishna Raja Sagara dam was signed between CWC & WRD Karnataka on 28.02.2020. All components of 136 nos of Sluice Gates and their hoisting arrangement have been successfully completed.

11) Isarda Dam Project, Rajasthan

Isarda Dam Project is located near village Banetha of Tonk district of Rajasthan across Banas river, a tributary of river Chambal. Drinking water requirement of five towns and 1198 villages of Dausa and Sawaimadhopur are proposed to be met from the project. As the project is envisaged for drinking water, the DPR has been approved by the State Government. CWC is providing consultancy for vetting of designs & drawings for construction of the project.

The composite dam consists of left flank earthen dam section having length 3198.5m & Right flank earthen dam having length 803.0m and concrete gravity dam having length of 587.50m. Two saddle dams are also proposed on right side of Right flank earth dam having length 354.0m and 324.0m respectively. CWC has approved a total of 70 drawings related to dam and its appurtenant which have been issued to the project authority.

12) Indroka & Bastawa Mata dam, Rajasthan

The project envisages construction of earthen dams at Bastawa Mata & Indroka village, Jodhpur District, Rajasthan, which is a part of the scheme, namely Ground Water Augmentation through Artificial Recharge in select Water Stressed Areas of Rajasthan being undertaken up by CGWB. The projects are being executed by WAPCOS on behalf of CGWB. CWC is vetting the design & drawings submitted by CGWB.

Bastawa Mata Dam project is located on the river Gotavar of Luni Basin in village Bastawa Mata of Balesar Tehsil in Jodhpur district, Rajasthan to address water scarcity in the area. It comprises an embankment dam and side channel spillway (over-flow portion).

Indroka Dam project is located on a local nalla in village Indroka of Mandor Tehsil in Jodhpur district, Rajasthan to address water scarcity in the area. It comprises an embankment dam and side channel spillway (over-flow portion).

A committee for overseeing the design and construction of these two dams has been constituted under the chairmanship of Chief Engineer, Designs (NW&S) CWC.

B. Projects at DPR Stage

1) Pancheshwar Multipurpose Project (Indo-Nepal)

An MoU has been signed between CWC and WAPCOS (I) ltd. for Pancheshwar multipurpose project (PMP) and Rupaligad H.E. Project (Indo–Nepal) to provide consultancy services for preparation/ updating of detailed project report (DPR). The design/drawings for main Rockfill dam, u/s and d/s coffer dams, water conductor system and power house have been taken up by CWC.

2) Damanganga (Val/Vagh)-Vaitarana (Pinjal/Upper Vaitarna) - Godavari (Kadvadam on Kadva river upto Dev stream) link Project

The Intra-state link of the proposed Damanganga (Val/Vagh) - Vaitarna (Upper Vaitarna)-Godavari (Kadva/Dev Nadi) in Maharashtra, from 4 identified storage reservoirs viz., Nilmati on Val river, Met on Vagh river in Damanganga basin, Koshimshet on Pinjal river and Udhale on Gargai River in Vaitarna basin. Total water transfer involved is 202 MCM (for industrial water requirement of Delhi-Mumbai new industrial Corridor, other Industrial area, irrigation and drinking water of Sinnar Taluka).

CWC is providing design consultancy to NWDA for preparation of DPR for this project. Design chapters and relevant drawings of Met & Udhale R.C.C dams have alreacy been issued to

NWDA. Design Chapter/ Drawings for the remaining two dams are under progress. Civil drawings related to Hydro-Mechanical aspects have been issued for Udhale Dam, Nilmati and Koshimshet are cleared.

3) The Damanganga (Ekdare) - Godavari Valley Link Project

It envisages transfer of 143 MCM water of Damanganga to existing Waghad dam in Godavari basin, through proposed Ekdare dam. The link system proposal consists of an Ekdare dam and two weirs, viz. Hatti & Nirgude etc. There is a link of 13.62 km long - 10.42 km (rising main) having total lift of 327.4 m in three stages up to Jharlipada Diversion scheme and then 3.20 km by gravity. CWC is providing design consultancy to NWDA for preparation of DPR for this project. Design Chapter and relevant drawings of Ekdare R.C.C dam, Hatti & Nirgude Weir Component have been issued to NWDA.

4) Barinium Hydro Electric Project, UT of J&K

Barinium H.E. Project is proposed in Chenab River in Paddar Valley of District Kishtwar, J&K. The PFR of the project is prepared by M/S WAPCOS Ltd. for JKSPDC. Consultancy for preparation of DPR of the Project has been entrusted to CWC by JKSPDC. Ministry of Jal Shakti accorded Administrative Approval and Expenditure Sanction amounting to Rs 15.47 Crore under IWRD scheme for Survey & Investigation and preparation of DPR of Barinium Hydro-Electric Project by CWC. Preliminary drawings for alternate layout have been prepared by CWC. Further, a site visit to proposed alternate dam axis of Barinium H.E. Project, has been conducted by the design experts from CWC (Hq.) and GSI during May, 2022. Data on geological and topographical survey has been sought from Project Authorities for finalization of layout.

5) Haora Dam Project, Tripura

CWC has taken up the works for preparation of DPR for Haora Dam Project at Champaknagar in Tripura. The project envisages construction of a 27.5 m high dam on the river Haora with a canal from the right bank. The project on completion would extend irrigation facility to a Gross Command Area (GCA) of 310 Ha. and the Culturable command area (CCA) of the project is 250 Ha. The net area to be irrigated annually from the project would be 210 Ha.

Joint site visit of CWC Designers and GSI Team was held in December 2020 to finalize the tentative dam axis. Geotechnical Investigations were carried out at site. DPR Chapter and

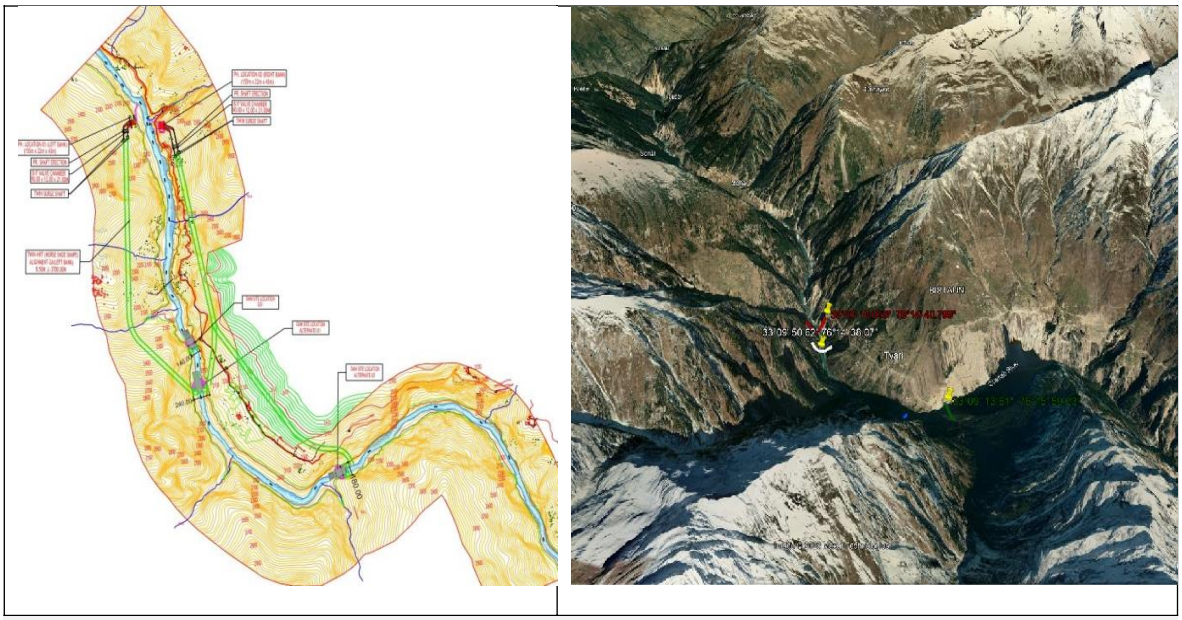


Fig. 5.8: Project area and alternate dam axis locations of Proposed Barinium HE Project

Drawings for various project components are under progress.

6) Ayodhya Barrage Project, Uttar Pradesh

Every year, in the months of October to June the water level in the Ghaghra river remains very low, because of which, water in sufficient quantity is not available near the Ghats of Ayodhya and pilgrims face great difficulty and disappointment. To tackle the problem, a Barrage has been proposed to be constructed across River Ghaghra in Ayodhya, so that there is a continuous supply of water throughout the year at the Ghats. Construction of the Barrage will also serve the purpose of Irrigation; fulfill drinking water requirement, and tourism development in the nearby areas.

CWC is providing the design consultancy for the preparation of DPR for the proposed Ayodhya Barrage Project for which a Memorandum of Understanding (MoU) was signed between CWC and Irrigation and Water Resources Department, Government of Uttar Pradesh on 26th March 2021. DPR stage design chapter & drawings have been completed by CWC and provided to IWRD, UP in January/ February 2022.

7) Kuri Gongri Hep, Bhutan

The Kuri-Gongri Hydroelectric Project has been envisaged on Kuri- Gongri River in Bhutan. The PFR of the project was prepared by NHPC in July 2012. NHPC recommended a high dam with installed capacity of 2640 MW on Kuri-Gongri River d/s of confluence of tributary rivers with a reservoir for preparation of DPR.

CWC is providing design consultancy for preparation of DPR for this project which is in progress. Necessary Technical inputs are being provided in respect of Design of the same. Various components and parameters are under finalization. Based on the investigations carried out, dam axis has been finalized and Rock fill type of dam is proposed.

8) Subarnarekha– Mahanadi Interlinking Project, West Bengal & Odisha

The Subarnarekha - Mahanadi link project envisages diversion of 17,900 Mm3 of water from the proposed Subarnarekha barrage located at Chorchita village, Gopiballbpur block, Medinapur district, West Bengal state across river Subarnarekha. This is an extension of Ganga – Damodar - Subarnarekha link which will receive 28,913 Mm3 of water from Manas-Sankosh-Tista-Ganga link in the upstream of Farakka. Out of this, a quantum of 11013 Mm3 will be utilized in the enroute of Ganga – Damodar - Subarnarekha link canal and the remaining 17900 Mm3 of water will be transferred to Subarnarekha Mahanadi for enroute utilization and further transfer to South.

CWC has taken up the works for preparation of DPR for this project. A team of officers from CWC along with officers from NWDA jointly visited the proposed Project during July'2022. Various data required for the preparation of DPR chapters have been sought by CWC.

Fig. 5.9: CWC Team at Subarnarekha – Mahanadi link Project site

9) Buroi Irrigation Project, Assam

Buroi River originates in the state of Arunachal Pradesh and flows through the state of Assam from North to South. It is a Right bank tributary of Brahmaputra River, which meets the Brahmaputra at Gohpur Sub-Division of

Biswanath Chariali District, Assam. CWC has been entrusted with the work of preparation of PFR & DPR of this project. The project envisages construction of a barrage across Buroi River, in Gohpur Block of Biswanath Chariali District, Assam to irrigate a CCA of approximately 8830 Ha. Apart from irrigation, the project will also fulfil the drinking water supply need of approx. 74970 households.

A joint field visit to the Project was made by officers of CWC and Officers from State Departments along with GSI during September'2022. Various data required for the preparation of DPR chapters have been sought by CWC.

10) Kishau Multipurpose Project, Uttarakhand

The Kishau (660 MW) multipurpose project is located on the Tons River, a major tributary of the Yamuna River, at the border of Dehradun district (Uttarakhand) and Sirmour district (Himachal Pradesh). The command area of the Kishau project is 97,076 hectares. The project involves the submergence of 2,950 hectares of land in the territories of Himachal Pradesh and Uttarakhand.

The investigation reports for the Kishau project were submitted to the CWC for examination in October 2020. In June 2022, an "Inception Report" for the preparation of the DPR of the Kishau Multipurpose Project (MPP) was received by the CWC from Uttarakhand for comments and observations. CWC's detailed views and comments on the Inception Report have been conveyed to the project authority during September'2022.

11) Panchnad Barrage, Uttar Pradesh

A barrage has been proposed across Yamuna River in Auraiya district just downstream of the confluence of five rivers viz Yamuna, Chambal, Sindh, Pahuj, and Kwari for Irrigation and drinking water purposes. CWC has taken up the consultancy work for the designing and preparation of DPR for this project. Accordingly, a MoU has been signed between CWC and I&WRD, Govt. of Uttar Pradesh on 29.08.2022.A joint field visit was carried out at the proposed location of Barrage during November'2022. The observations based on the field visit have been shared with the project authority. Further works related to this project are under progress.

12) Construction of two barrages in the downstream of existing Bariyarpur Pickup Weir under Ken-Betwa Link Project, Banda, Uttar Pradesh

To resolve the issues of water sharing in non-monsoon season, it has been proposed to utilize unfilled capacity of existing tanks in Mahoba district during monsoon season from Daudhan dam as well as creating new storages in the territory of Uttar Pradesh and utilize this water during non-monsoon period. Accordingly, the State of Uttar Pradesh identified two new barrages in the downstream of Bariyarpur pick-up weir.

NWDA and CWC have signed a MOU for carrying out the design, drawing and preparation of design chapter for the proposed two new barrages across Ken River in the D/S of existing Bariyarpur pickup weir in Uttar Pradesh on 31.05.2021. A visit to the project sites was undertaken by a team of offiecrs from CWC and CSMRS on during March'2023. Further works related to this project are under progress.

C. Special Problems Projects

1) Farakka Barrage Project (FBP), West Bengal

Farakka Barrage Project with headquarters at Farakka in Murshidabad district of West Bengal is a subordinate office under Department of Water Resources, River Development & Ganga Rejuvenation, Ministry of Jal Shakti. The Farakka Barrage Project Authority was set up in 1961 with the mandate to execute and thereafter operate and maintain the Farakka Barrage Project Complex comprising of Farakka Barrage, Jangipur Barrage, Feeder Canal, Navigation Lock and associated structures.

The Barrage comprises of 112 nos. of Gates (108 Nos. main Gates and 4 Nos. Fish Lock Gates) at

main barrage and 11 Nos. Head Regulator Gates for diversion of approximately 40,000 cusec (1035 cumec) of discharge into the Feeder Canal. The project construction commenced in 1961 and the project was commissioned and dedicated to the Nation in May 1975.

CWC at present is associated with various works related to the project in its operation stage and issues design/ drawings for the project components from time to time as per the requirement such as the drawings of Anti Erosion/ bank Protection works, Main barrage gates, Fish Lock Gates, etc.

2) Amjur Drainage Development Scheme, Assam

Amjur River originates in the Mizo hills and traverses a length of 108 km before joining the Sonai River (a left bank tributary of River Barak) at Amjurmukh. The Amjur Drainage congested area (about 101 sq km) is situated in south bank of river Barak in Amjur sub-Basin (catchment area is about 274 sq. km), under Cachar district in the state of Assam. The area is bounded by River Barak in the North, Mizo hills in the south, Sonai River in the West and Bhubuan hills in the East.

There are mainly two low laying areas (Haors) in the Amjur sub basins, namely Mangalpur Haor and Kaptanpur Haor. During high spate of River Sonai, water enters into the Amjur River from River Sonai, this backwater along with discharge of Amjur itself, creates flooding situation and inundation in the nearby agricultural land and in the two low lying areas as mentioned above. When the water level in the Sonai recedes, the water from Amjur starts draining into the Sonai. The two channels named Gogorikhal and Rakokhal carry the water from low lying areas into the Amjur River which finally drains into Sonai. But this process is very slow which takes long time, causing drainage congestion in the inundated/flooded area for long time. To get rid of this problem, Brahmaputra Board has prepared Detailed Project Report of Amjur Drainage Development scheme. As per the request from Brahmaputra Board, CWC officers visited the Amjur Drainage Development Project site during October'2021 and listed the data required to ascertain the effect of Turail HE Project on Amjur drainage Development Scheme. CWC has submitted its final report on 20.10. 2022

3) Imphal Barrage, Manipur

The Imphal barrage is located at Oinam Sawombung of Imphal West district in the

Fig. 5.10: Farakka Barrage Project- Main Barrage- Upstream view

southern part of Manipur and is at a distance of 17 km from Imphal city. It supplies Irrigation water to a Gross Command Area of 6000 ha; Culturable Command Area is 4000 ha. In addition, there is a link channel (TurelAhanbi) about 6 Km long leading water to a cross regulator which provides irrigation to a command area of 800 ha. The construction of Imphal Barrage & Cross Regulator across Imphal River was completed in the year 1984 and has been in operation since then. CWC is providing the consultancy for replacement of hydro-mechanical equipment under DRIP-II. Vetting /approval of vendor's drawings and designs for hydro-mechanical equipment is under progress.

4) The matter of maintaining Full Reservoir Level (FRL) in Bhakra dam and Pong dam

Bhakra Dam and Pong Dam are concrete gravity and earth-fill embankment dams on the Sutlej and Beas rivers, respectively, in the state of Himachal Pradesh. The dams are used for water storage for irrigation and hydroelectric power generation.

In the 30th meeting of the Northern Zonal Council held on July 9, 2022, in Jaipur under the chairmanship of the Honorable Union Home Minister, the matter of maintaining the Full Reservoir Level (FRL) in Bhakra Dam and Pong Dam was discussed. The council chairman directed that a study be conducted on the impact of water levels in the two dams to knowthe extent to which the water level can be safely taken, the flow through downward channels, and the impact of encroachment. The chairman also directed that an action plan with specific suggestions be developed and discussed with the states.

Subsequently, CWC undertook studies based on the revised design flood and prepared a draft report titled "Report on Restoration of Pong Dam Reservoir Level." The report has been sent to the Bhakra Beas Management Board (BBMB) with a request to submit their comments. The studies with regard to Bhakra Dam are in progress.

5) To study the Impact of newly proposed Lower Arun Hydroelectric project in Nepal on the Planned Sapta Koshi High Dam Multipurpose Project

The Sapta Koshi High Dam Multipurpose Project (SKHDMP) is a proposed hydroelectric and irrigation project on the Sapta Koshi River in Nepal. The project involves the construction of a 269-meter-high concrete dam.

Nepal has proposed, on the upstream of Sapta Kosi Dam, the Lower Arun Hydroelectric project

Fig. 5.11: Satluj-Beas river system with the location of major projects d/s of Bhakra and Pong Dam

on the Arun River. There is concern that this project may reduce the amount of water available to the SKHDMP, which may affect the project's benefits. To address this issue, CWC has studied the potential impacts of proposed upstream projects in Nepal on SKHDMP. Flood routing studies were carried out for various potential alternatives of the Full Reservoir Level (FRL) and the Maximum Water Level (MWL) in accordance with the benefits or intended purpose of the SKHDMP. Results of the study have been shared with the project authority for further necessary action.

6) Failure of Ferrule No. 345 in Penstock during commissioning of Uhl HE Project

Issue of penstock failure (Ferrule No. 345) of Uhl-III (100 MW) was referred to CWC by HPSEBL seeking advise on restoration of penstock. In this matter, CWC holistically studied the failure case and a comprehensive report was submitted to the project authorities bringing out the possible reasons behind the incident and gave recommendations for the restoration works. CWC reviewed the Hydraulic Transient Studies of the project. Computational Fluid Dynamic Studies (CFD) were carried out by IIT Roorkee. CWC helped project authorities to finalise the design parameters for penstocks being restored (underground and surface).

7) Remedial measures to check recurring damages on D/S side of Hathnikund Barrage

Hathnikund Barrage was constructed to replace the Tajewala weir (an old pre-independence structure) located around 2 km downstream. Post-construction of Hathnikund Barrage, Tajewala weir got heavily damaged and large parts of the weir started getting washed away from the year 2010 onwards. The aggradation which had taken place upstream of Tajewala weir also started eroding and consequently the river portion between Hathnikund and Tajewala started getting lower due to erosion caused by annual floods.

It has been proposed to construct a submersible weir at about 500 m downstream of Hathnikund barrage. CWC has taken up the design work of the proposed weir. In the interim, temporary remedial measures in the form of CC Block protection work were suggested to project authority. A modified solution to the above problem is also under consideration by CWC.

8) New Sharda Barrage, Janpad Champavat, UP

Irrigation & Water Resources Department, Govt. of Uttar Pradesh propose to construct a new barrage in place of existing Sharda Barrage which is around 100 years old. CWC has been requested to select a suitable location for the New Barrage and prepare its DPR as well as conduct a study to assess remaining life of the existing Sharda Barrage. The required study in this regard is under progress for which requisite information has been sought from the project authority.

9) Kichha Barrage, Udham Singh Nagar, UP

Head Regulator at the left abutment of canal of Kichha barrage, which was constructed in the year 1961, got washed away in the unexpected flood of 19.10.2021. CWC has been requested by I&WRD, Govt. of UP to conduct on-site inspection of Kichha barrage and prepare a DPR to study the options of construction of new barrage or remodelling of existing barrage at this place or its downstream for operation of canal emanating from Kichha barrage.The required study in this regard is under progress.

10) Rehabilitation of four existing dams in Dhamtari district of Chhattisgarh under DRIP

1. Ravishankar Sagar Dam

The dam is a multipurpose project located across Mahanadi River in Dhamtari district of Chhattisgarh. The project consists of earthen cum gravity dam of length 2751 m and maximum height of dam is 30.50 m. With FRL 348.70 m, the gross storage capacity is 910 MCM.

The dam consists of 14 nos. vertical gates of size 15 m X 10 m.

The project authority informed that construction of the dam was completed in 1978 and its EDA (slotted roller bucket) got damaged due to floods in 1994. It was further informed that PMF at dam site had been revised from 17230 to 17760, as per the hydrological studies by CWC and; therefore, while undertaking rehabilitation of spillway, the revised PMF is also to be kept in view.

Fig. 5.12: Energy Dissipation Arrangement of Ravisankar Sagar Dam

2. Murumsilli dam

The dam is located across Sillari River, a tributary of Mahanadi River in Dhamtari district of Chhattisgarh. The project consists of earthen dam of length 2591 m and maximum height 25.53 m, with gross storage capacity of 165 MCM. The dam consists of 34 nos. of syphon spillway in addition to 03 nos. of head regulators of size 3.0m X 2.7m each.

Project authority informed that its PMF has been revised to 4480 Cumec. Since, the spilling facility for syphon spillway plus Head regulator is 1274.43 cumec only, an additional spilling facility at saddle 1 dam and saddle dam 2 locations is proposed to be provided.

3. Dudhawa dam

The dam is an irrigation project located across Mahanadi River in Dhamtari district of Chhattisgarh. The project consists of an earthen dam of length 2907 m and maximum height of 30.53 m, with gross storage capacity of 165 MCM. The dam consists of 4 nos. of head regulators designed for total discharge of 2428 Cumec in addition to waste wier having discharging capacity is 1132.67 Cumec.

The project authority informed that, in view of the revised PMF (5012 Cumec) and existing spilling facility at waste weir, an additional spilling capacity is required to be provided at the site. For this purpose, they have identified two locations, which were seen by the team.

4. Soundur dam

The dam is an irrigation project located across Sondur River in Dhamtari district of Chhattisgarh. The project consists of an earthen cum gravity dam of length 3368 m and of maximum height 38.20m, with gross storage capacity of 198 MCM. The gated type of spillway with capacity 5407 cumec consists of 5 nos. of radial gate size 15m X 10m. The PMF of the project has been revised to 5276 cumec.

Studies related to the rehabilitation of above four dams are under progress and necessary data for the same has been requested from project authorities.

Fig. 5.13: Spillway of Sondur Dam

11) Technical examination of projects from Indus Water Treaty angle

CWC assists Commissioner (Indus), DoWR,RD&GR on Indus Water Treaty related issues of Hydro-electric Power Projects, being referred from time to time. Projects which have been examined from IWT angle includes Dugar

HE Project, Drass HE Project, Mohura Small HE Project. Following works have carried out during the year:

i) "**Pakistan's Technical Bases for Freeboard**" calculation in respect of Lower Kalnai HEP has been examined and CWC's views shared with Indus Wing, DoWR,RD&GR.

ii) **Pakal Dul HEP** – Examination of Technical Memorandum on its freeboard from NHP

iii) **Draft Memorial Chapters for the Ratle HEP and Kishenganga HEP** prepared for the resolution of disputes between India and Pakistan.

5.2.3 Technical Examination of Projects

The technical appraisal of DPR/PFR of irrigation and multipurpose projects in respect of hydropower component, gravity dam component, embankments, hydro-mechanical structures such as gates, hoists etc., barrages and different components of canal are carried out in the design organization of D&R Wing. The comments/clearances in respect of the projects are communicated to concerned appraisal unit of CWC. Further, the civil components in DPR of Hydro-Electric Projects are also technically examined in D&R Wing and comments/clearances in respect of the projects are communicated to CEA.

Table 5.1: Status of Technical Examination of Projects

	In India	In Foreign Country	Total
Hydro-Electric Projects			
Total Nos. of projects	58	3	61
Nos. of projects cleared	7	0	7
Nos. of projects in which comment issued	33	2	35
Projects under examination	18	1	19
Irrigation Projects			
Total Nos. of projects	15	1	16
Nos. of projects cleared	03	--	03
Nos. of projects in which comment issued	06	1	7
Projects under examination	6	--	6
Multi-Purpose Projects			
Total Nos. of projects	9	0	9
Nos. of projects cleared	0	--	00
Nos. of projects in which comment issued	06	0	6
Projects under examination	03	0	03

The list of above projects is at **Annexure- 5.2, Annexure-5.3 & Annexure-5.4**

5.3 Hydrological Studies

The Hydrological Studies Organization (HSO), a specialized unit under Design and Research (D&R) Wing of CWC, carries out hydrological studies in respect of the Water Resources projects in the country. The success of a project is largely governed by the hydrological inputs. The inputs in Detailed Project Report (DPR) or Pre-Feasibility (PFR) stage are made available in the form of:

- Water availability/Yield Studies.
- Design flood estimation.
- Sedimentation studies.
- Diversion flood studies.

The country has been divided into 7 zones and further into 26 hydro-meteorologically homogeneous sub-zones and flood estimation models are developed for each subzone to compute the design flood in un-gauged catchments. So far, flood estimation reports

covering 24 subzones have been published. During the year 2022-23, technical examinations of hydrological aspects of DPRs in respect of 124 projects have been carried out in CWC. Out of this, 59 projects have been cleared and comments were issued for 14 projects. List of projects along with their status is placed at **Annexure-5.5** In addition, CWC has also carried out Design Flood Review Studies of the 27 projects under Drip-II & III in the following states.

Table 5.2: Design Flood Review Studies under DRIP Phase-II & III

S.No.	Name of the State	No of Projects
1	Andhra Pradesh	1
2	Karnataka	2
3	Kerala	01
4	Madhya Pradesh	04
5	Maharashtra	02
6	Telangana	02
7	Tamil Nadu	14
8	West Bengal	01

5.3.1 Consultancy works / special studies related to hydrological aspects

Hydrological studies were carried out on consultancy basis for the following projects:

- Pailani Barrage and Banda Barrage Uttar Pradesh.
- Satyar Khad Medium Irrigation Project, Himachal Pradesh
- Tapovan Vishnugad HEP, Uttarakhand
- Chikna and Bhimakakaleshwar Irrigation schemes, Bihar
- Damanganga-Vaitarna-Godavari Link Project, Maharashtra
- Panchnad Barrage, Uttar Pradesh
- Subarnarekha- Mahanadi Interlinking Project, West Bengal & Odisha
- Sardar Sarovar dam, Gujarat
- Buroi Irrigation Project, Assam
- Mebo Irrigation Project, Arunachal Pradesh
- Burisuti Irrigation Project, Assam
- Kaya Vallet Irrigation Project, Arunachal Pradesh

HSO has provided secretariat assistance to various Technical /Expert Committees for undertaking special studies on various aspects related to water resources development and management. It has also participated and provided key role in Committees held by other organisations. Some of the important contributions during the year 2022-23 are as under:

1) Consultancy work to study the issue of floods and siltation in river Ganga due to Farraka barrage (under NHP)

A Committee headed by Chairman, CWC and having representatives of Govt of Bihar as well as experts /officers from M/oJS, NIH, CWC was constituted on the subject in January 2020. The work was awarded to RMSI Pvt. Ltd under NHP and the project started on 01.04.2021. The Committee unanimously accepted the Final Report in the 9th meeting held on 15.12.2022. Major finding of the study was that the simulated backwater effect due to Farakka Barrage in the Ganga river is observed up to 48.3 km upstream of Farakka Barrage for an extreme flooding condition (Design flood of Farakka Barrage of 100 year return period=76455 cumec).

2) Consultancy services of physical based mathematical modelling for estimate of sediment rate and sediment transport in 7 river basins of India (under NHP)

The objective of the study is to establish a methodology for modeling of sediment generation from basin catchments, its transportation mechanism through channels/rivers and its retention/deposition by flood water retention structures like reservoirs, as well as morphological behaviour of river reaches of Narmada, Ramganga, Barak, Cauvery, Kuttiyadipuzha, Mangalam and Peechi basins. The consultancy contract was signed on 14th October 2020 and commenced on 16th November 2020. Final Report of Phase-I accepted on 30.09.2022. Phase- II of the project has already been commenced from 16.11.2022. Under the capacity building three day trainings for 20 CWC

officials and 2 workshops of 2-3 days were organised during the phase-I of the project.

5.3.2 Trainings/Workshop/ Seminar

Officers of HSO delivered online lectures on Project Hydrology & Design Flood Studies for Training Programs conducted by NWA, Pune, WRD, Tamil Nadu, Chennai.

5.4 Dam Safety Aspects

Dam Safety Organization (DSO) of CWC looks after the issues related to Dam Safety aspects which can be broadly categorized as under:

- Mulla Periyar Dam Issue
- National Register of Large Dams
- DAM SAFETY ACT, 2021
- Dam Health and Rehabilitation Monitoring Application (DHARMA)
- Dam Rehabilitation & Improvement Project (DRIP) Phase II
- National Committee on Seismic Design Parameters
- Technical Examination of Projects for Seismic and Foundation Aspects
- Special Studies for water resources projects
- Consultancy Services on Instrumentation in Hydraulic Structures

5.4.1 Mulla Periyar Dam Issue

The Mulla Periyar Dam (MPD) is a masonry gravity dam constructed across the Periyar river in 1895, situated in Thekkady District in Kerala. The Dam is operated and maintained by Govt. of Tamil Nadu under 999 years lease agreement signed on 29.11.1886 between the Maharaja of Travancore and the Secretary of State for India in Council.

In 1979, the then Chairman, CWC inspected the dam and held a meeting with the officers of Kerala and Tamil Nadu. In the meeting three level measures, (i) emergency, (ii) medium term and (iii) long-term were suggested for strengthening the dam. It was recommended that, in the mean time, the water level in the reservoir be kept at 136 ft. A second meeting under the Chairmanship of Chairman, CWC was held on 29th April 1980 at New Delhi with officers of Kerala and Tamil Nadu and it was opined that after the completion of emergency and medium term measures, the water level in the reservoir can be restored upto 145 ft. However, no consensus could be reached between the two State Governments to raise the water level beyond 136 ft.

Subsequently, on the directions of Hon'ble Minister (WR) an Expert Committee under

Fig. 5.14: Mulla Periyar Dam

Member (D&R), CWC with representatives from both the States was constituted in 2000 to study the safety of the dam. The Expert Committee in its final report of March, 2001 opined that water level in the Mulla Periyar reservoir could be raised to 142 ft. Further raising the water level to 152 ft. will be considered after balance strengthening measures are completed. Hon'ble Supreme Court delivered its orders on 27.02.2006, permitting the water level in the Mulla Periyar dam to be raised up to 142 ft. Further, Hon'ble Supreme Court vide its order dated 18th February, 2010 constituted an Empowered Committee (EC) on Mulla Periyar Dam under the Chairmanship of Justice Dr. A.S. Anand, former Chief Justice of India to look into all the issues in relation to Mulla Periyar Dam. The EC in its report dated April 2012 concluded that as the existing Dam is found Hydrologically, Structurally and Seismically safe, the FRL may be raised from EL 136 ft to 142 ft and a new

Independent Expert Committee may look into the need of raising the FRL beyond 142 ft.

The Hon'ble Supreme Court in its Judgment of 07.05.2014, held that the dam is safe and hence permitted to raise the reservoir water level upto 142 ft. Furthermore, on completion of balance strengthening works and on examination of the same by the independent experts, the water level is permitted to be raised upto 152 ft.The Hon'ble Supreme Court also directed to constitute a Supervisory Committee to allay the apprehensions of Kerala- though none exists - about the safety of the Mulla Periyar dam. Accordingly, the committee was constituted with Chief Engineer, Dam Safety Organisation, CWC as Chairman and Principal Secretary, PWD, Tamil Nadu and Additional Chief Secretary, WRD, Kerala as members. Subsequently as per court orders dt 08.04.2022, Ministry of Jal Shakti re-constituted the Supervisory Committee on Mulla Periyar Dam, by including one technical expert each from both the states, vide OM dated 09.05.2022. The Hon'ble Court in the same order also directed that until the regular National Dam Safety Authority becomes functional, till such time, the reconstituted Supervisory Committee would discharge all the functions and also exercise all the powers of the NDSA for ensuring safety of the Mulla Periyar Dam, as also, prevention of dam failure related disasters.

The Supervisory Committee has met and inspected the dam 16 times since the Supreme Court judgment of 2014. 15th and 16th Meeting of


பேபி அணையை பலப்படுத்த நடவடிக்கை

பெரியாறு அணை பாதுகாப்பாக உள்ளது

கூடலூர், மார்ச் 28: பெரியாறு அணை பாதுகாப்பாக உள்ளது. பேபி அணையை பலப்படுத்த நடவடிக்கை எடுக்கப்படும் என ஆய்வுக்கு பின் கண்காணிப்பு குழு தலைவர் விஜய்சரண் தெரிவித்தார்.

பெரியாறு அணையை கண்காணித்து பராமரிக்க 3 பேர் கொண்ட கண்காணிப்பு குழுவை உச்சநீதிமன்றம் நியமித்தது. இந்த குழுவின் தலைவராக மத்திய நீர்வள ஆணைய தலைமை பொறியாளர் விஜய்சரண் உள்ளார். தமிழ்நாடு பிரதிநிதிகளாக நீர்வளத்துறை கூடுதல் தலைமைச் செயலாளர் சந்திப் சக்சேனா, காவிரி தொழில்நுட்ப குழும தலைவர் சுப்பிரமணியம், கேரள பிரதிநிதிகளாக

பெரியாறு அணையில் மத்திய நீர்வள ஆணைய தலைமை பொறியாளர் விஜய்சரண் தலைமையிலான கண்காணிப்பு குழுவினர் ஆய்வு நடத்தினர்.

Fig. 5.16: Inspection in May 2022

Supervisory committee on Mulla Periyar dam were held on 06.06.2022 and 27.03.2023, respectively. In the last inspection of Mulla Periyar dam by Supervisory Committee on 27.03.2023, the overall condition of dam and its appurtenant structures, as revealed by visual inspection was found to be satisfactory.

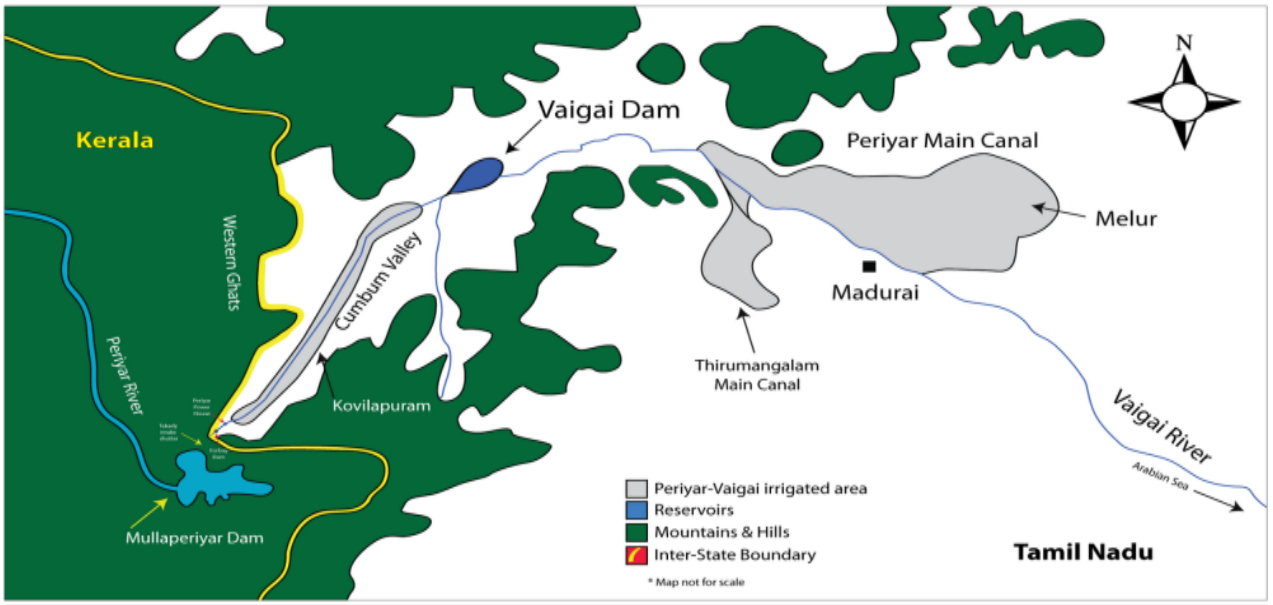


Fig. 5.15: Location of Mullaperiyar Dam

Further under the directions of Hon'ble Supreme Court dated 11.01.2018, a Sub Committee headed by Secretary, Erstwhile MoWR, RD &GR under National Executive Committee (NEC) of National Disaster Management Authority (NDMA) to monitor the measures for ensuring high level of preparedness to face any disaster has been constituted. So, far 4 meetings of the sub-committee have been convened.

5.4.2 National Register of Large Dams (NRLD)

Based on the information provided by State Govts./PSUs, Central Water Commission published the National Register of Large Dams (NRLD) - 2019 in June, 2019. As per the NRLD 2019, India has 5,745 large dams which includes 5,334 no. of constructed large dams and 411 no. of under construction large dams. The copy of NRLD-2019 can be viewed at http://cwc.gov.in/publication/nrld

5.4.3 Dam Rehabilitation & Improvement Project (DRIP)

Ministry of Jal Shakti initiated externally supported Scheme DRIP Phase II and Phase III in continuation of DRIP (2012-21) under the supervision and monitoring of Central Water Commission. The Scheme during April 2012 - March 2021 rehabilitated 223 dams located in seven States (Jharkhand, Karnataka, Kerala, Madhya Pradesh, Odisha, Tamil Nadu and Uttarakhand) with the final project completion cost of Rs 2567 Cr. The Phase II & III of the Scheme envisages rehabilitation of 736 dams at the budget outlay of Rs 10211 Cr during 10 years duration. 19 States (Andhra Pradesh, Chhattisgarh, Goa, Gujarat, Jharkhand, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Manipur, Meghalaya, Odisha, Punjab, Rajasthan, Tamil Nadu, Telangana, Uttar Pradesh, Uttarakhand, West Bengal) and three Central Agencies (Central Water Commission, Bhakra Beas Management Board, and Damodar Valley Corporation) are part of this Scheme. The Project duration of 10 years (October/November 2021- March 2031) is to be implemented in two

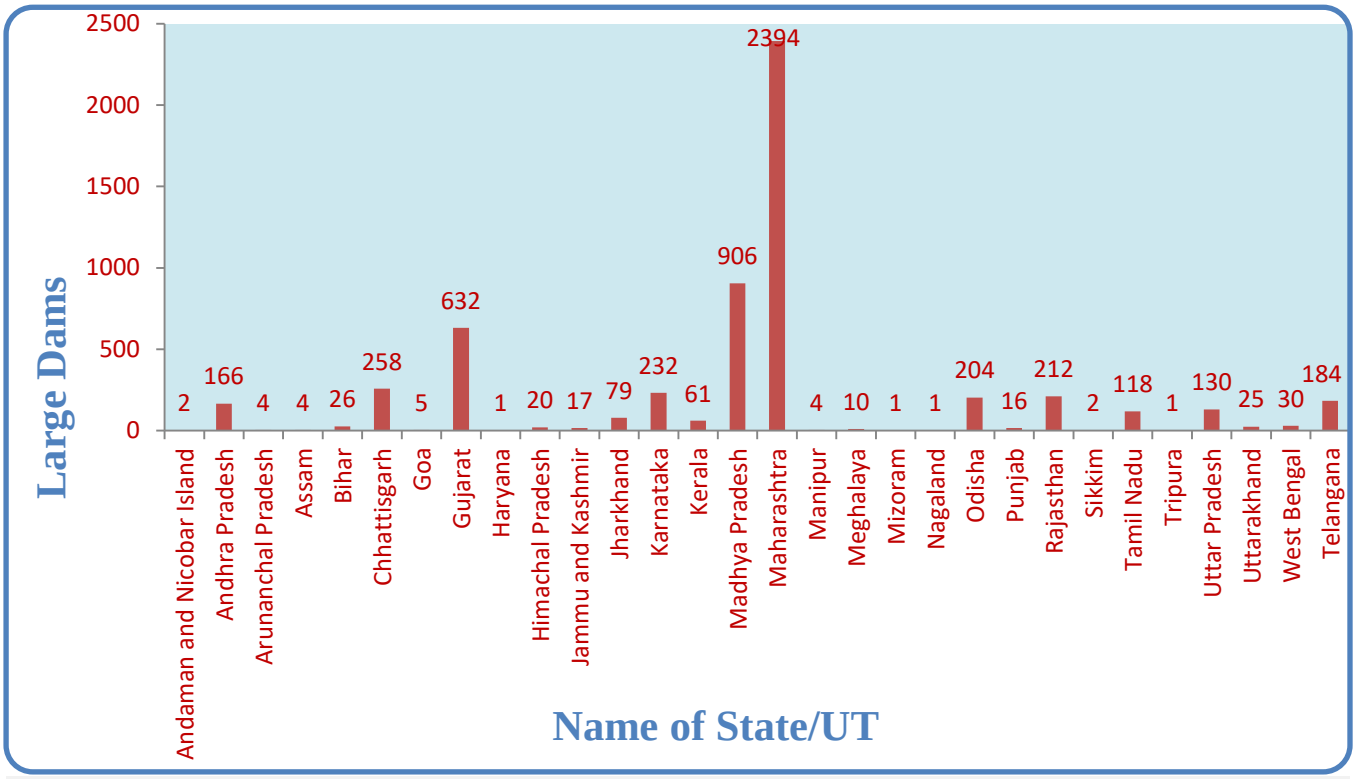


Fig. 5.17: State-wise Distribution of Large Dams (Existing & Ongoing) in India
Total No. of dams = 5745

Phases i.e. Phase-II and Phase-III, each of six years duration with an overlap of two years.

i) Objective of the Project

The project development objectives of DRIP Phase-II & Phase-III are:

a) To improve the safety and performance of selected existing dams and associated appurtenances in a sustainable manner,
b) To strengthen the dam safety institutional setup in participating States as well as at Central level, and
c) To explore the alternative incidental means at few of selected dams to generate the incidental revenue for sustainable operation and maintenance of dams

ii) Project Components

a) Rehabilitation of dams and associated appurtenances to improve the safety and operational performance of selected existing dams and associated appurtenances in a sustainable manner, and
b) Dam safety Institutional Strengthening to strengthen the dam safety institutional setup in participating States as well as on a Central level,
c) Incidental Revenue Generation for sustainable operation and maintenance of dams, and
d) Project Management.

iii) Cost and Funding

The total cost of the Project including both the Phases is Rs. 10,211 Cr (Phase II: Rs. 5107 Cr, Phase III: Rs. 5104 Cr). Out of the total proposed cost, Rs 7000 Cr is an external loan, Rs 3211 Cr would be borne by the respective participating States and the three Central agencies. DRIP Phase II entails financial assistance from the World Bank (WB) and the Asian Infrastructure Investment Bank (AIIB) to the tune of 500 Million US$.

iv) Funding Pattern

It is a State Sector Scheme with Central component. The Scheme has 100% back to back loan arrangement for States. Funding pattern for [loan: counterpart budget] Phase-II and Phase-III of DRIP is varying from 50% to 80% depending upon the category of the agency, as funding pattern proposed is 50:50 for the Central agencies, 80:20 for the Special Category of States and 70:30 for other States.The Scheme also has provision of Central Grant of 90% of loan amount for special category States (Manipur, Meghalaya and Uttarakhand).

v) Project Implementation Status

DRIP Phase II is being co-financed by the World Bank and Asian Infrastructure Investment Bank (AIIB) with US$ 250 million each. Loan Negotiation with World Bank (USD 250 Million) was held in November 2020. The loan agreement with World Bank (US$ 250 million) has been signed between DEA, MOF and World Bank on 4th August 2021. 10 States (Gujarat, Kerala, Madhya Pradesh, Maharashtra, Manipur, Meghalaya, Rajasthan, Odisha, Tamil Nadu, Chhattisgarh) and Central Water Commission participated in this event. The Loan Agreement and the Project Agreements with World Bank are effective since October 12, 2021. The inclusion of four additional States (Karnataka, Uttarakhand, Uttar Pradesh, and West Bengal) was notified by World Bank in June 2022. Loan signing for another US$ 250 million with AIIB has been done in May 2022 and this loan has been declared effective by AIIB in December 2022.

The contract(s) for about Rs 1500 Cr have been awarded by various Implementing Agencies under DRIP Phase-II. The cumulative expenditure of Rs. 495 crore has been incurred in the scheme so far and loan disbursed by the bank is US$ 44 million. During the year 2022-23, contracts worth Rs 607 crore have been awarded and expenditure of Rs. 269 crore has been incurred.

vi) Important Activities undertaken in the DRIP Scheme

a) Design Flood Review of 250 dams and Dam Safety Review Panel Inspection of 256 dams were carried out during the initial stage of the Project.

b) Major rehabilitation works have been completed at 221 dams. The rehabilitation at balanced two dam projects is under progress and would be completed under new Scheme DRIP Phase II.

c) Publication of Emergency Action Plan (EAP) and Operation and Maintenance manual. 217 EAPs and 221 O&M Manuals have been published under the Scheme.

d) The publication of 13 Guidelines/Manuals for strengthening technical regulation in dam safety areas and standardize the dam safety practices across the country.

e) The Scheme proposed Dam Instrumentation and Monitoring by providing Geodetic, Seismic, Hydro-meteorological, and Geotechnical instruments on need basis for scientific monitoring of comprehensive safety evaluation as well as integrated reservoir operations at 115 dams located across these seven States.

f) Capacity building of staff and officials involved in regular operation of these water assets along with central and academic institutions. Under DRIP, 10 Implementing agencies, eight academic institutions and two central agencies have been part of this activity. As a part of Institutional Strengthening, 186 customized national and international trainings have been conducted benefitting about 5500 officials.

g) To promote long term asset management, web-based tool called Dam Health and Rehabilitation Monitoring Application (DHARMA) has been developed to capture important data for all dams and use it for appropriate monitoring and development of rehabilitation protocols. As part of capacity building CPMU is organizing regular training programs on DHARMA.

h) As a part of institutional strengthening, post graduate degree program in Dam Safety started in IIT Roorkee and IISc Bangalore since July 2021 Academic Session.IIT Madras is in the process of starting similar program.

i) **Establishment of International Centre of Excellence for Dams (ICED):** A Memorandum of Agreement (MoA) was signed on 14.02.2023 between CWC and IIT Roorkee for Development of International Centre of Excellence for Dams at IIT Roorkee at the cost of Rs 108.99 Cr. The Centre will focus on the two main areas: Reservoir Sedimentation and Seismic Hazard Mapping and Analysis. ICED will act as a technological arm of the Central Water Commission (CWC), DoWR, RD&GR, MoJS

Fig. 5.18: MoA signed between CWC and IIT Roorkee for Development of International Centre of Excellence for Dams at IIT Roorkee

to provide specialized technical support in investigations, modelling, research and innovations, and technical support services for the Indian and overseas dam owners. Another centre is in pipeline to be established at Indian Institute of Sciences, Bengaluru.

j) As part of capacity building program in dam safety, the World Bank conducted an online training on Tier-1 Risk Assessment Framework during January 11-13, 2023, The 20 officials of CWC and 60 officials of State Government participated in this training. Also, training module of 6-day duration on various dam safety aspects has been developed by CWC; such trainings are being planned to be held in regional institutes or NWA at regular interval.

k) Dam Safety Conferences and Workshops: Three National Dam Safety Conferences in Chennai (2015), Bengaluru (2016), Roorkee (2017) and Three International Dam Safety Conferences in Thiruvananthapuram (2018), Bhubaneswar (2019) and Jaipur (2022) were organized.

5.4.4 DAM SAFETY ACT, 2021

Dam Safety Act (DSA), 2021 was enacted by the Parliament and notified in the Gazette of India by Ministry of Law and Justice (Legislative Department) as the Dam Safety Act, 2021 No.41 of 2021 on 14th Dec 2021. Further, vide MoJS, DoWR, RD&GR Gazette Notification-S.O. 5422(E) dated 28th Dec 2021, the Central Government appointed 30th Dec 2021 as the date on which the provisions of the said Act shall come into force. DSA, 2021 provides for surveillance, inspection, operation and maintenance of the specified dam for prevention of dam failure related disasters and to provide for institutional mechanism to ensure their safe functioning and for matters connected therewith or incidental thereto. The Act applies to all specified dams in the country.

Fig. 5.19: Hon'ble Minister of Jal Shakti during the discussion on Dam Safety Bill in Parliament

The Act has provision for four tier of institutional mechanism: constitution/ establishment of National Committee on Dam Safety (NCDS), National Dam Safety Authority (NDSA), State Committee on Dam Safety (SCDS), and State Dam Safety Organization (SDSO).

a) National Committee on Dam Safety

National Committee on Dam Safety (NCDS) shall evolve dam safety policies and recommend necessary regulations and maintain standards of dam safety. The functions of NCDS are defined in the first Schedule of the Act.

Ministry of Jal Shakti, vide Gazette notification S.O. 757(E) dated 17.02.2022 constituted National Committee on Dam Safety with Chairman, CWC as the Chairman of the Committee. Ministry of Jal Shakti vide Gazette notification G.S.R. 134(E) dated 17.02.2022 also published the rules of NCDS i.e. 'National Committee on Dam Safety (Procedures, Allowance and other Expenditure) Rules, 2022. The first meeting of NCDS was held under the chairmanship of chairman, CWC at New Delhi on 02.08.2022.

b) National Dam Safety Authority

National Dam Safety Authority (NDSA) shall discharge such functions as related to implementation of the policies made by the NCDS including making regulations on the recommendations of the NCDS for the purpose of maintaining standards of dam safety and prevention of dam failure related disasters. NDSA shall resolve any issue between the SDSOs of States or between a SDSO and any owner of a specified dam in that State. NDSA shall undertake the duties and functions of SDSO

where a specified dam is owned by a Central Public Sector Undertaking or where a specified dam is extended over two or more States, or where the specified dam in one State is owned by another State. The functions of NDSA are defined in the second Schedule of the Act.

Ministry of Jal Shakti, vide Gazette notification S.O. 758(E) dated 17.02.2022 established the NDSA and appoints the 18th February, 2022 as the date on which the said Authority shall come into force. Further, Ministry of Jal Shakti, vide Gazette notification G.S.R. 135(E) dated 17.02.2022 also published the rules of NDSA i.e. 'National Dam Safety Authority (Functions and Powers) Rules, 2022'.

Ministry of Jal Shakti vide OM No. N-52011/2/2021-BM/PR dated 25.04.2022 established the NDSA on the additional charge basis under the chairmanship of Member (Design & Research), CWC assisted by the 5 Members. Post of Members of NDSA is also being held by the officers of CWC and DoWR, RD&GR on additional charge basis. To support the NDSA, 4 regional offices (North, East & North East, West and South) headed by Director level officers of CWC on additional charge basis have been also established.

c) State Committee on Dam Safety

State Committee on Dam Safety (SCDS) shall supervise state dam rehabilitation programs, review the work of the SDSO, and review the progress on measures recommended in relation to dam safety. The functions of SCDS are defined in the third Schedule of the Act. All 28 States have constituted State Committee on Dam Safety. In addition to this, the 3 UTs having specified dams have also constituted UT committee on Dam safety.

d) State Dam Safety Organisation

State Dam Safety Organisation (SDSO) shall keep perpetual surveillance, carry out inspections, and monitor the operation and maintenance of all specified dams falling under their jurisdiction to ensure continued safety of such specified dams and take such measures as may be necessary to address safety concerns. All 28 States have established State Dam Safety Organisations. In addition to this, the 3 UTs having specified dams have also established UT Dam Safety Organisation.

Some of the important works carried out by the

Fig. 5.20: National Workshop on Dam Safety Governance in India- June2022

NDSA during 2022-23 is as under:

- As per the section 31(1) of DSA, 2021, every owner of a specified dam shall undertake every year, through their dam safety unit, a pre-monsoon and post-monsoon inspections in respect of each such dam. NDSA through dam owners got Post-monsoon inspection of 5017 dams during 2022-23 and Pre monsoon inspection of 70 dams.
- A National Workshop on Dam Safety Act, 2021 for dam safety governance in India was organized on 16th June 2022 to sensitize all the Central/State Governments, CPSUs, local authorities, company that own, control, operate or maintain a specified dam.
- To sensitize and stress upon the States to implement the provisions of DSA-2021, NDSA organized meeting-cum workshop in all four Regions in the country ie Coimbatore (Sept 2022), Chandigarh (Sept 2022), Pune (Nov 2022) and Guwahati (Nov 2022).
- 13 numbers of Draft rules and regulations under section 54 of Dam Safety Act 2021: have been prepared. These draft regulations have been shared with the members of NCDS and States/UTs for their comments and the same will be discussed in the next meeting of NCDS for the finalization
- Three dam related incidents were reported during the month of August-September 2022 at (i) Karam Dam, District Dhar of Madhya Pradesh (August, 2022) (ii) Ardla Dam, District Khandwa of Madhya Pradesh (September 2022) (iii) Parambikulam Dam of Kerala (September 2022). Officers from CWC/NDSA visited these sites and provided/suggested remedial measures to be adopted.
- NDSA and CWC, organized outreach program at the iconic dam sites across the Country with community participation under "Azadi Ka Amrit Mahotsav (AKAM) for promoting Dam Tourism at Tungabhadra Dam, Sardar Sarovar dam, Maithon Dam and Idukki dam.

5.4.5 Dam Health and Rehabilitation Monitoring Application (DHARMA)

Dam Health and Rehabilitation Monitoring Application (DHARMA), is a web-based asset management tool to support the effective collection and management of authentic asset and health data for all large dams in India conceived & developed by the Central Water Commission. This tool has various levels of access at Central, State and Dam Level officials. Also, some common information is available in public domain.

DHARMA is a step towards rational assessment of health status of existing dams, firm up appropriate maintenance and rehabilitation measures for ensuring the safety of these large dams at state as well as National level. Among the key objectives of DHARMA include ensure completeness of information, bring stakeholders together, assess soundness of dam health, and effectively manage asset inventory.

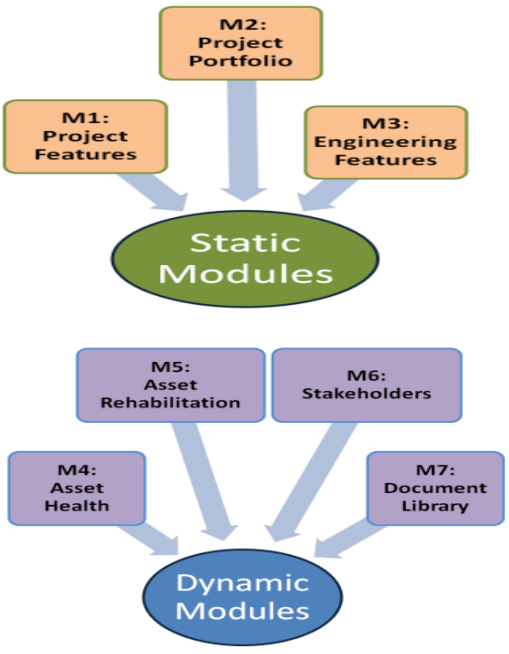


Fig. 5.21: Modules under DHARMA

It comprises of 7 modules namely: Project Features (Salient features of the dam project); Project Portfolio (Components parts of the project); Engineering Features (Technical information for each component); Asset Health (Inspection, EAP, O&M, Investigation, Instrumentation data); Asset Rehabilitation (Details of rehabilitation works); Stakeholders (Details of owner, operator, suppliers, contractors); and Document Library (Uploading, archiving of documents and drawings etc).

Presently there are more than 1400 Dam Data Managers and Dam Health Engineers who together have entered the data pertaining to approximately 1500 dams in DHARMA. Preliminary information available in National Register of Large Dams data for about 5,745 dams has been entered into DHARMA. Through training programs in various states over 1500 dam officials have been trained for entering data into DHARMA. Licenses have been issued to 40 dam owning agencies in the country for use of DHARMA.

5.4.6 National Committee on Seismic Design Parameters

The National Committee on Seismic Design Parameters (NCSDP) was constituted by erstwhile MoWR order dated 21st October, 1991 with the objective to recommend the Seismic Design Parameters for the proposals received from the dam owners. Member (D&R), CWC is the Chairman of the Committee with 11 other experts from various engineering disciplines from different technical institutions and Government organizations as its Members. Director FE&SA, CWC is the member secretary of NCSDP.

The 37th meeting of National Committee on Seismic Design Parameters (NCSDP) held on 10.03.2023 Site specific seismic study reports for 2 projects and 1 micro earthquake study report were cleared during the meeting. During 2022-23, Technical evaluation of 23 Site Specific Seismic reports have been carried out by CWC. Details of Projects are given in **Annexure- 5.6**

5.4.7 Technical Examination of Projects for Seismic and Foundation Aspects

During 2022-23, Detailed Project Reports/ Prefeasibility Reports of 18 nos. of river valley projects of various states were examined. Details of Project given in **Annexure-5.7**

5.4.8 Special Studies

CWC/DSO also undertakes special studies e.g. Dam Break Analysis, Backwater Study, GLOF studies, Reservoir routing etc. for water resources projects. Dam break analysis is carried out to prepare the inundation map and disaster management plan in the unlikely event of dam failure. It estimates the maximum water level at the downstream locations of the dam in the event of a hypothetical failure of the dam. Glacial Lake Outburst Flow (GLOF) studies are carried out to account for the flood, resulting from the breach of moraine dams, in the design of the projects.

During 2022-2023, following special studies have been carried out/appraised by CWC:

1) Dam Break Analysis of Mullaperiyar Dam (Kerala) and Emergency Action Plan of Mullaperiyar Dam (Kerala)
2) Dam Break Analysis report and Emergency Action Plan of Bisalpur Dam, Rajasthan
3) Glacial Lake Outburst Flood (GLOF) study report of Upper Siang Multipurpose Project, Arunachal Pradesh
4) Glacial Lake Outburst Flood (GLOF) study report of West Seti Project, Nepal
5) Glacial Lake Outburst Flood (GLOF) study report of 6 HEPs (Tandi, Rashil, Bardang, Reoli Dugli, Purthi, SachKhas) located in Chenab Basin

5.4.9 Consultancy Services on Instrumentation in Hydraulic Structures

DPRs of following projects have been examined/ appraised by CWC with respect to Instrumentation aspect during 2022-23:

1. Punatsangchhu-II H.E. Project, Bhutan
2. Indroka Dam Project in Tonk District, Rajasthan
3. Reoli Dugli H.E Project (456 MW) Himachal Pradesh
4. URI-I Stage-II HEP, (240 MW) Jammu and Kashmir Union Territory
5. Upper Sileru Pumped Storage Project (1350 MW) Andhra Pradesh

5.4.10 Formulation of Indian Standards

Central Water Commission, being an apex technical body in the water resources sector, has been playing an important role in formulation of standards in field of water resources development and management and allied areas through its participation in activities of Water Resources Division (WRD) and Civil Engineering Division (CED) of BIS. Chairman, Central Water Commission is presently the Chairman of Water Resources Division Council (WRDC). Central Water Commission has been represented by its officers of the rank of Chief Engineer as Chairperson of 7 Sectional Committees and Directors/Deputy Directors as Member in the 17 Sectional Committees of WRDC and Directors as Member of 08 Sectional Committees of CEDC constituted from time to time.

During 2022-23, 16 Nos. of draft standards/amendments to IS Codes have been approved by Chairman, CWC for adoption and printing. List is given at **Annexure 5.8**

5.5 International Cooperation

Expertise in Design helps CWC in providing technical advice to Government on issues related to international cooperation and international disputes. The activities in this area include:

- Special Technical studies for unresolved issues of projects under Indus Water Treaty.
- Preparation of technically sound arguments in support of India's position during meetings of Permanent Indus Commission, Secretary Level Talks, proceedings of Neutral Experts & Court of Arbitrations. A major part of Counter Memorial and Counter Rejoinder are prepared by CWC as and when issues arise.
- Technical assistance to government for Cooperation with China, Bangladesh, Nepal, Bhutan and Afghanistan and technical evaluation of impacts of the projects on neighboring countries.

5.6 Assistance in Inter-State Dispute Resolution

D&R wing of CWC provides technical advice and assistance to Committees setup by Court/ Tribunal for resolution of disputes related to Water sharing. It provides services for impartial/unbiased assessment of Water availability studies and Backwater assessment to give a fair picture for concerns on submergence. Site inspections and preparation of reports for Government on critical issues related to Inter-State Projects are undertaken by CWC.

5.7 Development, Dissemination and Standardisation of State of Art Technology and Capacity Building

D&R Wing is assisting BIS in formulation/amendment of codes for WRD Projects. Research component of D&R Wing is an integral part of the planning and design of the projects. The experience gained during the execution of the project is the basis of the modification/improvement in the prevalent design methodology/technology. This input is also given to BIS through the WRD Committee meetings to modify the relevant clauses in the codes. Technical papers on the relevant subjects are also contributed by this Wing in this regard.

D&R wing is also planning to come out with its own Technical E-Journal which will highlight the

technology being used/ developed in planning & design of WR Projects.

D&R Wing has also technically contributed in framing Guidelines for Use of Geo-textiles in Flood Management Works; Reassessment of Hydropower Potential of the country; Hydro-research; Advisory Role in Operation & Maintenance of FBP etc. It is also contributing towards disaster management by assessing hazard potential of landslide dams, providing mitigation measures for Landslides, Land subsidence etc.

D&R wing is imparting training to Water Resources Professionals of the country for planning, design & development of WR Projects by organizing training programme in CWC and at NWA, Pune. Most of the faculty in training programmes of NWA in this field is provided by D&R Wing, CWC.

Following activities for works related to BIS are noteworthy:

- 21st meeting of Water Resources Division Council (WRDC) was conducted on 06.03.2023 in hybrid mode under the Chairmanship of Chairman, CWC in the capacity of Chairperson, Water Resources Division Council (WRDC) of BIS.
- Director, Control Board Dte., CWC has been nominated for the Member of the Working Group Storm-water System and Services Sectional Committee Work Group SSD14/WG01.
- Director, River Conservation Dte., CWC has been nominated as Principal Member and Director, River Data Compilation Dte.-II, CWC as Alternate Member in Storm- water System and Services Sectional Committee, SSD 14 of BIS.
- Director, RDC –I, CWC has been nominated as Principal Member and Director, RDC – II, CWC as Alternate Member in Meteorological Instruments Sectional Committee PGD-21
- Change of nomination to Director, HCD (NW&S) as Principal Member and Deputy Director, HCD (N&W) as Alternate Member in the Sectional Committee on Rock Mechanics CED 48.
- Director, River Data Compilation Dte.-II, CWC has been nominated as representative from CWC in ISO/TC 113 Hydrometry representative in the Management Committee for Assessment of the Performance of Flow Measurements and Techniques project (Project X)
- CED 54: Concrete Reinforcement – Director, HCD (NW&S), CWC and Director, HCD(N&W), CWC have been made Principal and Alternate Members respectively.
- CED 56: Hill Area Development Engineering – Director, HCD (NW&S), CWC has been made Principal Member.
- CE Designs (NW&S) is Chairman of the Water Conductor Systems Sectional Committee, WRD 14 with Director HCD (E&NE) as principal member and Director HCD (N&W) as alternate member.

6 WATER MANAGEMENT

6.1 Monitoring of Reservoir Storage

Central Water Commission monitors the live storage of important reservoirs of the country. This information is also used by the Crop Weather Watch Group constituted by the Ministry of Agriculture and Farmers' Welfare (MoA&FW) for reviewing the crop planning strategy based on the availability of water in the reservoirs.

During Water Year 2022-2023 (1st June, 2022 – 31st May 2023), Central Water Commission (CWC) has added 6 more reservoirs under CWC monitoring. The total live storage capacity of 146 reservoirs is 178.185 BCM which is about 69.11% of the live storage capacity of 257.812 BCM which is estimated to have been created in the country. The status is given in Table 6.1.

Table 6.1: Storage Status for Water Year 2022-23

Number of Reservoirs monitored (Nos)			146
Total Designed live storage in BCM			178.185
ACTUAL STORAGE	On June, 2nd (Start of Monsoon)	In BCM	54.273
		In % of Designed Live Storage	31
		In % of last 10 Years Avg. Live Storage	133
	On September, 29th (End of Monsoon)	In BCM	154.181
		In % of Designed live Storage	87
		In % of last 10 Years Avg. live Storage	113

Weekly bulletins on storage status of important reservoirs of country were regularly issued during the Water Year 2022-23. The weekly bulletin contains current storage position vis-à-vis storage status on the corresponding day of the previous year and average of last 10 years on the corresponding day.

Whenever the percentage of departure of current storage of all reservoirs under CWC monitoring in a state falls below 80% of Normal (Average Storage of last Ten years), advisory is issued by CWC to the State Government for judicious use of available water. Based on reservoir storage during Year 2022-23, CWC has issued advisory to 4 States namely Andhra Pradesh, Telangana, Karnataka and Uttar Pradesh for judicious use of available water.

6.2 Interaction with Ministry of Agriculture

CWC is representing the Crop Weather Watch Group (CWWG) meetings of Ministry of Agriculture and Farmers' Welfare (MoA&FW) in which the water storage status of 146 important reservoirs being monitored by CWC is used as an important input for crop planning strategy.

The ICAR- CWC Joint Panel was constituted in March 1979 by the ICAR mainly to deal with the issues relating to efficient use of water for irrigation and suggest measures for maximizing the return from investment on irrigation in areas covered under major, medium, minor and other irrigation programs. The functions of the Panel include providing adequate and efficient agricultural research, education and extension services in irrigation commands. The Panel also reviews the work done by Agricultural Universities/ Research Institutes, Command Area Development Authorities, Central and State

Ground Water Organizations and others with a view to optimize the yield per unit of water.

Director General, ICAR is the Chairman of the Panel in the first and third years while Chairman, Central Water Commission is the Chairman of the Panel in the Second year. The panel has been reconstituted by the ICAR for a period of 3 years since 01.08.2019. The 1st meeting of reconstituted ICAR-CWC joint panel was held under the Chairmanship of Secretary, DARE & Director General, ICAR and Co-Chairmanship of Chairman, CWC on 13.03.2020 at Pusa, New Delhi.

6.3 Reservoir Sedimentation-Capacity Survey of Reservoirs

6.3.1 Hydrographic Survey/ Capacity Survey

The sedimentation studies of reservoirs has been a continuing activity, known as hydrographic survey of major reservoirs in the country. Sedimentation is a natural phenomenon in the reservoirs. It has been observed that the rate of siltation is on higher side in the initial years of impoundment and thereafter reduces with the passage of time. In this context, WS&RS Dte. of CWC has planned to carry out the capacity survey of reservoirs in the country from reputed consultants. The scheme was initiated during the VIII Plan and continued in subsequent Plans. Up to the end of XI plan, the capacity survey work of 36 reservoirs had been completed in all respects.

During Year 2020-21, a new scheme for conducting reservoir sedimentation survey using hydrographic techniques of major reservoirs in India under National Hydrology Project (NHP) was introduced with a total budget sanction of Rs 30 cr. Under the scheme in Phase-I, 32 reservoirs have been taken up, out of which works of 22 reservoirs have been completed in all respect and of remaining 10 reservoirs is under progress. In phase–II, 87 reservoirs across the country have been taken up, for which the works have been awarded and survey work is under progress.

Publication of Compendium on Silting of Reservoirs in India

A Compendium on sedimentation of Reservoirs in India has been published by CWC in 2020 with the data of 369 reservoirs.

6.3.2 Live Storage Capacity Survey using Remote Sensing Technique

The study "Estimation of Sedimentation in Reservoirs using Remote Sensing Techniques" is being carried out by CWC under the plan scheme "Research & Development programme in Water Sector" since 11th Five Year Plan. The details of the progress of studies are as under:

1. So far, Remote Sensing Dte. of CWC has completed 180 Sedimentation Assessment studies both in-house and by outsourcing.
2. As per approved EFC targets for 5-year period 2021-2026, 50 in-house and 80 (in 2 batches of 40) outsourced sedimentation assessment studies using SRS are to be done.
3. The work of "Sedimentation Assessment Study of 40 reservoirs using Remote Sensing Techniques" was awarded to M/s Geo Marine Solutions Pvt. Ltd. Out of which, 31 reservoirs were found feasible for study. The work is in progress and will be completed by April 2024.

CWC also conducts in-house sedimentation studies using Remote Sensing techniques. During 2022-23, two in-house studies were taken up. The details of these are given in the table below:

Table 6.2: Reservoir Sedimenattion Studies during 2022-23

In-house Reservoir Sedimentation Studies approved in year 2022-23	
Thein (Punjab)	Linganamakki (Karnataka)
Out-sourced Reservoir Sedimentation Studies year 2022-23	
Almatti Reservoir(Karnataka)	Sikasar Reservoir (Chhattisgarh)
Hemavathy Reservoir(Karnataka)	Jirgo Reservoir (Uttar Pradesh)
Chakra Reservoir(Karnataka)	ShardaSagar Reservoir (Uttar Pradesh)
Malaprabha Reservoir(Karnataka)	Ram Sagar Reservoir (Rajasthan)
Badua Reservoir (Bihar)	Rangawan (Uttar Pradesh)
Chandan Reservoir (Bihar)	Jamni (Uttar Pradesh)
Chankapur Reservoir (Maharashtra)	Nanak Sagar Reservoir (Uttarakhand)
Thokarwadi Reservoir (Maharashtra)	Rajghat (Uttar Pradesh)
Vir Reservoir (Maharashtra)	Dhandhraul Reservoir (Uttar Pradesh)
Warna Reservoir (Maharashtra)	Tungabhadra Reservoir (Karnataka)
Pawana Reservoir (Maharashtra)	VanivilasaSagar Reservoir (Karnataka)
Raiwada (Madhya Pradesh)	Banasurasagar Reservoir (Kerala)
HimayatSagar Reservoir (Telangana)	Chimony Reservoir (Kerala)
Kolar Reservoir (Madhya Pradesh)	Sholayar Reservoir (Tamil Nadu)
Thanwar (Rajiv Sagar) Reservoir (Madhya Pradesh)	Peechi Reservoir (Kerala)
RavishankarSagar Reservoir (Chattisgarh)	

4. In-House Studies of reservoirs namely Vaigai (Tamil Nadfu), Kol (Himachal Pradesh) and Tattihalla (Karnataka) have been also been completed and are at approval stage.

6.3.3 New initiatives

1. Sedimentation Analysis of reservoirs are being conducted using Microwave data (instead of optical data) since 2020. This has been tried for the first time in CWC. So far 28 reservoirs have been studied using Microwave data. The main advantage of using microwave data is that images are not affected by cloud cover. Hence, images of monsoon season can also be obtained when the reservoir level is near FRL (Imageries are cloudy in case of optical imageries during monsoon season).
2. A comparative study of sedimentation assessment of Jhakam reservoir was conducted using both hydrographic survey and Remote Sensing technique. It was noted that hydrographic survey of Jakham reservoir conducted in the year 2021 reported live capacity as 162.68 MCM having a deviation of only 2% from the SRS study (159.312 MCM), thus establishing the accuracy of both the methodologies.
3. Next batch for out-sorcing work "Sedimentation Assessment Study of 40 reservoirs using Remote Sensing Techniques" is planned to be taken up during 2024-2026.
4. Considering the importance of hydrographic survey of major reservoirs, it has been decided to take up the work of 191 major reservoirs of India under NHP by CWC. ToR and RFP for the same are being finalized. With this study, about 70-80% of the live storage of India will be covered for sedimentation assessment. The reservoirs are

divided into 4 groups and each group is likely to take 3 years time to complete.

6.4 Project Performance Evaluation

Performance Overview and Management Improvement Organization (PO&MIO) of CWCis involved in undertaking Post Project Performance Evaluation and Water use Efficiency studies of completed major/medium irrigation (MMI) projects in the country. It is also involved in benchmarking of completed irrigation projects and promoting Water Audit and Water Conservation in all the three sectors viz. domestic, industrial, and irrigation in the states. During 2020-21, a new initiative "Support for Irrigation Modernization Program (SIMP)" has been taken up by CWC, DoWR,RD&GR with technical support from Asian Development Bank (ADB) to modernize MMI Projects in the Country. POMIO has been functioning as Central Irrigation Modernization Office (CIMO) for overall implementation and management of SIMP.

6.4.1 Post Project Performance Evaluation study of Completed Irrigation Projects

The Study includes five components consisting 1) Evaluation of system performance 2) Agro-economic, 3) Socio-economic and 4) Environmental impacts of project along with economic analysis with the central objective of identifying deficiencies and 5) recommending corrective measures for improving the performance of projects for achieving the envisaged objectives and targeted benefits.

There is a Technical Advisory Committee (TAC) under the Chairmanship of Member (WP&P), CWC for guiding, supervising and approving the study reports.

Central Water Commission has undertaken Performance Evaluation Study (PES) of 28 nos. completed MMI projects in the country upto 12th Five Year Plan (2012 to 2017). The State Governments are also encouraged for carrying out the Performance Evaluation Study and Benchmarking Study of the completed MMI Projects in their respective states.

Further, to conduct Performance Evaluation studies of 10 nos. MMI projects during 2021-2026 by engaging WALMIs or other such institutes, State Govts have been requested for providing the list of potential/ priority projects.

6.4.2 Water Use Efficiency (WUE) Studies

Irrigation sector is the biggest consumer of developed water resources and its share in the overall demand of water is about 80%. However, water use efficiency (WUE) in irrigation sector is relatively low. CWC has undertaken WUE studies of 35 nos. completed MMI projects in the country during 10th & 11th Five Year Plans. CWC has in place the "Guidelines for computing WUE of the irrigation projects", updated from time to time, last updated in Feb'2014. The guidelines recommend the definition of WUE which is based on the following broad components:

i. Reservoir Filling Efficiency
ii. Delivery System/Conveyance Efficiency
iii. On Farm Application efficiency
iv. Drainage Efficiency

Based on 35 nos. studies, overall average WUE of MMI projects in India is about 36% only. The study reports also included set of recommendations/ suggestions for improving the efficiency by focussing on certain critical aspects of the irrigation project. A Technical Advisory Committee under the Chairmanship of Member (WP&P), CWC has been constituted for guiding, supervising and approving the WUE study Reports.

Further, to conduct WUE studies of 10 nos. MMI projects during 2021-2026 by engaging WALMIs or other such institutes, State Govts have been requested for providing the list of potential/ priority projects.

6.4.3 Baseline Studies of National Water Mission (NWM)

One of the five goals identified by NWM is to improve the water use efficiency in all sectors of

water use. Since agriculture is the sector which consumes almost 80% of the total annual water consumption in India, the increase in water use efficiency in irrigation sector could potentially lead to significant water savings. As seen from the studies carried out by CWC, the average Water Use Efficiency of irrigation projects in India is only 36% thus, there is significant scope in systematically improving the efficiency in irrigation sector. Under this goal, Baseline Studies of 22 MMI projects from various parts of the Country have been taken up to evaluate their water use efficiency.

Chief Engineer (POMIO), CWC is one of the members of the Core Group formed for steering the studies, who is responsible for technical examination of the study reports in light of CWC's Guidelines to Compute Water Use Efficiency in Irrigation Projects.

Draft Final Reports (DFRs) in respect of 14 projects were received from National Water Mission during 2021-22 which have been scrutinized by POMIO, CWC and comments conveyed to NWM. 08 DFRs have been recommended to NWM for approval of core group. Further, to expedite the DFR works, POMIO, CWC held virtual meetings with WALAMTARI, Hyderabad & NERIWALM, Tezpur to discuss the issues related to study and to clarify the same.

6.4.4 Efficiency Studies under International Cooperation

1) India- European Union Water Partnership (IEWP)

One of the priority area under IEWP is to formulate a protocol for assessment of irrigation efficiency of small and medium irrigation projects which would be practical and easy to implement. Phase-I of IEWP completed on 31.10.2020 and subsequently, the IEWP Phase-II commenced from 01.11.2020 for a period of three years.

The activity of developing the irrigation efficiency protocol has been included under the Thematic pillar "Irrigation & Efficient Water Use" of IEWP Ph-II. Under Phase-II for this particular Thematic pillar, Chief Engineer (POMIO), CWC has been nominated as the nodal officer from Indian Side. A Joint Technical Working Committee headed by CE (POMIO) has been constituted to oversee the development of protocol.

2) India- Australia MoU on Water Cooperation

MoU between Governments of India and Australia for cooperation in the field of Water Resources Management has been renewed on 20.05.2020. One of the activities identified under the MoU on the basis of mutual interest is to carry out the "Irrigation Efficiency pilot project" for improving irrigation efficiency and crop production on a pilot project from India. A steering committee under the Chairmanship of Member (WP&P) has been constituted for this particular study. Subernarekha Irrigation Project (Odisha) has been identified for carrying out this pilot study by Australian side. About 560 ha. of command area under Kichakeswari Panipanchayat of Subernarekha project has been selected for carrying out the pilot study. POMIO is acting as the nodal office from Indian side for the study.

3) India- Japan Memorandum of Cooperation (MoC) on Water Resources

A Memorandum of Cooperation (MoC) was signed between DoWR,RD&GR, MOJS (GoI) and Ministry of Land, Infrastructure, Transport and Tourism (MLIT) of Japan on December 11, 2019 in the field of Water Resources. The specific areas of Cooperation as per the MoC are as under:

i) Integrated Water Resources Management including River Basin management;

ii) Collaboration in the field of use of modern technology and scientific knowledge for efficient use of water and developing appropriate decision support system;

iii) Flood management and forecasting;

iv) Promoting water management, water quality issues and water cycle management through innovative concession arrangements;

v) Capacity building including science and

technology development;

vi) Water use efficiency;

vii) Any other mutually agreed areas as decided by the Parties.

DoWR,RD&GR vide OM dated 26.10.2021 constituted a Joint Working Group (JWG) headed by Addl. Secretary (WR,RD&GR) and Chief Engineer (POMIO), CWC as Member Secretary from Indian side. Further, a Joint Implementation Group (JIG) has been constituted dated 06.09.2022 comprising of officers from both sides to take forward the deliberations. CE (POMIO), CWC acts as the Nodal officer from Indian side for the JIG. 1st Meeting of the JIG was convened on 14.12.2022. Further, POMIO, CWC organized a virtual meeting on 09.03.2023, wherein officials of Municipal Corporation, Mumbai made a presentation to Japanese side on flooding situation in Mumbai city, causes of flood, Action taken by BMC for flood abatement, etc.

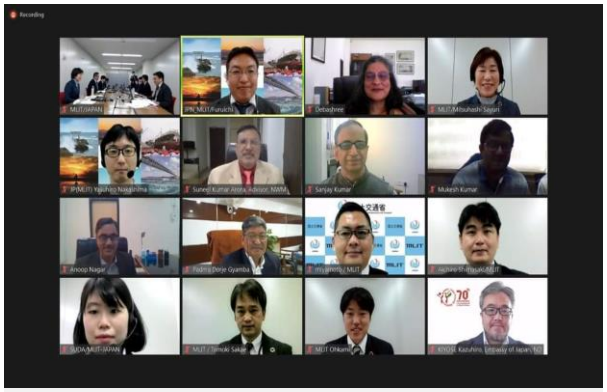


Fig. 6.2: 1st Meeting of India-Japan JWG

6.4.4 Support for Irrigation Modernization Programme (SIMP)

A new initiative "Support for Irrigation Modernization Program (SIMP)" has been taken up by CWC, DoWR,RD&GR during 2020-21 with technical support from Asian Development Bank (ADB) to modernize Major/ Medium Irrigation (MMI) projects in the country. Objective of the programme is to improve water use efficiency, increase crop water productivity and ultimately increase farmer's income in the command area of the project through application of national/ international best practices in the command area of the projects. For overall implementation and management of the programme, a Central Irrigation Modernization office (CIMO) has been setup under Chief Engineer (POMIO), CWC supported by National/ International consultants. SIMP is proposed to be taken up in 4 phases.

Phase-1 includes identification of first batch of projects i.e. 3 to 4 MMI projects. Phase-2 includes activities related to preparation of Irrigation Modernization Plans (IMPs) of batch-1 i.e. 3 to 4 MMI projects and capacity building. For IMP preparation, ADB will provide technical assistance in terms of International and National Consultants. Phase-3 includes activities related to preparation of Detailed Project Report (DPRs) of Batch-1 projects taking in consideration of IMP options for modernisation. Phase- 4 is Execution/Implementation of DPRs by concerned State Govts. Implementation of the project would lie with the concerned States who would have an option to either fund it from their own resources or they can avail loan facility from ADB or any other financial institutions.

Total 57 nos. proposals were received from 14 States/ 2 UTs for inclusion under SIMP. ADB is providing its Technical Assistance (TA) in terms of International and National Consultants for Phase-1(identification of first batch of projects) and for Phase-2 preparation of IMPs.

SIMP Ph-I has been successfully implemented in collaboration with ADB which concluded in December'2021. 04 nos. of projects namely IGNP St-II (Rajasthan), Palkhed (Maharashtra), Vanivilasa Sagara (Karnataka) and Loharu (Haryna) have been identified as Batch-1 Projects to be taken up for Modernization.

ADB had a Mission for SIMP from Feb-2022 to August-2022 wherein discussions were held with Water Resources/Finance Departments of four States namely Rajasthan, Maharashtra, Karnataka and Haryana.

Phase-2 of SIMP has been initiated during Nov-2022 and is targeted for conclusion by April-

2024. Under Phase-2, preparation of Irrigation Modernization Plans (IMP) of four projects is under process.

RAP-MASSCOTE (Mapping System and Services for Canal Operation Techniques) workshops have also been organized for all 4 projects during Dec-March'2023.

Fig. 6.3: SIMP Initiative with ADB Assistance

7 APPRAISAL OF PROJECTS

7.1 Project Appraisal

One of the important activities assigned to CWC is techno-economic appraisal of irrigation, flood control and multipurpose projects proposed by State Governments. This task is performed and coordinated by Project Appraisal Organisation (PAO) of CWC. After establishment of techno-economic viability of the project, the Advisory Committee of DoWR,RD&GR on Irrigation, Flood Control and Multipurpose Projects headed by Secretary, DoWR,RD&GR considers the projects for acceptance and thereafter recommends the same for investment clearance. Since 1976, about 1599 projects have been considered and accepted by the Advisory Committee of Erstwhile Ministry of Water Resources on Irrigation, Flood Control and Multipurpose projects till March 2023.

Besides these, the Hydro-power projects proposed by State Power Corporations/ Electricity Boards/ Private Sector Organisations for Techno-economic clearance by Central Electricity Authority (CEA) are also scrutinised in CWC from the view point of hydrology, civil design, inter-state issues and cost aspects of civil components. Technical aspects of water supply schemes and cost aspects of Flood Control Schemes (except projects for Ganga Basin and Brahmaputra Basin) are also appraised as and when referred to by State Governments.

7.2 Appraisal of Major Irrigation / Multipurpose Projects

During the year 2022-23, 19 major irrigation/ multipurpose projects have been appraised. Out of that, 05 major irrigation/ multipurpose projects have been accepted by the Advisory Committee of DoWR,RD&GR. A Pie chart showing state-wise distribution of major irrigation/ multipurpose projects under appraisal during 2022-23 is shown at Fig-7.1

7.3 Appraisal of Medium Irrigation Projects

During the year 2022-23, 12 medium irrigation projects have been appraised in field units of CWC. Out of that, 03 medium projects have been accepted by the Advisory Committee of DoWR, RD & GR during this period. Necessary assistance was provided by PAO, CWC to the concerned regional offices for processing the projects for acceptance by the Advisory Committee.

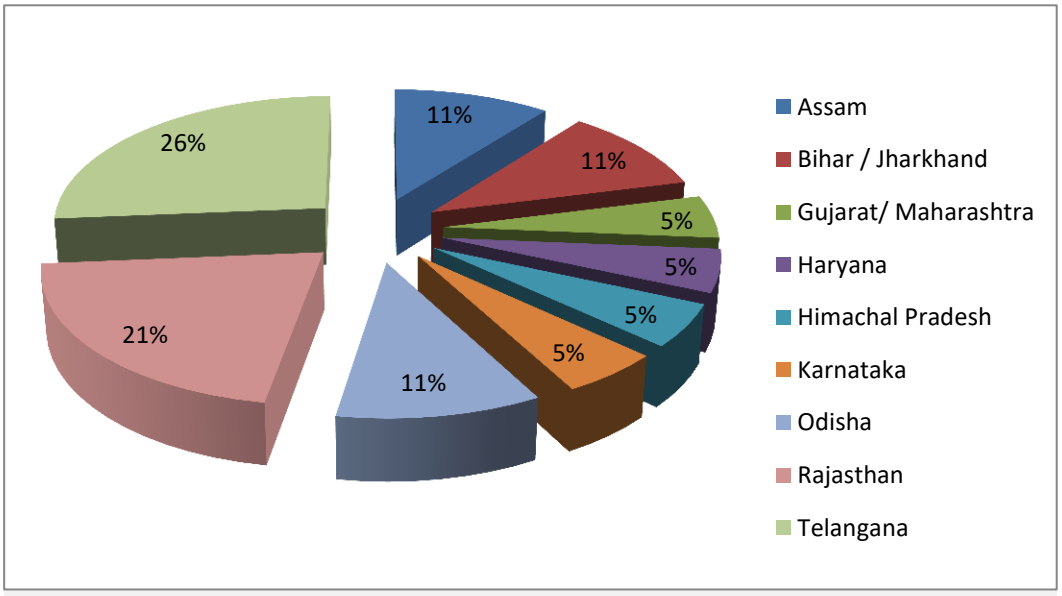


Fig. 7.1 State-wise distribution of major irrigation / multipurpose projects under appraisal during 2022-23

7.4 Meeting of the Advisory Committee

During the year 2022-23, the Advisory Committee of DoWR,RD&GR, under the Chairmanship of Secretary (DoWR,RD&GR) accepted 19 projects comprising 08 Major & Medium Irrigation/ Multipurpose projects and 11 Flood Control schemes in 2 meetings. The list of major & medium irrigation/ multipurpose projects and flood control schemes accepted by the Advisory Committee is enclosed as **Annexure- 7.1** and **Annexure- 7.2** respectively.

The irrigation projects accepted during 2022-23 envisages annual irrigation benefits to about 1.90 Lakh hectares in 7 States of the country. The Flood Control Schemes accepted during 2022-23 envisages protection to a population of about 10,70,938 persons & area of about approx. 1.6 Lakh hectares in the 6 States of the country. Pie Chart showing State-wise distribution of 08 Nos. major & medium irrigation/ multipurpose projects accepted by the Advisory Committee during the current year is enclosed as **Fig. 7.2.**

7.5 Appraisal of Hydro-Electric Projects

Apart from the appraisal of Irrigation and Flood Control projects, civil components of hydro-electric projects are also appraised by Central Water Commission. The said activity is coordinated by PAO, CWC. Cost finalisation of civil component of 04 DPRsof Hydro-Electric Projects has been done by CWC during the period of 2022-23. Techno-Economic Clearance (TEC) to the project is accorded by CEA. During 2022-23, CEA has accorded TEC to 04 No. Hydro-Electric Projects having total installed capacity of 2609 MW.

The list of H.E Project accepted by TEC is enclosed at **Annexure- 7.3**.

7.6 National Projects

Government of India is implementing the scheme of National Projects since XI Plan with a view to expedite completion of identified National Projects for the benefit of the people. So far, Central Government has declared 16 water resources projects as National Project.

The provision of financial assistance for National Projects has been included in the recently launched PMKSY. The proportion of Central share has now been revised to 60% except in case of projects in eight North Eastern States and three Himalayan States which will continue to obtain central assistance at 90% of the cost of the project.

Out of 16 projects included in the scheme of National Projects, eight projects, namely, Gosikhurd Project of Maharashtra, Shahpur Kandi of Punjab, Teesta Barrage Project of West Bengal, Saryu Nahar Pariyojana of Uttar Pradesh, Indirasagar Polavaram Irrigation Project of Andhra Pradesh, Ken-betwa inter-linking project

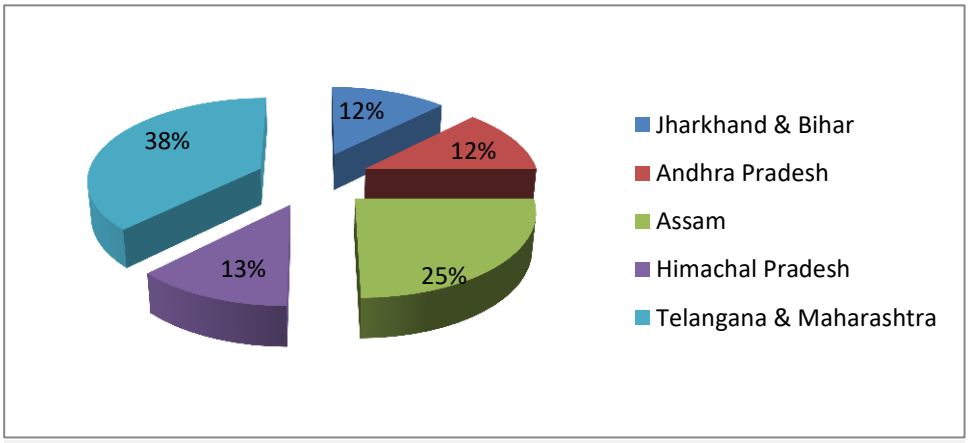


Fig. 7.2: State-wise Distribution of Major/ Medium/ Multipurpose Projects Accepted by the Advisory Committee of DoWR,RD&GR during the Year 2022-23

of MP & UP, Renukaji Dam Project of Himachal Pradesh and Lakhwar MPP of Uttarakhand are under implementation. Gosikhurd and Shahpur Kandi projects have been provided grant amounting to Rs. 3784.0445 Cr and Rs. 316.4058 Cr, respectively, up to March, 2023. Teesta Barrage Project started receiving funds under the scheme of National Project during 2010-11 and grant amounting to Rs. 178.20 Cr has been provided for the project till March 2012. Saryu Nahar Pariyojana started receiving funding under the scheme of National Project since 2012-13 and an amount of Rs. 2257.612 Cr has been released up to March 2023. The Indirasagar Polavaram Irrigation Project started receiving funding under the scheme of National Project since 2014-15 and an amount of Rs. 14418.39 Cr has been released upto March 2023. Saryu Nahar Pariyojana (Uttar Pradesh) and Gosikhurd Irrigation Project (Maharashtra) have been included under the 99 priority projects under PMKSY-AIBP. Saryu Nahar Pariyojana (Uttar Pradesh) was inaugurated by the Hon'ble Prime Minister Shri Narendra Modi on 11th December, 2021. CA for Ken-Betwa inter-linking project have been granted amounting of Rs. 5265.89 Cr up to March 2023. Renukaji Dam project and Lakhwar Project has received amounting Rs. 1495.4969 Cr and 38.58 Cr CA from Central Government.

Project-wise Status of 16 declared National Projects is presented at **Annexure 7.4.**

High Powered Steering Committee

The Union Cabinet in its meeting held on 7th Feb, 2008, constituted a "High Powered Steering Committee for Implementation of the Proposals of National Projects" with Secretary (WR) as Chairman and Chief Engineer (PPO), CWC as its Member-Secretary. The terms of reference of the Committee are as under:

a) To recommend implementation strategies for National Projects.
b) To monitor implementation of National Projects.
c) To examine the proposal for inclusion of new projects as National Projects and make appropriate recommendation to the Government.

Fourteen meetings of High Powered Steering Committee constituted for implementation of National Projects have been held so far.

7.7 Repair, Renovation and Restoration (RRR) of Water Bodies

The scheme on Repair, Renovation & Restoration (RRR) of Water Bodies was launched during January, 2005 to meet the needs of the communities which are dependent for water on tanks, ponds and lakes. The prime objective of the scheme was Comprehensive improvement and restoration of water bodies, including protection works to avoid encroachment thereby increasing tank storage capacity.

The scheme continued from 2005 onwards with slight changes from time to time. However, after launch of Pradhan Mantri Krishi Sinchayee Yojana (PMKSY) during 2015-2016, the scheme of RRR of Water Bodies became part of one of the components of PMKSY, namely Har Khet Ko Pani (HKKP).

During 2021-26, the scheme targets to create an irrigation potential of 0.9 lakh hectare. In addition to water bodies directly linked to irrigation, other water bodies such as percolation tanks and the water bodies used for providing drinking water and for other community purposes which fulfill the eligibility criteria, are now proposed to be included under the scheme.

As per the Guidelines of the scheme, rural water bodies having minimum water spread area of 2 hectares (1 hectare for North Eastern, Sikkim and Hilly States including UTs. of J&K and Ladakh), and urban water bodies having minimum water spread area of 1 hectare (0.5 hectare for North Eastern, Sikkim and Hilly States including UTs of J&K and Ladakh) are eligible for inclusion.

Since XII Plan, restoration works in respect of 3275 water bodies was taken up out of which works in respect of 1863 water bodies have been

reportedly completed. Irrigation potential of 154.307 Th ha has been restored with total release of Central Assistance of Rs 554.274 crore.

Status of Water Bodies & Funds released under Scheme of RRR of Water Bodies since XII Plan (as on 31.03.2023) is presented in **Table 7.1**

During FY 2022-23, 574 water bodies from Odisha and 185 water bodies from Tamil nadu were included under the scheme. Central Assistance of Rs. 58.544 crore was also released during the same period.

7.8 Surface Minor Irrigation (SMI) Scheme

Surface Minor Irrigation (SMI) component targeting to provide financial assistance to the identified minor irrigation projects (irrigation potential less than 2,000 hectare) using surface water, was included under Accelerated Irrigation Benefit Programme (AIBP) since 1999-2000 for special category States. Subsequently the scheme was extended to cover other special areas, namely, drought prone area programme (DPAP), tribal, desert development programme (DDP), flood prone, left wing extremism affected and Koraput, Bolangir and Kalahandi (KBK) region of Odisha. Main objective of SMI schemes is to expand cultivable area under assured irrigation.In 2015-16, SMI was included as one of the components of PMKSY-HKKP.

Since XII Plan, 7359 SMI schemes have been included under the programme till 31.03.2023. Out of this, 4428 schemes have been reported to be completed. Cumulative Central Assistance amounting to Rs. 9009.16 Crore has been released for completion of these schemes till 31.3.2023. Out of this, an amount of Rs. 312.545 Crore was released during 2022-23. The details are as given in **Table 7.2**. During FY 2022-23, 149 (Nagaland:2; Assam:9 & Karnataka:138) SMI projects were included for funding under the scheme SMI. The details are given in **Table 7.3**

Table 7.1
Status of Water Bodies & Funds released under Scheme of RRR of Water Bodies Since XII Plan (as on 31.03.2023)

Rs. in Crore

Sl.	Name of State	No. of Water Bodies	Estimated Cost	Committed Central Share (CA)	Irrigation Potential to be restored (Th. ha)	Central Fund Released during 2022-23	Total Central Fund Released since XII Plan	Cumulative expenditure	No. of Water Bodies Completed	Irrigation Potential Restored (Th. ha)
1	Andhra Pradesh	235	137.49	82.48	12.99	-	2.70	-	-	-
2	Bihar	93	161.91	89.46	26.09	7.285	33.985	29.2	59	17.87
3	Gujarat	61	102.91	61.74	11.36	3.162	11.972	12.45	16	1.41
4	Madhya Pradesh	125	183.24	93.01	33.31	-	37.70	149.66	124	33.00
5	Manipur	4	65.44	58.90	1.20	-	34.63	38.31	-	-
6	Meghalaya	9	11.43	10.29	1.10	-	5.18	8.99	8	0.88
7	Odisha	1437	988.52	570.15	89.73	11.10	156.28	330.17	815	48.07
8	Rajasthan	105	309.85	159.95	20.43	9.30	71.48	137.58	68	10.19
9	Tamil Nadu	552	365.22	218.97	6.60	27.697	79.377	132.53	236	5.98
10	Telangana	575	459.18	272.02	29.01	-	104.56	268.67	464	25.04
11	Uttar Pradesh	74	83.41	52.99	10.00	-	16.41	44.41	8	2.35
12	Uttarakhand	5	12.49	11.24	0.45	-	-	0	-	
Total		3275	2881.09	1681.2	242.27	58.544	554.274	1151.97	1798	144.79

Table 7.2

Details of Projects under implementation since XII Plan under Surface Minor Irrigation Scheme (till 31.03.2023)

Rs. in Crore

Sl No.	Name of State	No of schemes included	Irrigation Potential Planned (Th. ha)	Estimated Cost	Committed Central Share (CA)	CA Released during 2022-23	Cumulative CA released during XII plan & onwards	Cumulative expenditure	No of Schemes comple-ted	Irrigation Potential Achieved (Th. ha)
1	Arunachal Pradesh	919	42.02	716.316	644.684	41.9535	515.34	412.172	437	22.076
2	Assam	1110	465.35	5777.77	5199.99	71.5368	3824.00	3460.28	763	262.75
3	Bihar	176	77.54	351.620	274.071	4.4837	178.84	256.346	173	76.24
4	Chhattisgarh	147	50.513	722.17	433.2	-	200.37	720.72	106	31.900
5	Himachal Pradesh	168	35.190	878.26	790.43	40.50	457.51	464.866	124	22.1439
6	Jharkhand	82	8.982	75.324	56.49	-	19.379	66.775	82	8.73
7	Karnataka	465	39.104	1038.38	722.43	30.00	192.43	481.519	390	33.811
8	Madhya Pradesh	276	111.343	1817.39	1325.47	-	987.69	1657.64	258	64.65
9	Manipur	477	22.545	397.07	357.36	26.462	276.245	222.11	102	18.689
10	Meghalaya	335	58.961	1049.37	944.23	46.52	511.45	563.50	177	27.46
11	Mizoram	45	3.25	50.98	45.88	-	33.90	35.67	-	2.217
12	Nagaland	919	36.24	666.88	600.21	21.006	425.99	395.33	544	28.46
13	Sikkim	690	12.38	278.56	250.72	12.88	123.269	121.51	381	12.3295
14	Tripura	58	11.91	145.82	131.24	-	89.65	97.99	29	1.317
15	Uttarakhand	1073	59.95	870.01	782.99	17.204	483.60	494.12	651	43.83
16	UT of J&K	398	107.77	1177.47	1059.724	-	607.948	618.531	200	88.297
17	UT of Ladakh	21	7.29	100.17	90.16	-	81.55	84.324	11	6.4343
Total		**7359**	**1150.338**	**16113.56**	**13709.28**	**312.545**	**9009.16**	**10153.42**	**4428**	**751.33**

Table 7.3
Details of SMI projects included for funding under the scheme SMI during 2022-23

Sl. No.	State	No. of SMI Schemes	Estimated Cost (Rs. in Crore)
1	Nagaland	2	13.98
2	Assam	9	302.07
3	Karnataka	138	443.46
Total		149	759.51

8 MONITORING OF PROJECTS

8.1 Monitoring of Major and Medium Irrigation Projects

A three tier system of monitoring of major/medium irrigation projects at Centre, State and Project level was introduced in 1975. At Central level, this work was entrusted to CWC. The main objective of monitoring is to ensure the timely achievement of physical and financial targets regarding creation of irrigation potential. Monitoring System is also expected to contribute in identification of the inputs required, analysis of the reasons for any shortfalls/bottlenecks and suggest remedial measures, etc., with a view to complete the projects in a time bound manner.

The entire monitoring exercise normally comprises of three stages:

(i) Desk-top monitoring,
(ii) Satellite based monitoring,
(iii) Physical monitoring

The "Desk-top monitoring" exercise is being carried out project-wise at the CWC regional offices through review of all project related information, progress review through MIS, compliance review of audits/ site-visit reports, and inviting concerned Project officers at the beginning of the financial year to have an overall assessment of construction planning of the project, to make effort for a realistic assessment of the progress of the works made during the previous financial year, to know shortfall in the utilization CA fund as well as state share fund, to identify the bottlenecks faced in the general progress of work, to identify critical issues needing special attention, to ensure updated entries of Physical and Financial Status of projects in the online Monitoring Information System(MIS)

The "Satellite Based Monitoring" is being Carried out at the CWC HQ, regional offices, concerned Project offices or any other institute/organization assigned with the task to digitize the completed components of the project canal network and Irrigation Infrastructures for visualization of the extent and size of the project, to compare scope of the project with the actual progress thus digitized and help in the decision making process, to know the actual size of balance works and actual pace of construction of the project, gaps, and major bottlenecks, so as to rationally understand the impediments, risks and issues likely during the implementation for completion of the Project, to identify the critical areas/places of bottlenecks thus to reduce the numbers of site visits limiting to focus areas identified in advance for finding answers of some of the queries/doubts and to generate minor-wise/ outlet-wise digitized data to assess the status of potential utilization.

The "Physical Monitoring" is being carried out by the regional offices of CWC by way of minimum of two field visits per project per year, and any additional visit as per the direction issued from time to time. The CWC (HQ) is monitoring inter-state projects. The physical monitoring of the project will involve Preliminary preparation, Field visit and discussion with WUAs, Collection of information/ data and review of the status of the project, having wrap up meeting with project authorities, preparation of status report, follow up of the action point etc.

Government of India launched the Pradhan Mantri Krishi Sinchayee Yojana (PMKSY) during 2015 with the motto of 'Har Khet Ko Pani' ensuring access to some means of protective irrigation to all agricultural farms in the country, to produce 'per drop more crop', thus bringing much desired rural prosperity. The ongoing programmes as being implemented by the Government of India, viz Accelerated Irrigation Benefits Programmes (AIBP), Repair, Renovation and Restoration (RRR) of Water bodies and Command Area Development and Water Management (CADWM) have been subsumed in

Pradhan Mantri Krishi Sinchayee Yojana (PMKSY).

In order to overcome the bottlenecks faced in completion of project under AIBP, during 2016-17, ninety-nine (99) on-going Major/Medium irrigation projects (and 7 phases), having ultimate irrigation potential of 76.03 lakh hectare, were prioritized in consultation with States, for funding under PMKSY-AIBP in a mission mode. Six (06) new MMI/ERM projects have been included in the scheme during FY 2021-22 to 2022-23. During the year 2022-23, 91 monitoring visits to the projects were carried out by CWC in accordance with these targets. State-wise and project-wise list of these projects proposed for AIBP monitoring is given at **Annexure-8.1.**

Also during 2022-23, 5 monitoring visits wre carried out for Special Package Irrigation Projects of Maharashtra and 4 visits were carried out for Special Package Projects of Punjab (i.e. Relining of Sirhind Feeder & Relining of Rajasthan Feeder). State-wise and project-wise list of these projects proposed for Special Package monitoring is given at **Annexure-8.2**

8.2 Accelerated Irrigation Benefits Programme

Central Government launched the Accelerated Irrigation Benefits Programme (AIBP) during 1996-97, to provide Central Loan Assistance (CLA) to major/medium irrigation projects in the country, with the objective to accelerate the implementation of those projects which are beyond resource capability of the States or are in advanced stage of construction. While selecting the projects, special emphasis was to be given to Pre-Fifth and Fifth Plan projects. Priorities were also given to those projects which were benefiting Tribal and Drought Prone Areas. Under the revised AIBP Guidelines from the year 1999-2000 onwards, Central Loan Assistance under AIBP was also extended to minor surface irrigation projects of special category states (N.E. States & Hilly States of H. P., Sikkim, J&K, Uttaranchal and projects benefiting KBK districts of Orissa). However, later w.e.f. 01.04.2005 the programme was extended to non-special category states also and minor surface irrigation projects with potential more than 100 ha with preference to tribal areas and drought prone areas which fully benefit dalits and adivasis could be included. Grant component was introduced under the programme during 2004-05 and Centre provided both loan portion and grant component of Central Assistance. However, as per the present policy, Centre is providing the grant component only from 2006-07 and States are authorised to raise loan component by market borrowing.

The Government has further relaxed the criteria for central assistance under the AIBP in Dec 2006. The earlier guidelines stipulating completion of an ongoing project under AIBP for including a new project under AIBP has been relaxed for projects benefiting a) drought prone areas, b) tribal areas, c) States with lower irrigation development as compared to National average, and d) districts identified under the PM's Package for agrarian distress districts.

During the 12th Plan, AIBP guidelines has been further re-modified and implemented from October, 2013. As per the revised guidelines, the pari-passu implementation of Command Area Development (CAD) works were given more emphasis for the full utilization of the Irrigation Potential Created. The eligibility criteria for new projects was continued but the advanced stage of construction was defined in terms of at least 50% of physical and financial progress on essential works like Head-Works, Earth Works, Land Acquisition, R&R etc. Further, funding pattern and mode of disbursement was slightly modified. CWC was assigned the responsibility to comprehensively monitor the projects receiving CLA/Grant.

So far, 297 projects from 25 States had been included for funding under AIBP. Out of 297 projects, upto 31.03.2016, 143 projects had been completed and 5 projects were deferred. **Annexure - 8.3** gives State-wise list of Major and Medium projects completed under AIBP.

Government of India launched the Pradhan Mantri Krishi Sinchayee Yojana (PMKSY) during 2015 with the motto of 'Har Khet Ko Pani' ensuring access to some means of protective irrigation to all agricultural farms in the country, to produce 'per drop more crop', thus bringing much desired rural prosperity. The ongoing programmes as being implemented by the Government of India, viz Accelerated Irrigation Benefits Programmes (AIBP), Repair, Renovation and Restoration (RRR) of Water bodies and Command Area Development and Water Management (CADWM) have been subsumed in Pradhan Mantri Krishi Sinchayee Yojana (PMKSY).

In order to overcome the bottlenecks faced in completion of project under AIBP, Erstwhile MoWR, RD & GR identified 99 (106 including phases) priority projects from amongst the 149 on-going projects as on 01.04.2016 under AIBP for early completion. Under the dedicated funding mechanism i.e. Long Term Irrigation Fund (LTIF), a special window was created in NABARD which could be utilized by the Central and State Governments to bridge the requirement of funds for completion of the 99 priority projects including CAD works for central assistance as well as state share component. Out of these 99 (106 including phases) priority projects, 53 projects have been reported completed as on 31st March, 2023 and 23 projects have progress above 90%. The list of 53 projects reported as completed is given at **Annexure - 8.4**

Since the inception of AIBP, the cumulative total Central Loan Assistance / Grant provided to States under AIBP/PMKSY-AIBP was Rs. **148534.45** Crores till **31.03.2016** to 297 projects. Since 01.04.2016 to 31.03.2023 an additional Central Assistance of Rs. 14239.23 crore under PMKSY-AIBP to prioritized projects including 7 newly included priority projects. As reported by the State Governments, **11.19** Mha of additional irrigation potential has been created under AIBP since the start of the scheme till March, 2023. Central Assistance totalling to **Rs. 426.03** Crores has been released to **16** Projects, out of 99 (and 7 phases) and 7 newly included priority projects, under PMKSY-AIBP during 2022-23.

The Cabinet Committee on Economic Affairs (CCEA) approved the continuation of Pradhan Mantri Krishi Sinchai Yojana (PMKSY) for 2021 to 2026 on 15th December, 2021 with an **outlay of Rs.**

Fig. 8.1: Lower Panzara Project, Maharashtra (Completed under PMKSY-AIBP)

93,068.0 crore including Rs. 37,454 crore Central Assistance to States. Under the continuing scheme it is planned to provide financial assistance for completion of 60 ongoing MMI projects under PMKSY-AIBP, 85 ongoing CADWM projects and financial assistance to new MMI projects. Irrigation potential creation target through MMI projects under AIBP has been kept as 13.88 lakh ha. and CCA coverage under CADWM component has been targeted at 30.23 Lakh ha. Under SMI and RRR of water bodies component, it is envisaged to create 4.50 Lakh ha. of irrigation potential. Under Watershed Development Component, it is planned to complete sanctioned projects covering 49.5 Lakh Ha rain fed/degraded lands to bring additional 2.5 lakh ha. under protective irrigation.

During February, 2022 the new guidelines for PMKSY-AIBP and National Projects were issued. The eligibility criteria for inclusion of new MMI projects, ERM projects and National Projects were defined in the new guidelines. As per the revised guidelines, Central assistance under AIBP, for new major and medium irrigation projects, and also the ERM projects included under AIBP after March, 2021, shall be as under:

(i) 90% Central Assistance (CA) of project cost (works Component) in case of Projects in 8 North-Eastern, 2 Himalayan States (Himachal Pradesh, Uttarakhand) and Union Territories of Jammu & Kashmir and Ladakh.

(ii) 60 % CA of project cost Projects benefitting special area in other general category States, i.e., command under Drought Prone Area Programme (DPAP) & Desert Development Programme (DDP), Tribal area, Flood prone area, Left Wing Extremist area, Bundelkhand, Vidarbha, Marathwada and KBK (Odisha) and

(iii) 25% CA of project cost in case of Projects in general category states benefitting areas other than at (ii) above.

For National Projects (NP) Category wise funding pattern for central assistance (CA) in the form of grant will be as given below.

(i) 90% Central Assistance (CA) of project cost (works Component) in case of Projects in 8 North-Eastern, 2 Himalayan States (Himachal Pradesh, Uttarakhand) and Union Territories of Jammu & Kashmir and Ladakh.

Fig. 8.2: Gosikhurd (National) Project, Maharashtra (under PMKSY-AIBP)

(ii) 60% CA of project cost Projects in other States

A Screening Committee of DoWR,RD&GR has been constituted under the Chairmanship of Secretary, DoWR for the inclusion of new MMI Projects and Modernisation (ERM) projects under said scheme as per the revised guidelines. In accordance the decisions taken in the 2nd meeting of screening committee held on 09.03.2022, five new projects were included under PMKSY-AIBP after the approval of Competent Authority on 31st March 2022. One more project was included under PMKSY-AIBP in accordance with the decision taken in the 3rd meeting of the Screening Committee on 12.09.2022. The Details of newly included project are given at **Annexure 8.5**. Central Assistance totalling to Rs. 125.09 Crores has also been released to 4 new Projects, out of these 6 newly included projects, under PMKSY-AIBP during 2022-23. Total Central Assistance released under PMKSY-AIBP since 2016-17 to March 2023 is Rs. 14239.23 Crore.

8.3 Special Package Projects

Government of India has sanctioned a special package for completion of Irrigation Projects to address agrarian distress in Vidarbha, Marathwada and other chronically drought prone areas of Maharashtra during July, 2018. The package consists of 8 MMI Projects approved by TAC of DoWR,RD&GR and 83 Surface Minor Irrigation (SMI) Projects. The balance estimated cost of projects of Maharashtra to be completed under this package is Rs 13651.61 Cr as on 01.04.2018, with Rs 3831.41 Cr being the Central Assistance (CA) component by Government of India. On completion of the balance works of these projects, additional Irrigation Potential of 3.77 Lakh Ha would be created. Central Assistance amounting to Rs. 213.01 Crores has been released to Maharashtra Projects under Special Package during 2022-23.

Government of India has also sanctioned for funding of Relining of Sirhind Feeder and Relining of Rajasthan Feeder Project of Punjab as Central Assistance (CA). The approved cost of relining of Sirhind Feeder Canal is Rs. 671.478 Cr and that of Relining of Rajasthan Feeder Canal is Rs. 1305.267 Cr. Of the total estimated cost, Rs. 826.168 Cr would be provided as Central Assistance (Rs. 205.758 Cr for Sirhind Feeder and Rs.620.4l Cr for Rajasthan Feeder) in addition to Rs 155.84 Cr of Central Assistance earlier released for these projects. Central Assistance totalling to Rs. 170.24 Crore has been released to Relining of Sirhind Feeder and Relining of Rajasthan Feeder Project of Punjab under Special Package during 2022-23.

Project-wise details of these 10 MMI projects indicating Central Assistance released and Irrigation Potential details is enclosed at **Annexure-8.6 & 8.7**

8.4 North Koel project

North Koel project is situated on North Koel River which is a tributary of Sone River. The project construction originally started in the year 1972 and continued till 1993 when the work was stopped by the Forest Department, Govt. of Bihar.

The major components of project are: 67.86 m high (FRL : 367.28 m) and 343.33 m long concrete dam called Mandal dam originally intended to store 1160 million cubic metre (MCM) of water; 819.6 m long barrage at Mohamadganj, 96 km downstream of the dam; and two canals originating from left and right banks of Mohammadganj Barrage with distributary system for irrigation.

PS to PM took a meeting to revive the North Koel Project in June 2016 wherein it was decided to lower down the FRL of Mandal dam to 341 metre to save core area of Palamau tiger reserve. Mandal dam will now have a live storage of 190 MCM.

The irrigation achieved from the project in the year 2016 is reported as 71,720 hectares and completion of this project will provide additional irrigation benefit to the extent of 42,301 hectares. Thus, the project aims to provide irrigation to 1,14,021 hectares of land annually in the drought prone areas of Palamu & Garhwa districts of Jharkhand and Aurangabad & Gaya districts of Bihar.

The Union Cabinet approved the proposal for completion of the balance works of the North Koel Reservoir Project on 16th August, 2017 at an estimated cost of Rs. 1622.27 crores to be incurred during three financial years from the start of the project. The Cabinet also approved execution of balance works of the project on turnkey basis by M/s WAPCOS Ltd., a CPSU under DoWR,RD&GR as Project Management Consultant (PMC). The execution of the project is being monitored by an Empowered Committee of Government of India headed by CEO, NITI Aayog.

A Technical Evaluation Committee (TEC) has also been constituted under the Chairmanship of Member (WP&P), CWC for completing the balance works of North Koel Project, Jharkhand and Bihar in May, 2017. So far, 30 meetings of

TEC have been held, to discuss and decide on the various technical issues of the project.

8.5 National Infrastructure Pipeline (NIP)

The National Infrastructure Pipeline (NIP) for FY 2019-25 aims to improve project preparation and attract investments into infrastructure. To draw up the NIP, a High-Level Task Force was constituted under the Chairmanship of the Secretary, Department of Economic Affairs (DEA), Ministry of Finance. The Final Report on National Infrastructure Pipeline for FY 20-25 of the Task Force was released by the Union Minister for Finance & Corporate Affairs, on 29th April, 2020.

The Final Report of the Task Force projected total infrastructure investment of Rs.111 lakh crore for the period from FY 2019-20 to FY 2024-25, **including Rs. 8.94 lakh crore in irrigation** (water and sanitation) Sector. The meeting of Committee of Secretaries held on 5th March 2020 advised line Ministries/Departments to monitor the implementation of NIP projects and take up key reforms to accomplish the target of infrastructure investments in the next five years.

For monitoring of National Infrastructure Pipeline (NIP) Projects, an Inter- Ministerial Steering Committee (IMSC) of DoWR,RD&GR, Ministry of Jal Shakti has been formed under the Chairmanship of Secretary, DoWR,RD&GR. A list of NIP water resources projects comprising of Irrigation/Flood Control Projects from various State Governments was compiled. Projects under AIBP, CADWM, NMCG are also a part of these NIP Projects. Now, the NIP list is comprised of total 569 (as is being reflected in the portal @ indiainvestmentgrid.gov.in) projects. Out of which, 475 Projects are of State NIP Projects and rest 94 are Central NIP Projects.

Further, in pursuance to DO Letter of Secretary, Department of Economics Affairs dated 12.02.2021 and Discussion of meeting chaired by Hon'ble Finance Minister on 26.02.2021 it was decided to setup PPP/PD Cell in CWC under the guidance and supervision of Chairman, CWC.

Accordingly, a PPP/PD Cell has been created in PMO, CWC for development of NIP Projects with following objectives:

a. Development of investible projects in coordination between the Central Government and State Government and thereby grow the pipeline of investible projects in India and in turn increase private investment.

b. To identify issues that needs to be resolved in order to attract and finalize the investments and put forth these before Inter-Ministerial Steering Committee (IMSC).

9 PLANT & EQUIPMENT

PLANNING & CONSTRUCTION SCHEDULING

Control Board (CB) and Plant & Machinery (P&M) Directorate under the Performance Overview & Management Improvement Organization (POMIO) of CWC is actively involved in the following activities:

1) Techno-economic appraisal of Major & Multipurpose Irrigation and Hydro-Electric Projects regarding the following:

a) Construction Schedule of the project
b) Construction Methodology as per latest available national and international standards
c) Construction Plant & Equipment Planning
d) Cycle Time Analysis of Critical Activities in the project construction
e) Deployment Schedule of Plant & Equipment

2) Consultancy in preparation of chapter on "Construction Methodology and Equipment Planning" of Detailed Project Report (DPR).

3) Performance evaluation of Construction Equipment

4) Providing assistance to Projects/States in procurement and disposal of heavy earth moving and construction equipment by way of tender evaluation, fixing reserve price/transfer value of equipment.

5) Providing technical assistance to Mechanical Engineering Department (MED-18), Bureau of Indian Standards and advice the preparation of BIS/IS code for new construction equipments by updating of the old BIS/IS code.

9.1 Project Appraisal

During the year, 5 (five) project reports of Major & Multipurpose Irrigation Projects and Hydro-Electric Power Projects of various states of the country as well as an international project were techno-economically examined from the Construction Scheduling, Plant Planning & other aspects. Out of these 5 (five), 04 (four) project reports were considered acceptable from plant planning including one international project.

State Projects:

Sl.	Project Name	State	Status
1	REC of Parbati-II Hydro Electric Project (800 MW)	Himachal Pradesh	Project cleared from plant planning aspect, clearance conveyed to HPA vide letter dated 18.04.2022
2	Ujh Multipupose Project	Jammu & Kashmir	Revised DPR accepted; vide letter dated 15.11.2022
3	Uri-I Stage-II HEP(240 MW)	Jammu & Kashmir	Project is accepted from plant and planning angle, construction schedule and related aspects vide letter dated 20.12.2022

International Projects:

Sl.	Project Name	Country	Status
4	Lower Arun HEP (669 MW)	Nepal	Cleared; vide letter dated 12.09.2022

10 INTER-STATE MATTERS

10.1 Inter-State River Water Disputes

CWC provides technical assistance to DoWR,RD&GR, MoJS to settle water related disputes among the States amicably through negotiations. During the year 2022-23, a number of references were received in CWC involving various States. These references were examined and comments/views of CWC were communicated to concerned authorities. The details of some important reference and action taken thereof have been given in subsequent paras.

10.1.1 Godavari River Water Disputes - Monitoring of implementation of order of Supreme Court on Babhali Barrage:

In compliance to the Hon'ble Supreme Court Judgement dated 28-02-2013 in the matter of Original Suit No. 1 of 2006 - State of A.P vs Maharashtra & Others on Babhali Barrage issue, a three Member Supervisory Committee was constituted by DoWR,RD&GR to supervise the operation of Babhali Barrage vide its O.M. dated 24th October 2013. Subsequently, in pursuance to Hon'ble Supreme Court order dated 01.08.2016, DoWR,RD&GR re-constituted the Supervisory Committee on Babhali Barrage through O.M dated 14.10.2016. The composition of the re-constituted Committee is as under:

(a)	Member, Central Water Commission (CWC)	Chairman Ex-officio
(b)	Administrative Secretary, WRD, Government of Andhra Pradesh	Member Ex-officio
(c)	Administrative Secretary irrigation & CAD Department, Government of Telangana	Member Ex-officio
(d)	Administrative Secretary, WRD, Government of Maharashtra	Member Ex-officio

Powers and functions of the Committee as laid down by Hon'ble Court are as follows:

i) The Committee shall supervise the operation of Babhali Barrage.

ii) The Committee shall ensure that;

a) Maharashtra maintains storage capacity of the Babhali Barrage at 2.74 TMC of water out of the allocation of 60 TMC given to Maharashtra for new projects under the agreement dated 06.10.1975.

b) The gates of Babhali Barrage will remain lifted during the monsoon season, i.e. July 01 to October 28.

c) During the non-monsoon season i.e., from October 29 till the end of June next year, the quantity of water which Maharashtra utilizes from Babhali Barrage should not exceed 2.74 TMC of which 0.6 TMC forms the common submergence of Pochampad Reservoir & Babhali Barrage.

d) Maharashtra does not periodically utilize 2.74 TMC from time to time.

e) Maharashtra releases 0.6 TMC of water to Andhra Pradesh on 1st March every year.

Five meetings of Supervisory Committee have been held on 27.02.2014, 30.06.2014, 17.10.2014, 4.2.2015 and 23.6.2016. As per direction of Member (WP&P), CWC and Chairman of Supervisory Committee on Babhali Barrage, the opening and lowering of the gates at the beginning and end of monsoon period and releasing of the water on 1st March was successfully carried out during 2022-23 as per the Judgement dated 20.02.2013 of Hon'ble Supreme Court and as per precedent followed in the past.

10.1.2 Mahanadi River Water Dispute

On the complaint of State of Odisha under Section 3 of ISRWD Act, 1956, a Negotiation Committee was constituted by Erstwhile MoWR, RD & GR for resolution of the Mahanadi River Water Dispute on 19.01.2017. Negotiation Committee comprises of members from Basin States and concerned Ministries of Central Government, CWC, IMD and NIH with specified Terms of Reference. Two meetings of the Negotiation Committee were held on 28.02.2017 and 22.05.2017. However, the State of Odisha did not participate in the 2nd meeting of the Negotiation Committee. Both the States, Odisha and Chhattisgarh, also did not provide the requisite data to the Committee. On the basis of available data, the Negotiation Committee prepared its report and submitted the same to Erstwhile MoWR, RD & GR.

Later, the State of Odisha has filed an Original Suit (No 1 of 2017) on the Mahanadi Water dispute before Hon'ble Supreme Court. The final hearing of the case was concluded on 23.01.2018. In the final hearing, the Original Suit was disposed off and direction was given to Central Government for constitution of Water Dispute Tribunal for adjudication of the water dispute between the party States within a period of one month from the date of order. Accordingly, Erstwhile MoWR, RD & GR constituted the Mahanadi Water Disputes Tribunal vide its notification dated 12/03/2018. The complaint of the states of Odisha and Jharkhand has been referred to the Tribunal. The matter is under adjudication in the Tribunal.

On request of Tribunal, in exercise of the powers conferred under the provison to sub-section (2) of section 5 of the Inter-State River Water Disputes Act, 1956, the Central Government vide Gazette Notification No. S.O. 2176 (E), dated 03.06.2021 has extended the period of submission of report and decision by the Mahanadi Water Disputes Tribunal for a period of two years upto 11th March, 2023.

10.1.3 Vansadhara River Water Dispute

The State of Odisha filed a complaint under Section 3 of the Inter-State River Water Disputes Act, 1956 with the Erstwhile Ministry of Water Resources, Government of India on 14.02.2006 seeking constitution of an Inter-State Water Disputes Tribunal and to refer the water dispute between the State of Orissa and Andhra Pradesh in respect of inter-State river Vansadhara and its valley for adjudication. Pursuant to the order passed by the Supreme Court, the Central Government constituted the Vansadhara Water Disputes Tribunal (VWDT) by issuing a Gazette Notification on 24.02.2010 and the complaint of Odisha and Andhra Pradesh were referred to the Tribunal by the Central Government.

Tribunal submitted Report and decision under section 5(2) of ISRWD Act 1956 to Central Govt. on 13.09.2017. Further references under section 5(3) have been filed by the party States and the Central Govt. before the Tribunal. Tribunal submitted Further Report and decision under section 5(3) of ISRWD Act 1956 to Central Govt. on 21.06.2021. Govt. of Odisha has filed an SLP in Hon'ble Supreme Court seeking not to publish the Award. The Tribunal has been dissolved vide Gazette Notification no. S.O. 1051(E) dated 09.03.2022.

10.1.4 Mahadayi Water Disputes Tribunal

The Mahadayi Water Disputes Tribunal was constituted in November, 2010 under the provisions of the ISRWD Act, 1956 for adjudication of water disputes among party States i.e. Goa, Karnataka and Maharashtra in respect of Mahadayi basin. Report-cum-Decision of Mahadayi Water Dispute Tribunal was submitted to Central Government on 14th August, 2018 under section 5(2) of ISRWD Act, 1956. The report of the Tribunal was examined in CWC and certain issues requiring clarifications from the Tribunal under Section 5(3) of the said Act were identified and submitted to DoWR,RD&GR. The State of Maharashtra, the State of Karnataka and

the State of Goa have filed SLP(C) No. 32517/2018, 33018/2018, 19312/2019 respectively against the Report-cum-final decision dated the 14th August, 2018 of the Tribunal in the Hon'ble Supreme Court. Subsequently, as per the Hon'ble Supreme Court direction given on 20th February, 2020 on disposing I.A. No. 109720/2019 in SLP No.33018/2018, Central Government published Mahadayi Water Dispute Tribunal Award dated 14.08.2018 in the Gazette of India on 27.02.2020 which is effective now (http://egazette.nic.in/writeReadData/2020/216437.pdf).

Central Government vide Gazette Notification No. S.O. 3348 (E), dated 21.07.2022 has extended the term of the Tribunal for a further period of one year w.e.f. 20.08.2022 to submit its Further Report under Section 5(3) of ISRWD Act,1956.

10.1.5 Dispute related to Tilaiya Dhadhar Diversion Scheme

The State of Bihar filed a complaint under Section 3 of the Inter-State River Water Disputes Act, 1956 with the DoWR,RD&GR, MoJS, Government of India on 04.01.2018 seeking constitution of an Inter-State Water Disputes Tribunal and to refer the dispute related to Tilaiya Dhadhar Diversion Scheme between the States of Bihar and Jharkhand for adjudication.

In order to resolve the dispute, DoWR,RD&GR, MoJS has constituted a Negotiation Committee under the Chairmanship of Chairman, CWC on 06.01.2020 **for resolution of the dispute. Negotiation Committee held three meetings on 13.02.2020, 23.06.2020 and 01.10.2020 respectively.** Officials from DoWR,RD&GR, MoJS, CWC, Damodar Valley Corporation (DVC) and the State Governments of Bihar, Jharkhand and West Bengal participated in the meeting. Due to the firm stand taken by Govt. of Jharkhand, no fruitful settlement of the dispute could be achieved. The Govt. of Jharkhand is not agreeing to spare any amount of water to Bihar State for the Tilaiya Dhadhar Diversion Scheme. Negotiation Committee submitted final report to DoWR,RD&GR on dated 12.10.2020 and requested to consider constitution of Tribunal for settlement of the dispute.

10.1.6 Facilitation of collaborative activities between CWC and CPR

The MoJS Research Chair on 'Water Conflicts and Governance' at the Centre for Policy Research (CPR) has commenced from October 2018. A MoU to establish the Research Chair was signed between DoWR,RD&GR and CPR in August 2018. The MoU provides for a Management Committee headed by Chairman, CWC to advise the Research Chair.

The Research Chair has a mandate to pursue independent and evidence-based research to inform policy making, and enabling institutional transformation towards addressing the evolving challenges in India's water sector. The Research Chair will also help foster an enduring CPR-CWC collaborative research relationship, beginning with a forum for dialogue on contemporary water sector issues and challenges. CWC has assisted the Research Chair in organising a 'Roundtable of States' on March 6, 2019 at CWC Headquarters, Sewa Bhawan to discuss the challenges of interstate river water governance in the country.

The identified deliverables of Research chair for three year starting from 01.10.2018 were:

i) A monograph on Supreme Court's interventions in inter-state water disputes and their implications for policy formulation.

ii) An updated compilation of inter-state water sharing agreements and disputes as collaborative publications between CPR and CWC.

iii) A policy brief based on analysis of interstate water sharing agreements.

iv) A functional CPR-CWC consultation forum, with at least bimonthly events on various related issues of trans-boundary water governance issues.

v) Deliver annual lectures on trans-boundary water governance issues.

In fulfilment to above identified deliverables, CPR has submitted the following draft documents:

i) Updated compilation of interstate river water cooperation agreements 2021

ii) A synthesis paper on India's interstate river water cooperation track record

iii) The Bar and the Binding: The Supreme Court and Interstate River Water Disputes

The above draft documents have been examined by CWC and suggestions offered to CPR for making requisite changes in the documents.

10.1.7 Inter-State River Water Disputes Rules

The Inter-State River Water Disputes (Amendment) Bill, 2019 was passed by the Lok Sabha on 31.07.2019 and will be taken up for consideration in the Rajya Sabha in due course. Pursuant to enactment of the ISRWD (Amendment) Bill, Rules would be required to be framed to give effect to its provisions. In this regard, DoWR,RD&GR, MoJS constituted a Committee on 15.10.2019 under the Chairmanship of Member (WP&P), CWC for framing the draft Rules by amending the existing Inter-State River Water Disputes Rules, 1959 (last amended in January 2011).

Accordingly, the Committee held four meetings during which detailed discussions were held on various Sections & Sub-Sections of the ISRWD (Amendment) Bill, 2019 as well as of the existing ISRWD Rules. Based on the decisions taken during the four meetings of the Committee and suggestions/ views of Committee Members, a draft of the amended rules has been finalized on 18.03.2020 and submitted to DoWR,RD&GR for further needful action.

10.1.8 Krishna Water Disputes Tribunal

The Central Government vide Notification number S.O. 451(E) dated 02.04.2004 has constituted Krishna Water Disputes Tribunal (KWDT) for adjudicating dispute between the States of Maharashtra, Karnataka and erstwhile Andhra Pradesh under Section 4 of the Inter-State River Water Dispute (ISRWD) Act, 1956. The Tribunal has given its report and decision under Section 5(2) of the Act on 30.12.2010. The party States and the Central Government sought further clarification from the Tribunal under Section 5(3) of the Act. However, State of Andhra Pradesh (AP) filed in March, 2011 a Special Leave Petition (SLP (Civil) No. 10498/2011) before the Hon'ble Supreme Court against the States of Karnataka and Maharashtra under Article 139 of Constitution of India, challenging the decision of KWDT-II dated 30.12.2010 on various grounds. Tribunal in the mean-time has forwarded report on 29th November, 2013 under Section 5(3) of the ISRWD Act, 1956; recommending allocating of water amongst the States of Andhra Pradesh, Maharashtra and Karnataka. However, on account of stay by Supreme Court vide its order dated 16.09.2011, the award could not be published in the Official Gazette in terms of Section 6(1) of the ISRWD Act, 1956, yet. The matter of KWDT-II is still sub-judice before the Hon'ble Supreme Court. The Ministry vide its notification dated 15.05.2014 extended the tenure of the Tribunal for two years or until further order whichever is earlier with effect from 01.08.2014 in exercise of the powers conferred by the sub-Section 3 of Section 5 of the ISRWD Act, 1956 so as to address the Terms of Reference (TOR) specified in clauses (a) and (b) of the Section 89 of Andhra Pradesh Reorganization Act, 2014.

On request of Tribunal, in exercise of the powers conferred under the provison to sub-section (3) of section 5 of the Inter-State River Water Disputes Act, 1956, the Central Government vide Gazette Notification No. S.O. 2916 (E), dated 27.06.2022 has extended the period of submission of report and decision by the Krishna Water Disputes Tribunal for a further period of one year w.e.f 01.08.2022.

10.1.9 Pennaiyar River Water Dispute

Govt. of Tamil Nadu has submitted complaint dated 30.11.2019 to the Central Government under Section 3 of Inter State River Water Dispute Act, 1956 with respect to the use, distribution and control of the Inter-State River Pennaiyar and its tributaries with request for constitution of a Tribunal under section 4 of the Act. Accordingly, DoWR,RD&GR, Ministry of Jal Shakti constituted a Negotiation Committee vide Office Memorandum dated 20.01.2020 under the Chairmanship of Chairman, Central Water Commission under Section 4 of the ISRWD Act, 1956. Two meetings of the negotiation committee were held. Second meeting of the Negotiation Committee was held on 07.07.2020. The Negotiation Committee was of the considered view that any further negotiations by this Committee would not be useful and as such, no further meetings of the Committee are proposed. Accordingly, the Negotiation committee submitted its report to DoWR,RD&GR on 31.07.2020. The constitution of Pennaiyar water dispute tribunal is under consideration in Ministry.

10.2 Publishing of Important Documents Related to Inter State Matters in Public Domain

A large volume of information related to inter-state issues are available in different directorates of CWC. This includes reports of Tribunal, important judicial decisions, decisions of Central Government etc. CWC has compiled various such important documents and published on CWC website on Public Domain. Some of these documents available on CWC website are as under:

1. Report of Cauvery Water Disputes Tribunal (Vol.-I to Vol.-V)
2. Supreme Court Order dated 09.12.2016 regarding Cauvery Water Disputes Tribunal
3. Supreme Court Order dated 16.02.2018 regarding Cauvery Water Disputes Tribunal
4. Further Report of Godavari Water Disputes Tribunal (1980)
5. Report of Krishna Water Dispute Tribunal-I (1973) (Vol.-I to Vol.-III)
6. Further Report of Krishna Water Dispute Tribunal-I (1976)
7. Report of Krishna Water Dispute Tribunal-II (2010)
8. Further Report of Krishna Water Dispute Tribunal-II (2013)
9. Final Order and Decision of the Narmada Water Dispute Tribunal
10. Further Report of the Narmada Water Dispute Tribunal (1979) (Vol.-I & II)
11. Report of Ravi- Beas Water Tribunal Report (1987)
12. Report of Vamsadhara Water Dispute Tribunal (Vol.-I to Vol.-III)
13. Report of Narmada Water Disputes Tribunal (Vol.-I to Vol.-IV)
14. The Report of the Godavari Water Disputes Tribunal (Vol-I & II)
15. Report of Mahadayi Water Disputes Tribunal (Vol.-I to Vol.-XII)
16. Mahadayi Water Dispute Tribunal Order dated 16.08.2018 & 07.09.2018 (Corrigendum)
17. Gazette Notification dated 27.02.2020_Award and Final decision of the Mahadayi Water Dispute Tribunal
18. The Further Report of the Vamsadhara Water Dispute Tribunal
19. Decision of Cabinet Committee on dependability of projects

Further, CWC, publication titled "Legal Instruments on Rivers in India" was first brought out during 1995-1997 in the following form:

Vol- I: Constitutional provisions, Central Laws. Important notifications under Central Laws

Vol – II: Awards of inter-State water dispute Tribunal.

Vol- III: Agreements on Interstate rivers, Important notifications under these agreements.

Vol- IV: International agreements and treaties, Important notifications under these agreements and treaties.

The publication titled 'Legal Instruments on Rivers in India (Vol. II)- Awards of Inter-State Water Disputes Tribunal' was revised and updated in 2018 and 'Legal Instruments on Rivers in India (Vol. III) - Agreements on Inter-State Rivers' was revised and updated in 2015 in two parts namely 'Legal Instruments of Rivers in India (Volume-III) – Part-I' containing Inter-State River Water Agreements on water sharing and project implementation in respect of Ganga, Indus and Brahmaputra Basins and 'Legal Instruments of Rivers in India (Volume-III) – Part-II' containing Inter-State River Water Agreements on water sharing and project implementation in respect of Peninsular rivers. Above mentioned documents are available on CWC website.

10.3 Inter-State Projects- Control Boards/ Committees

10.3.1 Bansagar Control Board

In pursuance of an inter-state agreement among the Chief Ministers of Madhya Pradesh, Uttar Pradesh and Bihar, the Bansagar Control Board was constituted vide resolution of erstwhile Ministry of Agriculture & Irrigation in January, 1976 for efficient, economical and early execution of Bansagar Dam and connected works. The headquarter of the Board is located at Rewa (Madhya Pradesh).

The Union Minister of Jal Shakti is the Chairman of the Board and the Union Minister of Power, Union Minister of State for Jal Shakti, Chief Minister and Minister in charge of Irrigation and Finance of the concerned three States and Minister-in-charge of Electricity of Madhya Pradesh are its Members. Chairman, CWC is the Chairman of the Executive Committee of Bansagar Control Board, which manages the day to-day affairs of the Board. The 77th meeting of Executive Committee of Bansagar Control Board was held on 13.02.2023 at New Delhi under the Chairmanship of Chairman CWC / Executive Committee, BCB.

Bansagar Dam on Sone River, a joint venture of the States of Madhya Pradesh, Uttar Pradesh and Bihar was executed by Water Resources Department, Madhya Pradesh under the directions of the Bansagar Control Board. Execution of the canal works in respective territorial jurisdiction is being carried out by the concerned States independently and work of Power Houses was executed by MPEB. The benefits and cost of the dam including land acquisition and rehabilitation are to be shared by Madhya Pradesh, Uttar Pradesh and Bihar in the ratio of 2:1:1(MP : UP : Bihar). The capital expenditure incurred on Bansagar Project (Unit-1) upto March 2015 is Rs.1696.06 crore.

The total catchment area of the Sone river is 69,281 Sq. km of which 47,848 Sq. km or about 69.06% lies in Madhya Pradesh and rest in Uttar Pradesh, Bihar and Jharkhand. The catchment area up to dam site is 18,648 sq. km. The rainfall in the upper part of the catchment area is fairly high and the river has sizeable water resources.

River Sone has immense potential for development of irrigation and power to benefit the famine and scarcity hit areas in addition to providing much needed power for exploiting the industrial potential of the area which is rich in minerals. The project will cater for the irrigation needs of large parts of chronic scarcity affected areas in Shahdol, Sidhi, Satna and Rewa Districts of Madhya Pradesh, Mirzapur District of Uttar Pradesh and Palamau District of Jharkhand. The project will provide annual irrigation to 2.49 lakh hectares in Madhya Pradesh. 1.50 lakh hectares in Uttar Pradesh and 0.94 lakh hectares in Bihar towards stabilizing its existing Sone Canal System. The State Government of Madhya Pradesh, Uttar Pradesh and Bihar fund the project in the ratio of 2:1:1.

10.3.2 Betwa River Board

In accordance with the inter-state agreement of 1973 between Uttar Pradesh and Madhya Pradesh, a decision was taken to constitute a Control Board for the execution of the Rajghat Dam Project, an inter-state project of Uttar Pradesh and Madhya Pradesh. Accordingly, Betwa River Board was constituted under the Betwa River Board Act–1976 for efficient, economical and early execution of the project. The Headquarter of the Board is at Jhansi (Uttar Pradesh).

The Union Minister of Water Resources is the Chairman of the Board and Union Minister of Power, Union Minister of State for Water Resources, Chief Ministers and Minister-in-charge of Finance, Irrigation and Power of the concerned two States are its Members.

As per Betwa River Board Act 1976, Chairman, CWC is the Chairman of Executive Committee of Betwa River Board subject to the general superintendence and control of the Board. The management affairs of the Board are vested in the Executive Committee in accordance with rules and the directions of the Board. The Executive Committee may exercise any power and do any act which may be exercised by the Board. Chairman, Executive Committee has been delegated with emergency powers to take decision on urgent proposals, subject to ratification by the Executive Committee in its next meeting. The 93rd meeting of Executive Committee of Betwa River Board was held on 11.01.2023 at New Delhi under the Chairmanship of Chairman CWC / Executive Committee, BRB.

The Rajghat Dam with appurtenant structures has been constructed across river Betwa to provide irrigation facility to 1.38 lakh Ha in Uttar Pradesh and 1.21 lakh Ha in Madhya Pradesh with power generation of 45 MW (15 x 3 = 45MW) through Rajghat Hydro Electric Project which is at the toe of dam on left bank. All 03 (Three) units of Power House were commissioned during 1999-2000. Power generation during 2022-23 is 1247.28 lakh units. The cost as well as benefits of the project is to be shared equally by both the States. As per the Betwa River Board Act 1976, the entire expenditure on Rajghat Dam, Rajghat Power House and appurtenant works and all other expenditure incurred by the Board is to be equally shared by both Uttar Pradesh and Madhya Pradesh as proposed in the budget of the Board. The project was completed in June 2005 and is in O&M stage since October, 2005.

The status of contribution made by Govt. of U.P and M.P and expenditure for the period from 2005-06 to 2022-23 is placed at **Table 10.3** below. The reservoir (FRL 371.00) filled up to 371.00m during the year 2022-23.

10.3.3 Ghaggar Standing Committee

The Ghaggar Standing Committee was constituted in February 1990 to examine and coordinate the irrigation, flood control, and drainage works in Ghaggar basin and lay down priority for their implementation and accord clearance to individual schemes in Ghaggar basin from inter-state angle. The Members of Committee are from Erstwhile Ministry of Water ResourcesJal Shakti, Northern Railway, Central Water Commission and Irrigation Departments of the State of Punjab, Haryana and Rajasthan.

Hon'ble Supreme Court vide order dated 17-Aug-2022 has directed that the concerned States namely, the States of Punjab and Haryana are required to act and take measures recommended by CWPRS, Pune, recommended vide its final mathematical model study report so that the problem of over flooding of Ghaggar basin to the detriment of 25 villages, which has remained unresolved for last many years can be resolved.

The last hearing in Hon'ble Supreme Court was held on 15.11.2022. In this hearing, the Hon'ble Supreme Court has directed the following:

i) The concerned States are directed to prepare and submit the proposed Detailed Project Reports to implement the recommendations made in the final Model Study Report submitted by CWPRS, Pune and the orders

passed by this Court within a period of four weeks.

ii) Before submitting the proposed Detailed Project Reports before the Court, the same shall be shared by concerned States with CWCwho shall then appraise the Court whether the proposed Detailed Project Reports are in consonance with the recommendations made by the CWPRS, Pune or not.

iii) In the Detailed Project Reports, the concerned States shall fix the time-limit which shall be reasonable and which may not delay the implementations of the recommendations because every year at least minimum 25 villages are suffering because of the flood. Accordingly, Punjab and Haryana Govt submitted DPRs to CWC HQ and currently are in appraisal process.

iv) Compliance reports incorporating chronological developments were submitted to EE, UYD, YBO for further submission to Hon'ble Supreme Court vide letter dated 31.10.2022, 23.12.2022 & 09.03.2023.

10.3.4 Yamuna Standing Committee

The Yamuna Standing Committee was constituted to study the interest of Delhi, its suburbs and the Northern Railway bridges and other studies on Yamuna at Delhi against undue increase in Maximum Flood Level in Yamuna at Delhi on account of flood control works upstream, to safe guard the interest of Haryana, Uttar Pradesh and Delhi against adverse effect of flood control works done in any of these areas and to ensure that adequate water way is provided in any new structure built across the Yamuna river. The Members of the Committee are from GFCC, Northern Railway, Central Water Commission, Ministry of Surface Transport and Irrigation Department of States of Haryana, Uttar Pradesh and NCT of Delhi.

The 93rd meeting of Yamuna Standing Committee (YSC) was held on 18.01.2022 under the Chairmanship of Member (RM), CWC cum Chairman, Yamuna Standing Committee (YSC).

In this meeting Yamuna Standing Committee (YSC) conveyed No objection to the project "Nav Bharat Udyan – a part of Amrut Bio-Diversity Park" Project at village Indraprasth near Pragati Maidan, New Delhi, subjected to some conditions.

'Nav Bharat Udyan' a part of 'AMRUT Bio-diversity Park' will come up on 30.0 acres (appx.) land on the western bank of Yamuna. This Park is a part of ceremonies to commemorate 75 glorious years of India's Independence. It would improve the bio-diversity in the region and would reduce the pollution level of Yamuna. It would be environment friendly project. It would provide recreational activities for the public and at the same time showcasing the "Journey of India" apart from an "Iconic Tower" as the new symbol of the Capital of India.

Table 10.1: Status of contribution made by Govt. of U.P and M.P and expenditure for the period from 2005-06 to 2022-23

Year	Budget Allocation (Rs. in crore)	Share of M.P Govt. (Rs. in crore)	Share of U.P Govt. (Rs. in crore)	Contribution made by U.P Govt. (Rs. in crore)	Contribution made by M.P Govt. (Rs. in crore)	Revenue received (Rs. in crore)	Yearly Expenditure (Rs. in crore)
2005-06	4.5	2.25	2.25	-	-	0.62	9.499
2006-07	9.20	4.60	4.60	-	-	1.00	11.14
2007-08	9.30	4.65	4.65	6.65	11.406	1.2456	10.55
2008-09	13.50	6.75	6.75	6.755	4.50	1.72	14.85
2009-10	19.66	9.83	9.83	10.00	4.50	1.51	17.92
2010-11	20.88	10.44	10.44	4.50	4.50	1.93	16.96
2011-12	26.31	13.155	13.155	10.00	6.50	7.82	20.05
2012-13	30.60	15.30	15.30	15.30	5.00	8.93	20.62
2013-14	30.00	15.00	15.00	15.30	5.00	0.91	22.97
2014-15	26.00	13.00	13.00	13.00	4.00	1.58	24.97
2015-16	32.00	16.00	16.00	13.00	2.00	0.95	22.13
2016-17	34.00	17.00	17.00	13.00	10.00	0.59	23.59
2017-18	46.14	23.07	23.07	13.00	14.93	0.41	28.80
2018-19	41.00	20.50	20.50	13.00	18.00	0.59	22.88
2019-20	45.165	22.825	22.825	13.00	9.80	0.59	28.75
2020-21	48.96	24.48	24.48	25.00	14.35	0.51	30.32
2021-22	45.29	22.645	22.645	22.65	14.50	0.89	28.59
2022-23	38.90	19.45	19.45	19.45	16.00	1.31	30.16

11 ENVIRONMENTAL MANAGEMENT OF WATER RESOURCES PROJECTS

11.1 Environment Management

The Environment Management Organization of CWC is involved in Post Project Environment (including Social) Impact Assessment (EIA) Study of completed water resources projects and monitoring of implementation of environmental safeguards stipulated at the time of granting the environmental clearance to water resources projects.

11.2 Post Project Environmental (including Social) impact Assessment study of Completed water resources Projects

Post Project Environmental Evaluation Study has been carried out for the completed water resources projects of which comprehensive EIA study was not carried out prior to or during their implementation. The objective of the study is to assess both favourable and unfavourable effects of the water resource projects and to formulate future strategies to mitigate the unfavourable impacts to the extent possible. Till now, Post Project Environmental Evaluation Study of 10 projects have been completed.

A Guideline for "Environmental Impact Assessment Studies of Completed Water Resources Projects" & "Rapid Environmental Impact Assessment Studies of Completed Water Resources Projects" is being prepared.

11.3 National Environmental Monitoring Committee for River Valley Projects (NEMCRVP)

National Environmental Monitoring Committee for River Valley Projects (NEMCRVP) was constituted in February, 1990 to monitor the implementation of environmental safeguards of irrigation, multipurpose and flood control projects. The Committee is entrusted with the work to review the mechanism established by the State Governments and project authorities to monitor the implementation of environmental safeguards and to suggest additional compensatory measures in respect of water resource projects.

11.3.1 Constitution of NEMCRVP

Member (WP&P), CWC, is the Chairman of NEMCRVP. The representatives from Ministries of Agriculture & Farmer's Welfare; Environment,

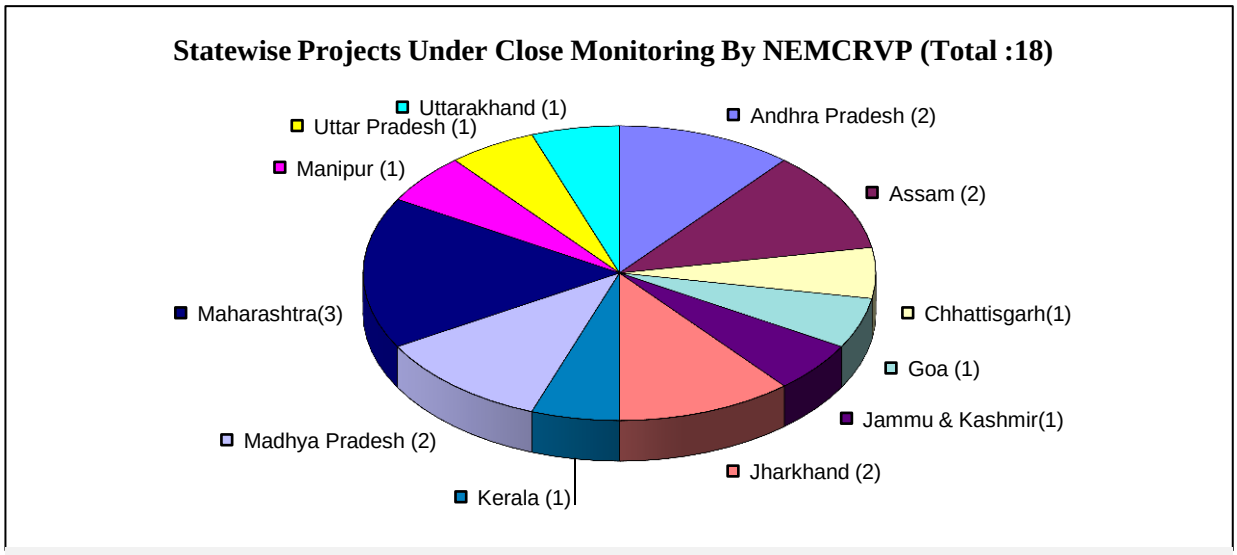


Fig.11.1: State wise Projects under Close Monitoring by NEMCRVP

Forests & Climate Change; Water Resources, River Development and Ganga Rejuvenation; Tribal Affairs; NITI Aayog; CEA and CWC are Members of the Committee. Chief Engineer (EMO), CWC is the Vice Chairman and Director (EM), CWC is the Member Secretary of the Committee. Environmental Management Directorate, CWC, functions as the secretariat of NEMCRVP.

11.3.2 Functions of NEMCRVP

The NEMCRVP visits the projects and holds meetings with the State Governments and Project Authorities for implementation of environmental safeguards as stipulated in environmental and forest clearances. It encourages the constitution of State Environmental Monitoring Committee (SEMCs) and Project Environmental Management Committee (PEMCs).

12 EXTERNAL ASSISTANCE

12.1 External Assistance for Development of Water Resources

External assistance flows into the country in various forms; as multilateral or bilateral aid, loan, grants and commodity aid from various foreign countries and other donor agencies. The main source of external assistance in irrigation sector has been the International Bank of Reconstruction and Development (IBRD) commonly known as the World Bank and its soft lending affiliate, the International Development Association (IDA). In addition to the World Bank, other funding agencies such as Japan Bank of International Cooperation (JBIC) and Asian Development Bank (ADB) have also been providing assistance for implementation of irrigation and multipurpose projects. The Erstwhile Ministry of Water Resources, River Development & Ganga Rejuvenation and its organizations assist the State Governments in tying up for external assistance from different funding agencies to fill up the resource gaps, both in terms of funds and technological update for rapid development of the country's water resources.

12.1.1 Role of CWC

The important activities of Central Water Commission in externally aided projects are:-

1. Providing assistance to the State Govts. for preparation of project proposal for obtaining external assistance for water sector projects.
2. Techno-economic examination of the projects posed for external assistance and coordination with State and concerned Departments/Ministries.

12.1.2 Techno- Economic Appraisal & Clearance of Projects

Eight Concept Note/ Preliminary Project Report & one Detailed Project Report (DPR) of externally aided irrigation and multipurpose project have been appraised in CWC during 2022-23. The details of these 9 projects are as provided in **Table 12.1**

Table 12.1(a) : Concept Note/ PPR stage

Sl.	Name of Project	Receiving Date	Status	Remarks
1.	West Bengal Accelerated Development of Minor Irrigation Project Phase-II Submitted by Govt. of West Bengal for World Bank Funding. Estimated Cost = Rs. 1500 Crore.	20.07.2021	PPR was examined in the specialized directorates, based on their recommendations, PPR was considered in the 8th Screening Committee meeting held under the chairmanship of Chief Engineer (PPO), CWC on 28.04.2022.	It accords in-principle consent for the preparation of DPR.
2.	Climate Adaptation in Vennar Sub basin in Cauvery Delta Project 2 Submitted by Govt. of Tamil Nadu for ADB Funding. Estimated Cost = Rs. 1825 Crore.	23.09.2021	PPR of the said proposal (in DEA format) was received in CWC through DoWR,RD&GR vide their e-mail dated 23.09.2021. A meeting was held under the Chairmanship of Secretary, DoWR,RD&GR on 01.08.2022 with officers of DoWR,RD&GR and CWC. During the meeting, it was decided CWC would prepare a background note of the proposed project for further examination by CWMA. The project details were subsequently sent to CWMA for needful examination.	Pending with CWMA.
3.	Kerala Sustainable Coastal Protection and Climate Resilience Planning Project Submitted by Govt. of Kerala for ADB Funding. Estimated Cost = Rs. 3500 Crore.	07.02.2022	PPR was examined in the specialized directorates, based on their recommendations, PPR was considered in the 7th Screening Committee meeting held under the chairmanship of Chief Engineer (PPO), CWC on 28.04.2022.	It accords in-principle consent for the preparation of DPR.
4.	Additional Financing for Resilient Kerala Program–Coastal Protection Project (Phase II) Submitted by Govt. of Kerala for World Bank Funding. Estimated Cost = Rs. 1590 Crore.	11.03.2022	PPR was examined in the specialized directorates, based on their recommendations, PPR was considered in the 8th Screening Committee meeting held under the chairmanship of Chief Engineer (PPO), CWC on 28.04.2022.	It accords in-principle consent for the preparation of DPR.
5.	Song Dam Drinking Water project Submitted by Govt. of Uttarakhand for French Development Agency (AFD) funding. Estimated Cost = Rs. 2021.57 crore.	02.09.2021	The PPR (in DEA format) was received from DoWR, RD&GR. Based on the observations received, it was considered in the 7th Screening Committee meeting held under the chairmanship of Chief Engineer (PPO), CWC on	The in-principle consent letter for modification/ updation of DPR issued on

Sl.	Name of Project	Receiving Date	Status	Remarks
	Central Line Ministry: Department of Drinking Water and Sanitation, Ministry of Jal Shakti RD&GR		29.10.2021	06.05.2022.
6	Water Security and Climate Adaptation in Rural India-II (WASCA-II) submitted by Ministry of Rural Development for GIZ Germany funding	22.02.2022	Preliminary Project Report (PPR) (in DEA format), was received from EA& IC Desk, DoWR,RD&GR.	Observations sent to Ministry on 09.03.2022
7.	Energy cost optimization specific to Mhaisal LIS by Integrating Solar Power Supply with Energy Efficient Water Management	10.10.2022	Preliminary Project Report (PPR) (in DEA format), was received from CAD wing, DoWR,RD&GR.	Observations sent to Ministry on 17.09.2022
8.	Augmentation of Water Source in Manipur	28.03.2023	Preliminary Project Report (PPR) (in DEA format), was received from SPR wing, DoWR,RD&GR.	Observations sent to Ministry on 31.03.2023

Table 12.1(b) : DPR/ Feasibility Study Report

Sl.	Name of Project	Status	Remarks
1.	DPR of the proposal namely "Improvement to Swarnamukhi Anicut System" under Andhra Pradesh Irrigation & Livelihood Improvement Project Phase-2 (APILIP-II) for JICA funding. Estimated Cost: Rs. 60 Cr	Govt. of Andhra Pradesh vide their letter dated 15.12.2020 has submitted a proposal (DPR) i.e "Improvement to Swarnamukhi Anicut System" near Srikalahasti town in Chittoor district in CWC. Approved in the 150th meeting of Advisory Committee of DoWR, RD&GR held on 19.09.2022.	Recommended

13 INTERNATIONAL COOPERATION WITH NEIGHBOURING COUNTRIES

13.1 Introduction

The three major river systems of India, namely, Ganga, Brahmaputra and Indus cross international borders. Ministry of Jal Shakti, Department of Water Resources, River Development and Ganga Rejuvenation is responsible for strengthening international co-operation on matters relating to these rivers by way of discussions with neighbouring countries concerning river waters, water resources development projects and operation of related international treaties.

13.2 Cooperation with Nepal

Most of the rivers, which cause floods in the States of Uttar Pradesh and Bihar originate from Nepal. These rivers are Ghaghra, Sarda, Rapti, Gandak, Burhi Gandak, Bagmati, Kamla, Kosi and Mahananda. In order to make flood forecasting and advance warning of floods in the flood plains of the above rivers, a scheme namely, "Flood Forecasting and Warning system on rivers common to India and Nepal" which includes 42 meteorological/ hydro-meteorological sites in Nepal and 18 hydrological sites in India, has been in operation since 1989. The data collected is helpful for formulating the flood forecasts and issue of warnings in the lower catchments.

A Treaty on Integrated Development of Mahakali (Sharda) River including Sharda Barrage, Tanakpur Barrage and Pancheshwar Multipurpose Project, namely "**Mahakali Treaty**" was signed between Governments of India and Nepal on 12th February 1996, and it came into force on 5th June, 1997. The Treaty is valid for a period of 75 years.

Various Joint Committees have been formed to co-ordinate and deal with different aspects of cooperation on issues related to water resources development and management among the two countries. Details of important Committees are as under:

13.2.1 India – Nepal Joint Committee on Water Resources (JCWR)

India-Nepal Joint Committee on Water Resources (JCWR) headed by the respective Water Resources Secretary of the two countries was formed in pursuance of the decision taken by the Prime Ministers of Nepal and India during the visit of the Hon'ble Prime Minister of Nepal to India from 31stJuly to 6th August, 2000. The first meeting was held during 1st-3rd October 2000, at Kathmandu, Nepal. The JCWR has met 9 times so far and the last meeting was held on 23rd September, 2022at Kathmandu, Nepal. JCWR has been functioning with the mandate to act as an umbrella Committee for all Committees and Groups formed for deliberation on water related issues between the two countries..

13.2.2 India-Nepal Joint Standing Technical Committee (JSTC)

During the 3rd meeting of India-Nepal Joint Committee on Water Resources (JCWR), it was decided to have a 3-tier mechanism to expedite the decision making process and the implementation of decisions undertaken at the institutional interactions. Joint Standing Technical Committee was constituted to coordinate all existing Committees and sub Committees under JCWR. Chairman, GFCC, Patna has been nominated as Indian Team Leader and Sr. Jt. Commissioner (Ganga), Erstwhile MoWR as Member Secretary from Indian side. The first meeting of JSTC was held on 8th-9th December, 2008 at New Delhi under the Chairmanship of Chairman GFCC. The JSTC has met seven times so far and the last meeting was held on 21-22nd

September, 2022 at Kathmandu, Nepal in which all outstanding technical issues between the two countries were discussed.

13.2.3 India-Nepal Joint Committee on Inundation and Flood Management (JCIFM)

In pursuance of the decision taken during the 4th meeting of JCWR held in 2009, **Joint Committee on Inundation and Flood Management (JCIFM)** with Member(C), GFCC, Patna as Team Leader from Indian side was constituted replacing erstwhile bilateral Committees namely, Standing Committee on Inundation Problem (SCIP), Standing Committee on Flood Forecasting (SCFF), High Level Technical Committee (HLTC), Sub Committee on Embankment Construction (SCEC), Joint Committee on Inundation and Flood Management (JCIFM). JCIFM implements the decisions of JSTC in inundation and flood management issues and address the issues related to flood in this regard. JCIFM has met 13 times and the last meeting was held during 11th-17th March, 2019 at Kathmandu, Nepal.

13.2.4 Joint Team of Expert (JTE)

An understanding was reached between his Majesty's Government of Nepal and Government of India during the visit of the Hon'ble Prime Minister of Nepal to India in December 1991 on preparation of Detailed Project Report (DPR) of SaptaKosi High Dam Multipurpose project. The JTE was constituted, with Member (RM), CWC as Team Leader from the Indian Side, to finalize the modalities of the investigations and the method of assessment of benefits of the proposed project. It was constituted in the year 2000, with the following mandate:

a) Prepare DPR of SaptaKosi High Dam and Sun Kosi Multipurpose Projects

b) Forward the approved DPR to respective Governments for acceptance

The last (16th) meeting of the India-Nepal Joint Team of Experts (JTE) on SaptaKosi high dam Multipurpose Project and Sun Kosi storage-cum-diversion scheme was held in July, 2019 at New Delhi.

13.2.5 Status of projects jointly implemented by India and Nepal

1) SaptaKosi High Dam Multipurpose Project & Sun Kosi Storage-cum Diversion Scheme, Indo-Nepal

Field investigation studies and preparation of DPR for SaptaKosi High Dam Multipurpose Project and Sun Kosi Storage-cum-Diversion Scheme have been taken up jointly by Government of India and HMG Nepal. A Joint Project Office (JPO) has been set up in Nepal in August, 2004 for investigation and preparation of DPR within a period of 30 months, which has been subsequently extended upto 22nd September, 2024.

Preliminary studies of SaptaKosi High Dam Multipurpose Project envisages construction of a 269 m high dam to divert river waters through a dam toe power house with an installed capacity of 3000 MW (at 50% load factor) and irrigation of 15.22 lakh ha. GCA (Gross Command Area) through construction of a barrage, 1 km downstream of the dam. An additional capacity of 300 MW is further contemplated by construction of three canal type power houses along the canal system.

The field investigation for preparation of DPR is still under progress. The project work is hampered mainly due to local disturbances in Nepalese territory.

2) Pancheshwar Multipurpose Project

In pursuance of the Mahakali Treaty signed between Governments of India and Nepal in 1996, India and Nepal jointly undertook investigations & studies and prepared a Detailed Project Report (DPR) of Pancheshwar Multipurpose Project. However, some issues between India and Nepal remained unresolved. Later, as per decision taken during the 3rd meeting of JCWR held in 2008, the Pancheshwar

Development Authority (PDA), a bi--National entity between India and Nepal with its office at Mahendranagar, Nepal, was constituted vide Erstwhile MoWR O.M No.Z-14012/3/2013-Ganga/2302-2314 dated 7th August, 2014 to finalise DPR of Pancheshwar Multipurpose Project and to undertake its execution, operation and maintenance. Seven meetings of the Governing Body (GB) of the PDA have been held so far. The last (7th) meeting was held on 29th Nov, 2019 at New Delhi, India.

The DPR of Pancheshwar Multipurpose Project was prepared/updated by Pancheshwar Development Authority (PDA) through M/s WAPCOS Ltd India. The final draft DPR was forwarded to the two Governments in December, 2016 by PDA for their observations. As there were a number of issues which required further working to make the DPR mutually acceptable to the two Governments, the PDA, as per the decision taken by its Governing Body, established a Team of Experts/ Officials (ToE) in 2017 to resolve such issues. Three meetings of the ToE have been held so far. The last (third) meeting of ToE was held in February, 2019 at Kathmandu, wherein substantial progress has been made towards resolving issues. The Project has also been discussed in 9th Joint Committee on Water Resources (**JCWR**) on 23rd Sep, 2022 for early resolution of pending issues.

13.3 Cooperation with Bhutan

A scheme titled **"Comprehensive Scheme for Establishment of Hydro-meteorological and Flood Forecasting Network on rivers common to India and Bhutan"** is in operation since 1979. The network consists of 36 hydro-meteorological/ meteorological stations located in Bhutan maintained by Royal Government of Bhutan (RGoB), out of which only 27 nos. are being funded by Government of India. Central Water Commission utilizes the data received from these stations for formulating the flood forecast.

A Joint Experts Team (**JET**) consisting of officials from the Governments of India and Royal Government of Bhutan was constituted in 1985, later modified in 1988 and further reconstituted in August, 1992 with Chief Engineer, CWC, as Team Leader from Indian Side. However, in October 2020, the JET has been re-composed with Chief Engineer (T&BDBO), CWC as the Team Leader (Indian Side). The Terms of References of JET are as follows:

a) To formulate programme for the Five- Year Plan for continuation of/ improvement in the ongoing scheme under operation.
b) To formulate year-to-year programme of work within the overall plan as per (i) above.
c) To review the progress of work vis-à-vis the programme laid down.
d) To recommend the releases to be made to the Royal Govt. of Bhutan on the basis of progress achieved/likely to be achieved after discussion/random general checks.
e) To look into any other specific point related to the scheme which may crop up from time to time.

So far thirty six meetings of the JET between Government of India and Royal Government of Bhutan (RGoB) have been held. The 36th meeting of JET was held during 28th-29th September 2022 at Darjeeling, India.

A Joint Group of Experts (JGE) on Flood Management headed by Commissioner, Brahmaputra & Barak Basin (B&BB), Erstwhile MoWR, RD & GR has been constituted in August 2004, between India and Bhutan to discuss and assess the probable causes and effects of recurring floods and erosion in the southern foothills of Bhutan and adjoining plains in India and to recommend appropriate and mutually acceptable remedial measures to both Governments. The first meeting of JGE was held in Bhutan from 1st to 5th November, 2004. The JGE has met 9 times and the last meeting was held during 7th -8th January, 2020 at Punakha, Bhutan.

In accordance with the decision taken during the first meeting of JGE, a Joint Technical Team (JTT) on Flood Management between the two Countries was constituted. During the 2nd meeting of JGE held in February 2008, the

reconstitution of Joint Technical Team (JTT) had been agreed with Chief Engineer, CWC as its Team Leader (Indian Side). Further, the JTT has been re-composed in October 2020, with Chief Engineer (BBO), CWC as the Team Leader (Indian Side). So far, six meetings of the Joint Technical Team (JTT) between Government of India and Royal Government of Bhutan (RGoB) have been held. The 6th meeting was held during 12th– 13th September, 2019 at Chalsa, Jalpaiguri, in West Bengal.

CWC is providing technical assistance for development of hydropower potential in Bhutan. The Bhutan Investigation Division (BID), CWC, Phuentsholling is coordinating with RGoB and carrying out necessary field works in this respect.

13.4 Cooperation with China

The Government of India had entered into a MoU with China in the year 2002 for sharing of hydrological information on Yarlung Zangbo/ Brahmaputra River. In accordance with the provisions contained in the MoU, the Chinese side is providing hydrological information (Water level, discharge and rainfall) in respect of three stations, namely Nugesha, Yangcun and Nuxia located on river Yarlung Zangbo /Brahmaputra during flood season. The MoU on River Brahmaputra was further renewed in 2008, 2013 and 2018.

During the visit of the Chinese Premier to India in April, 2005, an another MoU was signed on 11th April 2005 for supply of hydrological information by China to India in respect of Langquin Zangbo/ Sutlej river in flood season. The MoU on River Langquin Zangbo/ Sutlej was further renewed in 2010 and 2015.

During the visit of the Hon'ble President of the People's Republic of China in November 2006, it was agreed to set up an Expert Level Mechanism (ELM) to discuss interaction and co-operation on provision of flood season hydrological data, emergency management and other issues regarding trans-border Rivers as agreed between them.

Accordingly, the two sides have set up the Joint Expert Level Mechanism. The Expert Group from Indian side is led by a Joint Secretary level officer. The 12th meeting of Expert Level Mechanism was held during 12-13th June, 2019 in Ahmedabad, India. The special meeting of ELM through DVC was held on 8th September, 2021 for discussion on agenda, date, venue of 13th ELM etc. and water cooperation related issues with China. 13th meeting of ELM was held through DVC on 18-May-2022, in which Chinese side proposed two recommendations on the revision of the MOU on Langqen Zangbo/Sutlej River (i) The payment for flood season hydrological data provision shall be waived. (ii) The Indian side shall provide to the Chinese side hydrological data of downstream hydrological stations on Sutlej River.

13.5 Cooperation with Bangladesh

In order to ensure the most effective joint effort in maximizing the benefits from common river systems an Indo-Bangladesh Joint Rivers Commission (JRC) is functioning since 1972, which is headed by Water Resource Ministers of both the countries. 38th meeting of the JRC was held at New Delhi in August, 2022, wherein various matters pertaining to cooperation in Water Resources sector with Bangladesh were discussed.

Under bilateral arrangements, India provides the flood data of the sites namely, Pandu, Goalpara & Dubri on river Brahmaputra, Silchar & Badarpurghat on Barak and Domhani & Gazaldoba on river Teesta, Sonamura & Amarpur on Gumti, NH-31 on Jaldhaka (Dharla), Kailashahar on Manu & Ghughumari on Torsa (Dudhkumar), Khowai Town on Khowai and Dharmnagar on Juri during monsoon to Government of Bangladesh for use of their flood forecasting and warning arrangements. The transmission of flood forecasting information from India during the monsoon which is being supplied free of cost has enabled the Civil and Military authorities in Bangladesh to take

precautionary measures and shift the population affected by flood to safer places.

13.6 Co-Operation with Denmark

After meeting Prime Minister of Denmark H.E. Ms. MetteFrederiksen during her visit to India on 09th October 2021, Hon'ble Prime Minister, inter-alia made following declaration:

- Establish a Centre of Excellence for Smart Water Resources Management (CoESWaRM)
- Establish a Lab for Clean Rivers in Varanasi on the lines of Smart City Lab in Panji

In follow up of above declaration, during visit of Prime Minister to Denmark, on 03rd May 2022, Letter of Intent regarding purpose, co-operation areas and modes of co-operation regarding declarations was signed between Ministry of Jal Shakti, GoI and Ministry of Environment, Govt. of Denmark.

During visit of Hon'ble Minister of Jal Shakti to Denmark in September 2022, MoU between the Govt. of the Republic of India and the Govt. of Denmark on cooperation in the field of Water Resource Development and management was signed on 12th September, 2022. A Note on establishing Smart Laboratory for clean river in Varanasi has been approved in September, 2022 and components for establishment of SLCR is under finalization

Finalization of Terms of Reference for establishment of Centre of Excellence at New Delhi is under deliberation with Denmark.

14 WATER RESOURCES DATA MANAGEMENT

14.1 Development of Water Resources Information System (DWRIS)

Central Water Commission is implementing the Plan Scheme "Development of Water Resources Information System (DWRIS)" with an objective to operate a standardized national water information system in the country with provision for data collection, data processing and storage and online data dissemination. The scheme has following four major components:

i. Hydrological Observations Monitoring System
ii. Irrigation Census
iii. Strengthening of Monitoring Unit in CWC
iv. Data Bank and Information System

14.2 Hydrological Observations including Snow Hydrology, Water Quality and Monitoring of Glacial Lakes

14.2.1 Hydrological Observations

India has a total geographical area of 329 Mha having an annual precipitation of 4000 BCM with wide temporal and spatial variation. From river basin point of view, India has been divided into 20 river basins. The collection of hydro-meteorological data for all the river basin in a scientific manner is essential for achieving various objectives viz. planning and development of water resources projects, studies related to assessment of impacts due to climate change, water availability studies, design flood and sedimentation studies, flood level/inflow forecasting, solving of International & Inter-State issues, river morphology studies, Reservoir siltation studies, development of inland waterways, research related activities etc.

As on 01.01.2023, Central Water Commission is operating a network of 1543 (1522 operational and 21 under review) Hydrological Observation (HO) stations in different river basins of the country to collect (i) water level, (ii) discharge, (iii) water quality and (iv) Silt. This includes 717 new stations opened during the XII five year Plan. In addition to this, Meteorological parameters including snow observations are also recorded at some key stations. This will help in addressing the data requirement of the country more precisely and in better scientific manner.

As on 01.01.2023, CWC also operates 81 exclusive meteorological observations stations in various basins in the country

14.2.2 Monitoring of Glacial Lakes/Water Bodies in Himalayan Region

Glacial lakes are common in the high elevation of glacierized basin. They are formed when glacial ice or moraines impound water. The impoundment of the lake may be unstable, leading to sudden release of large quantities of stored water. This may lead to flash floods in the downstream reaches of lakes, called Glacial Lake Outburst Flood (GLOF). GLOFs have immense potential of flooding in downstream areas, causing disaster to human settlements, livestock and property. Incidents of outburst of Glacial Lakes/Water bodies in Himalayan region have been evident during the recent past. Therefore, Glacial Lakes and Water Bodies in Himalayan Region need to be closely monitored.

CWC took up the work of monitoring of glacial lakes and water bodies. In order to make inventory and monitoring of glacial lakes and water bodies present in the Himalayan Region, an MoU was signed with NRSC, Hyderabad in 2009. As per inventory created in 2009, there are 2027 nos of glacial lakes and water bodies (GL/WB)

with more than 10 Ha water spread area, out of which 477 have more than 50 Ha water spread area. Monitoring of these lakes has been taken up. 477 glacial lakes/water bodies with water spread area more than 50 ha have been monitored every year during monsoon season (June–October) of the years from 2011-2021.

CWC has increased the monitoring of glacial lakes/water body based on remote sensing from 477 to 902. The process of monitoring of GL/WBs has been automated to large extent to reduce processing time. The open-source satellite images at 10 m resolution are being used. The SAR images are also being used for detecting lakes even in cloudy condition.

The monthly monitoring reports from June to October are being shared with Ministry of Jal Shakti, concerned field offices of CWC, concerned Himalayans States and other stakeholders.

14.3 Coastal Management Information System (CMIS)

The activitity already covered in detail in Chapter -3 (River Management) under para 3.5.2

14.4 Computerisation Activities in CWC

Software Management in Central Water Commission is a sub-component of Data Bank and Information System of Memorandum for Expenditure Finance Committee for "Development of Water Resources Information System" for Finance Commission ending March, 2021 (2021-2022). SMD is entrusted with the work of management of CWC's requirement of IT hardware/ software and IT services. Presently, the Local Area Network of CWC comprises around 6000 nos. IT equipment and 1510 nos. networking nodes located in Sewa Bhawan premises.

Software Management Directorate of Central Water Commission is in existence for more than 25 years and its domain is increasing day by day as all the IT related works are delivered by the way of technology support to the end users of CWC (HQ as well as Regional Offices). Domain refers to the industry or activity sector in which an organization performs day to day business transactions and technology refers to hands-on experience of a particular information technology, for instance, system and database administration, programming, and networking. SM Dte., Central Water Commission has been equipped with domain as well as technological experience to deal with any upcoming challenges involving own officers and outsourced officials to cater to the need as and when required. The existing IT resources in CWC need regular up-gradation and upkeep to match with the technological development in the field of Information technology which needs to be embraced at organizational level in a very dynamic manner. Strengthening of the IT hardware/ software/ network resources is a continual activity. In addition, contemporary thrust has been to promote e-governance activities in CWC in line with focus of Government of India.

The major activities in this regard during 2022-23 were as under:

1. Maintenance and Management of the existing IT hardware/ software/ network resources in CWC.
2. Implementation of Human Resources Management System (eHRMS-DoPT) and SANDES messaging app in CWC
3. Award of work for AMC of CWC website.
4. Procurement of IT consumables as per requirement of office.
5. Procurement and distribution of Desktops and Laptop for CWC officers through GeM portal.
6. Management of IT helpdesk to resolve e-governance related issues of all CWC users in CWC HQ and all regional offices.
7. Regular management and new creation of VPN for accessing the e-office
8. Procurement of other IT T&P items as per requisition.

9. Implementation of SPARROW for Group C employees.
10. Regular management of NIC email ids of around 3500 employees.
11. Management of APAR management system for the employees who are not yet in SPARROW.
12. Management of hardware and software component of AEBAS (AADHAAR Enabled Biometric Attendance System).
13. Maintenance and management of Data center in SMD which is being used for hosting portals during development stage and providing secure internet to CWC users.
14. Development of 04 portals under DGQI.
15. Arranging to provide APIs for Open Govt. Data Platform (OGD).
16. Management of DGQI report card of DGQI 2.0 for CWC prepared by NITI Aayo

Table 14.1: Physical and Financial Progress during FY 2022-23

(Rs in Lakhs)

Budgetary Sub-Head	RE 2022-23	Actual Expenditure for the month March, 2023	Cumulative Expenditure up to the month	% of expenditure up to the month against RE	Remarks
	Major Head -2701: Major and Medium Irrigation 80.800.11- Development of Water Resources Information System				
11.00.13 -OE	10.00	0	9.96	99.60 %	MTNL Bills and IT bills
11.00.27 - MW	00.00	0	0	0	
11.00.28 - PS	18.00	4.31	9.72	70.16 %	Hiring of Manpower
	Major Head -4701 : Capital Outlay on Medium Irrigation 80.800.06- Development of Water Resources Information System				
06.00.52- M&E	0	0	0	0	
	Major Head -2701: Information Technology 80.800.11- Development of Water Resources Information System				
11.99.13 -OE	473.75	183.03	469.47	99.22 %	Purchase of T&P items, Software and IT consumables.
11.99.27 - MW	0.50	0	0.49	98.00 %	Maintenance of e-governance activity etc
	Major Head -4701 : Information Technology 80.800.06- Development of Water Resources Information System				
06.99.52- M&E	0	0	0	0	
Total	**501.65**	**187.34**	**492.55**	**98.19 %**	

15 TRAINING

15.1 Introduction

One of the important functions of Central Water Commission is capacity building of the professionals as well as non-professionals associated with water resources sector. In order to impart knowledge and develop technical and managerial skills of in-service officers of CWC and other Central/State Government Departments and their Organisations, CWC arranges and co-ordinates training programmes/seminars/ workshops in the field of water resources. CWC accomplishes this objective through a dedicated unit at HQ and a full-fledged training institute namely, National Water Academy (NWA) at Pune. Officers of CWC are also deputed to various programmes including seminars, conferences, workshops etc., held both within and outside the country. Further, CWC provides support to other professional organisations and societies and co-sponsors of the National level seminars, conferences, workshops etc. in the field of water resources.

15.2 National Water Academy (NWA)

National Water Academy, Pune under Central Water Commission, which is attached office of Department of Water Resources, RD & GR (DoWR,RD&GR), Ministry of Jal Shakti is functioning as "Centre of Excellence" in field of training and capacity building of Water Resources Professionals. NWA has an enriched pool of faculty, Central Water Engineering Services officers are major resource pool imparting training with focus on applied learning concepts coupled with guest faculty drawn from multi-dimensional, multi-organizational, multi-disciplinary serving & retired professionals.

The NWA, Pune is Central Training Institute (CTI) mandated to conduct Induction Training Program to Central Water Engineering Services Group 'A' & Group 'B' Officers and scientific cadre officers; Mandatory Cadre Training Programs for CWES Group A & Group B Officers; Capacity Building for Stakeholders in field of Water Resources Development and Management (mainly comprising of in-service professionals from State Government/Central Government/ PSUs & Private etc.); core area trainings; training on areas of emerging technologies, purpose-oriented trainings; Mass Awareness Programs for School Teachers; NGOs, Media, PRI etc; Demand Based Programs for Indian and Foreign Nationals etc. In addition, objectives of the Academy include assistance to State Government institutes for their specific training needs and collaboration with international agencies like WMO, COMET, ICID etc. for training & other purposes.

In addition to the above, training programs are also being conducted focusing on cutting-edge technology areas which includes analysis & design of structure of water resources projects including hydropower projects, mathematical modelling for flood management and overall management of water sector. NWA, for over last 36 years, is addressing the wider training needs of water resources professionals both technical (Engineering) and non-technical (non-Engineering). In its national role, the NWA is concentrating on conducting training courses for all water sector professionals, in the specialized and emerging areas. Major beneficiaries of these programs are State Govt. officers, officers of Central Water Commission, Central Organisations, School Teachers, Media Professionals, NGOs & Panchayat Raj functionaries, Foreign Nationals etc. National Water Academy has also forayed into custom-designed programs meeting specific requirement

of client organizations, both at its campus and been recognized as Regional Training Centre (RTC) of the World Meteorological Organization (WMO), and is conducting Distance Learning Programs on the topics of Hydraulics, Hydrological Sciences and Hydrometeorology in association with WMO for Asian countries.

15.3 Progress of Training Activities

Due to COVID-19 pandemic situation, NWA conducted its training activities in Distance Learning Mode by adopting simple and easily available tools. Popular platforms like CISCO Webex, Google Classroom and YouTube etc., were used for conducting the training programs. A fully paper less and online process from registration to issuance of certificates was developed. As the COVID situation improved, the NWA resumed residential training (face-to-face) again and steadily increased its activities in physical mode. In addition to the residential training programs, NWA is continuing to conduct training programs in distance learning mode through its MOODLE Learning Management System (LMS) – e-learning portal.

off-campus at the client locations. NWA has also

Since its inception in the year 1988, NWA has conducted a total of 878 training programs up to 31st March 2023 and trained total 44,696 officers. During the year 2022-23, 46 training programmes (36 Residential and 10 online) benefitting officers from Central/ State Governments, Central & State PSUs, Academic Institutions, Schools, NGOS, etc. 3,540 officers have been trained in these programs with 14,322,man-days of training. The list of training courses, workshops and seminars organized/ conducted/ coordinated by Training Unit of CWC and by NWA during 2022-23 are given at **Annexure 15.1** and **Annexure 15.2,** respectively.

Table 15.1: Training courses conducetd by NWA, Pune during 2022-23

Course name	No. of Courses	Residential	Online	Beneficiaries
Technical Trainings	**21**	**15**	**6**	**1945**
Water Talks; Eflow; Engineering Geology; Google Earth Engine & its application in WRM; e-GEM; RBM Cycle; Python Programming; Andriod App Development; GIS using ArcGIS Pro (ToT); Sharing of Content on Web using ARCGIS (ToT); ArcHydro & Advanced WRM Applications; Administration and Applications of Arc GIS Enterprise License (ToT); Reservoir Sedimentation : Assessment and Monitoring; Procurement through e-GEM				
Cadre Trainings	**10**	**10**		**256**
Induction Training Program for CWES Group A Officers (32 Weeks); MCTP for CWES Group A Officers – JTS (1 Batch); STS (1 Batch); JAG (2 batches); and SAG (2 Batches); Induction Training Program for Jes (3 Batches)				
Customized Trainings	**4**	**4**		**191**
Overview of Water Resources Sector of India – for Class 1 Officers of Soil & Water Conservation Department of Govt of Maharashtra; Overview of Water Resources Sector in India – for CGWB Officers;				

DHARMA Software – for Govt of Maharashtra				
Non - Technical Trainings	**6**	**5**	**1**	**539**
Webinar on Writing of APAR for CWES Officers; Pension Related Matters; Awareness Generation Exercise on Sexual Harassment of Women at Workplace (Prevention, Prohibition and Redressal) Act 2013; Constitutional Values and Fundamentals of Indian Constitution ; Workshop on SC/ST Prevention of Atrocities Act 1959; and Management Development Program for CWC & DoWR,RD & GR Officials.				
Other Cadre	**2**	**2**		**31**
Induction Training for Senior Draftsman, Junior Engineers of NWDA etc				
Mass Awareness	**3**		**3**	**578**
For School Teachers, NGOS, NYKs				
Total	**46**	**36**	**10**	**3540**

15.4 Other Important Activities/ Achievement of NWA

15.4.1 New Areas of Training

I. Induction Training Program for Junior Engineers of NWDA.
II. Induction Training Program for Senior Draftsman of CWC.
III. Environmental Flows : Assessments : Part 1 : Introduction on E-flows Assessment in India and EU.
IV. Customized training program on "Engineering geology – Concepts and Practices of Engineering Projects.
V. River Basin Management Cycle Training under the aegis of NMCG with GIZ, India (Under IEWP)
VI. Introduction to GIS using ArcGIS Pro (ToT)
VII. Sharing Content on Web using ARCGIS Enterprise (ToT)
VIII. ArcHydro and Advanced WRM Applications
IX. Administration and Applications of ArcGIS Enterprise License (ToT)
X. Reservoir Sedimentation : Assessment and Monitoring (NHP)
XI. Customized Training on DHARMA Software under DRIP

"Water Insight/ जल अंतर्दृष्टि –Veteran CWES Officers have a long rich experience in various facets of water sector including technological, managerial, and administrative aspects and sharing of which with working officials. Considering that the experience of such veteran would be of immense benefit to the sector and will equip other Officials to deal with various situations using their experiences more effectively. NWA conducted Weekly webinar talk series titled as "Water Insight/ जल अंतर्दृष्टि – Talk by Eminent Water Experts". Webinar were held once per week in on-line mode using CISCO Webex Meeting Platform. Total of 12 series were planned, till March 2022, three Series were successfully completed. Remaining nine series were successfully completed during 2022-23 as detailed below :

Shri M Gopalakrishnan, Former Member, CWC	**https://youtu.be/3qn-Bx_z1Gk**
Shri S M Hussain. Former Chairman,CWC	https://youtu.be/G06Sk5fSmv0
Shri M K Sharma,Former Member	https://youtu.be/MfIvbTs3HCk
Shri R K Jain,Former Chairman, CWC	https://youtu.be/pF71BmLRyeQ
ShriAvinashTyagi,Independent Consultant	https://youtu.be/uAnqB5YZrcA

Shri A K Bajaj,Former Chairman, CWC	https://youtu.be/ofOtEpKmpW4
Shri G S Jha, Former Chairman, CWC,	https://youtu.be/4CLOqSg6bJ0
Shri Naresh Kumar Mathur, Former Member ,CWC	https://youtu.be/6kX5zqOG_fk
Shri A D Mohile, Former Chairman, CWC	https://youtu.be/BfnimNVGoeE

15.4.2 Collaboration and Linkages

NWA develops and maintain linkages with leading institutions in India and abroad dealing with training related activities in water resources sector for sharing the expertise and imparting trainings.

1) **International Linkages**

- WMO: NWA is a component of Regional Training Centre(RTC) of India.
- World Bank: NWA is a nodal agency for capacity building & training programs under NHP and DRIP.
- International Certificate course on Micro Irrigation in association with ICID
- Programs under IEWP : India-EU Water Partnership – PR7 Group represented by CE-NWA. NWA, Pune has been identified as one of the Training Institute Partner to introduce RBM Cycle as a practical tool

2) **National Collaboration and Linkages**

- NWA has Linkages with many National Level Institutions, State Water Resources Departments, Universities, Private Consultants, NGOs, etc. Experts from these institutions are regularly invited for taking part in various training programs as guest faculty.
- NWA faculty are also invited by WALMIs, NERIWALM, IMD, IITM, CWPRS, IIRS, IIPA etc., for delivering lectures in their programs.
- NWA faculty members are part of the Governing Council of HIRMI, Kurukshetra; WALMI, Aurangabad; IMTI, Trichy; NERIWALM, Tezpur; NEHARI, Guwahati, etc.
- NWA faculty developed curriculum & training module on 'Water Conservation & Management' for LBSNAA for training of the IAS probationers; also contributed as guest faculty at LBSNAA.
- NWA has collaboration with IIT-Roorkee; IIM Ahmedabad; IISc Bangalore; IIM Bangalore; IIM Calcutta; various ISRO units – NRSC, IIRS etc., with MoUs for specific training collaborations
  - ✓ Indian Institute of Management, Ahmedabad
  - ✓ Indian Institute of Technology – Roorkee
  - ✓ Indian Institute of Management, Bengaluru
  - ✓ Indian Institute of Science, Bengaluru
  - ✓ Indian Institute of Management, Kolkata
  - ✓ Asian Institute of Technology, Bangkok
  - ✓ IHE- Delft, The Netherlands

15.4.3 New Initiatives

DoWR,RD&GR had taken an initiative of constituting 'Training Oversight Committee' under the chairmanship of Joint Secretary(Admin & GW) to oversee and integrate the content and process of training programs being offered by these three training institutions. As per the directions of the committee, the heads of the three training institutions had deliberated among themselves on how to enhance synergy amongst them. Enhancing Synergy among Training Institutions in the Department were adopted by:

- Synergy by complementarity
- Mutual consultation meetings
- Pooling of expertise/ Resource pooling
- Sharing of training infrastructure for wider dissemination
- Designing of joint training programs

- Annual 'Training Need Assessment' workshop
- MOODLE Learning Management System(LMS) at NWA
- Training Module on "Overview of Surface Water Resources" for newly recruited Officers of CGWB was conducted during January 2023
- Draft Training module on Namami Gange of 'iGOT was developed.
- Joint training : NWA contributed to the Certificate Course by on 'Water Auditing (Industrial Water Use)' by providing resource person.

15.4.4 WALMIs MEET 2022- "Synergizing Water Education in India – Joint Organisers – NWA, Pune and INCID, New Delhi

The National Water Academy, CWC, Pune also conducted WALMIs Meet -2022 in on-line mode. The WALMI Meet 2022 commenced from February 2022. Every week, one institute (WALMI) made presentation and discussion were held about the issues and challenges being faced by the WALMIs and exploring possibilities of collaboration and synergization. Total of 14 on-line meeting held. Six meets were held till March 2022 .Remaining eight meets were held during the financial year 2022-23 as detailed below:

Sl.	Name of WALMI/ IMTI	Date of Meet
1	CWRDM, Kerala	12 April 2022
2	WALMI, Gujarat	06 Jun 2022
3	HIRMI, Haryana	27 June 2022
4	WALMI, Bhopal	28 June 2022
5	WALAMTARI, Telangana	29 June 2022
6	IMTI, Kota	30 June 2022
7	IPRI, Punjab	11 Jul 2022
8	WALMI, UP	12 Jul 2022

15.4.5 Faculty Development & Exchange

1. Chief Engineer, NWA participated in the India-European Water Forum held at New Delhi during 27-28 October 2023.
2. The faculty members of NWA (Chief Engineer and two Director level officers) of NWA participated and attended Seventh India Water Week conducted at New Delhi during 31 October 2023 – 07 November 2023.
3. Three faculty members of NWA participated and attended International Conference on Driving Holistic Action for Urban Rivers (DHARA)2023 at Hyatt Hotel, Pune during 13-14 February 2022
4. Director (A&C), NWA participated and attended the All India WALMI Meet-2023 and International Conference on Water Management and Climate Change at WALMI, Dharwad during 23-25 January 2023 organised by Government of Karnataka.

15.4.6 Publications

Policy Paper on "Synergizing Water Education in India" with special reference to WALMIs and IMTIs was prepared and published in the compilation brought by WALMI Dharwad on the occasion of All India WALMI Meet 2023.

15.4.7 Visit of Senior Officers

- The Chairman, Central Water Commission visited NWA during 28-29 September 2023, during the visit he reviewed the activities of NWA and interacted with the 32 ITP Probationary Officers
- The Secretary, DoWR,RD&GR, MoJS visited NWA, Pune on 15.10.2022. During the visit to NWA he reviewed the activities of the academy and also interacted with the 32 ITP Probationary Officers

15.4.8 Mass Awareness Activities

1. **Overview of Water Resources Sector of India**: In addition to the technical programs and Mandatory Cadre Training programs, mass awareness activities are also taken up by NWA for promoting Water Conservation and Management. During the year 2022-23, two programs on topic "Overview of Water Resources Sector of India" were conducted wherein 444 school teachers, faculty of

District Institute of Education and Training (DIET) and faculty of Directorate of Technical Education (DTE) Pan-India attended the program in Distance Learning Mode. Out of total 444 Teachers, there were 183 Female and 261 Male participants.

2. **Training -cum-Workshop on Flood Control Measures in River Catchment:** As a follow-up action on the directions of the Hon'ble Home Minister during the meeting on 15th June 2021 to review the flood preparedness measured in the country, the NWA, CWC was directed to develop a "specific module for imparting training to NGOs, NCC etc., for undertaking flood control measures in the river catchment areas such as afforestation". In pursuance of the above directions, the National Water Academy, CWC, Pune developed and conceptualized the module on "Flood Control Measures in River Catchment". The objective of this module was to familiarize, spread awareness and building capacity of all the in involved stakeholders to mitigate the risks of flood and drought that have been projected to increase in many regions due to global warming. Afforestation is also considered as an adaptation option because it reduces flood risks by decreasing total runoff and peak river discharge. Afforestation involves the planting of trees in a drainage basin to increase interception and storage while reducing surface runoff. Afforestation also prevents mass wasting which reduces the amount of soil entering the river and keeps the rivers capacity high. When combined with floodplain zoning, afforestation can be very effective at reducing the risk of flooding. Thus, the National Water Academy, CWC, Pune organised one day "Training-cum-Workshop on 20 May 2022 for the officials of NGO,NCC, NYK, and other interested stakeholders. All sessions were held on-line e CISCO Webex Platform. Total of 137 participants representing NGOs, NCC, NYK on Pan India basis attended this Program. The program was appreciated by all the participants The details of the Pan-India participation, organisation wise participation and Gender wise participation is given below:

Organization	**Participants**
NCC Unit & NYK's	80
NGO's	34
Academician	21
Media	2
Total	**137**

State/UT	**Participants**
Andhra Pradesh	2
Assam	3
Bihar	30
Gujarat	4
Haryana	12
Jharkhand	26
Karnataka	7
Kerala	2
Madhya Pradesh	2
Maharashtra	8
New Delhi	16
Odisha	3
Rajasthan	1
Tamil Nadu	4
Telangana	11
Uttar Pradesh	2
Uttarakhand	1
Uttarakhand	2
West Bengal	1
Total	**137**

Gender	**Participants**
Female	35
Male	102
Total	137

16 VIGILANCE

16.1 Disciplinary Cases

The vigilance/ disciplinary cases and complaints received against officers and staff of CWC was given proper and prompt attention. During the year 2022-23, all new cases were taken up with the commitment of "Zero Tolerance against Corruption".

16.2 Observation of Vigilance Awareness Week

Vigilance Awareness Week 2022 (VAW 2022) was observed in CWC (Headquarters) along with all its field offices from 31st October to 6th November, 2022 with the theme "भ्रष्टाचार मुक्त भारत - विकसित भारत"/ "Corruption free India for a developed Nation".

17 REPRESENTATION OF CWC IN VARIOUS COMMITTEES

17.1 Committees Represented by CWC Officers

Chairman, Central Water Commission and Members, Central Water Commission represent CWC in various Technical Committees of various organisations either as the Chairman or as a Member. List of important Committees on which Chairman, CWC and Member, CWC represent are given in Table 17.1

Table 17.1: List of Important Committees Represented by Chairman and Members of CWC

Sl	Name of Committees/Boards/Panel of Experts/Technical Groups etc.	Representation of CWC
1	Indian National Committee On Irrigation And Drainage (INCID)	Chairman (CWC) as Chairman, Chief Engineer (Environment Management Organization), CWC is the Member-Secretary, The Remote Sensing Directorate, CWC serves as the INCID secretariat.
2	Technical Evaluation Committee (TEC) on North Koel Project	Member (WP&P) as Chairman
3	Committee on Implementation of ShahpurKandi Dam-	Member (WP&P) as Chairman
4	Joint panel of CWC-ICAR	Chairman (CWC) as Chairman and Member (WP&P) as Member
5	Expert Project Review Committee- "Relining of Sirhind Feeder from RD 119700 to 447927 and relining of Rajasthan Feeder from RD 179000 to 496000 of Punjab"	Member (WP&P) as Chairman
6	Steering Committee for implementation of Ken-Betwa Link Project	Member (WP&P) as Chairman
7	Expert Committee on Polavaram Project	Member (WP&P) as Chairman
8	Joint Operation Committee of Rihand Reservoir	Member (WP&P) as Chairman

Sl No.	Name of Committees/Boards/Panel of Experts/Technical Groups etc.	Representation of CWC		Concerned Directorate
		Officer	Position in Committee	
1	Technical Advisory Committee of the Farakka Barrage Project.	Member (D&R)	Chairman	BCD (E&NE)
2	Farakka Barrage Project Advisory Committee (FBP-AC).	Member (D&R)	Chairman	BCD (E&NE)
3	Standing Technical Committee (STC) for deciding project parameters of R-O-R Hydro-power scheme which were initially envisaged as storage scheme.	Member (D&R)	Co-Chairman	CMDD (E&NE)
4	CEDC(Civil Engineering Divisional Council)	Member (D&R)	Member	CMDD(NW&S)
5	National Committee on Dam Safety(NCDS)	Chairman, CWC Member(D&R)	Chairman Vice Chairman	DSM
6	Standing committee on Rihand Dam	Member (D&R)	Member	DSM
7	National Level Steering Committee (NLSC) of DRIP II	Chairman, CWC Member (D&R)	Member Member	DSR
8	Technical Committee (TC) of DRIP II	Member (D&R)	Chairman	DSR
9	Empanelment Committee to examine and recommend the names of various experts to be empanelled as members of Dam Safety review Panel(DSRP)	Member (D&R)	Chairman	DSR* *(Under Review)
10	Committee of International Commission on large dams, India (INCOLD)	Member (D&R)	Member	Emb (NW&S)
11	Governing Body of National Institute of Rock Mechanics (NIRM)	Member (D&R)	Member	FE&SA
12	National Committee on Seismic Design Parameters of River Valley Projects (NCSDP)	Member (D&R)	Chairman	FE&SA
13	Board meeting of Punatsangchhu-I H.E. Project Authority (PHPA)	Member (D&R)	Permanent Invitee	HCD (E&NE)
14	Technical Coordination Committee (TCC) for Punatsangchhu - I H.E Project, Bhutan	Member (D&R)	Co-Chairman	HCD (E&NE)
15	Punatsangchhu-II Hydro Electric Project Authority Meetings.	Member (D&R)	Permanent Invitee	HCD (E&NE)
16	Technical Co-ordination Committee (TCC) of Punatsangchhu-II Hydro Electric Project	Member (D&R)	Co-Chairman	HCD (E&NE)
17	Mangdechhu HE Project Authority Meetings.	Member (D&R)	Permanent Invitee	HCD (E&NE)

Sl No.	Name of Committees/Boards/Panel of Experts/Technical Groups etc.	Representation of CWC		Concerned Directorate
		Officer	Position in Committee	
18	Technical Co-ordination Committee (TCC) Mangdechhu HE Project	Member (D&R)	Co-Chairman	HCD (E&NE)
19	Empowered Joint Group meetings (EJG) (for monitoring of implementation of Hydro-power projects in Bhutan).	Member (D&R)	Permanent Invitee	HCD (E&NE)
20	Programme Advisory Committee (PAC) for Fly Ash Unit constituted by Department of Science and Technology	Member (D&R)	Member	HCD (NW&S)
21	Board of Directors of Tehri Hydro Development Corporation	Member (D&R)	Part Time Director	HCD(N&W)
22	National Institute of Hydrology Society (NIH Society)	Chairman, CWC Member(D&R)	Member Member	Hyd (DSR)
23	Governing Body of NIH	Chairman, CWC Member(D&R)	Member Alternate Member	Hyd (N)
24	Technical Advisory Committee of National Institute of Hydrology.	Chairman, CWC Member(D&R)	Chairman Member	Hyd (N)
25	Indian Meteorological Department (IMD)	Member (D&R)	Hydrological Advisor	Hyd (S)
26	World Meteorological Organization	Member (D&R)	Principal Representative	Hyd (S)
27	National Water Development Agency Society.	Chairman, CWC Member(D&R) Member(WP&P)	Member Member Member	Hyd(S)
28	Governing Body of National Water Development Agency.	Chairman, CWC Member(D&R) Member(WP&P)	Member Member Member	Hyd(S)
29	Technical Advisory Committee of National Water Development Agency.	Chairman, CWC Member(WP&P) Member(D&R)	Chairman Member Member	Hyd(S)
30	Governing Council for Central Soil & Materials Research Station.	Member (D&R)	Member	Instrumentation
31	Standing Technical Advisory Committee (STAC) to the Governing Council for CSMRS, New Delhi.	Member (D&R)	Chairman	Instrumentation
32	Advisory Committee for consideration of Techno Economic viability of Major	Chairman, CWC	Member	PA(N)

Sl No.	Name of Committees/Boards/Panel of Experts/Technical Groups etc.	Representation of CWC		Concerned Directorate
		Officer	Position in Committee	
	& Medium Irrigation, Flood Control and Multipurpose project proposals.	Member(WP&P) Member(D&R) Member(RM)	Sp. Invitee Sp. Invitee Sp. Invitee	
33	Committee of CEA to accord of techno-economic appraisal of Power Schemes.	Member (D&R)	Permanent Special Invitee	PAO/CEA
34	High Powered Steering Committee for Implementation of National Projects.	Chairman, CWC Member (D&R)	Member Sp. Invitee	PPO
35	Indian National Committee on Surface Water	Chairman, CWC Member (D&R)	Chairman Member	WSR Dte &INCSWSecretariat
36	Monitoring Committee for monitoring the overall progress relating to the preparation of PFR/DPR of proposed Upper Siang Multipurpose Storage Project (USMSP)	Member(D&R)		
39	Consultancy Evaluation Committee (CEC) for Engagement of Project Management Consultancy (PMC) Services for Ken-Betwa Link Project Authority (KBLPA)	Member (D&R)	Chairman	Design(NW&S)
40	Constitution of Committee to assess the various issues of the Indira Gandhi Feeder Canal /Rajasthan Feeder	Member (D&R)	Chairman	Design (N&W)
41	Committee to assess the technical viability of enhancing the capacity of Head Regulator of Indira Gandhi Feeder at Harike to 18,500 cusecs	Member (D&R)	Chairman	Design (N&W)
42	Committee tor conducting a joint detailed technical study to formulate an integrated plan to combat threat of erosion posed by Ganga- Padma river system in West Bengal	Chairman, CWC Member(D&R)	Chairman Member	
43	Committee for carrying out anInternal Review of the India Bangladesh Treaty of 1996 on Sharing of the Ganga/Ganges Waters at Farakka"	Member (D&R)	Chairman	CE,HSO

17.2 Activities of Some Important Committees for R&D

17.2.1 Indian National Committee on Surface Water (INCSW)

The Indian National Committee on Surface Water (INCSW) is an apex body to promote, coordinate and support R&D works related to Surface Water in India. INCSW is headed by Chairman, CWC with Director WS&RS Directorate & INCSW Sectt., CWC as Member Secretary. There are 12 members representing DoWR/CWC, CSMRS, CWPRS, NIH, DST/DSIR/CSIR, Min. of Agriculture, WALMIs, IITs, and NGOs etc. INCSW's main objective is to promote research work in the field of Water Resources Engineering (Surface Water aspect) by providing platform to academicians/experts in the Universities, IITs, recognized R&D laboratories, Water Resources/ Irrigation departments of the Central and State Governments and NGOs under R&D Programme of DoWR,RD&GR, Ministry of Jal Shakti. The secretariat support to INCSW is provided by CWC. The work of secretariat is two-fold (a) Regular secretariat work for managing service requests of PIs for R&D schemes and (b) Innovative work.

During the year 2022-23 following activities were undertaken:

i. Coordination of Research Schemes related to Surface Water:

91 research schemes are being managed by INCSW under R&D Programme of DoWR,RD&GR. Out of which, Final Reports of 28 schemes has been recommended for acceptanceduring 2021-22. Further, Overhead charges of 23 schemes out of 28 schemes were also recommended for release during 2022-23.

Chairman, INCSW/ CWC formulated a committee under the chairmanship of CE, EMO to identify topics for invited research regarding research needs for surface water. As per suggestions of this committee, 11 topics has been finalized and submitted for approval of Standing Advisory Committee (SAC) of DoWR, RD&GR, Ministry of Jal Shakti headed by the Secretary (DoWR, RD&GR).

17.2.2 Technical Advisory Committee of NIH

The research programmes and other technical activities of NIH are monitored and guided by Technical Advisory Committee of NIH headed by Chairman, CWC. Member (D&R) and Chief Engineer, Hydrological Studies Organization are also its Members. 74 meetings of TAC of NIH have been held so far. The last meeting was held on 15th December 2020.

TAC gets feedback from 3 Working Groups on Surface Water, Ground Water and Hydrological Observation and Instrumentation. Chief Engineer, HSO and Chief Engineer, BPMO are Members of the Surface Water Group and Chief Engineer (P&D) is Member of the Hydrological Observations and Instrumentation Group.

17.2.3 Technical Advisory Committee of Farakka Barrage Project

The TAC of Farakka Barrage Project is headed by Member (D&R), CWC which generally meets once every year and takes decisions about various works to be executed for efficient and safe functioning of the project. Various problems, special studies and related design work were referred to D&R wing from time to time. Member (D&R) held discussions with the Farakka Barrage project authorities from time to time and Chairs the Technical Advisory Committee meeting of Farakka Barrage Project. 118th meeting of TAC of FBP was held on 21st December 2022.

17.2.4 Standing Technical Advisory Committee of CSMRS

The Standing Technical Advisory Committee (STAC) was constituted under the Chairmanship of Member (D&R), CWC for providing an overall perspective and guidance in technical scrutiny of research schemes being undertaken at CSMRS. The STAC is composed of 11 members drawn from various public sector institutions and is

headed by Member (D&R), CWC. 37 meetings of STAC have been held so far. The last meeting of STAC was held on 06th October 2022.

17.2.5 Committee for the "Study on the issue of floods and siltation in river Ganga & its tributaries due to Farakka Barrage in the State of Bihar"

A Committee headed by Chairman, CWC and having representatives of Govt of Bihar as well as experts /officers from M/oJS, NIH, CWC was constituted on the subject in January 2020. The consultancy work was awarded to RMSI Pvt. Ltd under NHP and the project started on 01.04.2021. The Committee unanimously accepted the Final Report in the 9th meeting held on 15.12.2022. Major finding of the study was that the simulated backwater effect due to Farakka Barrage in the Ganga river is observed up to 48.3 km upstream of Farakka Barrage for an extreme flooding condition (Design flood of Farakka Barrage of 100 year return period=76455 cumec)

17.2.6 Consultancy services of physical based mathematical modelling for estimate of sediment rate and sediment transport in 7 river basins of India (under NHP)

The objective of the study is to establish a methodology for modeling of sediment generation from basin catchments, its transportation mechanism through channels/rivers and its retention/deposition by flood water retention structures like reservoirs, as well as morphological behaviour of river reaches of Narmada, Ramganga, Barak, Cauvery, Kuttiyadipuzha, Mangalam and Peechi basins. The consultancy contract was signed on 14th October 2020 and commenced on 16th November 2020. Final Report of Phase-I accepted on 30.09.2022. Phase- II of the project has already been commenced from 16.11.2022. Under the capacity building three trainings for 20 CWC officials and 2 workshops of 2-3 days were organised during the phase-I of the project.

17.3 Association with Bureau of India Standards (BIS)

Central Water Commission being an apex technical body in the water resources sector, has been playing an important role in the formulation of standards in the field of water resources development & management and allied areas through its participation in activities of Water Resources Division (WRD) and Civil Engineering Division (CED) of the BIS. Chairman, Central Water Commission is presently the Chairperson of Water Resources Division Council (WRDC).

CWC is represented by its officers of the rank of Chief Engineer and Director in the 17 Sectional Committees of WRDC and 08 Sectional Committees of CEDC besides few other Sectional Committees and Council. Design Standards Dte. is the LiaisonDirectorate in CWC dealing with works of WRDC & CEDC of Bureau of Indian Standards at CWC.

The draft codes and amendments to BIS Codes for adoption and printing are scrutinised in CWC and submitted for approval of Chairman, then communicated to BIS. During the current financial year, 16 draft standards/amendments to BIS codes have been approved by Chairperson, WRDC for adoption and printing.

17.4 Indian National Committee on Irrigation and Drainage (INCID)

The Indian National Committee for Irrigation & Drainage (INCID) was reconstituted in August, 2019 by DoWR,RD&GR as National committee for International Commission on Irrigation and Drainage (ICID) and is engaged in bringing the technological improvements in irrigation sector in India. INCID is headed by Chairman, CWC and its Member-Secretary is Chief Engineer (EMO) with secretariat at Remote Sensing Directorate of CWC. The objectives of the INCID include:

1. Stimulating and promoting the development and application of irrigation, drainage, river training, and flood control techniques within India;
2. Integrating the efforts of Central Government, State Governments, academic institutions, and private sector in the field of agriculture water management; and
3. Co-operating with the International Commission on Irrigation and Drainage (ICID) for the distribution and interchange of information concerning irrigation, drainage, river training, and flood control between the National Committees of the participating countries.

The major activities/ achievement for INCID during the year 2022-23 are as under:

A. **73rdFoundation Day celebrations for INCID and ICID:** INCID & ICID jointly celebrated their 73rd Foundation Day on 24th June 2022 at CWC, New Delhi. As part of the celebrations, a seminar on "Role of Modern Irrigation in Global Food Security" was organized.

B. **Conclave on "Water Security of India":** A Conclave on "Water Security of India" was organized by INCID, CWC & ICID as a 1½ day Side Event on 1st – 2nd Nov, 2022 during the 7th India Water Week (IWW) (1st – 5th Nov, 2022). As part of this, detailed discussions were held among various experts and officials on 3 themes pertaining to the water security of India.

C. **National Certificate Course on Participatory Irrigation Management (NCCPIM):** NWA Pune & INCID have joined hands to develop and launch an online National Certificate Course on Participatory Irrigation Management (NCCPIM). NCCPIM is aimed to fulfill the long-standing need for PIM literacy among farmers and government field functionaries engaged in implementing PIM through the formation and strengthening of water user associations.

D. **Launch of INCID Logo & dedicated Website**: INCID Secretariat prepared a dedicated Website (*http://incid.cwc.gov.in/*) and Logo for INCID along with INCID Booklet and Pamphlets which were launched by Chairman, CWC/INCID on 26/09/2022.

E. **Participation in 24th ICID Congress**: The 24th International Congress and 73rd IEC meeting of ICID were held at Adelaide, Australia from 3-10th October, 2022. Sh Gajendra Singh Shekhawat, Hon'ble Minister (Jal Shakti), Govt of India, along with a team of 5 Officials from CWC headed by Member (WP&P), CWC attended the event. Hon'ble Minister (Jal Shakti) delivered address in the Inaugural Session of the 24th ICID Congress, highlighting importance of water management and holistic approach towards management of this precious resource. He also held meetings with the delegates from other countries (Australia, Uzbekistan, Saudi Arabia, etc.) on the side-lines of the event. He also held meeting with the Business delegates engaged in the field of irrigation &

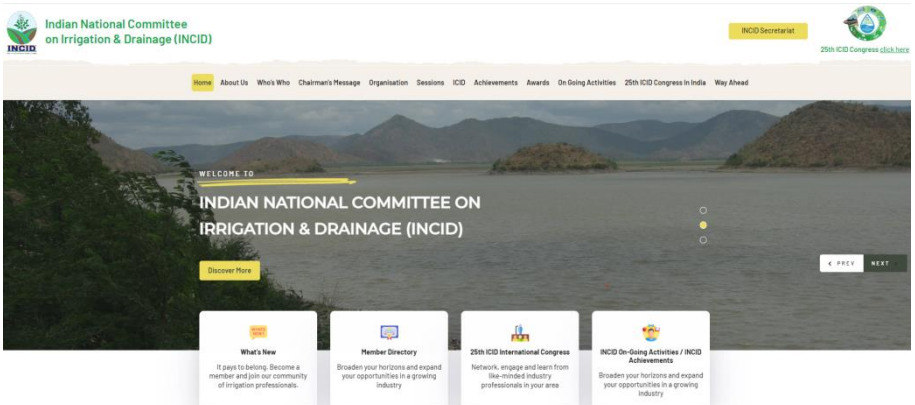


Fig. 17.1: Website of INCID (*http://incid.cwc.gov.in/*)

drainage and inaugurated the Exhibition of the ICID Congress where various entrepreneurs and departments had put up their studies, products etc for display.

INCID exhibited its activities at the international platform through a Display Booth. Further, the Govt. of Andhra Pradesh and INCID hosted a Reception Dinner. In addition to this, a Promotional event was hosted by INCID and Govt. of Andhra Pradesh on 07th October 2022 to promote the next event (25th Congress of ICID and 74th IEC) proposed to be held at Visakhapatnam (Vizag), Andhra Pradesh during Nov, 2023.

Fig. 17.2: Indian Delegation along with Hon'ble Minister (Jal Shakti) at 24th ICID Congress at Adelaide, Australia

F. **25th International Congress on Irrigation & Drainage & 74th IEC of ICID:** INCID is organizing the 25th International Congress & 74th IEC Meeting of ICID at Vishakhapatnam (Vizag), Andhra Pradesh during 1-8th, November, 2023 in partnership with the State Govt of Andhra Pradesh, CWC and ICID. This marks the return on the prestigious and mega event to India after a gap of almost 6 decades. The ICID Congress and IEC are expected to have about 1200 delegates from about 45 countries.

An Organizing Committee was constituted in April, 2022 to oversee the planning & management of the various aspects related to the organization of this event. The Organizing Committee has members from CWC, INCID, ICID, NWDA, Govt of Andhra Pradesh and Andhra University, Visakhapatnam (Andhra Pradesh).

G. **ICID WHIS Awards:** ICID, every year, announces awards namely: World Heritage Irrigation Structures (WHIS) and the Water Saving (WatSave) awards. On behalf of ICID, INCID every year invites nominations from the major irrigating States in prescribed format and recommends the deserving proposals to ICID, which further evaluates the nomination through a jury of international experts. Maximum four awards under the WHIS category are given to one country per year and one award under each of the four sub-categories of WatSave awards per year per country. India won 2 WHIS awards in 2018, 4 in 2020 and again 4 awards in 2021.

Now in 2022, India has again won the highest (4 nos) of WHIS awards which are listed below:

1. Baitarani Irrigation Project (Odisha)
2. Lower Coleroon Anicut (Lower Anicut) (Tamil Nadu)
3. Rushikulya Irrigation System (Odisha)
4. Sir Arthur Cotton Barrage (Dowleshwaram Anicut) (Andhra Pradesh)

18 PUBLICITY & PUBLICATIONS

18.1 Activities of Information System Organisation

The Information System Organisation (ISO), CWC brings out various publications at regular intervals on statistics related to water resources development and management and related aspects. Committees for improvement of all these publications have been constituted with the approval of Member (WP&P), CWC. The details of publications are given below:

18.1.1Pricing of Water in Public System in India (Periodicity: 5 years)

This publication is brought out at quinquennial basis (once in 5 years) and contains information on water rates for Lift and Flow Irrigation from Irrigation Departments of different States/UTs and Finance Accounts published by different States/UTs.

The important information available in the publication is as under:

- System of Assessment and Collection of Revenue : State-wise the Capital Expenditure, Revenue and Operational Expenses in respect of Major & Medium Irrigation Projects
- States/UTs-wise Irrigation charges for crops
- States/UTs-wise water rates (flow & lift) for specific crops viz. paddy, wheat, sugarcane, cotton etc.
- Governing Principles for fixation of Ground Water Abstraction and
- Water rates for domestic and industrial purposes

The latest edition of this publication is of 2022 and is available at the website of CWC.

18.1.2 Comprehensive Flood Management in India (Periodicity: 5 years)

The publication is brought out at quinquennial basis (once in 5 years) and intended to provide documentation of available data on comprehensive flood management in India. The information given in the publication is collected from FMP Directorate of CWC and Finance Accounts published by different States. The publication provides the following information on flood management in India:

- Constitutional Provisions for Flood Management
- Institutional Framework for Flood Management
- Approaches towards Flood Management
- Outcome of Flood Management Measures
- Efforts of Central Government for Flood Management in the Country
- Distribution of revenue expenditure by minor head of account and State
- Distribution of capital expenditure by minor head of account and State
- The Quantum of Damage due to Floods/Heavy Rains

The latest available edition of this publication is of 2018 and is available at the website of CWC.

18.1.3 Hydrological Data (Unclassified) Book (Periodicity: Annual)

This annual publication provides information of Hydrological Data for un-classified basins collected from the observation sites of CWC. The important information included in the publication is as follows:

- List of all basins (unclassified), assessment of water resources and an account of per capita availability of water
- Salient features of each basin like geographical location, major tributaries, soil characteristics, availability of minerals, major industries and important irrigation projects
- An account of average annual flow, estimated utilizable flow and total storage capacity

(completed and on-going projects) in different river basins

- Drainage area, hydrological observation sites, peak water level in different basins as well as maximum and minimum observed water levels and discharge at various sites in a river basin
- Annual dependable flow of water at terminal sites of river basins for the last thirty years
- Time series data of Sediment load by site in river basin, Tolerance limits of selected water quality parameters for inland surface water on the basis of its use, Critical absolute values of water quality parameters crossing tolerance limits (season-wise and basis-wise)
- Maximum and Minimum values of water quality parameters by site-wise and river basin-wise.
- Land use statistics: land utilization pattern of the unclassified river basins, gross and net area irrigated, source-wise and basin-wise.
- Basin-wise(unclassified) basic parameters of Ground water resource availability, utilization and stage of development

The latest available edition of this publication is of October, 2021 which is available at the website of CWC. The next edition of this publication is under process.

18.1.4 Water and Related Statistics (Periodicity: 2 Years)

The publication titled 'Water and Related Statistics' is brought out on biennial basis (once in 2 years). The information given in this publication is collected from various Directorates of CWC, various Ministries/Departments and other Organizations. This publication provides data/information on global water scenario; water and related aspects, financial aspects of water and related sectors and environmental aspects of water resources development activities in the country. It consists of data/information related to the following three chapters viz. i) Water and Related Resources, ii) Financial Performance and iii) Environmental Performance.

The latest available edition of this publication is of October, 2021 and is available at the website of CWC.

18.1.5 Water Sector at a Glance erstwhile 'Abstract on Water Sector' (Periodicity: Annual)

This publication provides a gist of water resources and related aspects at all India level. It is brought out on annual basis. The information given in this publication is collected from various Directorates of CWC, various Ministries/Departments and other Organizations. The first edition of this publication was released in December, 2020 with the name of 'Abstract on Water Sector-2020' while the second edition of this publication was released in November, 2022 with the name of 'Water Sector at a Glance-2021' and is available at the website of CWC. This publication provides a gist on the following 8 Sections viz. i) National Water Policy, 2012 ii) Water Resources at a Glance iii) Land-Use Statistics iv) Major and Medium Irrigation and other Projects v) Flood Management vi) Navigation-Inland Water and Transport vii) Hydro-Electric and viii) International Treaties and Cooperation

18.1.6 Financial Aspects of Irrigation Projects (Medium and Major) in India (Periodicity: 5 Years)

This publication is brought out at quinquennial basis (once in 5 years) and contains information on financial aspects related to irrigation projects at States/UTs level as well as all India level. The important information available in the publication are as under:

- Capital Expenditure, Working Expenses and Gross Receipts in respect of:
  - Major & Medium Irrigation Projects
  - Minor Irrigation Projects
  - CAD Programme
- State-wise status of Accelerated Irrigation Benefits Programme (AIBP) - Central Loan Assistance (CLA)/ Grant Released for Major, Medium and ERM Projects

- Number of Water Users Associations (WUAs) formed and area covered State-wise
- Central Assistance releases under CAD Programme by States

The source of information for this publication is Financial and Revenue Accounts of the Union and State Governments brought out by the Comptroller & Auditor General of India and the Accountant General of the States respectively. The latest edition of this publication is of December, 2020 and available at the website of CWC. The next edition of 2025 is under process.

18.2 Publication of Journals/ bulletins

18.2.1 Bhagirath

Since 1954, CWC has been publishing Bhagirath (English) which is one of unique publication related to Water Sector. In addition to above, Bhagirath (Hindi) is also being published since 1974. During 2022-23, following Volumes were published:

Bhagirath (English) Journal	Annual Issue 2020
	Annual Issue 2021
Bhagirath (Hindi) Journal	Annual Issue 2020

18.2.2 Jalansh- The Monthly Newsletter of CWC

Central Water Commission initiated publication of monthly newsletter titled "Jalansh" in August, 2018. The main purpose of this newsletter is to appraise the stakeholder organizations and public at large about the activities of Central Water Commission and other pertinent information related to water sector. Limited copies of the Newsletter is printed and distributed to limited audience. The softcopy is hosted on CWC website and also sent by email to a large no. of recipients for wider dissemination. During 2022-23, total of 7 monthly newsletters (from April-22 to March-2023) were published. These can be accessed from URL: http://cwc.gov.in/Jalansh

Hindi is the most commonly spoken language in India, so the hindi edition of Jalansh is also being published along with its English version. These can be accessed from URL: http://cwc.gov.in/hi/Jalansh

These publications are reviewed by the Editorial Board constituted under the Chairman-ship of Chief Engineer (HRM), CWC.

18.3 Compilation of News articles related to Water and allied sector

CWC is compiling the news articles related to water and allied sector published in various newspapers on daily basis and uploads the same on CWC website for wide dissemination. Such compilation can be used by officers of Central and State organisations as well as general public for keeping them updated on latest events taking place in the sector.

These can be accessed from following URL: http://cwc.gov.in/news-clipping

18.4 Engineering Museum

CWC is maintaining an engineering museum at Kalindi Bhawan, New Delhi. The museum has various translite, photographs, charts, working models related to the development of the water resources sector. This museum is visited by various officers, school children, etc. to get a feel of the matters related with water resources sector. On behalf of DoWR,RD&GR, MoJS, CWC participated in the following exhibitions related to water resources sector during the year 2022-23:

1) Govt. achievement & schemes expo at New Delhi from 17th to 19th June 2022
2) 9th Indian National Exhibition at Kolkata from 4th to 8 th August 2022
3) Aspiring Haryana at Hisar from 28th to 30th July 2022
4) Garavi Gujrat at Mehsana from 8th to 10th july 2022
5) 25th National Exhibition at kolkata from 24th to 27th auagust 2022
6) Jaipur Expo at Jaipur from 22nd to 24th september 2022

7) 7th Vibrant India at New Delhi from 14th to 16th Oct.2022
8) Vision Rajasthan at Sirohi from 1st Nov to 3rd Nov. 2022
9) Akash for Life at Dehradun from 5th-7th Nov.2022
10) IITF at New delhi from 14th to 27th Nov.2022
11) 13th Agro Vision at Nagpur from 25th-28th Nov.2022
12) HADR Exhibition at Agra from 28th-30th Nov. 2022
13) Shining Maharashtra at Akluj from 22nd-24th Dec.2022
14) 26th Sundarban krishi Mela at kolkata from 20th-29th Dec.2022
15) Rise in Up at Gaziabad from 22nd-24th Nov. 2022
16) Shining Madhya Pradesh at Ujjain from 18th-20th January-2023
17) 2nd Edition of Momentum NER at Guwahati from 20th-22nd January 2023
18) Govt.Development schemes expo at New Delhi from 3rd-5th March 2023
19) Alluring Rajasthan at Udaipur from 23rd-25th Feb. 2023
20) Ek Nayi Disha Aatmnirbhar Bharat at New Delhi on 15th March 2023
21) Jal prahari Samman Samaroh at New Delhi on 29th March 2023.

18.5 Presence on Social Media Platforms

Social Media Platform now-a-days is an important means to communicate with common people, disseminate information and create awareness. In order to fully harness the facility, CWC is operating accounts on various Social Media platforms such as Facebook, Twitter, Instagram and YouTube for dissemination of information to public at large. The URL for these accounts is as under.

https://twitter.com/CWCOfficial_GoI

https://www.facebook.com/CWCOfficial.GoI

https://www.instagram.com/cwcofficial.goi

https://www.youtube.com/c/CWCOfficialGoI

In addition to above, the Flood Forecasts are issued from the dedicated links given as below:

https://www.facebook.com/CWCOfficial.FF/

https://twitter.com/CWCOfficial_FF

18.6 Azadi ka Amrit Mahotsav

Azadi Ka Amrit Mahotsav is an initiative of the Government of India to celebrate and commemorate 75 years of independence and the glorious history of its people, culture and achievements. It commenced on 12th March 2021 starting a 75- week countdown to our 75th anniversary of independence i.e. 15th August 2023. CWC celebrated Azadi Ka Amrit Mahotsav by organising events/exhibitions and performing various activities at HQ and Field offices.


Fig. School children visit the CWC Museum at Kalindi Bhawan, New Delhi

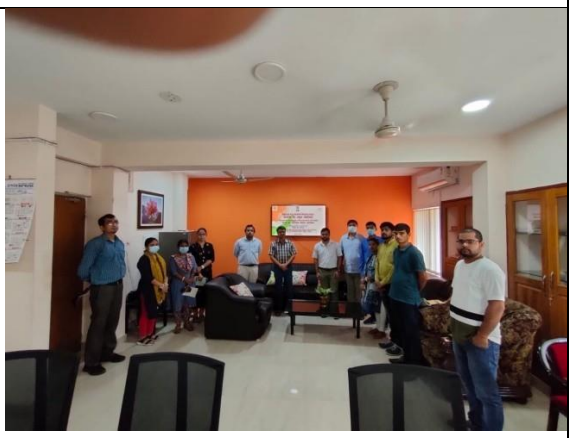
Interaction with Farmers regarding Modern Irrigation practices under NBO, Bhopal.

जल संरक्षण पर स्कूली छात्र/छात्राओ के लिए शिक्षा कार्यक्रम- यमुना बेसिन संगठन,नई दिल्ली

Mass awareness programme on Rainwater Harvesting, Sprinkler and Drip Irrigation system, problem of Single-use plastic, Ground Water Facts, etc. at Mahi & Tapi Basin Organisation, Central Water Commission, Gandhinagar.

Quiz & Painting competition in Vivekananda Kendra Vidyalaya, Chimpu, Itanagar under BOBO, Shillong and Awareness rally in Public place.

उपमंडल कार्यालय कोटा अधीनस्थ कार्यालय यमुना बेसिन संगठन,नई दिल्ली के समीप के विद्यालय के साथ जल निकायों के मरम्मत,नवीनीकरण एवं जीर्णोद्धार विषय पर चित्रकला प्रतियोगिता का आयोजन



An internal programme held at T&BDBO, Kolkata to commemorate the freedom struggle movement of India and pay respect to the martyrs of the freedom movement of India

18.7 Mass Awareness Activities

1. नर्मदा बेसिन संगठन, भोपाल, म.प्र. विज्ञान एवं प्रद्योगि की परिषद एवं नर्मदा समग्र द्वारा दिनांक 18.05.2022 एवं 19.05.2022 को भोपाल, म.प्र. में माननीय श्री प्रह्लाद सिंह पटेल, केन्द्रीय राज्य मंत्री, जल शक्ति मंत्रालय एवं माननीय श्री शिवराज सिंह चौहान, मुख्य मंत्री, मध्य प्रदेश के उपस्थिति में नदी उत्सव 2022 का आयोजन किया गया

2. "Alluring Rajasthan" Exhibition was held from 23.02.2023 to 25.02.2023 in Udaipur, Rajasthan. CWC won award for best Stall in Water Resource and Conservation category presented by Shri Arjun Lal Meena, Member of Parliament, Udaipur.

3. The 108th Indian Science Congress was organized at Nagpur from 03.01.2023 to 07.01.2023 on the theme- "Science and Technology for Sustainable Development & Women Empowerment". Ministry of Jal Shakti also had a stall in the exhibition. Apart from displaying several activities of the Department of Water Resources, River Development and Ganga Rejuvenation, a typical Rain water harvesting model was demonstrated by officers of Regional Organization of CWC at Nagpur at exhibition. The system is very simple, made up of some PVC pipes and a barrel. It is so easy to prepare that anyone can install it. This system is being successfully used at many HO sites of CWC across the country. Regional office of CWC, Nagpur explained the benefits of rainwater harvesting to the visitors and spread awareness especially amongst students. The visitors appreciated the model.

4. Nadi Utsav was organized at Mayurbhanj, Odisha from 14.02.2023 to 09.04.2023 by M&ERO, CWC, Bhubaneswar.

5. "Agro Vision-2022" Exhibition was held in Nagpur, Maharashtra from 25.11.2022 to 28.11.2022. Exhibition was inaugurated by Sh Nitin Gadkari, Hon'ble Minister of Road Transport and Highway of India and Sh Shivraj Singh Chauhan, hon'ble Chief Minister of Madhya Pradesh. At this event, CWC displayed Vision, Mission, Policies and Activities of MoJS.

6. Vision Rajasthan-2022" Exhibition in Sirohi, Rajasthan organised from 01.11.2022 to 03.11.2022. At this event, CWC in collaboration with CGWB displayed Vision, Mission, Policies and Activities of MoJS.

18.8 Publication Registration System

A Publication Registration System for tracking, retention and version control of various publications of CWC has been evolved in house. It is being implemented from January, 2020 onwards. All the publications would invariably display a registration number on their back cover before printing/publication and hosting on CWC website. The registration number should be one of the prime requisite for getting approval by the competent authority for printing and hosting of the publication on CWC website. This registration is being done by WSE Directorate and a unique registration number is being provided based on the request in prescribed Proforma. Total **57** publications were registered during April, 2022 to March, 2023

ANNEXURES

Annexure – 5.1

List of Consultancy Projects in D&R Wing during the Year 2022-23

Sl. No.	Name of Project
Construction Stage Projects	
Andhra Pradesh	
1	Polavaram Irrigation Project
Gujarat	
2	Bhadbhut Barrage Project Phase I
Haryana	
3	AdiBadri Dam, SombSaraswati Barrage Project
Himachal Pradesh	
4	Phina Sigh Medium Irrigation Project
5	Renukaji Dam Project
Jharkhand	
6	North Koel Reservoir Project (Mandal Dam)
7	Icha Dam Under Subarnarekha M.P.Project
Karnataka	
8	Rehabilitation of sluice gates for Krishna Raja Sagar
Madhya Pradesh	
9	Construction of Proposed Intake well in Rajghat Dam Reservoir for drinking water scheme.
Meghalaya	
10	Ganol H.E.Project
Odisha	
11	Anandpur Barrage Project
12	Chheligada Irrigation Project
13	Hirakund H.E Project AdditionalSpillway
Rajasthan	
14	Parwan Project
15	Isarda Major Dam Project in Tonk District
16	Rehabilitation of Garada Earth dam
17	Navnera Barrage Project
18	Khetri Copper Complex, Tailing Dam
19	Construction of Earthen Dams in Village Bastawa Mata & Indroka, Jodhpur.
Uttar Pradesh	

Sl. No.	Name of Project
20	ArjunSahayakPariyojna
21	Kanhar Irrigation Project
22	Vetting of Designs & Drawings of Intake well & Approach Bridge in Rajghat Reservoir
Uttarakhand	
23	LakhwarMulti-Purpose Project
Bhutan	
24	Punatsangchu Stage-I H.E. Project
25	Punatsangchu Stage-II H.E. Project
Nepal	
26	Arun-3 HEP
DPR Stage Projects	
Andaman &Nicobar Islands	
1	Development of Fresh Water Lake at Flat Bay, Port Blair
Arunachal Pradesh	
2	Kaya Valley Irrugation Project
3	Burusuti Irrigation Projet
4	Mebo Irrigation Project
Assam	
5	Katakhal Irrigation Project
6	Buroi Irrigation Project
7	Madhura Irrigation Project
Bihar	
8	Irrigation Schemes in Sitamarhi district
Haryana	
9	Technical Examination/checking of design of cross regulator at RD 1000 of parallel Lined Channel and WJC (MLL)
10	Sharda Yamuna Link
Himachal Pradesh	
11	SatyarKhad Project
12	Kishau Multipurpose Project
Jammu & Kashmir	
13	Barinium Hydroelectric Project
Jharkhand	
14	Bhuswa Reservoir Scheme
15	Barkattha Reservoir Scheme

Sl. No.	Name of Project
16	Bhelwa Reservoir Scheme
17	Khuntishot Reservoir Scheme
18	Bhur Reservoir Scheme
19	Sonadubi Reservoir Scheme
Maharashtra	
20	Intra State Link Projects. Daman Ganga, Ekdare-Godavari link
21	Daman Ganga (Val/Vagh)-Vaitarna–(Upper Vaitarna)-Godaveri(Kadva-Dev) Intra State Link Irrigation Projects.
Meghalaya	
22	Simsang Dam project in South Garo Hills
Mizoram	
23	Mat - Sekawi HE Project
24	Tlawng HE Project
25	Tuichang HE Project
Odisha	
26	Vetting of Designs & Drawings of proposed Weirs/Barrages on National Waterway-5
Tripura	
27	Preperation of DPR of Haora
28	Champaicherra Projects
Uttar Pradesh	
29	Ayothya Barrage Project
30	Consultancy for Design & Preparation of the DPR for the proposed Panchnad Barrage of Yamuna River in District, Auraiya, Uttar Pradesh.
West Bengal	
31	Subarnarekha-Mahanadi interlinking Project
Bhutan	
32	Kuri GongriH.E.Project
Indo- Nepal	
33	SaptaKosiMulti-Purpose Project
Sp. Problem Projects	
Andaman & Nicobar	
1	RK Pur VK Pur Dams and Canals
Andhra Pradesh	
2	Polavaram Irrigation Project
Arunachal Pradesh	
3	Ranganadi HEP (3*35 MW)

Sl. No.	Name of Project
Assam	
4	Barbhag Drainage Development Scheme
5	Amjur Drainage Development Scheme
Bihar	
6	Durgawati Dam Project
Delhi	
7	Request for in-principal approval for construction of new Barrage near to Existing Barrage across Yamuna at Wazirabad.
Gujarat	
8	Sardar SarovarH.E.Project
Haryana	
9	Somb Sarasvati Reservoir Project.
10	Remedial measures to check recurring damages on D/S side of Hatnikund Barrage on river Yamuna
Himachal Pradesh	
11	ShongtongKarchamH.E.Project(450 MW) H.P
12	Karcham WangtooHEP(1000 MW)
13	Uhl- III , H.E.Project
14	Maintaining Full Reservoir Level (FRL) in Bhakra Dam and Pong Dam.
Madhya Pradesh	
15	IndraSagar Dam Munlti Purpose Project
Manipur	
16	Imphal Barrage-Replacement of Gates & Hoisting arrangement.
Odisha	
17	Upper Indravati hydro Elcetric Project
Punjab	
18	Construction of Ravi Canal Head Regulator – Revised design and drawing
19	Committee for assisting the technical viability of enhancing the capacity of Head Regulator of Indira Gandhi Feeder at Harike from 15,000 cusecs to 18,500 cusecs.
20	Setting up of Mini Hydel Projects on Bhakra Main Line (BML) Canal at 27 sites with a total capacity of 63.75 MW in Punjab.
21	Issue of blockage of Fazila Drain in Fazila
Rajasthan	
22	Analysis and resolution of Deficit discharge in the Rajasthan protion of Narmada Main Canal
23	Remodeling/reconstruction of Nohar feeder to increase its capacity from 226 cusecs to 332 cusecs

Sl. No.	Name of Project
Telengana	
24	Srisailam left bank Hydroelectric Project
25	Srisailam Project Hydro Electric (EDA)
Uttarakhand	
26	TapovanVishnugad HEP
Uttar Pradesh	
27	New Sharda Barrage, Janpad Champavat.
28	Kichha Barrage, Udham Singh Nagar.
29	Khamariya Head Regulator, Bareilly.
30	Development of cracks on top of existing earthen section of Kanhar Dam
Tripura	
31	Construction of Inlit at Feni River
West Bengal	
32	Farakka Barrage Project
33	Bindu Barrage, Jaldhaka, H.E. Project

Annexure-5.2

Status of Hydro Electric Projects under Appraisal in D&R Wing of CWC

Sl.	State	Project Name	Status
1	Andhra Pradesh	Standalone Pumped Storage component of Pinnapuram Integrated Renewable Energy Project,(1200MW-PFR)	Conditional Cleared
2	Andhra Pradesh	Upper Sileru Pumped Storage Project.	Cleared/ Under Examination
3	Andhra Pradesh	Singanamala Pump Storage Project.	Under Examination
4	Andhra Pradesh	Paidipalem East Pump Storage Project (1200MW)	Under Examination/ Comments issued
5	Andhra Pradesh	Somasila PSP	Comments Issued
6	Andhra Pradesh	Karrivalasa PSP	Comments Issued
7	Andhra Pradesh	Kurukutti PSP	Comments Issued
8	Andhra Pradesh	Chitravathi FSP	Under Examination
9	Andhra Pradesh	Owk FSP	Under Examination
10	Andhra Pradesh	Gandikota Pump Storage Project	Under Examination / Comments Issued
11	Andhra Pradesh	Yerravaram PSP	Comments Issued
12	Andhra Pradesh	Padipalem North PSP (1200 MW)	Under Examination
13	Andhra Pradesh	Singanamala PSP (800 MW)	Under Examination
14	Andhra Pradesh	Veeraballi PSP (1200 MW)	Under Examination
15	Arunachal Pradesh	Anjaw HEP (270)	Comments issued
16	Arunachal Pradesh	Niare H.E.Project	Under Examination / Comments Issued
17	Arunachal Pradesh	Demwe Upper Stage-I	Under Examination
18	Arunachal Pradesh	Upper Siang Multipurpose Project	Comments Issued
19	Himachal Pradesh	Jangi Thopan Powari Project	Comments issued
20	Himachal Pradesh	Luhri Stage-II H.E.Project (172 MW)	Comments issued
21	Himachal Pradesh	Reoli Dugli H.E.Project (Pre-DPR)	Comments issued/ Cleared
22	Himachal Pradesh	Purthi HEP H.E Project (Pre-DPR)	Comments issued

Sl.	State	Project Name	Status
23	Himachal Pradesh	Bardang HEP	Comments issued
24	Himachal Pradesh	Gyspa Dam Project	Comments issued
25	Himachal Pradesh	Sach Khas HE Project (Pre DPR)	Comments issued
26	Himachal Pradesh	Tandi-Rashil HE Project	Under Examination
27	Karnataka	Standalone Pumped Storage component of Saundatti Integrated Renewable Energy Project,(1260MW)	Comments issued
28	Karnataka	Sharavathy Pumped Storage Project	Under Examination
29	Karnataka	Narihalla PSP (300 MW)	Under Examination
30	Kerala	Idukki Extension Scheme	Comments Issued/ Under Examination
31	Madhya Pradesh	MP30 Gandhisagar Pumped Storage Project(1440MW)	Comments issued
32	Maharashtra	Warasgaon Pumped Storage Scheme (2*300 MW)-PFR	Comments issued
33	Maharastra	Bhavali PSP91500MW	Comments issued
34	Maharastra	Pane PSP (1500 MW)	Under Examination
35	Meghalaya	Simsang Dam Project	Under Examination
36	Odisha	Upper Indravati Pumped Storage Project (600 MW)-PFR	Cleared
37	Odisha	Khadaga Hydro Power Project.	Under Examination
38	Odisha	Upper Kolab Pumped storage Project (UKPSP)	Comments issued
39	Odisha	Balimela Pumped Storage Project (500MW).	Comments issued
40	Rajasthan	Sukhpura PSP (2560MW)	Under Examination / Comments Issued
41	Rajasthan	Shahpur PSP (1800MW)	Under Examination / Comments Issued
42	Rajasthan	Sirohi PSP (1200 MW)	Under Examination
43	Sikkim	Memorandum of changes from concurred Feasibility Report of Rangit H.E Project Stage-IV	Comments issued
44	Tamil Nadu	Sillahalla Pumped Storage HEP Stage-I (1000 MW)	Comments issued
45	Telangana	Palamuru Ranga reddy Lift Irrigation Scheme.	Under Examination
46	Uttarakhand	Devsari HEP(162 MW)	Comments issued
47	Uttarakhand	Sirkari Bhyol Rupsiabagar HE Project.	Cleared

Sl.	State	Project Name	Status
48	UT of J&K	Bonar Lolab	Under Examination
49	UT of J&K	Uri-I (240 MW) HE Project	Cleared
50	UT of J&K	Dulhasti Stage – II HE Project	Cleared
51	UT of J&K	Sela Urthing HE Project	Under Examination/ Comments Issued
52	UT of J&K	Ujh Multipurpos Project	Under Examination
53	UT of Ladakh	Dubrok Shyok H.E.Project (19 MW)	Comments issued
54	UT of Ladakh	Nimu Chilling H.E.Project (24 MW)	Comments issued
55	UT of Ladakh	Drass HEP	Comments issued
56	West Bengal	Teesta Intermediate HEP 90 MW	Under Examination/ Comments issued
57	West Bengal	Memorandum of changes in respect of Teesta-VI H.E.Project (4*125=500).	Under Examination
58	West Bengal	Subarnlekha-Mahanadi link Project	Comments issued
Projects in Foreign Countries: 03 Nos.			
1	Nepal	Lower Arun HE Project (669 MW)	Under Examination/ Cleared
2	Nepal	Arun-4 HEP (490MW)	Comments issued
3	Nepal	West Seti H.E.P	Under Examination/ Comments issued

Annexure-5.3

Status of Irrigation Projects under Appraisal in D&R Wing of CWC

Sl.	State	Project Name	Status
1	Arunachal Pradesh	Flood Protection and River Front Development work on Yomgo River at Aalo Township under West Siang District.	Comments Issued
2	Arunachal Pradesh	Flood Management Work at Sub-Basin Kley River at Ziro Lower Subansiri District.	Comments Issued
3	Arunachal Pradesh	Anti Erosion Work Over Senki River at Chandranagar, Itanagar.	Comments Issued
4	Arunachal Pradesh	Anti Erosion Work Over Pachin River from DPS Bridge Point, Rechi to Tagatara under Itanagar.	Comments Issued
5	Arunachal Pradesh	Anti Erosion Work & River Front Development on Kameng River in East Kameng District.	Under Examination
6	Himachal Pradesh	Phina Singh Medium Irrigation Project	Cleared
7	Karnataka	Bhandura Nala Diversion Scheme.	Cleared
8	Karnataka	Kalasa Nala Diversion Scheme.	Cleared
9	Madhya Pradesh	Parbati-Kuno-Sindh Link(ERCP-PKC)	Under Examination
10	Madhya Pradesh	ERM of Sanjay Sarovar Project	Under Examination
11	Odisha	Upper Udanti Irrigation	Under Examination
12	Rajasthan	Eastern Rajasthan Canal Project	Comments Issued
13	Rajasthan	Revised DPR of Transfer of Rajasthan Share of Yamuna Water at Tajewala Head Works to Churu and Jhunjhunu Districts of Rajasthan by underground conveyance system and its utilization.	Comments Issued
14	Rajasthan	Gang Canal Automation	Cleared/ Under Examination
15	Telangana	Palamuru Rangareddy Lift Irrigation Scheme	Under Examination
Projects in Foreign Countries: 01 No.			
1	Nepal	Detailed feasibility study or Nepal Gandak Irrigation System Extension Project, Nawalparasi.	Comments Issued

Annexure- 5.4

Status of Multipurpose Projects under Appraisal in D&R Wing of CWC

Sl.	State	Project Name	Status
1	Andra Pradesh & Tamil Nadu	Godavari(Inchampalli) – Cauvery (Grand Anicut) Link Project	Under Examination
2	Arunachal Pradesh	Upper Siang Multi-Purpose Project	Comments issued
3	Himachal Pradesh	Kishau Multi- Purpose Project	Comments issued
4	Karnataka	Mekedatu Balancing Reservoir cum Drinking Water Project (PFR)	Comments Issued
5	Karnataka	Upper Krishna Project, Stage-III	Under Examination
6	Madhya Pradesh	Comprehensive Report of Ken Betwa Link Project	Comments Issued
7	Odisha	Middle Kolab Multi Purpose Project	Comments Issued
8	Odisha	Lower Vansadhara Project	Comments issued
9	Telangana	Sita RamaLift Irrrigation Project	Under Examination

Annexure-5.5

Status of Projects received for Hydrological Studies under D&R Wing of CWC

S.No.	State	Name of Project	Status
1	Andhra Pradesh	Feasibility Study Report of Kurukutti Project	**Cleared**
2	Andhra Pradesh	Feasibility Study Report of Karrivalasa Project	**Cleared**
3	Andhra Pradesh	Detailed Project Report of Yerravaram Project	**Cleared**
4	Andhra Pradesh	Revised feasability Study Report of Owk PSP	Under Examination
5	Andhra Pradesh	Paidipalem East Pumped Storage Hydro Power Project	Under Examination
6	Andhra Pradesh	Singanamala Pumped Storage Hydro Power Project	**Cleared**
7	Andhra Pradesh	Palamaru Rangareddy LIS	Comments issued
8	Andhra Pradesh	Veeraballi Pumped Storage Project (1800 MW)	Under Examination
9	Arunachal Pradesh	Jiadhal Dam Project	**Cleared**
10	Arunachal Pradesh	Nafra Hyd Project (WA study)	**Cleared**
11	Arunachal Pradesh	Niara Hyd Project	**Cleared**
12	Arunachal Pradesh	Tawang I & II HEP	**Cleared**
13	Arunachal Pradesh	Erosion Control and Flood Management in Left Bank of Siang River under Mebo Sub Division.	**Cleared**
14	Arunachal Pradesh	Erosion Control and Flood Management in Right Bank of Siang River under Pasighat Sub Division	**Cleared**
15	Arunachal Pradesh	Flood Control and Flood Management Over Sibokorong River under Pasighat Sub Division	**Cleared**
16	Arunachal Pradesh	Flood Management work at Sub Basin Kley River at Ziro Lower Subansiri District Arunachal Pradesh	**Cleared**
17	Arunachal Pradesh	Flood protection and river front development work on yomgo river at aalo township under west siang district	**Cleared**
18	Arunachal Pradesh	PFR of Upper Siang Project	**Cleared**
19	Arunachal Pradesh	Anti erosion work over Senki River at Chandranagar Itanagar (Re-uploaded)	**Cleared**
20	Arunachal Pradesh	Anti Erosion work along Remi River East Siang District(Protection work at	**Cleared**

S.No.	State	Name of Project	Status
		Miem,Miglung & Remi Village)	
21	Arunachal Pradesh	Anti Erosion work along Remi River East Siang District(Protection work at Oyan & Sile Village)	**Cleared**
22	Arunachal Pradesh	Erosion & FM works over left and Right bank of Simang river to protect entire agricultural land areas of supple sine pareng,Rengo,Lileng and Dosing Village	**Cleared**
23	Arunachal Pradesh	Anti Erosion work on botyh bank of Dollung River to protect agriculture land and village of Dollungmukh area	**Cleared**
24	Arunachal Pradesh	Anti Erosion and Flood protection work near Bogne mara to protect Aichingmorning agril filed habitats and valuable govt. And public properties under Jaring Circle	**Cleared**
25	Arunachal Pradesh	Protection of Lipu,Liru Village,Likabali township including BRO HQ Liakbali Army Division,Lower Siang District	**Cleared**
26	Arunachal Pradesh	FMP at the upstream and downstream side of confluence point along the right bank of Tezu and Lohit river to protect Tezu township and its adjoining areas	Comments issued
27	Arunachal Pradesh	Anti Erosion work and river front development on Kameng river in East Kameng district	**Cleared**
28	Arunachal Pradesh	Construction of river front development of Pappu valley Eask Kameng district	**Cleared**
29	Arunachal Pradesh	Anti Erosion work from Dumporijo to Rukrijo to project Dumporijo township(Ph-II)	**Cleared**
30	Arunachal Pradesh	Flood management work in Ranganadi basin under Lower Subanri district Arunachal Pradesh	**Cleared**
31	Arunachal Pradesh	River Training work on Yomgo river at Kabu village west siang district Arunachal Pradesh	**Cleared**
32	Arunachal Pradesh	Anti Erosion work over Pachin river from DPS bridge point to Rechi to Pagattara under Itanagar ,Arunachal Pradesh	**Cleared**
33	Arunachal Pradesh	Anti Erosion work over pachin river from barapani bridge to confluence of pare river	**Cleared**
34	Arunachal Pradesh	Flood Protection Work at Dibang River	**Cleared**

S.No.	State	Name of Project	Status
		Under Dambuk Sub Division Arunachal Pradesh	
35	Arunachal Pradesh	Mebo Irrigation Project	**Cleared**
36	Arunachal Pradesh	Anti erosion work to protect residential, agricultural, horticultural areas and tourist spot under Shiyomi district	Under Examination
37	Arunachal Pradesh	Construction of flood management border area programme to protect various village of Koyu Kora Circle at Singen,Ngele Sichi,Hingen,Hippo Sijju, Tene,Dobu, Ngopi,Saku and Doge River	Under Examination
38	Arunachal Pradesh	Hydrology Integrated flood and river erosion management project in Buri Dehing Basin	Under Examination
39	Arunachal Pradesh	Hydrology of River front development on right bank of Dikrong river at Banderdewa in Papum Pare	Under Examination
40	Arunachal Pradesh	Construction of flood control work under flood management and border area programme(FMBAP)at Kumey, Parsi and Parlo river to protect Parsi Parlo town under Kurung Kumey	Under Examination
41	Arunachal Pradesh	Flood and river erosion management project in Dissnsg Basin at Mopakhat and Longhua village in Arunachal Pradesh	Under Examination
42	Arunachal Pradesh	Anti erosion work on Lohit river to protect Yatong township, village and agricultural land	Under Examination
43	Arunachal Pradesh	FM & BAP work at Palin	Under Examination
44	Arunachal Pradesh	Construction of flood control work boulder gabion wall bank of Panyo river at Nyapin town,Chabang and Langrh under ADC Nyapin Sub-Divisional	Under Examination
45	Arunachal Pradesh	Flood management border area programme to protect various villages of Nari Circle at Dobu River	Under Examination
46	Arunachal Pradesh	Flood Protection work at Mini Secretariat area,Dirang	Under Examination
47	Arunachal Pradesh	Flood management work in Sigen river to protect Gensi town and WRC field at Gensi	Under Examination
48	Arunachal Pradesh	Flood management work on river Kley & its tributaries at Ziro district,Lower Subansiri district	Under Examination

S.No.	State	Name of Project	Status
49	Arunachal Pradesh	Nafra HEP (DF study)	Under Examination
50	Arunachal Pradesh	Anti erosion work on right bank of Subansiri river to protect JNV school at Meg Dong village and agriculture horticulture land of Meg Dong and Lillidong village	Under Examination
51	Arunachal Pradesh	Anti erosion work at Zemithang, BTK and Namtsering Villages in Border Area of Tawang District(Nyamjang Chu River)	Under Examination
52	Arunachal Pradesh	Anti erosion work along Onkhar Nallah to protect Bomba, Gyankhar, Paidhar, Maidung, Jaleng and Bumteng Villages in Tawang District (Onkhar River)	Under Examination
53	Arunachal Pradesh	Anti erosion work in Siang river to protect Yingkiong Township(Siang River)	Under Examination
54	Arunachal Pradesh	Flood & river erosion management project in Ranga Nadi basin, under Water Resources division Sagalee,Papumpare District,Arunachal Pradesh	Under Examination
55	Arunachal Pradesh	Anti erosion work on Pappu Nallah from Modirijo to confluence of Pachin river Naharlagun(Pappu Nallah)	Under Examination
56	Arunachal Pradesh	Anti erosion work over Pachin river from Pagatara to Barapani bridge	Under Examination
57	Arunachal Pradesh	Climate Resilient Brahmaputra Integrated Flood and River bank Erosion Risk Management Project in Assam-Morigaon,Nagaon,Tezpur Sub project	Under Examination
58	Arunachal Pradesh	River training and flood management on the banks of Khud river at Kimin in Papumpare District	Under Examination
59	Arunachal Pradesh	Climate Resilient Brahmaputra Integrated Flood and River bank Erosion Risk Management Project in Assam-Guwahati West ,P.G.P Sub project	Under Examination
60	Arunachal Pradesh	Flood & River Erosion Management Project in Dikrong Basin under Water Resources Division Sagalee, Papumpare District	Under Examination
61	Assam	R/S to B/Dyke from Bahari to Baghbar including protection of Bahari with channelization of Brahamputra River	**Cleared**
62	Bihar	Chikna and Bhimakakaleshwar Iriigation scheme in Sitamarhi district Bihar	**Cleared**

S.No.	State	Name of Project	Status
63	Bihar	DPR of Kharagpur Lake, Bihar	**Cleared**
64	Himachal Pradesh	Hydrological Study of Reoli-Dugli HEP	**Cleared**
65	Himachal Pradesh	Hydrological Study of Bardang HEP	**Cleared**
66	Himachal Pradesh	Hydrological Study of Purthi HEP	**Cleared**
67	Himachal Pradesh	Hydrological Study of Tandi HEP	Comments issued
68	Himachal Pradesh	Hydrological Study of Sach Khas HEP	**Cleared**
69	Himachal Pradesh	Mallana-II HEP, Himachal Pradesh	**Cleared**
70	Himachal Pradesh	DPR for Construction of Medium Irrigation project by providing Rain Water Harvesting Structure in Satyar Khad (near Parchhoo) in tehsil Dharampur/ Sarkaghat distt. Mandi. H.P (Consultancy)	Under Examination
71	Himachal Pradesh	Review of PMF studies in respect of Pandoh & Pong Dams	**Cleared**
72	Jammu & Kashmir	Jainpur / Makora Pattan after construction of Ujh Multipurpose Project	**Cleared**
73	Jammu & Kashmir	Kirthai-II, HEP, J&K	Under Examination
74	Jharkhand	DPR Lugu Pahar Pump Storage Project, Jharkhand.	Under Examination
75	Gujarat	Design Flood Review Sardar Sarovar Dam	**Cleared**
76	Karnataka	Modified Bhandura Nala Diversion Scheme (Lift Scheme)	**Cleared**
77	Karnataka	Narihalla PSP (300 MW)	Under Examination
78	Kerala	Feasibility Study Report -hydrology of Idukki Extension scheme	**Cleared**
79	Madhya Pradesh	PFR of Extesnion Renovation And Modernisation of Sanjay Sarovar Project	Comments issued
80	Madhya Pradesh	Karam Dam Medium Irrigation Project	Comments issued
81	Maharashtra	Detailed Project Report of Warasagoan Pumped Storage Hydro-electric Project	Under Examination
82	Maharashtra	Damanganga-Vaitarna-Godavari Link Project	**Cleared**
83	Maharashtra	Feasibility report of Bhavali PSP	**Cleared**
84	Maharashtra	Par-Tapi-Narmada & Damanganga-Pinjal link projects	Under Examination
85	Maharashtra	Nira Deoghar Project	Under Examination
86	Maharashtra	Pane Pumped Storage Project (1500 MW)	Under Examination
87	Meghalaya	Mawblei H. E. Project (2*70 MW)(DF)	Under Examination
88	Meghalaya	Umngot HEP	Under Examination
89	Mizoram	Tuichang HEP	Under Examination
90	Mizoram	Mat Sekawi HEP	Under Examination
91	Odhisha	Subarnarekha-Mahanadi Link Project	**Cleared**
92	Odhisha	Balimela PSP	Under Examination
93	Rajasthan	Revised PFR of Diversion of Surplus	Comments issued

S.No.	State	Name of Project	Status
		Water of Sabarmati Basin for filling of Jawai Dam, Rajasthan	
94	Rajasthan	Pre-feasibility report of modified parbati – kalisindh-chambal link project integration with eastern rajasthan canal project	**Cleared**
95	Rajasthan	Sukhpura Off- Stream Closed Loop Pumped Storage Project	**Cleared**
96	Rajasthan	Shahpur Off- Stream Closed Loop Pumped Storage Project	**Cleared**
97	Rajasthan	DPR of Phase-I of Modified Parbati Kalisindh Chambal (PKC) link project	Under Examination
98	Tamilnadu	Climate adaptation in Vennar Sub-basin in Cauvery Delta project-2	Comments issued
99	Telengana	Sita Rama Lift Irrigation Project	Under Examination
100	Telengana	Design Flood Review Kinnersani Project.	Under Examination
101	Telengana	Modikuntavagu MI Project	comments issued
102	Telengana	Revised report of Kaleshwaram Project	**Cleared**
103	Telengana	P.V Narasimha Rao Kanthanapally (Thupakulagudem) Project renamed as " Sammakka Sagar" Project	comments issued
104	Uttar Pradesh	Hydrological studies of Pailani and Banda Barrage on Ken river	**Cleared**
105	Uttar Pradesh	Kanhar Irrigation Project, Uttar Pradesh	**Cleared**
106	Uttarakhand	International aspect of Sirkari Bhyol Rupsiabagr HEP	**Cleared**
107	Uttar Pradesh	Panchnad Barrage	**Cleared**
108	Uttar Pradesh	Design flood review of Bariyarpur Weir	Comments issued
109	Uttarakhand	Joshiyara barrage of ManeriBhali Stage-II HEP (4X76 MW) under DRIP, Phase-II	Under Examination
110	Uttarakhand	Bowala Nand Prayag HEP, Uttarakhand	Comments issued
111	Uttarakhand	Kishau Multi Purpose Project, Uttarakhand	Comments issued
112	Uttarakhand	Talaghati Drinking Water Project	**Cleared**
113	Uttarakhand	Consultancy for the study for reassessing the design flood for Tapovan Vishnugad HEP, Uttarakhand.	Under Examination
114	Uttarakhand	Bokang Bailing HEP	Under Examination
115	West Bengal	West Bengal Accelerated Development of Minor Irrigation Project Phase - II	**Cleared**
116	West Bengal	Teesta Barrage	**Cleared**
117	West Bengal	Teesta Intermediate HEP (90 MW)	Under Examination
118	West Bengal	Teesta Barrage Project (study note)	Under Examination

S.No.	State	Name of Project	Status
Projects in Foreign Countries			
1	Nepal	Submission of Pre Feasibility report and Techno-economic clearance of Arun-4 HEP	**Cleared**
2	Nepal	Sapta kosi High Dam Multipurpose Project and Sun kosi Storage cum diversion scheme	Under Examination
3	Republic of Niger	Appraisal Report on the Agriculture Irrigation Project for the Resettlement Sites of the Kandadji Programme (Phase-2) in the Republic of Niger	**Cleared**
4	Nepal	Lower Arun HEP-Concurrence of DPR	Comments issued
5	Nepal	Inod-Nepal Matter:- Detailed feasibility stduy on Design and Estimate for Direct offtake on Bishnugunj Branch Canal FromMain Western Canal	Under Examination
6	Nepal	West Seti HE Project, Nepal	Comments issued

Annexure- 5.6

Technical evaluation of Site Specific Seismic reports carried out during 2022-23

1. Doongri Dam Project Site, Rajasthan
2. Kunnu Barrage Project Site, Rajasthan
3. Selim HEP, Meghalaya
4. Bhadbhut Project, Gujarat (considered in 37th NCSDP meeting)
5. Ukai Project, Gujarat
6. Kirthai-II HEP, Jammu & Kashmir (considered in 37th NCSDP meeting)
7. Panam Project, Gujarat
8. Hir Project, Gujarat
9. Dharoi Project, Gujarat
10. Mach Project, Gujarat
11. Saundatti PSP Project, Karnataka
12. Shetrunji Dam, Gujarat
13. Kadana Dam, Gujarat (cleared in 37th NCSDP meeting)
14. Simsang Dam Project, Meghalaya
15. MP 30 Gandhisagar PSP, Madhya Pradesh (considered in 37th NCSDP meeting)
16. Chitravathi PSP, Andhra Pradesh (cleared in 37th NCSDP meeting)
17. Damanganga - Ekdare– Godavari, Maharashtra
18. Sharavathy PSP, Karnataka
19. Damanganga - Vaitarna – Godavari , Maharashtra
20. Tlawng HE Project, Mizoram
21. Oju H.E. Project , Arunachal Pradesh
22. Sarasvati River Rejuvenation and its Heritage development project, Haryana
23. Arun-4 Hydro Electric Project, Nepal

Annexure-5.7

Technical Examination of Projects carried out during 2022-23 for Seismic and Foundation Aspects

Sl.	Name of the Project	Date of Observation/ Received	Status
1.	Anjaw HEP (270MW), Arunachal Pradesh	12.09.2022	Observations issued
2.	Upper Sileru PSP (1350 MW), Andhra Pradesh	06.03.2023	Observations issued
3.	MP 30 Gandhi Sagar PSP (1440MW), Madhya Pradesh	30.12.2022	Observations issued
4.	WarasgaonPSP (4x300MW), Maharashtra	30.11.2022	Observations issued
5.	Gandikota PSP(4x250 MW), Andhra Pradesh	23.01.2023	Compliance Received
6.	Chitravathi PSP(2x250 MW), Andhra Pradesh	24.02.2023	Observations issued
7.	Niare HEP(770 MW + 90 MW), Arunachal Pradesh	26.09.2022	Observations issued
8.	Lower Arun HE Project(669MW), Nepal	20.05.2022	DPR Cleared
9.	REOLI DUGLI HEP, Himachal Pradesh	30.12.2022	Observations issued
10.	Upper Siang Multipurpose Project, Arunachal Pradesh	20.10.2022	Observations issued
11.	Paidipalem East PSP (1200 MW), Andhra Pradesh	22.03.2023	Observations issued
12.	Arun-4 HEP (490 MW), Nepal	22.03.2023	Observations issued
13.	Sukhpura PSP (2560 MW), Rajasthan	19.10.2022	Observations issued
14.	SelaUrthing HEP (114 MW), Uttarakhand	29.09.2022	Compliance Received
15.	Idukki Extension Scheme, Kerala	07.02.2023	Compliance Received
16.	Bhavali PSP (1500 MW), Maharashtra	20.01.2023	Compliance Received
17.	Teesta Intermediate HEP (90 MW), West Bengal	25.10.2022	Compliance Received
18.	Tandi-Rashil HEP (268 MW), Himachal Pradesh	27.12.2022	Observations issued shortly

Annexure-5.8

Draft standards/amendments to IS Codes approved by Chairman, CWC during 2022-23 for adoption and printing

Sl.	Code	Subject	Date of approval
1	WRD22 (14188)	Planning and design of guide banks for alluvial rivers guidelines (Second revision of IS 10751)	19.04.2022
2	WRD/05/17646	Geological Exploration for Tunnels Guidelines (IS 17883 : 2022)	15.07.2022
3	WRD 09 (17967)	Junction of Earth/Earth Core Rockfill Dam with Spillway, Non-Overflow (NOF) Dam, Foundation and Outlets — Guidelines	02.09.2022
4	WRD/05/15908	Amendment No. 1 to IS 13578:2008 Subsurface exploration for Barrages and Weirs - Code of Practice (First Revision)	15.09.2022
5	WRD 01 (16254)	Hydrometry — Open Channel Flow Measurement Using Triangular Profile Weirs	30.09.2022
6	WRD 10 (16886)	Glossary of Terms Relating to River Valley Projects Part 6 Reservoirs (Second Revision)	30.09.2022
7	WRD/15/12602	Amendment No. 1 to IS 12837:1989 Hydraulic Turbines for Medium and Large Power Houses- Guidelines for Selection.	31.10.2022
8	WRD/15/11558	Amendment No. 2 to IS 5496:1993 Guide for preliminary dimensioning and layout of elbow type draft tubes for surface hydroelectric power stations	31.10.2022
9	WRD 01(16253)	Liquid flow measurement in open channels-slope-area method(IS 2912 Second revision)	22.11.2022
10	WRD/13/17888	IS 4410 Glossary of Terms Relating to River Valley Projects Part 15 Canal Structures Section 1 General Terms	20.12.2022
11	WRD/13/17987	IS 4410 Glossary of Terms Relating to River Valley Projects Part 15 Canal Structures Section 2 Transitions	20.12.2022
12	WRD/13/18009	IS 4410 Glossary of Terms Relating to River Valley Projects Part 5 Canals	20.12.2022
13	WRD/13/18040	IS 4410 Glossary of Terms Relating to River Valley Projects Part 15 Canal Structures Section 5 Cross- Drainage Works	20.12.2022
14	WRD/ 12/17639	Recommendations for Design of Screw Hoists for Hydraulic Gates (First Revision of IS : 11228)	21.12.2022
15	WRD/ 12/18191	Painting system for Hydraulic Gates and Hoists - Guidelines (First Revision of IS : 14177)	21.12.2022
16	WRD/13/17627	Assessment of Seepage Losses from Canals by Analytical Method - Guidelines (First Revision)	30.12.2022

Annexure-7.1

List of the Irrigation / Multipurpose Projects Accepted by the Advisory Committee of DoWR, RD&GR during 2022-23

Sl. No.	Name of the Project	State	Type of the project	Estimated Cost (in Crore)	Intended Benefits
1.	North Koel Reservoir Project (8th RCE)	Jharkhand & Bihar	Major Irrigation	3199.85 Cr at Dec. 2021 PL	CCA-125500 ha
2.	Improvement to Swarnamukhi Anicut under Andhra Pradesh Irrigation & Livelihood Improvement Project, Phase –II (APILIP-II)	Andhra Pradesh	Medium Irrigation	53.635 Cr at 2020-21 PL	CCA-4127.80 Ha
3.	Rukni Irrigation Project	Assam	Major Irrigation	764.12 Cr at March 2020 PL	CCA-17566 Ha
4.	Sonai Irrigation Project	Assam	Major Irrigation	740.93 Cr at March, 2020 PL	CCA-10850 Ha
5.	Phina Singh Multipurpose Project	Himachal Pradesh	Multipurpose	643.68 Cr at March 2022 PL	CCA-4025 Ha Power-1.88 MW
6.	Mukteshwar (Chinna Kaleshwaram) lift irrigation scheme, Major, Telangana	Telangana	Major Irrigation	Rs. 545.15 Cr at March, 2021 PL	CCA- 18211 Ha.
7.	Rudha (Channaka - Korata) Barrage (Medium) - Inter State Project of Telengana & Maharashtra	Telangana & Maharashtra	Medium Irrigation	Rs. 452.50 Cr (Telengana-409.44 & Maharashtra-43.06)	CCA-6680 Ha.
8.	Choutpally Hanmanth Reddy Lift Irrigation Scheme (Medium), Nizamabad, Telangana	Telangana	Medium Irrigation	Rs. 48.207 Cr	CCA-3359 Ha.

Annexure - 7.2

List of the Flood Control Schemes Accepted by the Advisory Committee of DoWR,RD&GR during 2022-23

Sl. No.	Name of the Project	State	Type of the project	Estimated Cost (in Crore)	Intended Benefits
1.	Integrated Water Resources Management of Buridehing Basin	Assam	Flood Control	733.0473 Cr at 2021-2022 PL	Population benefitted-6,00,000 Area benefitted-65,000 Ha
2.	Integrated Flood and Erosion Management of Manasand Beki River in the District of Baksa and Barpeta in Brahmaputra Valley within Assam (Review)"	Assam	Flood Control	733.0473 Cr at 2021-2022 PL	Population benefitted-3,00,000 Area benefitted-80,000 Ha
3.	Flood Protection work near General Ground at upstream side of Decorai Irrigation Project at Seijosa in Pakke Kessang District,	Arunachal Pradesh	Flood Control	82.16 Cr at January 2022 PL	Population benefitted-12474 Area benefitted-550 Ha
4.	DPR on Providing Flood Protection Works and Channelization of Suketi Khad along with other Tributaries under Beas Catchment area in district Mandi	Himachal Pradesh	Flood Control	485.23 Cr at February, 2021 PL	Population benefitted-41493 Area benefitted-881 Ha
5.	DPR on Providing Flood Protection Measures for Swan River & its tributaries joining Beas Basin in Tehsil Amb, District Una	Himachal Pradesh	Flood Control	339.25 Cr at April, 2021 PL	Population benefitted-14744 Area benefitted-510.18 Ha
6.	DPR on Providing Flood Protection / Anti Erosion measures for Different Khads under Jaswan Pragpur Constituency, Distt. Kangra	Himachal Pradesh	Flood Control	504.07 Cr at April 2021 PL	Population benefitted-23715 Area benefitted-811.03 Ha

7.	Providing Flood Protection Works to Seer Khad from village Talwara to Balghat in Tehsil Ghumarwin/Jhandutta, District Bilaspur	Himachal Pradesh	Flood Control	195.49 Cr at April, 2021 PL	Population benefitted-14647 Area benefitted-179.35 Ha
8.	Project for construction of flood protection work for Thathyur and Bhawan from Aglad river in Tehri Garhwal	Uttarakhand	Flood Control	30.2189 Cr.	Population benefitted-3750 Area benefitted-29.70 Ha
9.	Anti -erosion work to the right bank of river Padma at AOR of BOP Atrosia and Renu for a total length of 1830.00 m in Block & P.S. - Lalgola, district - Murshidabad, West Bengal	West Bengal	Flood Control	Rs. 73.8298 cr. at 2022 PL	Population benefitted-35000 Area benefitted - 2500 Ha
10.	Construction of embankment of Right Bank of River Ganga at Hastinapur, district-Meerut, Uttar Pradesh	Uttar Pradesh	Flood Control	Rs. 73.3854 cr	Population benefitted-7915 Area benefitted-6672.20 Ha
11.	Protection for Construction of Marginal Bund in Purkaji Khadar along right bank of River Solani in District - Muzaffarnagar, Uttar Pradesh	Uttar Pradesh	Flood Control	Rs. 113.88 cr.	Population benefitted-17200 Area benefitted-3425 ha

Annexure - 7.3

The list of H.E Project accepted by TEC during 2022-23

Sl. No.	Name of the Project	State / Country	Installed Capacity (MW)
1.	Pinnapuram PSP	Andhra Pradesh	1200
2.	Dugar HEP	Himachal Pradesh	500
3.	Uri-I Stage-II HEP	Jammu & Kashmir	240
4.	Lower Arun HEP	Nepal	669
Total			**2609**

Annexure - 7.4

Present Status of Projects declared as National Projects

Sl. No.	Name of the Project	1) Irrigation (Ha) 2) Power (MW) 3)Storage (MAF)	Year-wise Central Assistance released under Scheme of National Project (Rs in Crores)	Status
1.	Gosikhurd, Maharashtra	1) 2.50 lakh 2) 26.5MW 3) 0.93 MAF (1147.14 MCM-Gross)	2008-09= 450.00 2009-10= 720.00 2010-11= 1412.94 2012-13= 405.00 2017-18= 166.59 2018-19=195.81 2019-20=50.34 2020-21=135.244 2021-22=146.548 2022-23=101.57 **Total= 3784.0445**	Project is under execution.
2.	Shahpurkandi, Punjab	1) 0.37 lakh 2) 206MW 3) 0.012MAF 120.71 MCM (Gross)	2009-10= 10.80 2010-11=15.236 2018-19=3.705 2019-20=56.295 2020-21=147.466 2021-22 = 49.1438 2022-23=33.76 **Total= 316.4058**	Project is under execution..
3.	Teesta Barrage, West Bengal	1) 9.23 lakh (5.27 Lakh-NP Component) 2) 1000 MW 3) Barrage	2010-11= 81.00 2011-12= 97.20 **Total= 178.20**	Project is at standstill since 2014-15 due to land acquisition issues.
4.	Saryu Nahar Pariyojana, Uttar Pradesh	1) 14.04(NP comp. 4.73) 2) - 3) Barrage	2012-13= 67.98 2013-14= 380.75 2014-15= 210.855 2015-16= 500.00 2016-17= 62.00 2018-19=305.00 2019-20=358.22 2020-21=358.30 2022-23=14.512 **Total = 2257.612**	Project is under execution. The project was inaugurated by the Hon'ble Prime Minister Shri Narendra Modi on 11th December, 2021.
5.	Polavaram Irrigation Project, Andhra Pradesh	1) 4.36 lakh ha 2) 960 MW 3) 1.73 MAF 4) 23.44 TMC of water to Vizag city for drinking and Industrial Purpose	2014-15= 250.00 2015-16= 600.00 2016-17= 2514.16 2017-18= 2000.00 2018-19=1400.00 2019-20=1850.00	Project is under execution. Central Assistance of Rs. 562.47 Cr also provided under AIBP prior to declaration of National

Sl. No.	Name of the Project	1) Irrigation (Ha) 2) Power (MW) 3)Storage (MAF)	Year-wise Central Assistance released under Scheme of National Project (Rs in Crores)	Status
		and Diversion of 80 TMC to Krishna.	2020-21=2234.20 2021-22=1898.8 2022-23=1670.61 **Total= 14418.39**	Project.
6.	Renukaji, HP	1) Drinking water 2) 40 MW 3) 498.33 MCM (Live)	2016-17=446.96 2021-22=1048.535 **Total= 1495.495**	Pre-construction activities are in progress. Revised cost finalised as 6946.99 Cr. at PL October, 2018. One–time special grant of Rs 446.96 Cr was provided as per order of Hon'ble Supreme Court. Subsequently, an amount of Rs. 10.61 Crore has been released further to Himachal Pradesh vide letter dated 11.08.2021 of DoWR,RD&GR to transfer it to Himachal Pradesh Power Corporation Limited (HPPCL) for depositing the same with the Hon'ble High Court Shimla towards land acquisition of Renuka Dam in the matter of Regular First Appeal RFA 161/2019 in compliance to Hon'ble High Court Order dated 30.07.2021. On Account Payment of Central Assistance under AIBP Capital Asset (PMKSY) in 2021-22 for Rs 1037.925 Cr were issued vide DoWR,RD&GR Letter dated 03.03.2022.
7.	Lakhwar Multipurpose Project, Uttarakhand	1) 0.338 2) 300MW 3) 587.84 MAF (Gross)/ 39.415 MCM(Drinking)/ 39.415 MCM (Industrial)	2022-23=38.58 **Total=38.58**	Pre-construction activities are in progress. RCE of the project amounting to Rs. 5747.17 at PL 07/2018 was accepted during 141stAdvisory Committee meeting held on 11.02.2019.

Sl. No.	Name of the Project	1) Irrigation (Ha) 2) Power (MW) 3)Storage (MAF)	Year-wise Central Assistance released under Scheme of National Project (Rs in Crores)	Status
				Lakhwar MPP was accepted by Investment Clearance Committee of DoWR,RD&GR in its 16th meeting held on 02.11.2021 for Rs. 5747.17 Cr at PL July 2018. Funding of Lakhwar MPP has also been approved by Cabinet Committee on Economic Affair (CCEA) in its meeting held on 15.12. 2021.
8.	Ken Betwa, Link Project, Madhya Pradesh & Uttar Pradesh	1) 9.08 Lakh 2) 130 MW 3) 3495 MCM (Live)	2021-22=4639.46 2022-23=626.43 **Total=5265.89**	Project is under execution. Funding of Ken-Betwa Link Project has been approved **by** Cabinet Committee of Economic Affair (CCEA) in its meeting held on 08.12.2021. KBLP Phase- II have been accepted by Advisory Committee of DoWR,RD&GR in its 148th meeting held on 17.01.2022. Ken Betwa Link Project Authority (KBLPA) and steering committee constituted via Gazette notification dated 09.02.2022.
9.	Ujh Multipurpose Project, J&K	1) 0.91 lakh 2) 89.5 MW 3) 925 MCM (Gross)/ 20 MCM (Drinking)/ 20 MCM (Industrial)	-	Estimated cost of Rs. 11907.77 Cr. (at December, 2019-PL) was accepted by Advisory Committee of DoWR,RD&GR in its 148th Meeting of held on 17.01.2020.
10.	Kulsi Dam Project, Assam	1)0.395 lakh GIA 2) 55 MW 3) 525.64 MCM (Gross)	-	Under appraisal in CWC / CEA. The State is to decide ownership, funding of their

Sl. No.	Name of the Project	1) Irrigation (Ha) 2) Power (MW) 3)Storage (MAF)	Year-wise Central Assistance released under Scheme of National Project (Rs in Crores)	Status
				part and enter into Memorandum of Agreement (MoA) with the State of Meghalaya.
11.	Noa-Dihing Dam Project, Arunachal Pradesh	1) 0.036 lakh. 2) 72MW 3) 322.00 MCM (Gross)	-	Under appraisal in CWC / CEA. The State is to decide funding of their part.
12.	Kishau, HP/ Uttarakhand & Himchal Pradesh	1) 0.97 Lakh 2) 600 MW 3)) 1824 MCM (Gross)/ 617 MCM (Drinking)	-	Revised DPR under preparation by Project Authority. Timeline of 24 months for preparation and clearance of DPR has been submitted by Kishau Corporation limited (KCL). Inception Report' in view of upgradation/revision of Kishau DPR has been submitted by KCL vide letter dated 18.04.2022.
13.	Bursar, J&K	1) 1.74 lakh (indirect) 2) 800 MW 3) 616.74 MCM	-	Under appraisal in CWC/CEA. Command Area is yet to be submitted by NHPC/Govt of J&K and Himachal Pradesh.
14.	Gyspa Project, HP	1) 0.50 lakh ha 2) 300 MW 3) 912.78 MCM (Live)	-	The work of DPR under preparation is held up due to agitation by local people.
15.	Upper Siang, Arunachal Pradesh	1) Indirect 2) 9750 MW 3) 1.44 MAF 4) Flood moderation	-	DPR under preparation
16.	2nd Ravi Vyas Link, Punjab	Harness water flowing across border (about 715.42 MCM. in non-monsoon period)	-	Under PFR stage

Annexure - 8.1

State-Wise and Project-Wise List of Projects under AIBP - Target & Achievements of Monitoring Visits during 2022-23

Sl. No	State/Project Name	Major/ Medium/ ERM	Date of Visit	Remarks
	ANDHRA PRADESH			
1	Yerrakalva Res.	Med.	08/11/2022 & 08/03/2023	Ongoing
2	Tadipudi LIS	Maj.	08/11/2022 & 08/03/2023	Ongoing
3	Pushkara LIS	Maj.	20/06/2023 & 07/03/2023	Ongoing
4	Gundlakamma	Maj.	i)19/01/2023 & ii)(29-30)/03/2023	Ongoing
5	Thotapally Barrage	Maj.	i)(22-23)/11/2022 & ii)07/03/2023	Ongoing
6	TarakaramathirthaSagaram	Med.	i)(22-24)/11/2022& ii)06/03/2023	Ongoing
7	Musurumilli	Med.	i)21/06/2022 & ii)07/03/2023	Ongoing
8	Maddigedda Res. Project	Med.	--	Completed
	TOTAL=08			
	ASSAM			
9	Dhansiri	Maj.	22/09/2022	Completed
10	Champamati	Maj.	27/09/2022	Completed
11	Borolia	Med.	--	Ongoing
12	ERM of Sukla Irrigation Project	ERM	--	Ongoing
	TOTAL=04			
	BIHAR			
13	Durgawati	Maj.	i)(11-13)/07/2022 & ii)(16-17)/03/2023	Ongoing
14	Punpun	Maj.	(18-19)/10/2022	Ongoing
	TOTAL=02			
	CHHATTISGARH			
15	Kelo Project	Maj.	(17-19)10/2022	Ongoing
16	Kharung	ERM	(27-29)/11/2022	Completed

Sl. No	State/Project Name	Major/ Medium/ ERM	Date of Visit	Remarks
17	Maniyari Tank (ERM)	Maj	(12-13)/01/2023	Completed
	TOTAL=03			
	GOA			
18	Tillari	Maj.	i)(29-30)/09/20222 & ii)(20-23)/02/2023	Completed
	TOTAL=01			
	GUJARAT			
19	Sardar Sarovar	Maj.	i) (28-30)/07/20222 ii) 29/09/2022 iii) (28-31) /12/2022	Ongoing
	TOTAL=01			
	HIMACHAL PRADESH			
20	Nadun Medium Irrigation project	Med.	(05-06).01.2023	Ongoing
	TOTAL=01			
	UT of JAMMU & KASHMIR			
21	Rajpora Lift	Med.	--	Completed
22	Tral Lift	Med.	--	Completed
23	Restoration & Mod. Of Main Ravi Canal	ERM	--	Completed
	TOTAL=03			
	UT of LADAKH			
24	PrakachikKhows Canal	Med.	08/11/2022	Ongoing
	TOTAL=01			
	JHARKHAND			
25	Subernarekha Multipurpose	Maj	i) (09-11)/11/2022 ii) (22-24)/03/2023	Ongoing
	TOTAL=01			
	KARNATAKA			
26	Karanja	Maj.	i)(20-21)/06/2022 ii) (27-28)/03/2023	Completed
27	Bhima LIS	Maj.	--	Completed
28	Upper Tunga Irrigation Project	Major	i) (26-28)/09/2022 ii) (06-07)/03/2023	Ongoing
29	Sri Rameswar Irrigation	Major		Completed
30	NLBC System Project(New ERM)	ERM	i)(11-12)/04/2022 ii) (16-17)/03/2023	Ongoing
	TOTAL=05			

Sl. No	State/Project Name	Major/ Medium/ ERM	Date of Visit	Remarks
	KERALA			
31	Muvattupuzha	Maj.	(14-15)/03/2023	Ongoing
32	Karapuzha	Med.	---	Ongoing
	TOTAL=02			
	MADHYA PRADESH			
33	Indira Sagar Unit II (Ph I &II)	Maj.	---	Completed
34	Indira Sagar Canal Ph. III	Maj.	---	Completed
35	Indira Sagar Unit IV	Maj.	---	Completed
36	Indira Sagar Unit V	Maj.	---	Completed
37	Bansagar Unit-II	Maj.	---	Completed
38	Sindh Phase II	Maj.	11/03/2023	Completed
39	Mahi	Maj.	---	Completed
40	Bariarpur LBC	Maj.	(06-09)/09/2023	Completed
41	Mahan	Maj.	---	Completed
42	Omkareshwar, Ph.-II	Maj.	---	Completed
43	Omkareshwar, Ph.-III	Maj.	---	Completed
44	Omkareshwar, Ph.-IV	Maj.	---	Completed
45	Bargi Diversion Ph– I	Maj.	08/09/2022	Completed
46	Bargi Diversion Ph -II	Maj.	08/10/2022	Ongoing
47	Bargi Diversion Ph -III	Maj.	i) 11/08/2022 ii) 28/02/2023	Ongoing
48	Bargi Diversion Ph-IV	Maj.	01/03/2023	Ongoing
49	PenchDiv-I	Maj.	---	Ongoing
50	Sagar(Sagad)	Med.	---	Completed
51	Singhpur	Med.	(06-09)/09/2023	Completed
52	Sanjay Sagar (Bah)	Med.	---	Completed
53	Mahuar	Med.	03/10/2023	Completed
	TOTAL=14 (including 21 phases)			
	MAHARASHTRA			
54	Gosikhurd [NP]	Maj.	(15-16)/12/2022	Ongoing
55	Waghur	Maj.	---	Ongoing

Sl. No	State/Project Name	Major/ Medium/ ERM	Date of Visit	Remarks
56	Upper Pen Ganga	Maj.	(03-04)/01/2023	Ongoing
57	Bawanthadi [IS]		---	Completed
58	Lower Dudhna	Maj.	---	Completed
59	Tillari		---	Ongoing
60	Warna	Maj.	---	Completed
61	Lower Wardha	Maj.	(11-12)/07/2022	Ongoing
62	Khadakpurna	Maj.	---	Completed
63	Dongargaon	Med.	---	Completed
64	Bembla	Maj.	(13-14)/07/2022	Ongoing
65	Sangola Branch Canal	Maj.	---	Ongoing
66	Tarali	Maj.	01/02/2023	Ongoing
67	Dhom Balakwadi	Maj.	31/05/2022	Completed
68	Morna (Gureghar)	Med.	01/12/2022	Ongoing
69	Arjuna	Med.	---	Ongoing
70	Lower Pedhi	Maj.	(15-16)/09/2022	Ongoing
71	Upper Kundalika	Med	---	Completed
72	Wang Project	Med	01/12/2022	Completed
73	Lower Panzara	Med	---	Completed
74	Aruna	Med	---	Ongoing
75	Krishna Koyana Lift	Maj.	---	Ongoing
76	Naradave (Mahammadwadi)	Med	---	Ongoing
77	Gadnadi	Med	---	Ongoing
78	Kudali	Med	06/10/2022	Ongoing
79	NandurMadhmeshwarPh-II		---	Completed
80	Jihe Kathapur LIS	Maj	(09-10)/07/2022	Ongoing
	TOTAL=27			
	MANIPUR			
81	Thoubal	Maj.	--	Ongoing
82	Dolaithabi Barrage	Med.	--	Completed

Sl. No	State/Project Name	Major/ Medium/ ERM	Date of Visit	Remarks
83	Loktak LIS	ERM	--	Ongoing
	TOTAL=03			
	ODISHA			
84	Upper Indravati(KBK)	Maj.	--	Completed
85	Subernarekha	Maj.	i) (29-30)/06/2022 ii)(24-25)/03/2023	Ongoing
86	Anandpur Barr./ Integrated Anandpur Barr.	ERM	i) 18/05/2022 ii) 25/11/2022	Ongoing
87	Lower Indra(KBK)	Maj.	08/09/2022	Completed
88	Telengiri(KBK)	Maj.	09/09/2022	Completed
89	RET Irrigation(KBK)	Med.	08/09/2022	Completed
90	Kanupur	Maj.	i) 19/05/2022 ii)23.03.2023	Ongoing
91	Rukura-Tribal	Med	--	Completed
	TOTAL=08			
	PUNJAB			
92	Kandi Canal Extension (Ph.II)	ERM	--	Completed
93	Rehabilitation of Ist Patiala Feeder and Kotla Branch Project	ERM	--	Completed
	TOTAL=02			
	RAJASTHAN			
94	Narmada Canal	Maj.	--	Completed
95	Mod. of Gang Canal	ERM	--	Completed
96	Parwan Major Multipurpose Irrigation Project	Maj	26/05/2022	Ongoing
	TOTAL=03			
	TAMILNADU			
97	Kannadian Channel	Maj	07/05/2022 & 09/03/2023	Ongoing
	TOTAL=01			
	TELANGANA			
98	Indiramma FFC of SRSP	ERM	i) 07/06/2022 ii) 25/01/2023	Ongoing
99	SRSP St.II	ERM	15/02/2023	Ongoing
100	Ralivagu	Med.	03/03/2023	Completed

Sl. No	State/Project Name	Major/ Medium/ ERM	Date of Visit	Remarks
101	Gollavagu	Med.	05/01/2023	Completed
102	Mathadivagu	Med.	03/03/2023	Completed
103	Peddavagu at Jagannathpur	Med.	i) 18/05/2022 ii) 06/01/2023	Ongoing
104	J. ChokkaRao LIS	Maj	i) 21/09/2022 ii)16/03/2023	Ongoing
105	Neelwai (Peddavagu)	Med.	i) 19/05/2022 ii) 05/01/2023	Ongoing
106	Sri KomaramBheem	Med.	i) 19/05/2022 ii) 06/01/2023	Ongoing
107	Palemvagu	Med.	15/03/2023	Ongoing
108	Rajiv Bhima LIS	Maj	i) 23/09/2022 ii) 04/03/2023	Ongoing
	TOTAL=11			
	UTTAR PRADESH			
109	Saryu Nahar NP	Maj	i) (20-21)/12/2022 ii) (02-03)/02/2023	Ongoing
110	Bansagar Canal	Maj.	--	Completed
111	Madhya Ganga Canal Ph-II	Maj.	i) (25-27)/05/2022 ii) (06-07)/02/2023	Ongoing
112	Arjun Sahayak	Maj.	--	Ongoing
	TOTAL=04			
	Grand Total=	**112 (105+7 Phases)**		**Completed-53 Ongoing- 59**

Annexure - 8.2

State-Wise and Project-Wise List of Projects under Special Package Monitoring Visits during 2022-23

Sl. No	State/Project Name	Major/ Medium/ ERM	Date of Visit*	Remarks
1	Tembhu LIS Dist. Satara	Major	--	Completed
2	Urmodi Dist. Satara	Major	--	Ongoing
3	SulwadeJamphalKanoli L.I. Scheme Dist. Dhule	Major	(12-13)/01/2023	Ongoing
4	Shelgaon Barrage Medium Project, Dist.Jalgaon	Medium	14/01/2023	Ongoing
5	Ghungshi Barrage LIS Akola	Medium	24/11/2022	Ongoing
6	Purna Barrage No.2 (Nerdhamana) Dist.Akola	Medium	23/11/2022	Ongoing
7	Jigaon Dist. Buldhana	Major		Ongoing
8	WarkhedLondhe Dist. Jalgaon	Medium	11/01/2023	Ongoing
9	Relining of Rajasthan Feeder canal	Major	i) (12-13)/05/2022 ii) 18/05/2022	Ongoing
10	Relining of Shirind Feeder canal	Major		Ongoing

Annexure - 8.3

Details of Completed Projects under AIBP

S. No.	State/Project Name	Year of Inclusion in AIBP	Year of Completion
	ANDHRA PRADESH		
1	Cheyyeru(Annamaya)	1996-97	2003-04
2	Somasila	1998-99	2006-07
3	Madduvalasa	1998-99	2005-06
4	Maddigedda	2001-02	2006-07
5	Vamsdhara St-II Ph I	2003-04	2008-09
6	Veligallu	2006-07	2008-09
7	Swarnamukhi	2005-06	2008-09
	ASSAM		
8	Pahumara	1996-97	2008-09
9	Hawaipur lift	1996-97	2006-07
10	Rupahi Lift	1996-97	2001-02
11	Boradikarai	1997-98	2004-05
12	Intg. Irr. Scheme in Kallong Basin	1997-98	2006-07
13	Kallonga @	1996-97	2006-07
14	Mod. ofJamunaIrr.	2001-02	2008-09
	BIHAR		
15	Upper Kiul	1996-97	2006-07
16	Orni Reservoir	1997-98	2006-07
17	Bilasi Reservoir	1997-98	2000-01
18	Sone Modernisation	1998-99	2008-09
19	Restoration of Kosi Barrage and its appurtenants for sustaining created irrigation Potential	2008-09	2010-11
	CHHATTISGARH		
20	HasdeoBango	1997-98	2006-07
21	Shivnath Diversion	1997-98	2002-03

S. No.	State/Project Name	Year of Inclusion in AIBP	Year of Completion
22	Jonk Diversion	1999-2000	2006-07
23	Kosarteda	2002-03	2013-14
24	Mahanadi Res. Pr.	2005-06	2010-11
25	Barnai	2002-03	2006-07
26	Minimata (HasdeoBango Ph. IV)	2007-08	2010-11
	GOA		
27	Salauli	1997-98	2006-07
	GUJARAT		
28	Jhuj	1996-97	1999-2000
29	Sipu	1996-97	1999-2000
30	Mukteshwar	1996-97	2006-07
31	Harnav - II	1996-97	1997-98
32	Umaria	1996-97	1996-97
33	Damanganga	1997-98	1999-2000
34	Karjan	1997-98	1999-2000
35	Sukhi	1997-98	1999-2000
36	Deo	1997-98	1997-98
37	Watrak	1997-98	1999-2000
38	Aji-IV	2000-01	2009-10
39	Ozat-II	2000-01	2009-10
40	Brahmini-II	2000-01	2008-09
41	Bhadar-II	2002-03	2010-11
	HARYANA		
42	Gurgaon Canal	1996-97	2003-04
43	WRCP	1996-97	2006-07
	HIMACHAL PRADESH		
44	Changer Lift Irr. Project	2000-01	2012-13
	JAMMU & KASHMIR		

S. No.	State/Project Name	Year of Inclusion in AIBP	Year of Completion
45	Marwal Lift*	1996-97	2006-07
46	Lethpora Lift*	1996-97	2006-07
47	Koil Lift*	1996-97	2006-07
48	Mod. of Kathua Canal	1999-2000	2006-07
49	IgopheyIrr. Pr.	2000-01	2006-07
50	Rafiabad High Lift Irr.	2001-02	2010-11
51	Mod. of Zaingir Canal	2001-02	2006-07
52	Mod. Of Martand Canal	2006-07	2010-11
53	Mod. Of MavKhul	2006-07	2010-11
54	Mod. of Babul Canal	2007-08	2011-12
	JHARKHAND		
55	Latratu	1997-98	2002-03
56	Kansjore	1997-98	2010-11
57	Tapkara Reservoir	1997-98	2002-03
	KARNATAKA		
58	Hirehalla	1996-97	2006-07
59	GhataprabhaSt.III	1997-98	2010-11
60	GandoriNala	2001-02	2009-10
61	Maskinallah	2002-03	2003-04
62	Votehole	2007-08	2008-09
	KERALA		
63	Kallada	1996-97	2004-05
	MADHYA PRADESH		
64	Bansagar Unit-I	1996-97	2010-11
65	Upper Wainganga	1996-97	2002-03
	Rajghat Dam	1998-99	2004-05
66	Sindh Phase I	1999-2000	2006-07
67	Urmil RBC	2000-01	2002-03

S. No.	State/Project Name	Year of Inclusion in AIBP	Year of Completion
68	Banjar	2000-01	2002-03
	MAHARASHTRA		
69	Surya	1996-97	2006-07
70	Bhima	1997-98	2006-07
71	Upper Tapi	1997-98	2004-05
72	Upper Wardha	1997-98	2008-09
73	Wan	1998-99	2005-06
74	Jayakwadi Stage-II	2000-01	2004-05
75	Vishnupuri	2000-01	2005-06
76	Bahula	2000-01	2006-07
77	Krishna	2002-03	2008-09
78	Kukadi	2002-03	2008-09
79	Hetwane	2002-03	2008-09
80	Chaskaman	2002-03	2008-09
81	Wan - II	2006-07	2008-09
82	PothraNalla	2006-07	2008-09
83	Utawali	2006-07	2008-09
84	Purna	2006-07	2008-09
85	NandurMadhmeshwar	2006-07	2008-09
86	Kar	2006-07	2008-09
87	LalNalla	2006-07	2008-09
88	Arunavati	2006-07	2008-09
89	Tajnapur LIS	2006-07	2008-09
90	Khadakwasla	2002-03	2004-05
91	Kadvi	2002-03	2004-05
92	Kasarsai	2002-03	2004-05
93	Jawalgaon	2002-03	2004-05
94	Kumbhi	2002-03	2006-07

S. No.	State/Project Name	Year of Inclusion in AIBP	Year of Completion
95	Kasari	2002-03	2004-05
96	Patgoan	2004-05	2006-07
97	Madan Tank	2005-06	2008-09
98	ShivnaTakli	2005-06	2008-09
99	Amravati	2005-06	2007-08
100	Chandarbhaga	2007-08	2009-10
101	Sapan	2007-08	2009-10
102	Pentakli	2007-08	2009-10
103	Prakasha Barrage	2007-08	2008-09
104	Sulwade Barrage	2007-08	2008-09
105	Sarangkheda	2007-08	2008-09
	ODISHA		
106	Upper Kolab(KBK)	1997-98	2004-05
107	Titlagarh St-II(KBK)	1998-99	2004-05
108	Potteru(KBK)	2001-02	2004-05
109	Naraj Barrage	2001-02	2005-06
110	Improvement to Sason Canal System	2002-03	2004-05
111	Salandi Left Main Canal-Ambahata	2002-03	2005-06
112	Improvement to Salki Irrigation	2003-04	2004-05
	PUNJAB		
113	RanjitSagar Dam	1996-97	2000-01
114	Remodelling of UBDC	2000-01	2006-07
115	Irr. to H.P. below Talwara (ShahneharIrr. Project)	2000-01	2005-06
	RAJASTHAN		
116	Jaisamand (Modernisation)	1996-97	2000-01
117	Chhapi	1996-97	2004-05
118	Panchana	1997-98	2004-05
119	Bisalpur	1998-99	2006-07

S. No.	State/Project Name	Year of Inclusion in AIBP	Year of Completion
120	Gambhiri (Modernisation)	1998-99	2000-01
121	Chauli	1998-99	2006-07
122	Mahi Bajaj Sagar	1999-2000	2006-07
123	WRCP	1996-97	2006-07
	TELANGANA		
124	SriramsagarSt.I	1996-97	2005-06
125	PriyadarshiniJurala	1997-98	2006-07
126	Nagarjunsagar	1998-99	2005-06
127	Gundalavagu	2001-02	2006-07
128	Alisagar LIS	2006-07	2008-09
129	Guthpa LIS	2006-07	2008-09
	UTTAR PRADESH		
130	Upper Ganga including Madhya Ganga Canal	1996-97	2003-04
131	SardaSahayak	1996-97	2000-01
132	Providing Kharif Channel in H.K. Doab	1996-97	2004-05
133	Rajghat Dam	1996-97	1996-97
134	GuntaNala Dam	1996-97	1999-2000
135	Gyanpur Pump Canal	1999-2000	2001-02
136	Eastern Ganga Canal	1999-2000	2010-11
137	Rajghat Canal	2000-01	2008-09
138	Mod. Agra Canal	2002-03	2008-09
139	Jarauli Pump Canal	2003-04	2006-07
	UTTARAKHAND		
140	Tehri	1999-2000	2006-07
	WEST BENGAL		
141	Kangsabati	1997-98	2001-02
142	Mod. Barrage and Irrigation System of DVC	1997-98	2006-07
143	Hanumata	2000-01	2008-09

Annexure - 8.4

Details of Projects Reported completed under PMKSY-AIBP as on 31.3.2023

Sl. No.	State/Project Name	Year of Inclusion in AIBP	Year of Completion
	ANDHRA PRADESH		
1	Maddigedda	2001-02	2017-18
	ASSAM		
2	Champamati	1996-97	2019-20
3	Dhansiri	1996-97	2022-23
	CHHATISGARH		
4	Maniyari Tank (ERM)	2011-12	2017-18
5	Kharung(ERM)	2010-11	2018-19
	GOA		
6	Tillari	2000-01	2022-23
	UT of JAMMU & KASHMIR		
7	Rajpora Lift	2000-01	2018-19
8	Restoration & Mod. of Main Ravi Canal	2011-12	2021-22
9	Tral Lift Irrigation Project	2000-01	2021-22
	KARNATAKA		
10	Sri Rameswar Irrigation	2014-15	2017-18
11	Bhima LIS	2009-10	2018-19
12	Karanja	1997-98	2020-21
	MADHYA PRADESH		
13	Sagar(Sagad)	2011-12	2017-18
14	Singhpur	2011-12	2017-18
15	Mahuar	2013-14	2017-18
16	Sindh Phase II	1998-99	2018-19
17	Bariarpur LBC	2000-2001	2018-19
18	Bansagar Unit-II	2003-04	2018-19

Sl. No.	State/Project Name	Year of Inclusion in AIBP	Year of Completion
19	Sanjay Sagar (Bah)	2011-12	2018-19
20	Indira Sagar Unit II (Ph I & II)	1996-97	2018-19
21	Indira Sagar Unit V	2014-15	2018-19
22	Omkareshwar, Ph.-IV	2014-15	2018-19
23	Bargi Diversion Ph - I	2001-02	2018-19
24	Mahi	2000-01	2020-21
25	Mahan	2003-04	2020-21
26	Indira Sagar Project Canal Phase -III	2007-08	2022-23
27	Indira Sagar Project Canal Phase -IV	2008-09	2022-23
28	Omkareshwar Project Canal Phase-II	2007-08	2022-23
29	Omkareshwar Project Canal Phase-III	2007-08	2022-23
	MAHARASHTRA		
30	Bawanthadi [IS]	2004-05	2017-18
31	Lower Panzara	2009-10	2017-18
32	Dongargaon	2005-06	2017-18
33	Warna	2005-06	2017-18
34	NandurMadhmeshwar	2006-07	2018-19
35	Upper Kundalika	2008-09	2018-19
36	Lower Dudhna	2005-06	2019-20
37	DhomBalaakwadi	2007-08	2019-20
38	Khadakpurna	2006-07	2019-20
39	Wang	2008-09	2022-23
	MANIPUR		
40	Dolaithabi	2002-03	2020-21
	ODISHA		
41	Upper Indravati(KBK)	1996-97	2017-18
42	Rukura-Tribal	2009-10	2017-18

Sl. No.	State/Project Name	Year of Inclusion in AIBP	Year of Completion
43	RET Irrigation(KBK)	2003-04	2018-19
44	Upper IndravatiExtn (KBK)	1996-97	2019-20
45	Telengiri	2003-04	2019-20
	PUNJAB		
46	Kandi Canal Extension (Ph.II)	2002-03	2017-18
47	Rehabilitation of Ist Patiala Feeder and Kotla Branch Project	2007-08	2017-18
	RAJASTHAN		
48	Narmada Canal	1998-99	2018-19
49	Mod. of Gang Canal	2000-2001	2018-19
	TELANGANA		
50	Gollavagu	2006-07	2017-18
51	Ralivagu	2006-07	2017-18
52	Mathadivagu	2006-07	2017-18
	UTTAR PRADESH		
53	Bansagar Canal	1997-98	2018-19

Annexure –8.5

Details of One newly included project under PMKSY-AIBP during 2022-23

S.N.	Name of Project	CCA	Estimated Balance cost as on 01.04.2021 with central share	Target date	Benefitted districts
01	ERM of Loktak lift irrigation Project (Phase-I), **Manipur**	UIP 17400 Ha	Balance Cost of works:Rs. 57.71 crore Central Share: Rs. 51.94 crore	March 2025	Bishnupur, Imphal west

Annexure - 8.6

Central Assistance to MMI Projects included under Special Package for Maharashtra

S. No	Project Name	Districts Benefitted	Central Assistance (CA) released status						Ultimate Irrigation Potential in Ha	Potential created in Ha from 2018 to 2023 as on 31.03.2023
			CA released during 2018-19	CA released during 2019-20	CA released during 2020-21	CA released during 2021-22	CA released during 2022-23	Total CA released		
1	Tembhu LIS Dist. Satara	Satara, Sangli, Solapur	25.00	69.79	77.56	108.01	10.77	291.13	111856	96319
2	Warkhed Londhe Dist. Jalgaon	Jalgaon	10.41	19.345	26.03	23.68	2.78	82.24	7919	0
3	Sulwade Jamphal Kanoli L.I. Scheme Dist. Dhule	Dhule	0.23	0.00	95.97	108.55	103.47	308.22	52720	0
4	Shelgaon Barrage Medium Project, Dist.Jalgaon	Jalgaon	15.22	13.99	47.15	43.59	15.32	135.26	11318	80
5	Ghungshi Barrage LIS Akola	Akola (V)	3.27	2.55	3.84	10.43	2.71	22.81	6660	3000
6	Purna Barrage No.2 (Nerdhamana) Dist.Akola		0.00	0.00	12.43	0.74	1.35	14.52	6954	0
7	Jigaon Dist. Buldhana	Buldhana, Akola (V)	262.02	17.01	39.53	336.42	33.66	688.64	101088	0
8	Urmodi Dist. Satara	Satara	13.27	10.63	0.00	14.35	0.00	38.25	32000	17264
	Total MMI		**329.43**	**133.31**	**302.52**	**645.77**	**170.05**	**1581.06**	**330515**	**116633**

Annexure – 8.7

Central Assistance to MMI Projects included under Special Package for Punjab

S. No	Project Name	Districts Benefitted	Central Assistance Released			
			CA released till March 2016 under AIBP	CA released during 2016-2023 under PMKSY	Total CA released	Additional Irrigation Potential Stabilization Target (in Ha)
1	Relining of Rajasthan Feeder RD 179000 to 496000	Mukatsar & Faridkot	105.84	294.64	400.478	98739
2	Relining of Sirhind Feeder RD119700 to RD 447927	Mukatsar & Faridkot	50.00	153.65	203.651	69096
	Total		**155.84**	**448.29**	**604.129**	**167835**

Annexure - 15.1

Training Activities Organized / Coordinated by Training Directorate, CWC during 2022-23

Sl.	Topic of Programme	FY 2022-23	Venue	Participants
1.	Interactive session with visiting dignitaries Prof. Asit K. Biswas and Dr. Cecilia Tortajada	25 April 2022	CWC Auditorium, Delhi	127 Officers
2.	Hindi Workshop	30 June 2022	CWC (HQ)	75 CWC Officers
3.	Presentation on the DHI suite of software by Dr. Mark Britton, VP,DHI	6th July 2022	Auditorium, CWC, New Library Building, Delhi	Hybrid Mode
4.	Hindi Workshop	05 Sept 2022	CWC (HQ)	65 CWC Officers
5.	Valedictory Function of 32th ITP for CWES Officers	07 Nov.,2022	CWC Auditorium	15 CWC Officers
6.	Hindi Workshop	27 December 2022	CWC (HQ)	65 CWC Officers
7.	Hindi Workshop	3 March 2023	CWC (HQ)	75 CWC Officers
8.	Sponsoring of candidates for various Post Graduate Degree Programmes in IISc., Bengaluru and IIT, Roorkee for the Academic session 2023-24	24 Feb 2023	IIT, Roorkee & IISc., Bengaluru	3 CWC officers
9.	International Women's day - A workshop on Women Empowerment	3 March & 6 March 2023	New Library Building	119 CWC Officers
10.	Hindi Workshop	17 March 2023	CWC (HQ)	150 CWC Officers

Participation of CWC Officers in Training/Workshop/Webinar/Talks Organized by other Institutions

Sl.	Topic of Programme	FY 2022-23	Venue	Participants	Organized by
11.	International Conference on "Hydropower and Dams Development for Water and Energy Security – Under Changing Climate"	07-09 April 2022	Rishikesh	11 Officers	CBIP, New Delhi
12.	Webinar talk on Pension related Issues organized by NWA, Pune	20 April 2022	Online Mode	Open to all	NWA Pune
13.	Workshop on "Extended Hydrological Prediction (Multi-week Forecast) project under NHP	21-22 April 2022	The Lalit, Barakhamba Avenue, Connaught Place, New Delhi	45 Officers	BPMO,CWC (HQ) in association with Ms. RTI International India
14.	36th Water Tech Talk	22 April 2022	CISCO WEBEX, Online	Open to all	National Water Mission, DoWR
15.	Induction Training Programme for newly joined Senior Draftsman of CWC	02-13 May 2022	NWA, Pune	10 Officers	NWA Pune
16.	International Conference on Systems Analysis in Asia	11 May 2023	Online Mode	Open to all	TIFAC, Dept. of Science & Tech., GOI, New Delhi
17.	Yoga lecture/demonstration by yoga experts	28 May 2023	National Media Centre, Raisina Road, New Delhi.	Open to all	DoWR, RD & GR
18.	5 days training on NABL accredition of chemical laboratories	30 May 2022 to 3 June 2022	CGWB, Raipur	06 CWC Officers	NGWTRI, CGWB, Raipur
19.	LOCAL Evaluation Week, 2022	30 May 2022 to 3 June 2022	Online Mode	Open to all	DMEO, NITI Aayog

20.	Online lecture on "Writing of Annual Performance Appraisal Report (APAR) for CWES Officers"	June 2022	Online Mode	Open to all	NWA Pune
21.	iGOT karamyogi Digital platform under Misssion Karamyogi-NPCSCB	05 July 2023	Online Mode	Open to all	DoPT
22.	Call of Paper(s) for an International Workshop on "Nonconventional Irrigation in High Value Agriculture - Application of Modern Technologies"	04 October 2022	Adelaide, Australia	Open to all	ICID
23.	National seminar on "Glacial Lake Outburst Floods(GLOFs) and Landslide Lake Outburst Floods(LLOFs) Disasters in Himalayan Regions"	15 June 2022	Online	Open to all	WRD of BIS, New Delhi with IIT-Roorkee
24.	Customized training programme on Engineering Geology-Concepts and Practices of Engineering Projects through GSI faculty	16-24 June 2022 25-29 June 2022	NWA, Pune Siliguri/Gangtok	14 Officers	GSI Faculty
25.	One day National Workshop on "Dam Safety Act 2021 for Dam Safety Governance in India"	16 June 2022	Dr. Ambedkar International Centre, 15 Janpath, New Delhi	150 CWC Officers	DOWR, RD & GR MOJS
26.	73rd Foundation Day of ICID/INCID	24 June 2022	CWC Auditorium, New Delhi	100 Officers	INCID
27.	Workshop on "Observational	24-25th June	MMRDA Conference	01 Officer	

	approach in tunneling : Issues and challenges"	2022	Hall, Mumbai		CBIP, New Delhi
28.	International Conference on Underground Space : The need of the day	27-28th June 2022	Hotel ITC Maratha, Mumbai	02 Officers	
29.	Training on Basic Applied Hydrology under NHP	15th July 2022		Online	FFM Dte, CWC (HQ)
30.	Physical based Mathematical Modelling for Estimation of Sediment Rate and Sediment Transport in Seven (7) River Basins	25-29 July 2022 & 22-26 Aug 2022	Computer Lab, SMD, Sewa Bhawan	20 CWC Officers	M/S Haskoning DHV Consultant Pvt Ltd
31.	Deputation of CWC officers for Joint Hydrological observations with Bangladesh during lean season of 2023 (1 Jan 2023-31 May 2023)	15th July 2022	Bangladesh	Open to all	FM wing, MoWR
32.	Data processing and database management (GIS – based web application & ISMIS), Modelling and Morphological analysis revision-Theory and practical	25-29th July 2022	Computer lab, SMD, Sewa Bhawan, Delhi	20 Officers	M/S Haskoning DHV Consultant Pvt Ltd
33.	Webinar from Wisconsin , USA on HECRAS using GeoHECRAS	28th July2022	Online	Open to all	CivilGEO, Inc., USA
34.	One week training course on "Public Procurement"	29th August-03rd September 2022	Arun Jaitely National Institute of Finance Mgmt. (AJNIFM),	02 Officers	AJNIFM, Faridabad Haryana

			Faridabad		
35.	Training program on Management Development Program for Non-Technical Officers	22-26th August 2022	NWA Pune	30 Officers	NWA Pune
36.	Presentation on real time discharge measurement system using robust Image-based stream flow measurements for real time continuous monitoring for CWC	01 September 2022	Auditorium, CWC, New Library Building, Delhi	Hybrid Mode (CISCO Webex)	Virtual Hydromet, Roorkee
37.	Two days training course on Construction Material & Quality Control by CSMRS	14 -15th September 2022	CSMRS, Delhi	02 Officers	CSMRS, New Delhi
38.	Webinar on Dam safety monitoring 24/365 days online with cloud storage and alert prompts	20 September 2022	Online mode	Open to all	M/S Resensys LLC,USA
39.	Virtual workshop and training on the basics of water accounting under INDIA-EU water partnership (IEWP) action/phase II	22 September 2022	Online mode	Open to all	BPMO, CWC (HQ) with IHE, Delft institute
40.	International Dam Safety Conference	10-12 Oct 2022	Jaipur	96 CWC Officers	INCOLD with CBIP & DRIP
41.	Inundation modelling for central water commission officials	17-21 October 2022	FFM Dte. West Block-II, R.K. Puram	16 CWC Officers	DHI, India Water & Envi. Pvt Ltd., New Delhi
42.	Swatch Bharat Diwas	02 October, 2022	Vigyan Bhawan, New Delhi	190 CWC Officers	D/o Drinking Water & Sanitation, GoI

43.	7th India Water Week	01-05 Nov., 2022	India Expo-Centre Greater Noida, U.P.	237 CWC Officers	NWDA, DoWR RD & GR
44.	One Day Technical Seminar at Platinum Jubliee Hall of Central Marine Fisheries Research Institute	11 Nov., 2022	Kochi, Kerala	29 CWC Officers	CWC,SWRD, Kochi
45.	Webinar on Tax Saving & Retirement Planning	21 Nov., 2022	Online Zoom Meeting	Open to all	Bajaj Capital Limited
46.	Batch-3 Level-IV MCTP SAG Officers	14-18 Nov., 2022	IIT, Ahmedabad	10 CWC Officers	IIT Ahmedabad
47.	Webinar on the topic "Constitutional values and Fundamentals of Indian Constitution"	25 Nov 2022	Online Mode	Open to all	NWA Pune
48.	Webinar on the topic of "Awareness Generation on Sensitization on Schedule Caste/Schedule Tribe Prevention of Atrocities Act, 1989"	30 Nov 2022	Online Mode	Open to all	NWA Pune
49.	2-Days Training Workshop on Hydrologic Unit modal for InDia (HUMID)	01-02 Dec., 2022	IIT, Madras	06 CWC Officers	IIT Madras & NRSC,ISRO
50.	ITP for JE Batch-I	14 Nov. to 02 Dec., 2022	NWA,CWC, Pune	43 CWC Officers	NWA Pune
51.	ITP for JE Batch-II	05 -23 Dec., 2022	NWA,CWC, Pune	43 CWC Officers	NWA Pune
52.	ITP for JE Batch-III	30 Jan.-17Feb., 2023	NWA,CWC, Pune	41 CWC Officers	NWA Pune
53.	Level-I, Batch-II MCTP for JTS officers	05-23 Dec.,2022	IIT, Roorkee IIM, Ahmedabad NWA, CWC,	25 CWC Officers	NWA Pune

			Pune		
54.	Training Course on Geo-Technical Instrumentation and Numerical Modelling	08-09 Dec., 2022	CSMRS, New Delhi	02 CWC Officers	CSMRS, New Delhi
55.	27th International Conference "Hydraulic, Water Resource, Environmental and Coastal Engineering	22-24 Dec., 2022	Punjab Engineering College, Chandigarh	05 CWC Officers	HYDRO-2022,PEC, Chandigarh
56.	MCTP-Batch-II, Level-3 for JAG Officers	13-24 Feb., 2023	IIM, Calcutta & NWA, CWC, Pune	25 CWC Officers	IIM, Calcutta & NWA, CWC, Pune
57.	International Conference on Water Management & Climate Change, All India WALMIs meet 2023	24-25 Jan., 2023	WALMI Dharwad, Karnataka	02 CWC Officers	WALMI, Karnataka
58.	National Conference on Preparedness on Disaster Prevention and Management for Hydro-Power Projects	23rd Jan., 2023	CBIP Conference Hall, New Delhi	05 CWC Officers	CBIP, New Delhi
59.	5 Days Training Course on Environmental Data Processing	30 Jan., to 03 Feb., 2023	NIH Roorkee	02 CWC Officers	NIH Roorkee
60.	"Brainstorming Session on Urban Flood Management"	03rd February, 2023	IISc., Bengaluru	01 CWC Officer	ICWR, IISc, Bengaluru
61.	5 Days Training Course on "Water Quality Monitoring & Management"	February 13-17, 2023	NIH, Roorkee	02 CWC Officers	NIH Roorkee
62.	Training Program on 'Arc Hydro and Advanced WRM Applications'	06– 10 February 2023	NWA, Pune	04 CWC Officers	NWA, Pune
63.	Training on RISAT – 1A Satellite Data	13-24 February,	NRSC, Hyderabad	11 CWC Officers	NRSC, Hyderabad

	Applications"	2023			
64.	National Meet on "Disaster Risk Management - Trend and Technologies"	February 27-28, 2023	ICC, Hyderabad	05 CWC Officers	NRSC, Hyderabad
65.	Training/capacity building in "RISAT–1A Satellite Data Applications"	March 01 - 03, 2023	NRSC, Hyderabad	05 CWC Officers	NRSC, Hyderabad
66.	Workshop on "Applications of Machine Learning Models in Water Resources Management"	Feb 25, 2023	IIT, Roorkee	02 CWC Officers	Deptt. Of water resource development & Mgmt.,IIT Roorkee & IWRS, Roorkee
67.	ToT Program covering the Administration and Applications of Arc GIS Enterprise license	13-14 March, 2023	NWA, CWC, Pune	04 CWC Officers	NWA, Pune
68.	3rd session of National Platform for Disaster Risk Reduction (NPDRR)	10-11 March 2023	Vigyan Bhawan, New Delhi	02 CWC Officers	NERC, Ministry of Home Affairs, GoI
69.	One day National Conference on "Geo-Textiles- PM Gati Shakti Scheme: Leveraging growth opportunity"	24th March 2023	Hotel Shangri-la, New Delhi	05 CWC Officers	NTTM, Ministry of Textile, New Delhi
70.	National Workshop on 'Web based Dynamic Composite Risk Atlas & Decision Support System"	27 March 2023	Conference room, Chandralok Building, Janpath, New Delhi	05 CWC Officers	NDMA, New Delhi

Annexure - 15.2

Details of Training Programs undertaken by National Water Academy, Pune during 2022-23

Sl. No.	Name of Training Programme	Dates	Duration of Program (Weeks / Months)	Officers Trained	Manweeks	Mandays	Training Days	Mode of Delivery
1	Induction Training Program (ITP) for the officers of Central Water Engineering (Group A) Services	28 March 2022 - 04 November 2022	32	15	480	2400	160	Residential
2	Series 4 : "Water Insight/ जल अंतर्दृष्टि – Talk by Eminent Water Experts" : Dealing with my experiences in Water Sector to face future Water Challenges of India"	6-Apr-22	0.2	50	10	50	1	Online
3	Interactive Trainings on Environmental Flows Assessments :Part 1: Introduction on E-Flows Assessment in India and the EU	05-07 April 2022	0.6	169	101.4	507	3	Online
4	Series 5 : "Water Insight/ जल अंतर्दृष्टि – Talk by Eminent Water Experts" : Some Important Issues in the Planning and Development of Water Resources Projects	13-Apr-22	0.2	50	10	50	1	Online
5	MCTP Level 2 - for STS (one Week at NWA+ One Week at IISc Bengaluru + One Week	11-29 April 2022	3	25	75	375	15	Residential

Sl. No.	Name of Training Programme	Dates	Duration of Program (Weeks / Months)	Officers Trained	Manweeks	Mandays	Training Days	Mode of Delivery
	at IIM Bangalore)							
6	MCTP Level 3 - for JAG (one Week at IIM Calcutta+ One Week at NWA)	18-29 April 2022	2	19	38	190	10	Residential
7	MCTP Level 4 - for SAG (one Week at IIM Ahmedabad)	18-22 April 2022	1	10	10	50	5	Residential
8	Training on Pension Related Issues	20-Apr-22	0.2	56	11.2	56	1	Online
9	Series 6 : "Water Insight/ जल अंतर्दृष्टि – Talk by Eminent Water Experts" : Sharing of Experience	20-Apr-22	0.2	107	21.4	107	1	Online
10	Series 7 : "Water Insight/ जल अंतर्दृष्टि – Talk by Eminent Water Experts" : Various facets of CWES as experienced by me"	27-Apr-22	0.2	52	10.4	52	1	Online
11	Induction Training Programme for the newly joined Senior Draftsman	02-13 May 2022	2	10	20	100	10	Residential
12	Series 8 : "Water Insight/ जल अंतर्दृष्टि – Talk by Eminent Water Experts" : "सबका प्रयास – Need for people's participation in Water Domain"	4-May-22	0.2	51	10.2	51	1	Online
13	Series 9 : "Water Insight/ जल अंतर्दृष्टि – Talk by Eminent Water Experts" : "Dam Safety in India - an Overview"	13 May 202	0.2	59	11.8	59	1	Online

Sl. No.	Name of Training Programme	Dates	Duration of Program (Weeks / Months)	Officers Trained	Manweeks	Mandays	Training Days	Mode of Delivery
14	Training-cum-Workshop on Flood Control Measures in River Catchment Area	20-May-22	0.2	137	27.4	137	1	Online
16	Distance Learning Program on Water Resources Sector of India	26-27 May 2022	0.4	191	76.4	382	2	Online
17	Series 10 : "Water Insight/ जल अंतर्दृष्टि – Talk by Eminent Water Experts" : "Insights into my experiences of Water Sector"	1-Jun-22	0.2	24	4.8	24	1	Online
18	Series 11 : "Water Insight/ जल अंतर्दृष्टि – Talk by Eminent Water Experts" : "Some Random Thoughts - not so random"	7-Jun-22	0.2	73	14.6	73	1	Online
19	Training-cum-Webinar on "Writing of Annual Performance Appraisal Report (APAR) for CWES Officers	10 June 2022	0.2	139	27.8	139	1	Online
20	Training Program for Newly Recruited Junior Engineer of NWDA	13-24 June 2022	2	21	42	210	10	Residential
21	Customized training programme on "Engineering Geology – Concepts and Practices of Engineering Projects	16-29 June 2022	3	14	42	210	15	Residential
22	Introduction to Google Earth Engine and its application in Water Resources Management (Under NHP)	27 June 2022 - 08 July 2022	2	27	54	270	10	Residential

Sl. No.	Name of Training Programme	Dates	Duration of Program (Weeks / Months)	Officers Trained	Manweeks	Mandays	Training Days	Mode of Delivery
23	Procurement through e-GEM	11-12 August 22	0.4	219	87.6	438	2	Online
24	Management Development Program	22-26 August 22	1	29	29	145	5	Residential
25	River Basin Management Cycle Training under the aegis of NMCG with GIZ, India (Under IEWP)	29 Aug - 02 Sept 22	1	24	24	120	5	Residential
26	Workshop on Sexual Harassment of Women in Workplace	19 Sept 2022	0.2	35	7	35	1	Online
27	Introduction to Python Programming and Its Applications in Water Resources Sector (under NHP)	19-23 Sept 22	1	604	604	3020	5	Online
28	Android App Development	26 Sept - 07 Oct 22	2	32	64	320	10	Online
29	MCTP Level 4 - for SAG (one Week at IIM Ahmedabad)	14-18 Nov 2022	1	10	10	50	5	Residential
30	Induction Training Program for Junior Engineers (Batch 1)	14 Nov - 02 Dec 22	3	39	117	585	15	Residential
31	Webinar on Constitutional Values and Fundamentals of Indian Constitution	25-Nov-22	0.2	195	39	195	1	Online
32	Workshop on SC/ST Prevention of Atrocities Act 1959	30-Nov-22	0.2	85	17	85	1	Online
33	Induction Training Program for Junior Engineers (Batch 2)	05-23 Dec 22	3	46	138	690	15	Residential
34	Mandatory Cadre Training Program: Level 1 (JTS) (5-9Dec23-IITR;12-16 Dec 23-IIMA; &19-23 Dec NWA) (Batch size 25)	05-23 Dec 22	3	25	75	375	15	Residential
35	Training-cum-Workshop on Overview of Water Resources in India	6-Jan-23	0.2	62	12.4	62	1	Residential

Sl. No.	Name of Training Programme	Dates	Duration of Program (Weeks / Months)	Officers Trained	Manweeks	Mandays	Training Days	Mode of Delivery
36	Training Program on Overview of Water Resources Sector	09-13 January 23	1	21	21	105	5	Residential
37	Introduction to GIS using ArcGIS Pro (ToT by ESRI India Pvt Limited)	09-10 January 23	0.4	13	5.2	26	2	Online
38	Sharing Content on the Web using ARCGIS Enterprise (ToT by ESRI India Pvt Limited)	18-20 January 23	0.6	13	7.8	39	3	Online
39	Training Program on DHARMA Software (under DRIP) (at Client Location)	23-25 Jan 2023	0.6	66	39.6	198	3	Residential
40	Training Program on DHARMA Software (under DRIP) (at Client Location)	27,28,29 Jan 2023	0.6	42	25.2	126	3	Residential
41	Induction Training Program for Junior Engineers (Batch3)	30 Jan 23-17 Feb 23	3	42	126	630	15	Residential
42	ArcHydro and Advanced WRM Applications	06-10 February 2022	1	14	14	70	5	Residential
43	Mandatory Cadre Training Program: Level 3 for JAG (Batch Size : 20) (13-17 Feb 2023 : IIM-Calcutta & 20-24 Feb 2023 at NWA, Pune)	13-23 Feb 2023	2	25	50	250	10	Residential
44	ToT Program by ESRI India Pvt Ltd on 'Administration and Applications of Arc GIS Enterprise license'	13-14 March 2023	0.4	6	2.4	12	2	Residential
45	Reservoir Sedimentation : Assessment and Monitoring (under NHP)	20-24 March 23	1	22	22	110	5	Residential
46	Procurement through e-GEM	20-21 March 23	0.4	322	128.8	644	2	Online
Till Date			**77.8**	**3540**	**2864.4**	**14322**	**389**	

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