



Annual Report

2021-2022



CENTRAL WATER COMMISSION

Department of Water Resources,
River Development & Ganga Rejuvenation,
Ministry of Jal Shakti

INDIA - LAND AND WATER RESOURCES: FACTS

•	Geographical Area & Location	328.7 M ha Latitude: 8° 4'N to 37° 6' N Longitude: 68° 7'E to 97° 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 Sq km)	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 (2020)	1283 mm
•	Mean Annual Natural Run-Off	1999.2 BCM
•	Total Utilisable Water	1122 BCM
•	Estimated Utilisable Surface Water Potential	690 BCM
•	Total Replenishable Ground Water Resources (2013)	432BCM
•	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

LAND RESOURCES

•	Total Cultivable Land	181.1 M ha
•	Gross Sown Area (2016-17)	200.2 M ha
•	Net Sown Area (2016-17)	139.4 M ha
•	Irrigation Potential Created (upto 2012)	113.5 M ha
•	Gross Irrigated Area (2016-17)	98.2 M ha
•	Net Irrigated Area (2016-17)	68.7 M ha

HYDRO-POWER

•	Ultimate Hydropower Potential	148701 MW
•	Potential Developed by 31.3.2020 (Installed Capacity of plants above 25 MW)	45699 MW

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FROM CHAIRMAN'S DESK

I feel highly delighted to bring out the Annual Report of Central Water Commission (CWC) for the year 2021-22. As has been done during the previous years, the Annual Report for the year 2021-22 also gives an overview of the functions and activities of CWC in the field of water resources in the country & abroad.

Since its formation in 1945, CWC has been providing necessary guidance for the development of the water resources sector in the country. It has also provided necessary support to the Department of Water Resources, River Development and Ganga Rejuvenation, Ministry of Jal Shakti on all technical and policy matters in the field of water resources such as inter-state matters, sharing of waters with neighbouring countries, bilateral treaties and MoUs etc. CWC has carried out regular activities, namely appraisal of major and medium irrigation projects and other water resources development schemes, monitoring of major, medium and extension/renovation/modernization (ERM) projects, environmental issues related to projects, design of hydraulic structures, hydrological observations and studies and flood forecasting services during the year.

During 2021-22 CWC has provided design consultancy for preparation of DPR and construction of projects in respect of 79 water resources development projects in India and neighbouring countries namely Bhutan, Afghanistan and Nepal.

During the period 2021-22, 06 water resources development projects comprising of 05 major & medium irrigation projects and 01 flood control projects were accepted by the Technical Advisory Committee. Under PMKSY-AIBP programme, CWC has undertaken rigorous monitoring of irrigation projects as well as scrutiny of proposals for release of funds which resulted in release of funds to 16 Major and Medium Irrigation Projects to the tune of Rs. 813.84 Crore

CWC has also been monitoring storage position of 143 reservoirs in the country which has helped the States in planning water utilisation during non-monsoon period. We have provided Flood Forecasting service at 331 stations during 2021-22. The timely issue of 10617 flood forecasts during the monsoon period of 2021 has helped concerned authorities/society in effective flood fighting and relief.

During the year, 17 Water Quality Laboratories of CWC were accredited by National Accreditation Board for Testing and Calibration Laboratories (NABL) for chemical testing.

Since its inception in 1945, CWC has been working for providing quality service to the nation in the field of water resources development and management and will do so in future.

(Dr R. K. Gupta)
Chairman

Central Water Commission

HIGHLIGHTS OF THE YEAR 2021-22

❖ DESIGNS

- CWC provided design consultancy to States / Project Authorities for 79 water resources development projects involving detailed designs and preparation of drawings of various types of hydraulic structures.

❖ RIVER MANAGEMENT

- Carried out hydrological observations at 1543 sites and meteorological observation at 187 sites in different basins spread over the entire country.
- 17 River Water Quality Laboratory of CWC were accredited by National Accreditation Board for Testing and Calibration Laboratories (NABL) in the discipline of chemical testing.
- Provided Flood Forecasting service at 331 flood forecasting stations (including 132 inflow forecasting stations) spread over 20 major river systems in the country. During the flood season 2021, 10617 flood forecasts (6670 level forecast and 3947 inflow forecasts) were issued, out of which 9976 (93.96%) forecasts were within prescribed limits of accuracy. Daily flood bulletins and weekly flood news letters were also issued during the flood season.

❖ WATER PLANNING

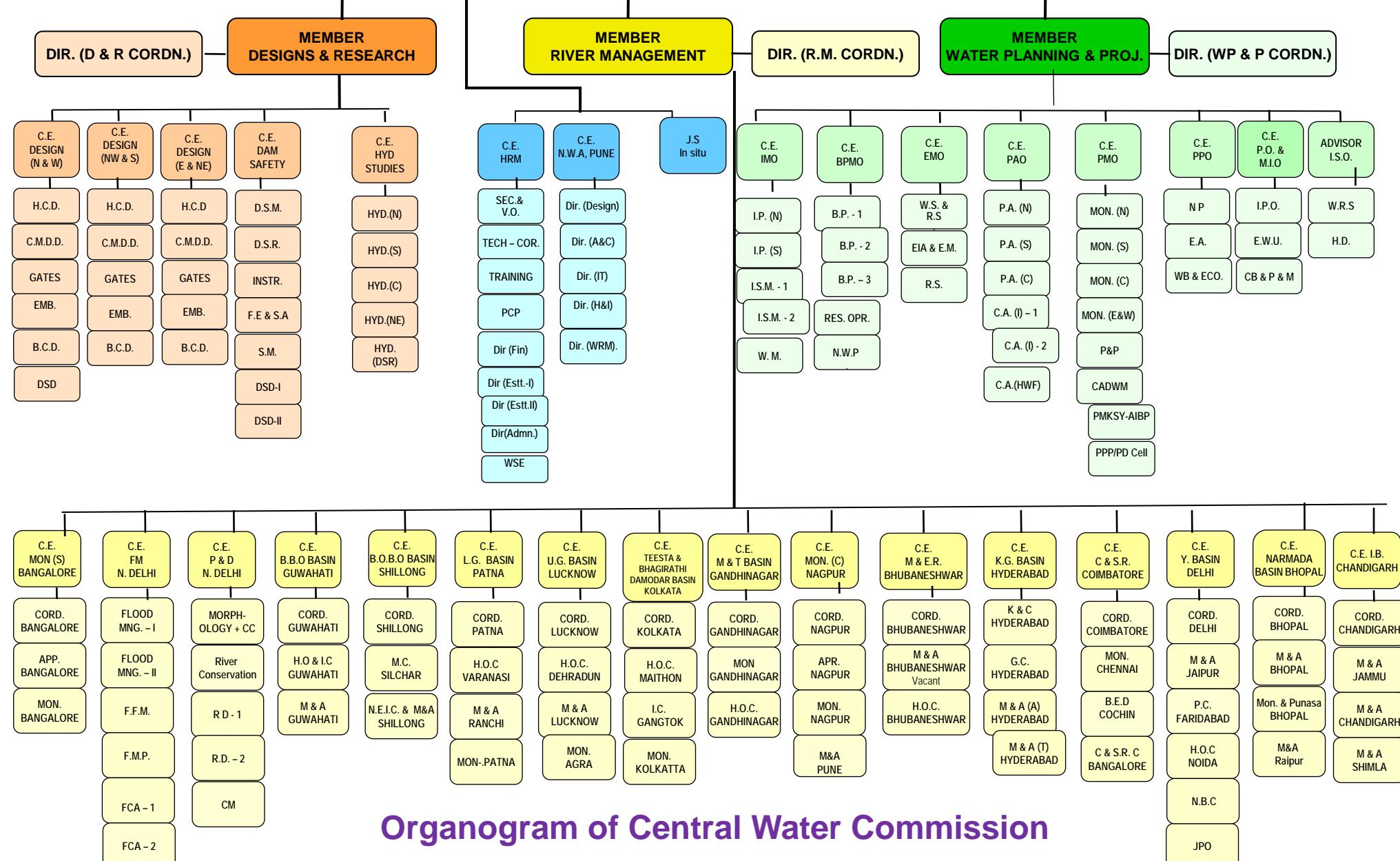
- During the year 2021-22, 24 major / medium irrigation projects were under appraisal in CWC. 06 projects comprising 05 major/ medium irrigation projects and 1 flood control projects were accepted by the Technical Advisory Committee.
- CWC monitored 38 Irrigation projects out of 99 priority projects (including Extension/Renovation/Modernization (ERM) projects) receiving grants under PMKSY-AIBP programme.
- The Cabinet Committee on Economic Affairs (CCEA) has approved the continuation of Pradhan Mantri Krishi Sinchai Yojana (PMKSY) for 2021 to 2026 on 15th December, 2021 with an outlay of Rs. 93,068.0 crore including Rs. 37,454 crore Central Assistance to States. And five new projects were included under PMKSY-AIBP after the approval of Competent Authority on 31st March 2022.
- Storage positions of 143 important reservoirs, with total live storage of about 175.957 BCM, were monitored on weekly basis.

❖ HRM

- National Water Academy, CWC, Pune conducted 86 training programmes through distance learning during 2021-22 including Workshop/Seminar for officers of Central / State Governments and Public sector undertakings with a total number of man weeks to the tune of 11605. Besides it, a number of in-house trainings for officials of CWC at CWC(HQ) and field offices were conducted throughout the year technical as per the the Annual training calendar to enhance and referesh various skills of and non technical staff in the field of water resources sector.

Chairman, CWC

DIRECTOR (FINANCE)



Organogram of Central Water Commission

CHAPTER-I

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 ORGANISATION

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

Head of the Organization – 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 (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 2021-22 were:

1. Chairman, CWC	:	Sh. S. K .Haldar	(01-04-2021 to 17-11-2021)
		Sh. R. K. Sinha	(17-11-2021 to 31-01-2022)
		Sh. R. K. Gupta	(01-02-2022 to 31-03-2022)
2. Member (D&R)	:	Sh. R. K. Gupta	(01-04-2021 to 13-02-2022)
		Sh. J. Chandrashekhar	(14-02-2022 to 31-03-2022)
3. Member (RM)	:	Sh. R. K. Sinha	(01-04-2021 to 04-01-2022)
		Sh. K. Vohra	(05-01-2022 to 31-03-2022)
4. Member (WP&P)	:	Sh. K. Vohra	(01-04-2021 to 31-03-2022)

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

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 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, MoWR, 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, 46 projects have been reported completed and 27 projects have progress more than 90%.

The Cabinet Committee on Economic Affairs (CCEA) has approved the continuation of Pradhan Mantri Krishi Sinchai Yojana (PMKSY) for 2021 to 2026 on 15th December, 2021 with an outlay of Rs. 93,068.0 crore including Rs. 37,454 crore Central Assistance to States. And five new projects were included under PMKSY-AIBP after the approval of Competent Authority on 31st March 2022

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 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. 28 Surface Minor Irrigation (SMI) Projects have been reported to be completed upto March 2022.

Flood Management Programme

The “Flood Management Programme (FMP)” a State Sector scheme amounting to Rs. 8,000 crore under Central Plan proposed by MoWR, RD & GR was approved by Government of India during XI Plan (Nov. 2007). The continuation of flood management programme has been approved by the Government of India during XII Plan with an outlay of Rs 10,000 crore. 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, 421 schemes have been completed; 64 schemes foreclosed, dropped and shifted (47-foreclosed; 16-dropped & 1 shifted to RMBA component) and 37 schemes are ongoing. Out of these 43 ongoing schemes; 21, 13 & 3 schemes are being monitored by CWC, GFCC & Brahmaputra Board respectively. These 421 completed schemes have given protection to an area of around 4.991 mha and protected a population of about 53.475 million.

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. No.	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)

The total amount recommended by EFC for FMBAP 2021-26 for XVth Finance Commission Cycle is Rs. 4,500 Cr. Approval of FMBAP 2021-2026 vide Cabinet decision dated 19.01.2022 is up to September, 2022. 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.

Release under the FMP as well as RMBA till date is as under.

Releases under FMP and RMBA since XI Plan			
Rs. in crore			
Fund Releases	FMP	RMBA(Grant-in-Aid)	Total
XI PLAN	3566.00	340.41	3906.4053
XII PLAN	1307.07	223.20	1530.27
Total (XI+XII)	4873.07	563.61	5436.6753
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
Total as on date since XI Plan	6687.51	1095.17	7782.68

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

1.5 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.

Ministry of Water Resources had issued guidelines for implementation of scheme of National Projects in February 2009. Later, the Ministry had issued modification in the guidelines of the same on 28.09.2012. Recently, Department of Water Resources, River Development and Ganga Rejuvenation, Ministry of Jal Shakti vide letter dated 07.02.2022 issued Guidelines for Pradhan Mantri Krishi Sinchayee Yojana -Accelerated Irrigation Benefit Programme (PMKSY-AIBP) and National Projects.

Initially, such projects were provided financial assistance @ 90% of cost of irrigation & drinking water component of the project in the form of central grant for its completion in a time bound manner. As per the approval for continuation of scheme of National Project in XII Plan issued on 12.09.2013, the proportion of central assistance has been revised and the same was to be provided as 75% and 90% of the cost of balance works of Irrigation and Drinking Water Component for Projects of Non-Special Category State and Special Category States, respectively. 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.

The Government of India declared 14 projects as National Projects in February 2008. The Cabinet Committee on Infrastructure approved inclusion of Saryu Nahar Pariyojna in the scheme of National Project on 3rd August, 2012. Later, the Government of India also declared Polavaram Irrigation Project as a National Project in its Gazette published on 01.03.2014.

Out of 16 projects included in the scheme of National Projects, five projects, namely, Gosikhurd Project of Maharashtra, Shahpur Kandi of Punjab, Teesta Barrage Project of West Bengal, Saryu Nahar Pariyojna of Uttar Pradesh and Indirasagar Polavaram Irrigation Project of Andhra Pradesh are under implementation. Goshikhurd and Shahpur Kandi projects have been provided grant amounting to Rs. 3631.641 crore and Rs. 282.6498 crore, respectively, up to March, 2022. Teesta Barrage Project started receiving funds under the scheme of National Project during 2010-11 and grant amounting to Rs. 178.20 crore 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. 2243.10 Crores has been released up to March 2022. The Indirasagar Polavaram Irrigation Project started receiving funding under the scheme of

National Project since 2014-15 and an amount of Rs. 12027.26 Crores has been released upto March 2022. Saryu Nahar Paryojna (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.

The Status of other projects are as under:

1. **Lakhwar Multipurpose Project (Uttarakhand):** Revised Cost Estimate (RCE) of the Lakhwar Multipurpose Project at Estimated cost of Rs. 5747.17 Crore @ PL July 2018, has been accepted by Advisory Committee in its 141st meeting held on 11.02.2019. Environment clearance has also been issued by MoEF & CC on 02.02.2021. 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
2. **Ken Betwa (KB) link Project Phase-I (Madhya Pradesh):** K-B Link Phase- I has been accepted in 129th meet of TAC held on 08.07.2016. A comprehensive report on Ken Betwa Link Project (KBLP) including (Phase I&II) having estimated cost of Rs. 35111.24 Cr at PL 2017-18 prepared by NWDA and forwarded to State Govt. of M.P./UP on 18.10.18. NWDA submitted the Comprehensive Report to CWC on 13.08.2019. NWDA further vide letter dated 28.08.2019 informed that some changes are likely to be expected in the above mentioned report after resolving of water sharing issues related to non-monsoon season between the states of Madhya Pradesh & Uttar Pradesh. All the three projects namely Kotha Barrage, Lower Orr and Bina complex under KBLP Phase- II have been accepted by Advisory Committee of DoWR, RD&GR in its 148th meeting held on 17.01.2022 for the project cost at PL 2017-18 of amounting to Rs.709.47 Cr., Rs. 2657.04 Cr. and Rs. 3353.62 Cr. and BC ratio 1.63, 1.54 and 1.502 respectively. Funding of Ken-Betwa Link Project has been approved by Cabinet Committee of Economic Affair (CCEA) in its meeting held on 08.12.2021. Ken Betwa Link Project Authority (KBLPA) and steering committee constituted via Gazette notification dated 09.02.2022. An amount of Rs. 4639.46 Cr has been released for the project in the month of March, 2022.
3. **Ujh, Multipurpose Project (MPP):** Modified DPR of Ujh, MPP of J&K, with an estimated cost of Rs. 9,167 Crore (Price level (PL) Dec, 2019), was accepted by Advisory Committee on Irrigation, Flood Control and Multipurpose Projects of DoWR, RD & GR in its 144th meeting held on 08.05.2020, subject to various conditions viz. forest clearance, tribal clearance etc.

Ministry of Finance vide letter dated 30.03.2021 has, conveyed that an average annual outgo of about Rs 1,280 Crore (total Central Assistance Rs 8340 Crore & Completion time of Project -78 months) may cause severe stress on the fiscal position of Government in case of entire central funding of Project. It has been requested to examine the possibility of re-designing the Ujh project, to enhance socio-economic benefits leading to BC Ratio of at least 1.00, so that the project could be taken up for funding by NABARD under its long term LTIF thus easing pressure on the fiscal position of the Government.

The modified Ujh MPP Proposal was accepted by Advisory Committee of DoWR, RD & GR in the 148th TAC meeting held on 17.01.2022 for RCE of Rs 11907.77 Cr at PL 2019 PL.

4. **Renuka Dam Project (Himachal Pradesh):** RCE of the project amounting to Rs. 6,946.99 Cr (PL October 2018) has been accepted by Advisory Committee in its 143rd meeting held on 09.12.2019. However, forest clearance phase II is to be obtained by the Project Authority, and further Upper Yamuna River Board (UYRB) has to coordinate with co-basin beneficiary States to deposit their respective share of money for the project. Funding of Renukaji Dam Project has been approved by Cabinet Committee of Economic Affairs (CCEA) in its meeting held on 15.12.2021. UYRB vide letter dated 24.01.2022 requested beneficiary states to deposit their respective share money towards Renukaji Dam Project.

Central Assistance of Rs. 446.96 Cr & Rs. 10.61 Cr vide was released vide order dated 03.10.2016 and 11.08.2021, respectively for payment of compensation to the oustees whose land has been acquired for the project. Further, on Account Payment of Grant Component of Central Assistance under AIBP Capital Asset (PMKSY) for the State Annual Plan 2021-22 for Rs 1037.925 Cr were issued vide DoWR, RD & GR Letter dated 03.03.2022. The share money so deposited will be adjustable against their final share in the project cost.

5. **DPR of Kishau Multipurpose Project (Himachal Pradesh & Uttarakhand):** DPR of Kishau Multipurpose Project was submitted to CWC in 2010 by UJVNL for appraisal. Compliances to most of the observations of CWC/CEA are awaited since 2011. In view of the fact that this DPR was prepared in June, 2010, since then technology and design philosophy has changed considerably and it was decided by the Project Authority to update the DPR. Director (Projects) & Director (Tech) Kishau Corporation Limited (KCL), vide its letter dated 01.06.2020 has requested to convene a web meeting for finalizing scope of work for upgradation / revision of DPR of Kishau Multipurpose Project. Thereafter, a meeting among CWC/CEA/UYRB and Project Authorities to discuss the scope

of work for upgradation /revision of DPR of Kishau Multipurpose Project was held under the Chairmanship of Member (WP&P), CWC on 17.07.2020 through video-conferencing. Member (WP&P) stressed for submitting the time line for preparation of Revised DPR to CWC and start consultation with GSI / Survey of India / NIH during this period. Revised DPR is under preparation by Project Authority. A timeline of 24 months for preparation and clearance of DPR has been submitted by Kishau Corporation limited (KCL) vide letter dated 16.12.2020.

During the meeting of 13th HPSC held on 06.12.2021, Secretary (DoWR, RD&GR, MoJS) directed UJVNL to send a note in respect of seed money issue to DoWR, RD & GR (MoJS). KCL vide letter dated 15.02.2022 submitted note in respect of seed money contribution by beneficiary states, vide which, KCL has requested to arrange the release of 1st instalment of their share by beneficiary states.

Inception Report in view of upgradation/revision of Kishau DPR has been submitted by KCL vide letter dated 18.04.2022

6. **Noa Dihing Project:** The DPR of the Noa Dihing Project was prepared by Brahmaputra Board and its appraisal was carried out by CWC. However, as the ownership of the project and the source of funding were not clear and overall economic viability of the project could not be established, the Advisory Committee in its 135th meeting had deferred this project till the ownership issues are resolved. Department of Power, Government of Arunachal Pradesh (GoArP) vide letter dated 09.01.2019 informed that the project ownership will be of GoArP. The project was discussed in the 12th HPSC meeting for implementation of National Projects under the Chairmanship of Secretary (WR) held on 24.11.2020. Secretary (WR) desired that GoArP may carry out the overall economic viability study of the project and if required, guidance from Brahmaputra Board/ Central Electricity Authority/ Central Water Commission can be obtained. Hon'ble Minister of Jal Shakti vide D. O. letter no. X-45011/13/2020-B&B-MoWR dated 02.07.2021 has requested Hon'ble CM of ArP for implementation of this national project at the earliest after obtaining the mandatory clearances in an expeditious manner by the project authority of GoArP.
7. **Kulsi Dam Project (Assam):** Govt. of Assam & Meghalaya is to decide upon the ownership and source of funding of the Project and to sign an Agreement/MoU between the State of Assam & Meghalaya. Hon'ble Minister of Jal Shakti vide D. O. letter no. X-45011/13/2020-B&B-MoWR dated 02.07.2021 has requested Hon'ble CMs of Assam & Meghalaya to take up the matter to resolve the issue of

ownership of the project so that same may be executed and its benefit are accrued at the earliest.

8. **Bursar Project (J&K):** The project was discussed during the 13th meeting of HPSC held on 06.12.2022 vide which it was stated that under the provision of Indus Water Treaty an additional irrigation potential of 4.31 lakh acres can be harnessed indirectly through a storage of 0.5 MAF in the project. In the meeting issue of additional command area which was to be identified for the project on J&K side still remains unidentified was flagged. Information from J&K and Himachal Pradesh is yet to be received
9. Two projects, viz. Upper Siang Project (Arunachal Pradesh) and Gyspa Project (Himachal Pradesh) are at DPR preparation stage.
10. 2nd Ravi Beas Link Project is at PFR stage.

1.6 Modernization and Renovation works in CWC HQ

The Renovation and Modernization work of CWC Head Quarter Building (Sewa Bhawan, R K Puram) was started in 2010-11. The works for 9th Floor and 8th floor were undertaken and completed by CPWD. During 2014-15, the work for Renovation and Modernization of remaining office space of CWC in Sewa Bhawan (2nd to 7th Floors) and West Block-I & II was awarded to National Projects Construction Corporation Ltd. (NPCC) at an estimated cost of Rs.40.68 Crores which was subsequently revised to Rs. 43.85 Crores in July, 2019. The work started in January 2016 and Renovation and Modernization of Sewa Bhawan from 2nd to 7th floors, one wing at West Block-I and Five Wings of West Block-II has been completed.

In continuation of Renovation and Modernization work of office space at CWC (HQ), the work of Renovation and Modernization of 80 Nos. toilets located at Sewa Bhawan, West Block-I &II and Library Building, CWC (HQ), R K Puram, New Delhi with estimated cost of Rs. 4.84 Crores has also been assigned to NPCC Ltd. on nomination basis. The renovation work of all 80 toilets has been completed by June,2021.

To meet in increase electric load demand in view of the Renovation and Modernization work of office space, the work for electric Load Augmentation at an estimated cost of Rs. 3.83 Crores has also been taken up through CPWD. The above work has physically completed by CPWD at the final authorized amount of Rs 2.82 Crores.

The work of installation of Electrical Generator for the offices of CWC under RM Wing at West Block-II was undertaken by CPWD at an estimated cost of Rs.28.39 Cr. for which mentioned funds were transferred to CPWD during the Financial Year 2021-22. The said work has been completed by CPWD and the Electric Generator is now operational for providing power back up for CWC offices located at West Block-II.

1.7 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:

1.7.1 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.

1.7.2 Use of e-Office in CWC

E-office was launched in CWC in August 2017 by implementing the same in 6 Directorates of CWC. The same has been gradually implemented in other Directorates. So far, all Directorates at HQ have been included under e-office. The process for implementing e-office in Regional Office is under progress.

1.7.3 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.

1.7.4 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.

1.7.5 CWES Bio-Data Information System:

Bio-data Information System for Central Water Engineering Service (CWES) officers is operational to facilitate CWES officers to upload their bio-data and to mention about their achievements in the field of water resources. The CWES bio-data information system can be accessed through CWC web-site. CWC officers can log in to system with their employee ID as login code and unique passwords to view and edit their records. The information can also be viewed by common public.

1.7.6 Implementation of e HRMS in CWC:

- e HRMS- Manav Sampada Software developed by NIC Shimla Team has been implemented in CWC along with its customization.
- APAR module was implemented in eHRMS during the period 2016-17. However, due to many technical issues especially in the representation process, APAR module of eHRMS was dropped and SPARROW has been implemented during the period 2017-18.
- 5585 no of employee of CWC have been registered in e-HRMS. 4372 number of Service books have been entered in e-HRMS and 1317 number of Service books have been verified.
- Annual Immovable Property Return (AIPR) is being submitted through eHRMS (Manav Sampada) software since the year ending 2019 in r/o all the Officers of CWC (Gr 'A', Gr 'B' and Gr 'C') of Central Water Commission.

1.8 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.

1.9 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 approx. 73,500 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 is also receiving nearly hundred Technical and non-technical journal/ bulletins / newsletters/ publications from various government, education institutes and societies on complimentary basis.

Library stock is arranged in a manner to make retrieval of desired publication fast and easy. The Library is located in a dedicated building and has adequate space and improved facilities. There is one fully air conditioned reading room with latest journals/ magazines and newspapers. The Library is being progressively modernized and automated, in order to serve the users in better, fast and accurate way providing latest available information from across the globe.

This year CWC Library has been upgraded and modernized by putting list of all its available books/references on the e-Granthalay portal of NIC. The link of the CWC Library has been created on CWC web site. This has facilitated the listening of all the available books available in the CWC library, in the public domain for larger benefit. Also from this year, the Library membership/ login for e-Granthalaya is being created/given to all CWC employees to excess the CWC Library through online portal.

Online new membership/login has been provided to 150 Director, Deputy Director and Assistant Director Level officers at CWC HQ in year 2021-22.

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..

1.10 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 08 regional offices of CWC were carried out by the Second sub-committee of the Parliamentary committee on Official Language. These inspection by Parliamentary Committee on Official Language was highly successful and the efforts made by Central Water Commission (HQ) 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 2022, Ninety three (93) Field Offices of CWC have been notified under Rule 10(4) of Official Language Rules, 1976. Further, eleven (11) 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 2021-22. 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 2021-22:

- i. 35 Regional Offices of CWC and 20 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.
- ii. 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, to generate awareness about the use of Hindi language, the provisions under Official Language Act and incentive schemes for use of Hindi etc.
- iii. 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.
- iv. "Hindi Pakhwada" was organized from 14 to 28 September, 2021. During this period, various competitions like Hindi Noting/Drafting, Essay Writing competition, Translation competition, calligraphy competition for MTS, Hindi Typing for UDC, LDC & MTS, Poem Recitation competition for Hindi and non-Hindi officials, Technical Speech competition for Hindi and non-Hindi officials were organized, and winners were awarded cash prizes and certificates. Cash Prizes and Certificates were also awarded to the officials who did their maximum official works in Hindi under the Annual Noting & Drafting Scheme. A sum of Rs. 2,44,036/- against the allocation of Rs. 2, 50,000/- was spent on this occasion.
- v. Raj Bhasha Shields for the year 2020-21 were awarded to the Field Offices of Central Water Commission situated in regions, A, B and C to Yamuna Basin Organization, New Delhi, National Water Academy, Pune and Monitoring (South) Organization, Bangalore respectively. Raj bhasha Shield for Directorates and Sections at Headquarters were awarded to River Management Coordination Directorate and Establishment-II Section for doing maximum work in Hindi during the year.
- vi. 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.
- vii. For the effective use of Official language, voice tools were provided to the Officers of Deputy Secretary and above level, so that they may easily perform their official work in Hindi.

1.11 Welfare Measures and Incentives

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

1.11.1 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 financial assistance is provided in two ways:

- Immediate Relief up to Rs. 15,000/-
- Long Term Relief up to Rs. 10,000/- payable in ten monthly instalments.

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. The existing subscription rate is Rs. 10/- (ten) per month.

1.11.2 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 Ministry 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 Ministry of Water Resources and Pay & Accounts Office, Central Water Commission. It provides its member loans to the extent of Rs. 3, 00, 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.

1.11.3 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 2021-22 are as under:

- The CWC Hockey team reached the Finals of Inter-Ministry Hockey Tournament 2021-22 and won Silver Medal.
- Shri Altaf Husain, Deputy Director, RDC-1 Dte. Reached the Quarter Finals of the Inter-Ministry Badminton Tournament 2021-22
- Shri R. Suresh, MTS, CWC Library has represented the Central Secretariat Volleyball Team in the All India Civil Services Volleyball Tournament 2021-22 held at Kurukshetra, Jharkhand. 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 2021-22.

1.12 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 1.1.2022)

Category	No. of Filled Posts	No. of SCs	No. of STs	No. of OBCs
Group A	562	97	36	92
Group B	905	155	69	157
Group C	2970	556	263	677
Total	4437	808	368	926

Table 1.2

Representation of PWD (OH/VH/HH) Officials in Different Grades (As on 1.1.2022)

Category	Orthopedic Handicapped (OH)	Visually Handicapped (VH)	Hearing Handicapped (HH)	TOTAL
Group A	10	0	0	10
Group B	16	1	10	27
Group C	17	10	7	34
Total	43	11	17	71

1.13 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.

1.14 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>

CHAPTER-II

WATER RESOURCE DEVELOPMENT

2.1 Water Resources in India

Central Water Commission (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 loss

- 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. The State-wise Irrigation Potential Created up to end of XI plan periods is given in Table 2.1.

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. The cumulative figures of potential created in the successive plan periods are given in Figure 2.1.

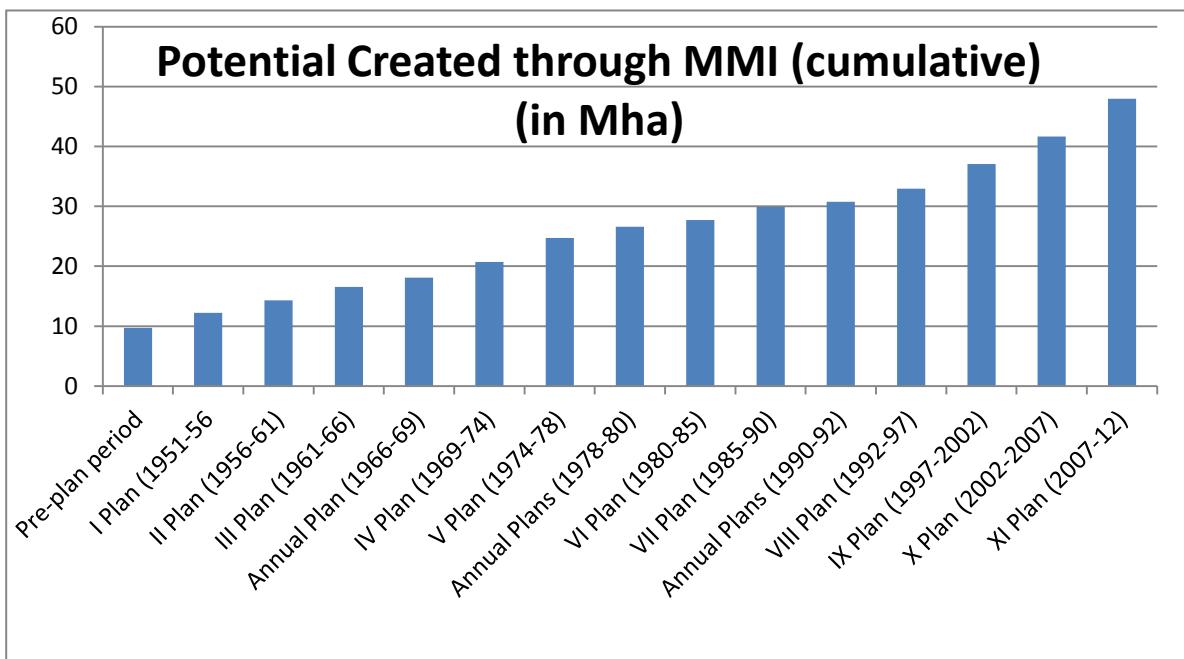


Fig 2.1 Growth of Irrigation Potential Created through Major and Medium Irrigation Project during Pre-Plan and Plan Period (Cumulative)

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. Numbers of MMI Projects taken up and completed up to XI Plan are given in Table 2.2.

The Plan-wise growth of irrigation potential created through major and medium irrigation sector and corresponding actual expenditure (anticipated expenditure in case of XI Plan) in various plan periods is given in Table. 2.3

Table 2.1

State-wise Creation of Irrigation Potential through Major & Medium Irrigation Sector

(Thousand ha.)

S. No.	Name of State/ UT	UIP of MMI Projects	UIP of Minor Projects	Total UIP	IPC up to XI Plan		
					MMI	MI	Total
1	Andhra Pradesh	5000.00	6260	11260	4803.73	3340.55	8144.28
	Telangana						
2	Arunachal Pradesh	0.00	168	168	1.20	132.248	133.448
3	Assam	970.00	1900	2870	455.96	1016.82	1472.783
4	Bihar	5223.50	5663.50	10887	3054.46	5924.78	8979.24
5	Chhattisgarh	1146.93	571	1717.93	1269.32	842.295	2111.61
6	Goa	62.00	54	116	55.55	25.927	81.478
7	Gujarat	3000.00	3103	6103	3679.09	2071.97	5751.06
8	Haryana	3000.00	1512	4512	2206.29	1637.67	3843.96
9	Himachal Pradesh	50.00	303	353	30.45	186.217	216.667
10	Jharkhand	1276.50	1183.5	2460.00	530.71	745.661	1276.366
11	Jammu Kashmir	250.00	1108	1358.00	325.61	534.2	859.809
12	Karnataka	2500.00	3474	5974	2965.83	1704.17	4670
13	Kerala	1000.00	1679	2679	715.69	763.65	1479.34
14	Madhya Pradesh	4853.07	11361	16214.1	2506.43	2534.34	5040.772
15	Maharashtra	4100.00	4852	8952	4128.71	3185.6	7314.31
16	Manipur	135.00	469	604	158.50	120.69	279.19
17	Meghalaya	20.00	148	168	-	77.77	77.77
18	Mizoram	0.00	70	70	-	51.74	51.74
19	Nagaland	10.00	75	85	-	124.51	124.51
20	Orissa	3600.00	5203	8803	2147.36	1887.43	4034.79
21	Punjab	3000.00	2967	5967	2684.39	3497.71	6182.1

S. No.	Name of State/ UT	UIP of MMI Projects	UIP of Minor Projects	Total UIP	IPC up to XI Plan		
					MMI	MI	Total
22	Rajasthan	2750.00	2378	5128	3167.13	2487.76	5654.898
23	Sikkim	20.00	50	70	-	42.74	42.74
24	Tamil Nadu	1500.00	4032	5532	1578.27	2331.99	3910.26
25	Tripura	100.00	181	281	29.25	161.863	191.113
26	Uttar Pradesh	12154.00	17481	29635	9288.09	25320.13	34608.22
27	Uttarakhand	346.00	518	864	288.98	585.347	874.327
28	West Bengal	2300.00	4618	6918	1901.41	4159.68	6061.09
29	Union Territories	98.00	46	144	0.00	61.935	61.935
	Total	58465.00	81428	139893	47972.4	65557.4	113529.8

Source: Erstwhile Planning Commission and Project Monitoring Organisation, CWC

Table 2.2

Number of Major, Medium & ERM Projects taken up and completed up to XI Plan

Category	Projects Taken Up			Projects completed			Balance
	Pre-plan	Up to XI Plan	Total	Pre-plan	Up to XI Plan	Total	
Major	74	406	480	74	231	305	175
Medium	143	1135	1278	143	880	1023	255
ERM	-	259	259	-	122	122	137
Total	217	1800	2017	217	1233	1450	567

Source: Report of the Working Group on MMI & CAD for XII Five Year Plan (2012-17)

Table 2.3

Plan wise Outlays and Cumulative Growth in Creation of Irrigation Potential
(Major& Medium Irrigation Sector)

Period	Outlay/ Expenditure (Rs in Crore)		Potential created (Mha)		Potential Utilized (Mha)
	During	Cumulative	During	Cumulative	Cumulative
Pre-plan period	-	-	9.70	9.70	9.70
I Plan (1951-56)	376.2	376.2	2.50	12.20	10.98
II Plan (1956-61)	380	756.2	2.13	14.33	13.05
III Plan (1961-66)	576	1332.2	2.24	16.57	15.17
Annual Plan (1966-69)	429.8	1762	1.53	18.10	16.75
IV Plan (1969-74)	1242.3	3004.3	2.60	20.70	18.39
V Plan (1974-78)	2516.2	5520.5	4.02	24.72	21.16
Annual Plans (1978-80)	2078.6	7599.1	1.89	26.61	22.64
VI Plan (1980-85)	7368.8	14967.9	1.09	27.70	23.57
VII Plan (1985-90)	11107.3	26075.2	2.22	29.92	25.47
Annual Plans (1990-92)	5459.2	31534.4	0.82	30.74	26.31
VIII Plan (1992-97)	21071.9	52606.3	2.21	32.95	28.44
IX Plan (1997-2002)	49289	101895.3	4.10	37.05	31.01
X Plan (2002-2007)	83647	185542.3	4.59	41.64	33.74
XI Plan (2007-12) Outlay (Projection)	165350	350892.3	6.33	47.97	35.01

* Anticipated figures under reconciliation with States

Source: Erstwhile Planning Commission & Report of the Working Group on MMI & CAD for XII Five Year Plan (2012-17) and Project Monitoring Organisation, CWC.

Number of Major, Medium and ERM projects taken up and completed in the pre-plan and plan period are shown in Fig 2.2, 2.3 and 2.4 respectively.

Major Irrigation Projects Taken Up and Completed (Cumulative)

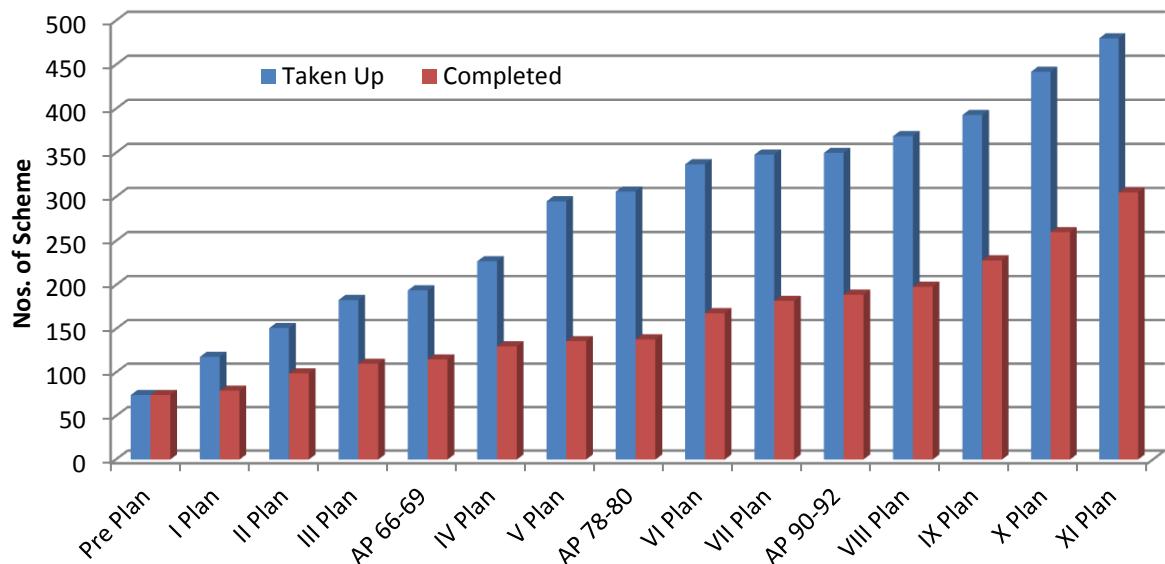


Fig 2.2 Major Irrigation projects taken up and completed (Cumulative)

Medium Irrigation Projects Taken Up and Completed (Cumulative)

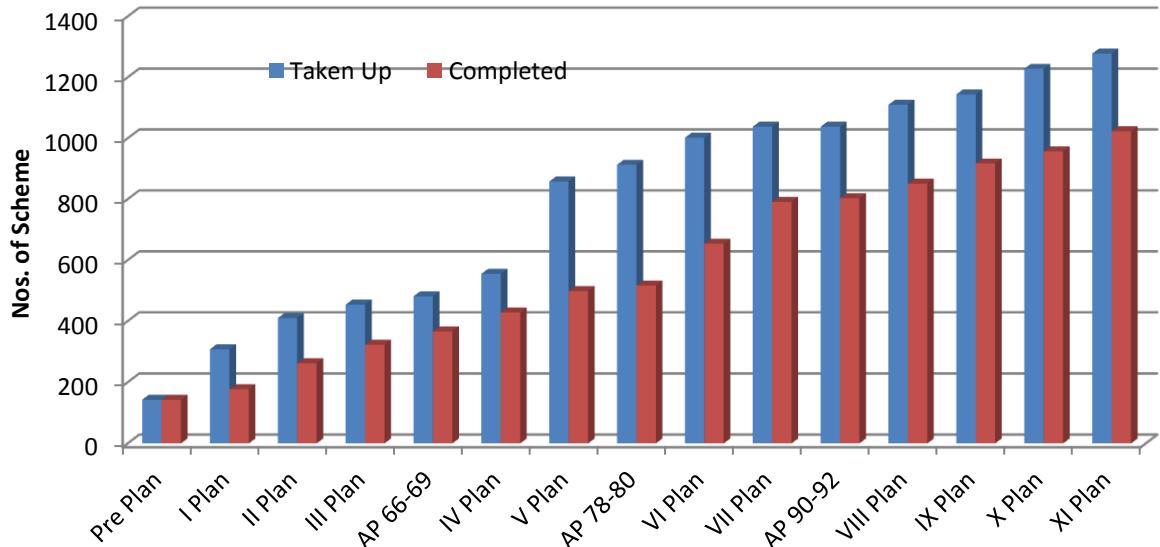


Fig 2.3 Medium Irrigation projects taken up and completed (Cumulative)

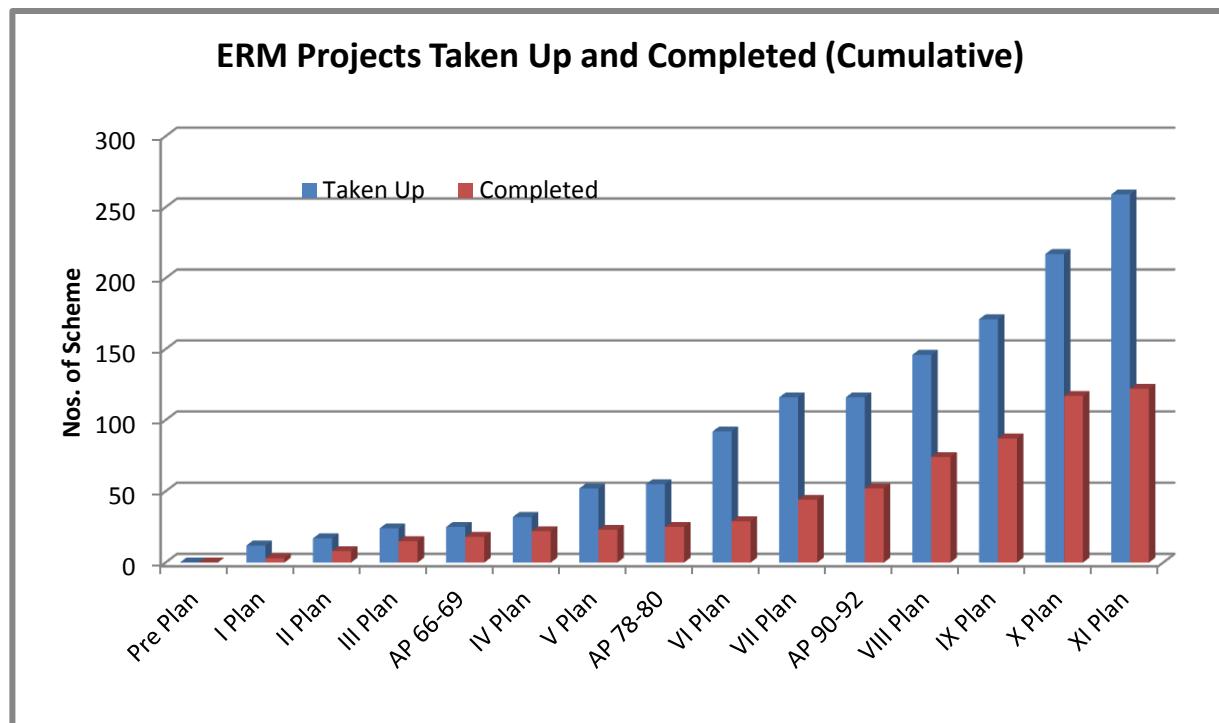
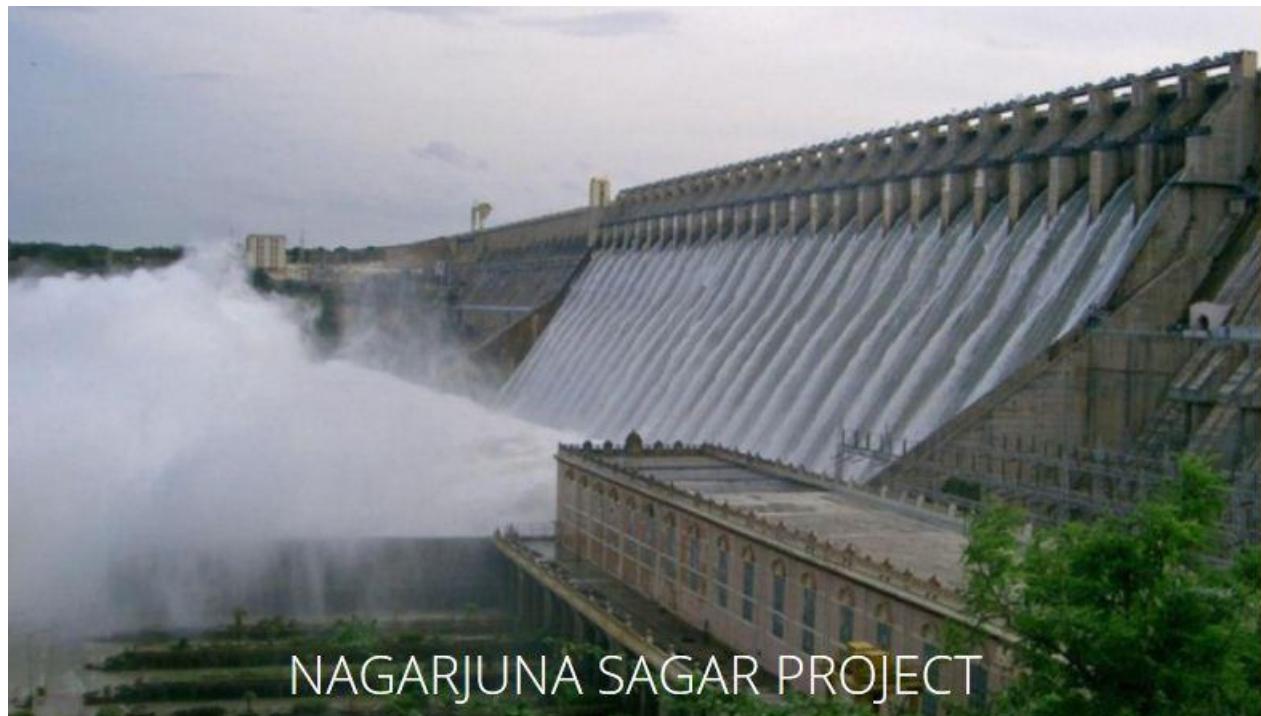


Fig 2.4 Modernization of ERM Projects taken up and Completed (Cumulative)



image from Topographical Survey work by Drone for Barinium Hydro Electric Project in remote areas of J&K by CWC. Project is proposed on Chenab River in Paddar Valley of District Kishtwar, J&K.



Inspection and Testing of New Supplied ADCP was done in presence of Chief Engineer, Mahanadi & Eastern Rivers Organization (M&ERO) at Site Rajghat

CHAPTER-III**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

S. No.	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 / toxic parameters and pesticides are analysed. As on April 2022, out of 23 laboratories in CWC, 17 laboratories got accredited by National Accreditation Board for Testing and Calibration Laboratories (NABL) in accordance with Standard ISO/IEC 17025:2017 and accreditation of 6 laboratories are under process. Details of NABL Accreditation status of 23 Water Quality Laboratories of CWC are given in the Table 3.1.1.

Table: 3.1.1 NABL Accreditation status of Water Quality Laboratories of CWC

S.No	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

S.No	Name of Laboratory	Level	Location	Organisation	NABL Accreditation Status
8	Upper Krishna Divisional Water Quality Laboratory	II	Pune	KGBO, Hyderabad	Accredited
9	Krishna & Godavari River Water Quality Laboratory	III	Hyderabad	KGBO, Hyderabad	Accredited
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	Non Accredited
13	Mahanadi Divisional Water Quality Laboratory	II	Raipur	MERO, Bhubaneswar	Accredited
14	Eastern River Water Quality Laboratory	II	Bhubaneswar	MERO, Bhubaneswar	Accredited
15	Wainganga Divisional Water Quality Laboratory	II	Nagpur	MCO, Nagpur	Accredited
16	Narmada Divisional Water Quality Laboratory	II	Bhopal	NBO, Bhopal	Non 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	Non Accredited

S.No	Name of Laboratory	Level	Location	Organisation	NABL Accreditation Status
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 Basis is”

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 331 flood forecasting stations, of which 199 are level forecasting and 132 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 8000 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	1 st May to 31 st October
All other basin up to Krishna Basin	1 st June to 31 st October
Basins south of Krishna basin (Pennar, Cauvery and southern Rivers)	1 st June to 31 st 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 2021

During the year, the flood forecasting activity began from 1st May 2021. During the flood season of 2021 (May to December), 10617 flood forecasts (6670 level forecast and 3947 inflow forecasts) were issued out of which 9976 (93.96%) forecasts were found within accuracy limit (± 0.15 m for level forecast and $\pm 20\%$ 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://120.57.99.138>. 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 2021 onwards till December 2021. 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 2021

During the flood season of 2021, out of 199 level forecasting stations, Extreme Flood Situation was witnessed at 8 stations. Further, 50 more stations, where water level is being monitored by CWC, witnessed Extreme Flood Situation during the period. The details are as under:

Sl. No.	State	District	River	Station	Period	
					From	To
1.	Bihar	Patna	Ganga	Hatidah	13/08/2021	19/08/2021
2.		Bhagalpur	Ganga	Bhagalpur	16/08/2021	19/08/2021
3.	Uttar Pradesh	Auraiya	Yamuna	Auraiya	06/08/2021	07/08/2021
4.		Buduan	Ganga	Kachlabridge	23/10/2021	23/10/2021
5.		Siddartha Nagar	Rapti	Bansi	02/09/2021	04/09/2021
6.	Odisha	Balasore	Jalaka	Mathani Road Bridge	22/09/2021	22/09/2021
7.	West Bengal	Coochbehar	Teesta	Mekhliganj (R/B)	20/10/2021	20/10/2021
8	Andhra Pradesh	Nellore	Pennar	Nellore Anicut	20/11/2021	20/11/2021

50 Flood Monitoring Stations flowed in Extreme Flood Situation as detailed under:

Sl No.	State	District	River	Station	Period	
					From	To
1	Tamilnadu	Kanyakumari	Kodaiyar	Thiruvarambu	26/05/2021 16/10/2021 13/11/2021	26/05/2021 17/10/2021 14/11/2021
2		Tiruvallur	Kosasthalaiyar	Monnavedu	11/11/2021 19/11/2021	13/11/2021 20/11/2021
3		Ranipet	Kallar	Poyyapakkam	11/11/2021 19/11/2021 29/11/2021	13/11/2021 19/11/2021 29/11/2021
4		Ranipet	Araniar	Puduvayal	12/11/2021	12/11/2021
5		Kanyakumari	Pazhayar	Ashramam	14/11/2021	14/11/2021
6		Nilgiri	Bhavani	Kukkalthurai	17/11/2021	18/11/2021
7		Vellore	Palar	Thiruvalam	19/11/2021	21/11/2021
8		Thiruvannamalai	Ponnaiyaru	Vazhavachanur	19/11/2021	19/11/2021
9		Krishnagiri	Ponnaiyaru	Panneswarammadam	19/11/2021	19/11/2021
10		Vellore	Palar	Nariyampattu	19/11/2021	23/11/2021

11		Chengalpattu	Palar	Chengalpatu	19/11/2021	22/11/2021
12		Vellore	Kosasthalaiyiar	Ayilambedu	21/11/2021	21/11/2021
13		Cuddalore	Periyadai	Venganur	26/11/2021	26/11/2021
14		Tiruchirapalli	Ayyar	Thandalaiputhur	26/11/2021	26/11/2021
15		Ariyalur	Marudaiyiar	Varanavasi	26/11/2021	27/11/2021
16	Bihar	Muzaffarpur	BurhiGandak	Sakra	10/07/2021	14/07/2021
17		Vaishali	Gandak	Lalganj	02/09/2021	03/09/2021
18	Maharashtra	Ratnagiri	Vashisti	Muradpur	22/07/2021	23/07/2021
19		Ratnagiri	Bav	Nivali	22/07/2021	23/07/2021
20		Raigad	Savitri	Mahad	22/07/2021	23/07/2021
21		Sindudurg	Gad	Belne Bridge	23/07/2021	23/07/2021
22		Chandrapur	Wardha	Dhanora(Wardha)	23/07/2021	24/07/2021
23		Aurangabad	Shivana	Lasur	08/09/2021 28/09/2021	08/09/2021 29/09/2021
24		Chandrapur	Wardha	Dhanora	08/09/2021	09/08/2021
25		Wardha	Wardha	Kapsi	08/09/2021	10/09/2021
26		Yavatmal	Wardha	Patala	10/09/2021	10/09/2021
27		North Goa	Madai	Ganjam	23/07/2021	24/07/2021
28	Telangana	Adilabad	Penganga	Thamam	23/07/2021	23/07/2021
29		Karimnagar	Maner	Somanpally	07/09/2021	08/09/2021
30	Karnataka	UttaraKanada	Aghanashini	Santeguli	23/07/2021	23/07/2021
31		Mandy	Shimsa	Thoreshettahalli	23/10/2021 16/11/2021 21/11/2021	23/10/2021 17/11/2021 22/11/2021
32		Chamarajanagar	Uduthorehalla	Pudunagara	14/11/2021	15/11/2021
33	Uttarpradesh	Balrampur	Kwano	DumriGhat	23/07/2021	24/07/2021
34		Kheri	Sarda	Paliakalan	21/10/2021	21/10/2021
35	Rajasthan	Kota	Parwati	Khatoli	03/08/2021	04/08/2021
36		Kota	Ujjad	Barodiya	07/08/2021	07/08/2021
37	Madhya Pradesh	Datia	Sind	Seondha	04/08/2021	05/08/2021
38		Mendhikeda	Narmada	Kaner	24/09/2021	24/09/2021

39	Gujarat	Surat	Tapi	Kholwad(Kath ore)	29/09/2021	30/09/2021
40	Kerala	Kollam	Ithikkara	Arkkannur	12/10/2021	12/10/2021
41		Kottayam	Manimala	Pullakkayar	16/10/2021	16/10/2021
42		Kottayam	Manimala	Manikal	16/10/2021	16/10/2021
43	Uttarakhand	Chamoli	Alkananda	Karan Prayag	19/10/2021	19/10/2021
44		Pithoragarh	Sarda	Ghat	19/10/2021	20/10/2021
45		Champawat	Sarda	Pancheshwar	19/10/2021	20/10/2021
46	Andhra Pradesh	Chittoor	Nagari	Buggaagraharam	12/11/2021	19/11/2021
47		Chittoor	Poini	Narasingarayanipet	19/11/2021	21/11/2021
48		Cuddapah	Cheyyeru	Nandalur	19/11/2021	19/11/2021
49		Anantapur	Chitravathi	Singavaram	19/11/2021	20/11/2021
50	Puducherry	Puducherry	Varahana di	Kumarapalayam	18/11/2021	20/11/2021

Severe Flood Situation

87 FF Stations flowed in Severe Flood Situation in the States of Arunachal Pradesh, Assam, Odisha, Bihar, Uttar Pradesh, Uttarakhand, West Bengal, Maharashtra, Rajasthan, NCT Delhi, Andhra Pradesh, Kerala, Telangana and Jharkhand during the period 1st May to 31st December 2021 as shown below:

Sl. No.	State	District	River	Station
1	Arunachal Pradesh	East Siang	Siang	Passi ghat
2	Assam	Sonitpur	Jia-Bharali	N T Road Crossing
3		Jorhat	Brahmaputra	Neamati ghat
4		Sivasagar	Desang	Nanglamora ghat
5		Barpeta	Beki	Beki Rd Bridge
6		Goalpara	Brahmaputra	Goalpara
7		Dhubri	Brahmaputra	Dhubri
8		Sonitpur	Brahmaputra	Tezpur
9		Kamrup	Brahmaputra	Guwahati (DC Court)

10		Kokrajhar	Gaurang	Kokrajhar
11		Dibrugarh	Brahmaputra	Dibrugarh
12		Lakhimpur	Subansiri	Badati ghat
13	Odisha	Keonjar	Baitarni	Anandpur
14		Bhadrak	Baitarni	Akhuapada
15		Balasore	Subarnarekha	Rajghat
16	Bihar	Madhubani	Kamalabalan	Jainagar
17		Gopalganj	Gandak	Dumaria ghat
18		Muzzafarpur	Gandak	Rewa ghat
19		Samastipur	BurhiGandak	Rosera
20		Sitamarhi	Bagmati	Dheng Bridge
21		Araria	Parwan	Araria
22		Darbhanga	Adhwara Group	Ekmi ghat
23		Muzzafarpur	BuriGandak	Sikandarpur (Muzzafarpur)
24		Motihari	BuriGandak	Lalbegia ghat
25		BuriGandak	Samastipur	Samastipur
26		Khagaria	BurhiGandak	Khagaria
27		Purnea	Mahananda	Dhengra ghat
28		Darbhanga	Bagmati	Haya ghat
29		Madhubani	Kamlabalan	Jhanjharpur
30		Khagaria	Kosi	Baltara
31		Sitamarhi	Lakhanadi	Runisaidpur
32		Muzzafarpur	Bagmati	Benibad
33		Darbhanga	Adhwara Group	Kamataul
34		Siwan	Ghagra	Darauli
35		Bhagalpur	Ganga	Kahalgaon
36		Munger	Ganga	Munger
37		Vaishali	Gandak	Hajipur
38		Siwan	Ghagra	Gangpur Siswan
39		Patna	Punpun	Sripalpur
40		Patna	Sone	Maner
41		Patna	Ganga	Gandhi ghat
42		Patna	Ganga	Digha ghat
43		Buxar	Ganga	Buxar
44		Katihar	Kosi	Kursela
45		Kishanganj	Mahananda	Taibpur
46		W Champaran	Gandak	Chatia
47		Katihar	Mahananda	Jhawa
48		Muzzafarpur	Burhi Gandak	Ahirwalia
49	Uttar Pradesh	Kushinagar	Gandak	Khadda
50		Ballia	Ghagra	Turtipar

51		Farukkabad	Ganga	Fatehgarh
52		Faizabad	Ghagra	Ayodhya
53		Barabanki	Ghagra	Elgin bridge
54		Balrampur	Rapti	Balrampur
55		Gorakhpur	Rapti	Bird ghat
56		Allahabad	Ganga	Phaphamau
57		Mirzapur	Ganga	Mirzapur
58		Ghazipur	Ganga	Ghazipur
59		Ballia	Ganga	Ballia
60		Varanasi	Ganga	Varanasi
61		Allahabad	Ganga	Allahabad
62		Etawah	Yamuna	Etawah
63		Hamirpur	Betwa	Sahjina
64		Allahabad	Yamuna	Naini
65		Hamirpur	Yamuna	Hamirpur
66		Jalaun	Yamuna	Kalpi
67		Kanpur	Ganga	Kanpur
68		Shahjahanpur	Ganga	Dabri
69		Banda	Yamuna	Chilla ghat
70	Uttarakhand	Pauri Garhwal	Alakananda	Srinagar
71		Haridwar	Ganga	Haridwar
72		Dehradun	Ganga	Rishikesh
73	West Bengal	Jalpaiguri	Tista	Domohani
74		Hoogly	Mundeswari	Harinkhola
75		Birbhum	Ajoy	Gheropara
76		Coochbehar	Torsa	Ghugumari
77		Murshidabad	Ganga	Farakka
78	Maharashtra	Satara	Krishna	Arjunwad
79	Rajasthan	Dholpur	Chambal	Dholpur
80		Kota	Chambal	Kota City
81		Karauli	Chambal	Manderial
82	NCT Delhi	North Delhi	Yamuna	Delhi Rly Bridge
83	Andhra Pradesh	East Godavari	Godavari	Kunavaram
84		Srikakulam	Nagavali	Srikakulam
85	Telangana	Bhopalpalli	Godavari	Kaleswaram
86	Jharkhand	Sahibganj	Ganga	Sahibganj
87	Kerala	Pathanmitta	Pamba	Malakkara

Above Normal Flood Situation:

42 FF Stations in Assam, Bihar, Jharkhand, Uttar Pradesh, West Bengal, Andhra Pradesh, Telangana, Maharashtra, Tamilnadu and Odisha flowed in Above Normal Flood Situation during the period 1st May to 31st December 2021 as shown below:

Sl. No.	State	District	River	Station
1	Assam	Lakhimpur	Ranganadi	Ranganadi NT Rd Crossing
2		Sivasagar	Dikhow	Sivasagar
3		Golaghat	Dhansiri(s)	Numaligarh
4		Dibrugarh	Buridehing	Chenimari (Khowang)
5		Nalbari	Pagladiya	Pagladiya NT Rd Crossing
6		Kamrup	Puthimari	N H Crossing
7		Barpeta	Manas	Manas NH Xing
8		Dhubri	Sankosh	Golokganj
9		Nagaon	Kopili	Kampur
10		Karimganj	Kushiyara	Karimganj
11	Bihar	Sapual	Kosi	Basua
12		Adhwara	Sitamarhi	Sonebarsa
13		Chhappra	Ghaghra	Chhappra
14	Jharkhand	Purba Singh bhum	Subarnarekha	Jamshedpur
15	Uttar Pradesh	Bahraich	Rapti	Kakardhari
16		Kanpur	Ganga	Ankinghat
17		Kannauj	Ganga	Kannauj
18		Ghaziabad	Ganga	Garhmukhteshwar
19		Rae-Bareli	Ganga	Dalmau
20		Rae-Bareli	Sai	Rae-Bareli
21		Bareilly	Ramganga	Bareilly
22		Moradabad	Ramganga	Moradabad
23	West Bengal	Coochbehar	Jaldhaka	Mathabhanga
24		Alipurduar	Torsa	Hasimara
25		Jalpaiguri	Jaldhaka	NH 31
26		Coochbehar	Raidak-I	Tufanganj
27	Andhra Pradesh	Kurnool	Tungabhadra	Mantralayam
28		East Godavari	Godavari	Dowlaiswaram
29		Nellore	Pennar	Nellore Anicut
30	Telangana	Kothagudem	Godavari	Dummagudem
31		Kothagudem	Godavari	Bhadrachalam
32		Bhopalpalli	Godavari	Eturunagaram
33	Maharashtra	Nanded	Godavari	Nanded

34		Parbhani	Godavari	Gangakhed
35		Nasik	Godavari	Nasik
36	Odisha	Jajpur	Brahmani	Jenapur
37		Balasore	Burhabalang	Govindpur NH 5 Rd Bridge
38		Gajapati	Vamsadhara	Kashinagar
39		Cuttack	Mahanadi	Naraj
40	Tamilnadu	Madurai	Vaigai	Madurai
41		Tiruchirapalli	Cauvery	Musiri
42		Erode	Cauvery	Kodumudi

Reservoirs having Inflow above threshold limit:

79 reservoir received inflows above its threshold limit in Karnataka, Jharkhand, Odisha, West Bengal, Bihar, Maharashtra, Tamilnadu, Uttarakhand, Uttar Pradesh, Telangana, Rajasthan, Gujarat, Andhra Pradesh, Kerala and Madhya Pradesh during the period from 1st May to 31st December 2021.

Sl. No.	State	District	River	Station
1	Karnataka	Mysore	Kabini	Kabini Dam
2		Vijayapura	Krishna	Almatti Dam
3		Mandy	Cauvery	Krishnarajasagar Dam
4		Chikmagaluru	Bhadra	Bhadra Dam
5		Shivamogga	Tunga	Upper Tunga
6		Bagalkot	Krishna	Hippargi Dam
7		Belgaum	Malaprabha	Malaprabha Dam
8		Ballari	Tungabhadra	Tungabhadra Dam
9		Gadag	Krishna	Singatalur Barrage
10		Belagavi	GhatPrabha	Hidkal Dam
11		Vijayapura	Krishna	Narayanpur Dam
12		Coorg	Harangi	Harangi Dam
13		Hassan	Hemavathy	Hemavathy Dam
14	Jharkhand	Saraikela Kharaswan	Subarnarekha	Galudih Barrage
15		Dhanbad	Damodar	Panchet Dam
16		Dhanbad	Barakar	Maithon Dam
17		Dumka	Mayurakshi	Massanjore Dam
18		Bokaro	Damodar	Tenughat Dam
19		Saraikela Kharaswan	Subarnarekha	Chandil Dam
20	Odisha	Sambalpur	Mahanadi	Hirakud Dam

21		Kendujhar	Baitarani	Salandi Dam
22		Angul	Brahmani	Rengali Dam
23	West Bengal	Burdwan	Damodar	Durgapur Barrage
24		Birbhum	Mayurakshi	Tilpara M Barrage
25		Bankura	Kangsabati	Kongsabati Dam
26	Maharashtra	Satara	Nira	Veer Dam
27		Satara	Koyna	Koyna Dam
28		Kolhapur	Warana	Warana Dam
29		Solapur	Bhima	Ujjani Dam
30		Bhandara	Wainganga	Gosikhurd Dam
31		Yavatmal	Penganga	Issapur/Upper Penganga
32		Amaravati	Wardha	Upper Wardha Project
33		Aurangabad	Godavari	Jaikwadi Dam
34		Jalgaon	Tapi	Hathnur Dam
35	Bihar	West Champaran	Gandak	Gandak Barrage
36	Uttar Pradesh	Bulandshahar	Ganga	Narora Barrage (U/S)
37		Bahraich	Ghagra	Katerniaghata Dam
38		Sonebhadra	Rihand	Rihand Dam
39		Lalitpur	Betwa	Matatila Dam
40		Bijnor	Ganga	Dharmanagri Barrage
41	Uttarakhand	Champawat	Sharda	Banbasa Barrage
42		Pauri Garhwal	Ramganga	Kalagarh Dam
43	Tamilnadu	Thanjavur	Cauvery	Grand Anicut
44		Tirichirapalli	Cauvery	Upper Anicut
45		Erode	Bhavani	Bhavanisagar Dam
46		Salem	Cauvery	Mettur Dam
47		Thiruvallur	Kosasthalaiyar	Poondi Satyamurthy Reservoir
48		Theni	Vaigai	Vaigai Dam
49		Cuddalore	Periyar Odai	Wellington Dam
50		Thiruvannamalai	Ponnaiyar	Sathanur Dam
51		Tiruvallur	Adyar	Chembarampakkam Lake
52	Telangana	Wanaparthy	Krishna	Priyadarshini Jurala
53		Nizamabad	Godavari	Sriram Sagar Dam
54		Karimnagar	Godavari	Sripada Yelempally Dam
55		Nalgonda	Musi	Musi Project
56		Bhupalpally	Godavari	Laxmi Barrage
57		Sanga Reddy	Manjira	Singur Dam
58		Kama Reddy	Manjira	Nizamsagar Dam

59		Adilabad	Kaddamvagu	Kaddam Dam
60	Rajasthan	Jhalawar	Kalisindh	Kalisindh Dam
61	Gujarat	Tapi	Tapi	Ukai Dam
62		Valsad	Damanganga	Madhuban Dam
63	Andhra Pradesh	Kurnool	Krishna	Srisailam Dam
64		Krishna	Krishna	Prakasham Barrage
65		Kurnool	Tungabhadra	Sunkesula Barrage
66		Guntur	Krishna	Dr KLRS Pulichintala Dam
67		West Godavari	Godavari	Indirasagar (Polavaram)
68		Srikakulam	Nagavali	Narayanpuram Anicut
69		Vizianagaram	Nagavali	Madduvalasa Reservoir
70		Nellore	North Pennar	Somasila Dam
71	Madhya Pradesh	Jabalpur	Narmada	Bargi Dam
72		Raisan	Narmada	Barna Dam
73		Khandwa	Narmada	Indirasagar Dam
74		Khandwa	Narmada	Omkareswar Dam
75		Mandsaur	Chambal	Gandhisagar Dam
76		Shahdol	Sone	Bansagar Dam
77		Lalitpur	Betwa	Rajghat Dam
78		Hoshangabad	Narmada	Tawa Dam
79	Kerala	Idukki	Periyar	Idukki Dam

3.2.4 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 2021, 245 daily bulletins (once daily), 866 Orange Bulletins for Severe Flood Situation (every 6 hours) and 316 Red Bulletins for Extreme Flood Situation (every 3 hours) 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, MoWR, National Crisis Management Committee (NCMC), National Executive Council (NEC) meetings.

3.2.5 Communication System of CWC used for flood forecasting purposes

Various modes of communication namely, wireless (VHF & HF), satellite, 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 3E 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 were also used at all the DFCR and CFCR (under FFM Directorate, CWC) for transmission of data. The CFCR at Delhi was operated on 24x7 basis during monsoon. The information regarding Severe and Extreme Flood Situation were also sent to concerned authorities in MoWR, RD & GR, CWC, National Disaster Management Authority (NDMA), Indian Meteorological Department (IMD), National Disaster Response Force (NDRF) etc. through email, phone, fax and SMS. Bulk SMS service of MTNL was also utilized to disseminate the flood information. The forecast, water level and rainfall information were regularly uploaded on web site <http://india-water.gov.in/wims> during monsoon season 2020.

3.2.6 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.

3.2.6.1 Installation of Telemetry System

The installation of Telemetry System for 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. Till the end of XII Plan, there were 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. These Modelling Centres are located at 1.Agra, 2.Asansol, 3.Bengaluru, 4.Bhubaneshwar, 5.Burla, 6.Bhopal, 7.Chennai, 8.Haridwar, 9.Dibrugarh, 10.Gandhinagar, 11.Gangtok, 12.Guwahati, 13-14.Hyderabad (Two stations one each for Krishna and Godavari basins), 15.Jaipur, 16.Jalpaiguri, 17.Nagpur, 18-19.Two at Lucknow, 20.Bhusawal, 21.Maithon, 22-23. New Delhi (Two at headquarter and one for Yamuna Basin), 24.Patna, 25.Shimla, 26.Surat and 27.Varanasi. The data reception from stations all over India is being monitored from Central Flood Control Room at CWC Headquarter, New Delhi.

Upto Feb 2022, 20 more Telemetry stations have been installed under XII Plan. Total number of installed stations is 960 upto XII Plan. [3 remaining]

Installation of 125 Telemetry Stations under 14th finance commission is under progress out of which installation is completed at 54 stations. [71 remaining]

3.2.6.2 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 modeling for 20 major river basins of the country covering 199 water level and 132 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.

3.2.6.3 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) 2017-21:

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 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, 421 schemes have been completed; 64 schemes foreclosed, dropped and shifted (47-foreclosed; 16-dropped & 1 shifted to RMBA component) and 37 schemes are ongoing. Out of these 43 ongoing schemes; 21, 13 & 3 schemes are being monitored by CWC, GFCC & Brahmaputra Board respectively. These 421 completed schemes have given protection to an area of around 4.991 Mha and protected a population of about 53.475 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 Rs700 Cr was kept for period 2017-21 under this component.

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

Sl. No.	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 FLOOD MANAGEMENT AND BORDER AREAS PROGRAMME (FMBAP) 2021-26.

The total amount recommended by EFC for FMBAP 2021-26 for XVth Finance Commission Cycle is Rs. 4,500 Cr. Approval of FMBAP 2021-2026 vide Cabinet decision dated 19.01.2022 is up to September, 2022. 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.

Release under the FMP as well as RMBA till date is as under.

Releases under FMP and RMBA since XI Plan			
Rs. in crore			
Fund Releases	FMP	RMBA(Grant-in-Aid)	Total
XI PLAN	3566.00	340.41	3906.4053
XII PLAN	1307.07	223.20	1530.27
Total (XI+XII)	4873.07	563.61	5436.6753
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
Total as on date since XI Plan	6687.51	1095.17	7782.68

Flood Erosion

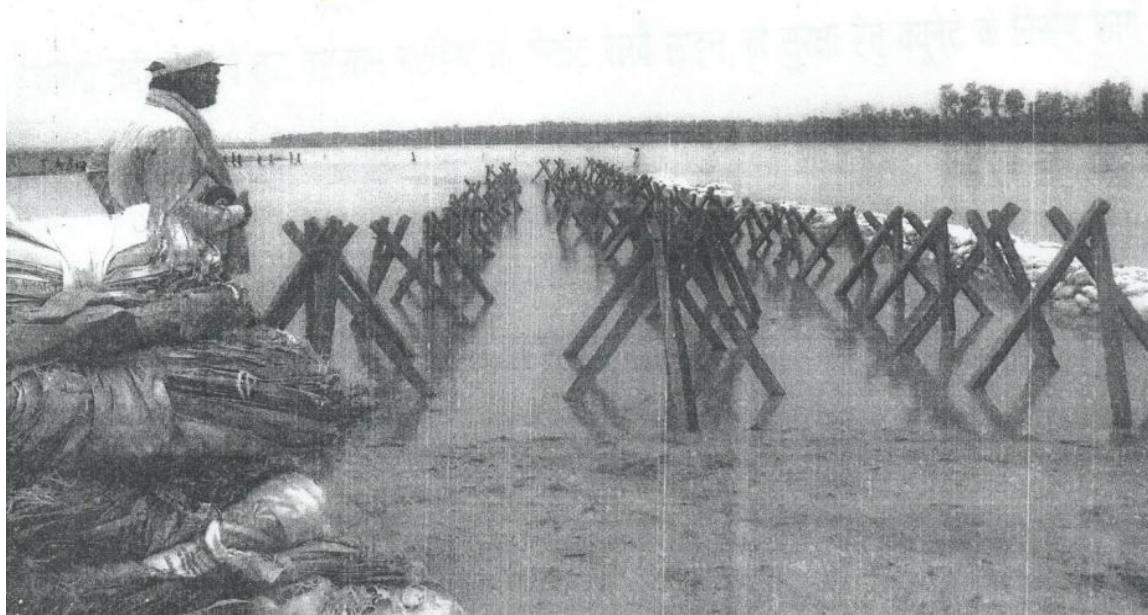
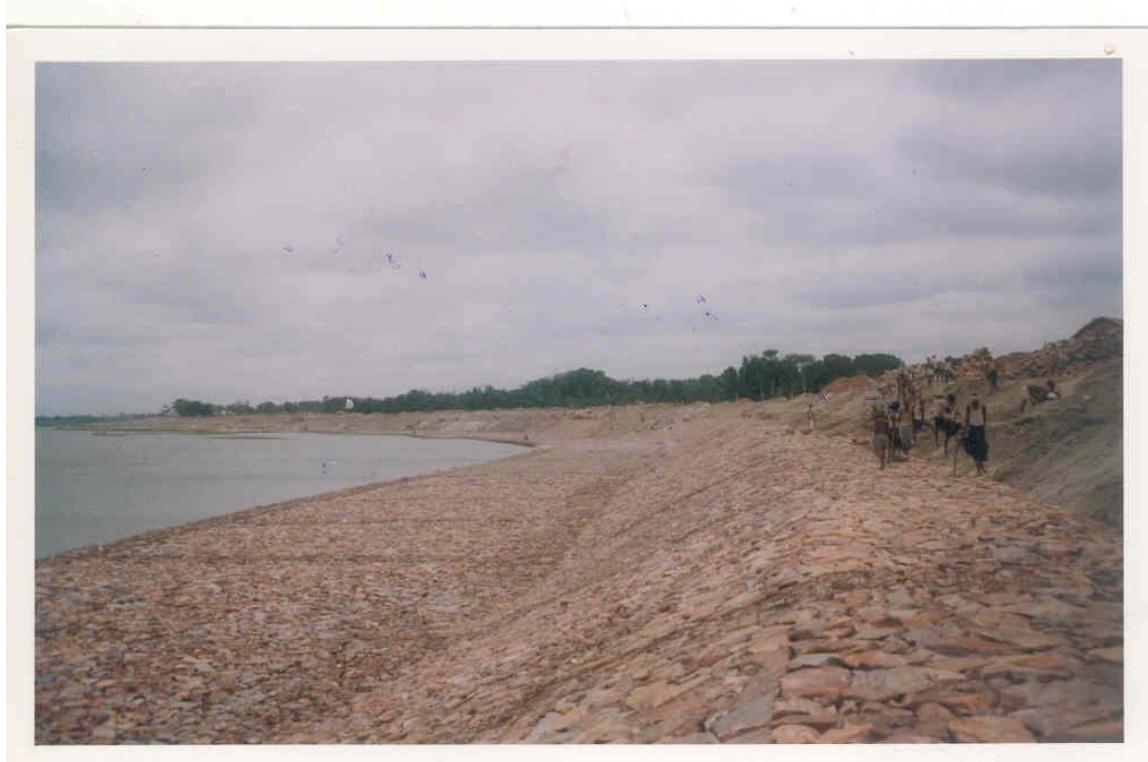






Flood Protection works







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.

Morphological study of three rivers namely, Ghaghra, Sutluj and Gandak has been completed till the end of 11th Plan period. The study of Ghaghra and Satluj has been conducted by NIH, Roorkee and the study of river Gandak has been conducted by CWPRS, Pune.

During the 12th plan period, consultancy works for morphological studies of 15 rivers (Ganga, Sharda, Rapti, Kosi, Bagmati, Yamuna, Bramhaputra, Subansiri, Pagladiya, Krishna, Tungbhadra, Mahananda, Mahanadi, Hoogli, & Tapti) by using Remote Sensing technology have been awarded to IITs /NITs under the Plan Scheme “R&D Programme in water sector”. The details and status of these studies are given below:-

Sl. No.	Institute	Name of Rivers	Status
1.	IIT Roorkee	Ganga, Sharda, Rapti	Completed
2.	IIT Delhi	Kosi, Bagmati, Yamuna	Final Report of Kosi and Bagmati Submitted. Draft Final Report of Yamuna Submitted.
3.	IIT Guwahati	Brahmaputra, Subansiri, Pagladiya	Completed
4.	IIT Madras	Krishna, Tungbhadra	Final Report Submitted
5.	IIT Kharagpur	Mahananda, Mahanadi, Hoogly	Final Report Submitted
6.	SVNIT Surat	Tapi	Completed

The above studies have been spilled over beyond 12th Plan. The remaining part of the above studies has been included in the EFC of Plan scheme “Research and Development programme in water sector and implementation of National Water Mission”.

3.5 Coastal Erosion

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. As per the data reported by various maritime States/UT agencies about 1829 km of coastline of the country is affected by erosion and about 844 km of coastline have protection works. CWC is involved in following activities for providing assistance to the States:

3.5.1 Coastal Protection and Development Advisory Committee

The Coastal Protection and Development advisory Committee (CPDAC) (erstwhile Beach Erosion Board) has been constituted by 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 has been 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 have been completed and intended targets have been achieved. All the remaining payments as per MoU was 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 and an advance payment amounting to Rs 1.40 crore was made to IIT Madras in February 2020. 1st PMC meeting was held through VC on 21st December, 2020 and 2nd PMC meeting held through VC on 2nd March, 2021. One week online training on CMIS was conducted during January 2021. Amount paid by CWC in the second phase of CMIS is Rs.355 lakhs. Establishment of three nos. of coastal data collection sites (Devanari-Tamil Nadu, Karaikal-Puducherry and Ponnani-Kerala) have been completed and sites were taken over from the project executor, IITM, Chennai on 31.05.2021. Data collection has been started by CWC from the above sites in the month of June 2021.

B) CWPRS

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.

A meeting was held among the officers of CWC, CWPRS Pune and the representatives of the State Govt. of Gujarat and Maharashtra at CWC, New Delhi on 18/08/2017 wherein detailed discussions were held on the various modalities involved in the tripartite arrangement for implementation of CMIS and also the various experiences/learning from the on-going implementation of CMIS by IIT Madras. Consequently, the State Govt. of Gujarat and Maharashtra accorded their concurrence for the implementation of CMIS in their respective States. The competent authority in MoWR, RD & GR has 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.

Advance payment amounting to Rs 2.09 crore for the project was made to CWPRS, Pune in June 2019. First Project Monitoring Committee (PMC) meeting was held at CWPRS, Pune in September 2019. Establishment of 2 sites, one at Satpati in North Maharashtra and another at Nanidanti-Motidanti in South Gujarat is in progress under this project.

Second PMC meeting was held via VC on 11.08.2020 and 3rd PMC meeting was held via VC on 04.06.2021. Two on-line training workshops have been organized viz. Installation and Operation of coastal equipment which was organized in August 2020 and Role, Method and Importance of Coastal Data Collection for CMIS Activities in North Maharashtra and South Gujarat which was organized in February 2021. Similarly, two Fields trainings have been organized during testing of equipments and their installation. First year balance payment amounting to Rs. 253.62 lakhs has been made to CWPRS, Pune in the month of June 2021. Third PMC meeting for the implementation of CMIS in the State of Maharashtra and Gujarat was held through Video Conferencing on 04.06.2021. Procurement of most of the equipment have been completed and data collection has been started in this project.

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.

Approval was received from DoWR, RD & GR for the revalidation of sanction for making advance payment of Rs.4.13 crore to NIO, Goa for the implementation of Coastal Management Information System (CMIS) at two sites in the state of Goa and at one site in the State of Maharashtra. Accordingly, advance payment of Rs 4.13 crore was made to NIO Goa.

1st Project Monitoring Committee (PMC) meeting was held at NIO, Goa in January 2020. 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.

Second PMC meeting was held via VC on 16.06.2020 and 3rd PMC meeting was held via VC on 03.02.2021. First Training in the form of Webinar conducted by NIO, Goa on 25.09.2020. Bathymetry, beach profiling, shoreline change, coastal sediment Coastal bed sediments, suspended sediment and beach sediment measurements are being conducted as per schedule. The procurement of various equipments is under progress. Fourth PMC meeting for the implementation of CMIS in the State of Maharashtra and Goa was held in Goa on 08.03.2022.

3.5.3 Salinity Ingress Management Projects

On the intervention of Hon'ble Prime Minister, a study was taken up by the 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 adopting suitable protection measures for prevention of salinity ingress in the coastal states/union territories was constituted under the chairmanship of Chairman, CWC with Chief Engineer, HSO, CWC as Member-Secretary.

On the direction of Hon'ble Prime Minister during a review meeting taken on 19.06.2014, a Report namely "Problems of Salinization of Land in the Coastal States/Union Territories" was prepared by HSO, CWC, New Delhi and submitted in Aug, 2017.

A meeting to discuss the report was held under the Chairmanship of Secretary (MoWR, 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 in the third meeting of the committee held on 09.12.2020. These draft finalized Guidelines for the preparation of DPR for Salinity Ingress Management Projects in coastal areas was submitted to DoWR, RD & GR on 19.02.2021 for the approval of the competent authority in the Ministry. DoWR, RD & GR accorded the approval to the draft guidelines in October, 2021 and

requested CWC to circulate the draft guidelines to all the coastal states/UTs for their comments/views. The same were circulated to all the coastal states/UTs in October, 2021 through DO Letters from Chairman, CWC. Further, DoWR, RD & GR has also sent the guidelines to all the coastal states/UTs for their comments/views. Responses are still awaited from some of the states/UTs.

3.5.5 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.

CHAPTER-IV

BASIN PLANNING

4.1 BRICS Water Minister Meet

A country paper on 'Addressing the water, food & energy security' was prepared by the BPMO officers and the same was presented in the BRICS Water Forum Session held on 17.11.2021. A draft Joint Declaration of BRICS Water Ministers was prepared and deliberations upon it were held during the BRICS Water Forum session held on 17.11.2021. The Draft Joint Declaration was finally adopted by Water Ministers in the BRICS Water Minister Meet held on 18.11.2021. BPMO Officials participated in the "BRICS Water Ministers Meet" on 18.11.2021 held through Video Conferencing.



Hon'ble Minister of Jal Shakti signing "New Delhi Statement on Water" during 1st BRICS Water Ministers Meeting



BRICS Water Forum

4.2 Extended Hydrological Prediction

Extended Hydrological Prediction (EHP) is the prediction of hydrological variables, most commonly the monthly/seasonal stream flow or in simple term it is the prediction of water availability in a catchment at the time scale of days to weeks to seasons in future. The skilful and reliable forecasts of stream flows are highly valuable for providing water allocation, managing drought, planning and managing water use.

The consultancy for EHP work of 3 basins (Yamuna, Narmada, and Cauvery) under NHP has been awarded to M/s Research Triangle Institute (RTI) International, USA. Project has started since 01.07.2020. Main objective of the consultancy is to develop tools for multi-week forecast of volume of water in the above mentioned basins. Multi week forecasts will cover a period of up to 4 weeks from the date of issuing forecasts. The final outcomes consist of:

- Forecast model for high flow (wet) season
- Forecast model for low flow (dry) season
- Dashboard with Integrated Operational Forecast Models
- Documentation (manuals, etc) and Capacity building

4.3 India-EU water Partnership

Under India- European Union (EU) water Partnership (IEWP), Priority Area 1 is dedicated to the topic 'Sustainable River Basin Management and Governance'.

As a key task, under Phase-I of IEWP, a pilot Tapi River Basin Management Plan (Tapi RBM Plan) was developed.

The Tapi RBM Plan follows the internationally acknowledged River Basin Management Cycle taking into account water quality and quantity. In this context and as a first implementation step of the RBM Cycle, the three Tapi States jointly identified five Key Water Management Issues (KWMIs) as essential basis of the Tapi Plan (29 March 2019, Gujarat). These five KWMIs are listed as follows:

1) Pollution from Urban Areas and Industries

- Organic point source pollution
- Point source pollution through hazardous substances

2) Pollution from Agriculture

- Point and non-point source pollution through nitrogen, phosphorous and pesticides

3) Alterations of River Hydrology/Water Quantity

- Alterations from irrigation/abstraction; crop patterns;

4) Alterations of Groundwater Quality and Quantity

- Alterations from irrigation/abstraction; solar pumping; pollution

5) Alterations of River Structure through Sand Mining

Ministry of Jal Shakti established a Tapi River Basin Committee on 27.05.2019 comprising of members from the Central agencies (CWC; CGWB) and all three Tapi River Basin States (Maharashtra, Madhya Pradesh and Gujarat) to jointly develop the Tapi RBM Plan under the IEWP. In addition, the Committee involved the EU Delegation as well as the IEWP/GIZ Project Management Unit and its EU Team of Consultants to support the technical work towards the Tapi RBM Plan. Three years (2018-2020) of phase-I of the IEWP were completed on 31.10.2020.

For implementation of the Phase-II of IEWP, the Tapi RBM committee has been reconstituted on 09.03.2021 with inclusion of members from Central Pollution Control Board (CPCB), Ministry of Agriculture and Farmers Welfare (MoA & FW), National Mission for Clean Ganga (NMCG) and Regional offices of CWC in Tapi basin. A Flexible Action Plan summarising the activities to be carried out in Phase II was adopted during a meeting Chaired by Member (WP&P), CWC on 14.01.2022.

4.4 National Water Planning

The uneven distribution of water in time and space and the recurring occurrence of floods and droughts in various parts of the country have underscored the need for a national perspective in water resources development involving participation of all concerned. Planning of water resources development and utilization is a multi-level process involving Central and State Governments, Non-Governmental Organizations and beneficiaries with intense interaction among them. CWC is actively involved in aspects related to holistic approach towards development and management of water resources.

4.4.1 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 MoWR for suggesting roadmap for implementation of National Water Policy - 2012 under the Chairmanship of Dr. S.R. Hashim, Former Chairman, UPSC & Former Member, and 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.

4.5 United Nations Sustainable Development Goal (SDG) Indicator

6.5.1

SDG Indicator 6.5.1 represents the Degree of Integrated Water Resources Management (IWRM) implementation, on a scale of 0 – 100. The indicator measures progress towards target 6.5: “By 2030, implement integrated water resources management at all levels, including through transboundary cooperation as appropriate”. The target supports the equitable and efficient use of water resources, which is essential for social and economic development, as well as environmental sustainability. The actions to achieve target 6.5 directly underpin the other water-related targets within SDG-6: “Ensure availability and sustainable management of water and sanitation for all”. The all matters pertaining to SDG Indicator 6.5.1 have been coordinated by United Nations Environment Programme (UNEP) and Global Water Partnership (GWP).

Chief Engineer, Basin Planning & Management Organisation (BPMO) is national focal point for reporting on SDG 6.5.1. Inputs were sought from 36 states & UT and 12 Agencies/Departments in April, 2020 for country's reporting through a set of questionnaire called survey instrument. Survey was completed and sent to UNEP in September, 2020 and final score of India in the scale of 100 was estimated as 45. The survey instrument was thoroughly examined and accepted by UNEP as per their data verification policy. A Global Workshop on Integrated Monitoring of SDG 6 on Water and Sanitation of all member countries of UN held on 10.12.2020 and 08.12.2021 were participated by BPMO officials.

4.6 State Specific Action Plan

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). A Steering and Technical Committees for State Specific Action Plan (SSAP) on Water was constituted in September 2020 having Chief Engineer, Basin Planning & Management Organisation (BPMO) and Director, Basin Planning-III as members respectively. The main responsibility of these committees is to examine and approve the SSAPs for States and UTs. The Draft Status Report (DSR) of five states namely Arunachal Pradesh, Assam, Sikkim, Uttarakhand and West Bengal were examined. Meetings of Steering Committee have been held for acceptance of Status Report of the States Sikkim, Assam and Uttarakhand. The Draft Status Report (DSR) of ten states namely Uttar Pradesh, Tamil Nadu, Rajasthan, Maharashtra, Karnataka, Madhya Pradesh, Chandigarh, Bihar, Andaman & Nicobar and Andhra Pradesh were received and examined.

4.7 Water Heroes: Share Your Stories Contest

“Water Heroes – Share Your Stories” Contest was started by DoWR, RD & GR in 01.09.2020, with the objective of promoting water conservation and sustainable development of water resources. The participant will have to post their Success stories in the field of water conservation which will comprise of a write-up (upto 300 words), pictures and a video of one to five minutes duration depicting their efforts/ significant contributions/ best practices used in different parts of the country in field of water conservation, water utilization or water resources development and management. Director, Basin Planning-III is a member of selection committee constituted to select the winner of the contest. Meeting of the Selection Committee for selection of the winner of success stories submitted by the participants up to March 2022 have been held.

4.8 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, 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 which was 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 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.

4.9 River Basin Management Bill

MoWR, 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.

MoWR, 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 Vigyan Bhawan, 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.

4.10 Joint Operation Committee of Rihand Reservoir

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 32nd meeting of the Joint Operation Committee (JOC) for the Rihand Reservoir was held on 18.10.2019 under the chairmanship of Member (WP&P) at CWC Headquarters, New Delhi. In the meeting it was decided that in view of higher demands and lesser availability in the month of May, Chairman, JOC suggested WRD Bihar to explore the possibility of shifting the sowing period of Kharif season in the Sone command in Bihar from May end to mid-June.

Further, it was decided to hold a meeting of JOC at the end of March 2020 or the first week of April 2020 to review the release pattern as per the availability of storage at that time and the requirements of WRD, Bihar. The above meeting could not be held due to outbreak of Covid-19 pandemic. However, letters have been issued in January 2021 to concerned state authorities of both states for providing the latest data on actual and proposed releases from Rihand reservoir and plan for the next JOC meeting.

CHAPTER-V

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. D&R Wing is using and promoting State-of-Art technology for planning and design of water resource projects at par with International Standards. The 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. Hydrological studies : Water Availability assessment; Design Flood
3. Examination and vetting of manufacturers design of hydro mechanical components.
4. Analysis & Design : Dams/Weirs, Barrages & canals, Gates, Tunnels, Power House, Slopes etc.
5. Technical Appraisal of Water Resources & Hydro Power Projects
6. Technical appraisal of Pre-feasibility/Detailed Project Reports of Irrigation, Hydropower and Multipurpose River Valley Projects.

7. Site Specific Seismic Design Parameters for dams. (National Committee on Seismic Design Parameters).
8. Glacial Lake Outburst Flood (GLOF) Studies.
9. Dam Break Analysis.
10. Sedimentation Analysis.
11. Instrumentation of Structures
12. Standardisation- Revision/ Amendments in BIS codes. Review of safety aspects of existing dams and its monitoring.
13. To organise meetings of National Committee on Dam Safety (NCDS) and National Dam Safety Authority (NDSA) to implement the various provisions of National Dam Safety Act 2021.
14. Dam Rehabilitation & Improvement Project (DRIP) Phase II and Phase III.
15. Coordination of research, development and capacity building activities.
16. Attending to distressed structures as applicable to design aspects and suggesting cost effective technical solutions to the agencies for resolution of problems during and post construction of projects.
17. 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 units to undertake the works related to planning and design of water resources projects. These units are as under:

- 1. Design (North & West) Organisation**
- 2. Design (East & North-East) Organisation**
- 3. Design (North-West & South) Organisation**

The above organisations have specialised Directorates such as Hydel Civil Design (HCD), Concrete & Masonry Dam Design (CMDD), Embankment Design, Gates Design and Barrage & Canal Design (BCD).

These units provide design and consultancy services during various stages of implementation of water resources 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. These units also undertakes appraisal of DPR of projects from design aspects. The works allocated to these units are as under:

(1) Design(N&W) Organization:

The scope of work of Design (N&W) unit includes design consultancy of various components of construction stage Projects, DPR stage projects, rehabilitation measures of existing projects and technical examination of DPR of projects pertaining to northern and Western states of India i.e. J&K, Himachal Pradesh, Punjab, Haryana, Delhi, Uttarakhand, Uttar Pradesh, Bihar and Jharkhand of the country as well as neighbouring countries i.e. Nepal and Afghanistan. The works also include preparation of joint detailed project reports for Indo-Nepal Project and assisting Indus Water Commission, Ministry of Jal Shakti on works related to J&K Projects. Apart from above, this unit is actively engaged in providing assistance in preparation of BIS Codes.

(2) Design (E&NE) Organization:

The unit provides services to projects located in the States/UTs of Sikkim, Assam, West Bengal, Meghalaya, Manipur, Mizoram, Nagaland, Tripura and Arunachal Pradesh. It also provides services to projects located in Bhutan. The design related support in respect of projects for which survey and investigation is carried out by CWC and Brahmaputra Board is also provided by the unit.

(3) Design (NW&S) Organization:

The unit provides services to projects located in the States/UTs of Kerala, Andhra Pradesh, Telangana, Tamil Nadu, Maharashtra, Madhya Pradesh, Odisha, Chhattisgarh, Gujarat, Rajasthan, Goa, and Andaman and Nicobar Islands in the country. It also provides services to projects located in other neighbouring countries namely Myanmar, African Countries and Srilanka.

5.2.2 Design Consultancy carried out by Design Organisations

CWC has provided design consultancy services to 79 projects during the year 2021-22. These include 73 nos. of Projects from various States in India and 7 nos. of Projects from Foreign Countries i.e., Afghanistan (1), Bhutan (3), Indo-Nepal (2) and Nepal (1) . The details are given below:

Sl. No.	Category	No. of Projects
1.	Projects at construction stage	28
2.	Projects at investigation and planning stage (for which detailed project reports are being prepared)	27
3.	Projects with special problems	25
	Total	80

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) Arjun Sahayak Pariyojana, Kabrai Dam, Uttar Pradesh

CWC is providing design consultancy for Arjun Sahayak Pariyojna in respect of raising the height of existing Kabrai dam and construction of related structure. Kabrai dam is a part of Arjun Shayak Pariyojna, Uttar Pradesh and situated on Kulhani river near junction of Magaria Nallah with Kulhani river in District Mahoba. Arjun Sahayak Pariyojna envisages use of surplus water of river Dhasan during monsoon to fill existing Arjun, Chandrawal and Kabrai Dam, through feeder channel from Lahchura Dam. Hon'ble PM inaugurated the Kabrai Canal head regulator on 19/11/2021.

Construction stage Civil and Hydro-mechanical drawings required from concerned Directorates under Design (N&W) unit have been prepared and issued to project authorities.

Inauguration of Kabrai Canal Head Regulator By Hon'ble PM



2) Garudeshwar Weir Project (Gujarat):

CWC is providing design consultancy services for vetting of design/drawings of hydro-mechanical components. Design of penstock service gate and emergency gate, 120T rope drum hoist for the operation of penstock emergency gate have been approved. 90T hydraulic hoist for the operation of penstock service gate and 120T hoist bridge is under examination. Approval of construction/ fabrication drawings of Penstock service gate, Hydraulic Hoist, 120 T Rope Drum Hoist for operation of Penstock Emergency gate were recommended.



Garudeshwar Weir

3) Phina Singh Medium Irrigation Project, Himachal Pradesh:

The Project involves the construction of Phina Singh medium irrigation project at tehsil Nurpur in Kangra district on Chaki Khad stream with an irrigation potential of 9946

Acres. Technical specification (1 No.), Design memorandum (01number) and specification drawings (4 Nos) pertaining to Intake Head Regulator service and Emergency gate for HRT have been issued. Forty (40) nos. of construction drawings related to Dams and Appurtenant Hydraulic Structures have been issued. This medium irrigation project also envisages construction of micro level power plant at a cost of Rs.18.8Cr (at a rate of Rs.10Cr/MW). Installed capacity and design discharge for this micro level power plant is to be 1.88MW and 3.275 cumecs respectively as per approved PPS. DPR from Hydel Civil Design aspects has been cleared.

Further, the following works have been carried out during the year:

- a) Static and non-linear dynamic analysis of intermediate overflow (Sluice) Block has been carried out and based on the results of analysis, Structural design for Dam Intermediate Piers, Sluice Glacis has been done and recommendations sent to Project Authorities.
- b) The revised DPR has been examined .

4) Icha Dam under Subarnarekha M.P.P., Jharkhand

Twenty Seven (27) construction drawings of Dams and Appurtenant Hydraulic Structures have been prepared and issued to the project authorities. In respect of hydro-mechanical components, comments were issued on study drawing of Typical Overflow Section, Plan Details and Concrete Brackets (Corbel) to support the Gate arms of Icha Dam.

The data for taking up design works of embankment dam are awaited from project authorities. The work will be taken up after the receipt of requisite data from Project authorities.

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

To revive the Saraswati River by transferring the water of Somb River to Sarasvati River, Haryana Saraswati Heritage Development Board has decided to construct a project to link Somb River to Saraswati River. The main purpose of the project is revival of Saraswati River as a heritage project along with the incidental benefits of Ground water recharge, Flood Control, Fish farming, Recreation/Tourism, Notional irrigation. The Project report on construction of Adi Badri dam and Somb Sarasvati Barrage on Somb nadi for the revival of Sarasvati nadi was received on 21.08.2019 in CWC. As per the project authorities, clearance from CWC on interstate aspects and clearance of UYRB have been obtained. The State of HP is yet to give its NOC to the Project. Subsequently, Twenty Five (25) nos. of Study/Specification/Tender drawings related to Dams and Appurtenant Hydraulic Structures have been prepared and issued. Layout of water conveyance system from barrage proposed in river Somb is being finalised in consultation with project authorities.

CWC has studied various combinations for the construction of Adi Badri Dam, Somb Saraswati Barrage and Saraswati Reservoir and the same has been shared with the SHDB for their comments. Further SHDB is to provide topographical, geological, geotechnical data etc. to CWC for finalization of drawings.

CWC has prepared Twenty Seven (27) numbers of Tender (Specification) drawings related to the Concrete Gravity Dam (or Adi Badri Dam) and its Appurtenant Hydraulic Structures and sent them to the Project Authority for further necessary action.

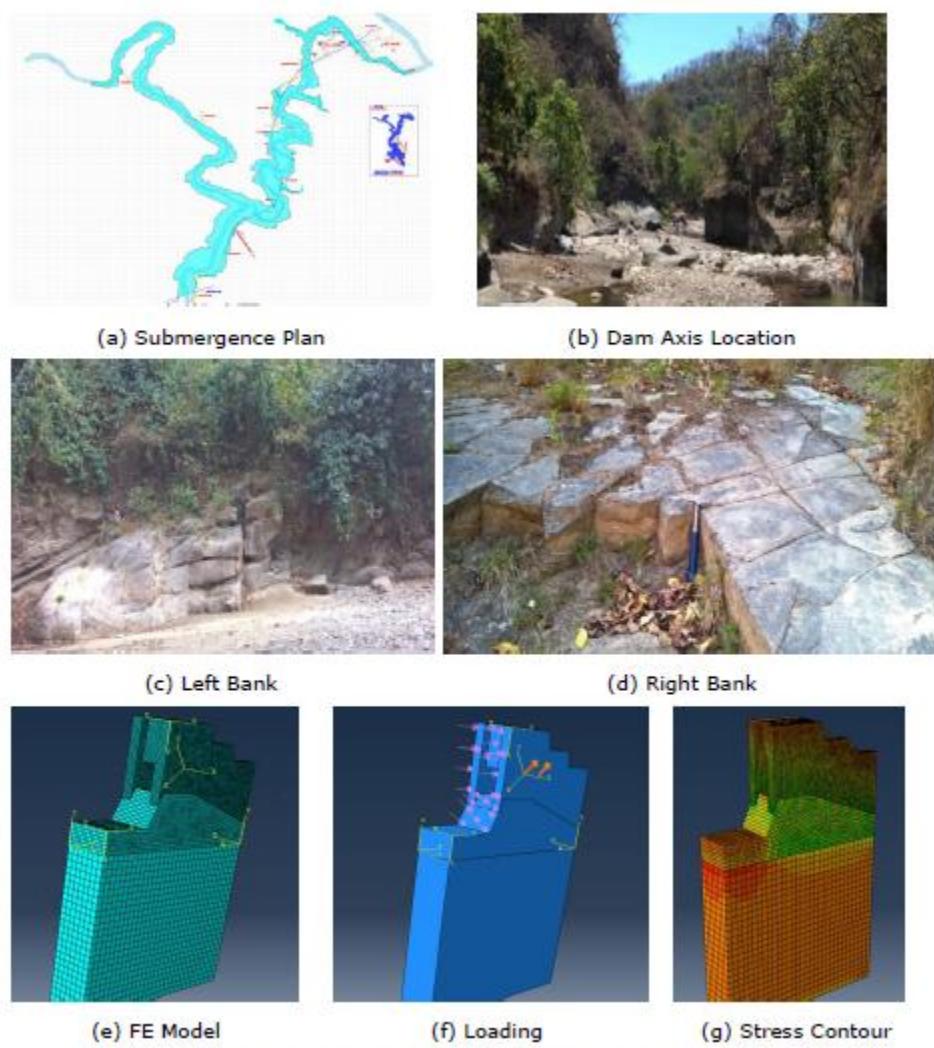


Figure 1: Adi Badri Dam Location and FE Analysis

6)Lakhwar M.P.P. Uttarakhand :

The Lakhwar multi-purpose project has a command area of 33780 Ha and provides irrigation and water components to UP, Haryana, Rajasthan, Delhi, and Himachal Pradesh. Memorandum of Understanding (MoU) was signed between CWC and UJVNL in September 2013. Lakhwar Dam is a multipurpose project with 300 MW installed capacity. The main project components are a 204 m high concrete gravity dam, 3 steel-lined penstocks, and an underground powerhouse housing 3 vertical Francis turbines of 100 MW each. The Full Reservoir Level (FRL) and minimum drawdown level (MDDL) of the reservoir are El 796 m and El 752 m, respectively, with gross storage of 587.84 MCM at FRL for diurnal peaking capabilities. The total area of submergence is 9.57 sq. km. Earlier, five (05) numbers of specification drawings of Overflow (OF) sections were issued for physical model studies to be conducted by CWPRS.

The MoU between CWC and UJVNL has been further extended for the next 36 months commencing from 20/06/2021 as MoU was elapsed on 19/06/2021. Further, UJVNL was requested to provide tender drawings of Lakhwar MPP vide letter dated 15/12/2021 Subsequently, a meeting was held on Lakhwar MPP with project authorities at CWC headquarters wherein project authority expressed an urgency to float tender of Lakhwar MPP. Following works have carried out during the year:

- a) The static and dynamic analysis OF (sluice) and Maximum NOF sections of the dam have been done. Based on the result of analysis, design of OF and NOF sections is finalized.
- b) Based on the design, twenty-five (25) numbers of tender drawings related to the Concrete Gravity Dam and its Appurtenant Hydraulic Structures have been prepared and sent to Project Authority for estimation purposes.

7) Anandapur Barrage Project, ODISHA:

- The Anandapur Barrage is located at village Anandapur, in District - Keonjhar, (Odisha) at Longitude 860 8' E and Latitude 210 13' N.
- The scheme envisages construction of a Barrage, having 491.60m total waterway with 25nos. spillway bays and 8nos. under sluice bays, across river Baitarani at Anandapur including Left & Right Head Regulators to divert 165.00cumecs water in Baitarani Left Bank Canal (BLBC) to irrigate 1200Ha in Anandapur & Hatadihi Blocks of Keonjhar District and 10.00cumecs water in Baitarani Right Bank Canal (BRBC) to irrigate 5000Ha CCA in Ghasipura Block of Keonjhar District.

- The Left Bank Canal (Link Canal) carrying 165.00cumecs water, outfalls in Salandi River at upstream of existing Bidyadharpur Barrage to provide water to the extended Salandi left ayacut of 53,800ha in Balasore District.

Status:

- Construction of Barrage is almost completed including gates. CWC has released / vetted 186 numbers of drawings in respect of civil works as per the requirement of the project authority and for Hydro Mechanical works a total of 42 Design and 300 drawing have been vetted/issued (including revision).
- Presently some design issue related to D/S Guide Bund of the Barrage is under consideration. Relevant information sought from Project authorities vide office letter dated 04/03/2022 is awaited.

8) Tehri Pumped Storage Plant (PSP) (1000 MW), Uttarakhand:

Memorandum of Understanding (MoU) has been signed on 25th July 2017 between CWC and THDC to appoint CWC as an overview consultant for three projects namely; Tehri Pumped Storage Project (1000MW) Uttarakhand), Vishnugad-Pipalkoti HE Project (444MW) (Uttarakhand) and Dhukwan Small HE Project (24MW), Uttar Pradesh.

9) Kanhar Irrigation Project, Uttar Pradesh:

CWC is providing design consultancy to the project for vetting of design/drawings of hydro-mechanical components. Design of Spillway Radial Gate, trunnion level walkway bridge and River Sluice Service Gate, River Sluice Emergency Gate, hydraulic hoist 125T for the operation of Spillway Radial Gate and Hoist Supporting structure have been approved.

10) Punatsangchhu H.E. Project (Stage -I), Bhutan:

- Punatsangchhu-I H.E. Project which intercepting total catchment area of 6390 sq. km. envisages construction of a concrete gravity type dam, 130m high above the deepest foundation and 240.0 m long at the top.
- The overall length of the spillway section of the dam is 120.0 m comprising of seven nos. of sluice spillway bays, each of 8 m width with crest elevation at El.1166.0 m to pass simultaneously Probable Maximum Flood of 11500 cumec + GLOF of 4300 cumec.

- The length of the concrete non-overflow section on both sides of dam would be about 120.0 m. The dam would provide a gross pondage of 24.92 cu. mts. and live pondage of 5.00 cu. m. between MDDL 1195m and FRL 1202m to enable the power station envisaged under the project, to cater to diurnal variations in power requirements.
- The project would have an installed capacity of 1200 MW and construction of the project is underway.

Status :

- CWC has been providing design consultancy and releases drawings as per the need of the Project Authorities.
- During 2021-22, HCD (E&NE) issued 2 construction drawings, revised 15 construction drawings and prepared 1 Design note.
- As of September 2021, the project is 87.30% completed.

11) Punatsangchhu H.E. Project (Stage -II), Bhutan:

- The Punatsangchhu-II H.E. Project envisages construction of 86m high concrete gravity dam with an installed capacity of 1020 MW.
- The dam is located 29km downstream of the Wangdue Bridge and 3 km downstream of TRT outfall of PHEP-I on WangdueTshirang National Highway.
- The dam comprises of seven sluice blocks and five non-overflow blocks. The length of the dam is 213.00m.
- 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. The gross storage capacity of the reservoir formed by dam construction is 7.0 MCM and the live storage capacity is 4.64 MCM.

Status:

- CWC provides design consultancy and releases drawing as per the requirement of Project Authority.
- Gates Design (E&NE) Dte of CWC provides design consultancy of HM works which inter alia includes vetting of design & drawings submitted by HM suppliers.

- HCD (E&NE) Directorate, CWC is involved in analysis, design and issue of construction drawing for the Hydel Civil components of the projects.
- During 2021-22, HCD (E&NE) issued 89 construction drawings, revised 66 construction drawings and prepared 10 Design notes.
- As of January 2022, the project is 91.19% completed

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

MoU on the project was signed between CWC and Project authorities in August 2017. Arun-3 HEP (4 x 225 MW) is a run-of river project located on Arun River, a tributary of Kosi in the district of Sankhuwasabha (Eastern Nepal) with a catchment area of 26747 sq.km. The project will generate about 3924.03 GWh energy per annum at 90% dependable year. Comments/Observations on the report/presentation on Dynamic Analysis of concrete gravity dam block has been communicated to project authorities. Subsequently, various design note and construction drawings have been examined and observations/ recommendations related to Dams and Appurtenant Hydraulic Structures have been issued.

The construction is going on in almost all the project components viz excavation at dam axis, construction of diversion tunnel, surge shaft, and powerhouse complex. Construction of HRT is continuing at five different faces. CWC designers made two site visits to the project to overview ongoing activities in the project area and gave advice on various critical design issues.

Following works have carried out during the year:

- i. Comments/Observations on report/presentation on Dynamic Analysis of NOF Blocks has been communicated to project authorities.
- ii. Static and dynamic nonlinear analyses of Intermediate overflow (sluice) block were carried out with officials of SJVNL for the detailed structural design of the intermediate pier and sluice glacis.
- iii. The submitted drawings and design note of Curtain and Consolidation Grout Details were reviewed in CWC and found to be in order.
- iv. The note forwarded by SJVNL related to the requirement of minimum reinforcement for the structural design of the concrete gravity dam was examined by CWC and recommendations were sent to the project authority.

- v. On the recommendations of CWPRS, SJVNL submitted drawings of plunge pool. The drawings submitted were reviewed in CWC and observations were conveyed to SJVNL



Figure 3: Construction is going on in almost all the project components viz excavation at dam axis, construction of diversion tunnel, surge shaft, and powerhouse complex

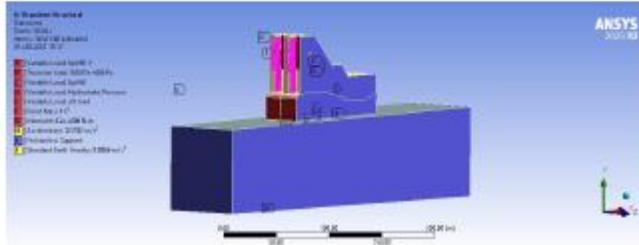


Figure 4: FE Model of Intermediate Overflow (sluice) Block

13) Ganol H.E. Project, Meghalaya (22.5 MW):

- Ganol Small Hydro-Electric Project (3x7.5 MW) is situated in West Garo Hills Dist. of Meghalaya is under construction.
- This project envisages 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 and generation of 22.5 MW of Power.
- Probable Maximum Flood Discharge (PMF):1750 Cumec
- Spillway Type: Radial Gated Sluice Spillway

Status:

- CWC has been providing design consultancy and releases drawings as per the need of the Project Authorities.

- During 2021-22, HCD (E&NE) issued 53 construction drawings and prepared 6 Design notes.
- During 2021-22, CMDD (E&NE) issued 19 drawings.
- The Present status of components executed as follows,
 - Intake structures - 95%
 - Concreting dam - 90%
 - Surge shaft - 90%
- A visit to Ganol HEP, Meghalaya was undertaken by Officers from Design (E&NE), CWC during 20.03.2022 to 23.03.2022

Photographs of visit at Ganol site





14) 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 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.

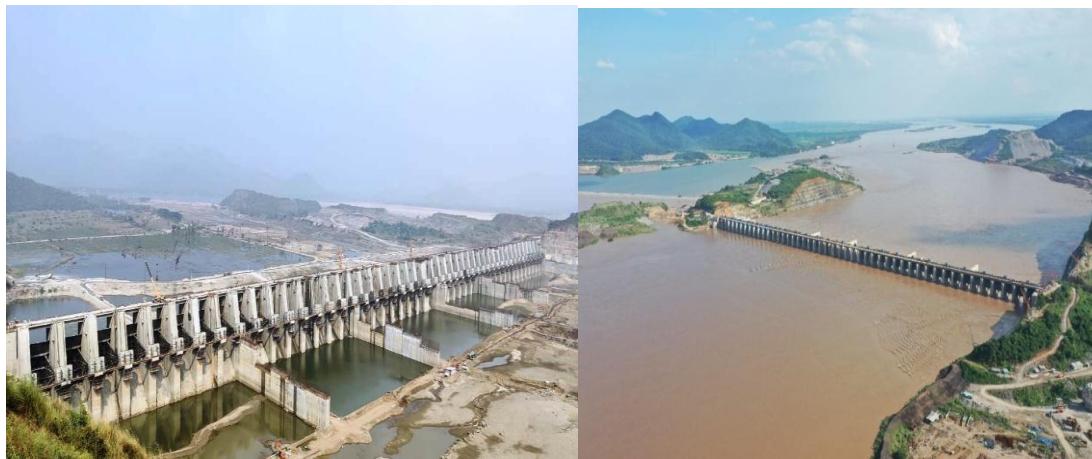
iv) Spillway located on right bank along with connecting approach channel and spill channel.

An Ogee Type Concrete Spillway has been proposed on the right bank for 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.

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

Status:

- Total 818 nos. of 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 have been issued so far.
- Designs & Drawings related to spillway and its appurtenant structures have been almost completed.
- Upstream coffer dam is completed and drawings for scoured portion of downstream coffer dam have been issued.
- The drawings for ground improvement using vibro-stone column, DSM and diaphragm wall under ECRF dam at GAP-I has been approved and execution of the same is almost complete.
- The drawings for foundation improvement by vibrocompaction in sand portion of GAP-II have been approved and executed. The diaphragm wall below the ECRF dam at Gap-II was constructed in the entire reach.



Polavaram Irrigation Project, Andhra Pradesh



Arial View of spillway during flood

15) Parwan Dam Project, Rajasthan

Parwan Project is having 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 Chabra 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 28948 cumecs with

FRL of the reservoir at EL. 308.8 m. The MWL of project is 309.30m. 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.

Status:

- Total 138 drawings (50 CMDD) pertaining to spillway, sluice blocks, stilling basin, training wall, tunnel, spillway, radial gates, stoplog gates and their embedded parts, hydraulic hoist for radial gates, liner & bonnet cover assembly of under sluice gates have been issued so far.
- Block no. 14 to 18 has been raised upto crest elevation (294.6m). Block nos 4 to 8 are also approaching the crest elevation. For block nos 9, 10 and sluice block 11 excavation is being carried out. Sluice block 12 has been raised upto 285.0m.
- Design & drawings of trunnion bracket to resist the uplift forces of Gates has been submitted and is under examination.
- Total 2 Design and 2 Drawings have been issued during 2021-22.
- Vetting of Design & Drawing of Intake structure with provision of trash rack for tunnel work of RMC on right bank across river Parwan examined and comments issued.
- sample checking of design/drawing of pressurised pipe irrigation network at Parwan Major Irrigation project Jhalawar, Rajasthan examined and comments issued.



Parwan Dam, Rajasthan



Parwan Dam, Rajasthan

16) Chheligada Dam Project, Odisha

Chheligada Project with 36 metre high concrete gravity dam is planned on river Badajore, a tributary of river Vansadhara, near village "Chheligada" in Udaygiri Block of Gajapati District. With storage capacity of 52.01 MCM at FRL 599.83 m it proposes to divert 6.9 cumecs of water to Ghodahada river neighbouring Rushikulya basin through a 1130m long tunnel connected with approach and exit channels. It targets a gross command area of 3800 Ha and CCA of 3000 Ha in Gajapati district along with drinking water provision of 31.54 MCM for Berhampur Town as also 0.73 MCM for Chheligada Village. It also has a hydel power installed capacity of 35 MW. The latest estimated Cost is Rs 28.96 Crore and target completion date is December 2023.

Status:

CWC is providing design consultancy for the project. The project is under construction stage and the field test data has been provided, the same has been examined and the design & Constitution drawings under preparation.



17) Rehabilitation of Gararda Dam, Rajasthan

The Gararda Earthen Dam in Bundi district, Rajasthan was completed in March 2010, and subsequently breached on 15.08.2010 during the initial filling of the reservoir. State Government of Rajasthan requested CWC to suggest rehabilitation/restorations measures in respect of the Dam. The dam was inspected by the CWC team and based on the recommendations, the necessary investigations and analyses were carried out.

Based on the aforesaid report, all required construction drawings for rehabilitation of the dam have been issued by June 2019. Subsequently, during rehabilitation works boulder-stratum was encountered. The site was inspected by the joint team of officers from CWC and CSMRS on 04.03.2021 and corrective measures were suggested. The work is in progress.

Status: 3 No. of construction drawings issued in 2021-22.



18) 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 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 rehabilitation of the Hydro-Mechanical work Package-II of Krishna Raja Sagara dam was signed between CWC & WRD Karnataka on 28.02.2020. The rehabilitation includes work of 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 100 years old Krishna Raja Sagara Dam.

Total 6 Design and 9 no. of drawings pertaining to gates at EL +114, EL +106 with respective 9MT & 10MT rope drum hoist and trestle for gates have been cleared during 2021-22.

**19) 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 Sawai Madhopur 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.

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. An Ogee Type Concrete Spillway has been proposed to cater the PMF of 40462 cumecs with FRL of the reservoir at EL. 262.0 m. The MWL of project is 262.80m. The concrete dam comprises of 28 nos. of overflow blocks, 2 nos. of non-overflow blocks, 2 composite blocks. Spillway with crest level at EL. 249.0 m has 15 Nos. of Radial Gates of sizes 15.5m (W) x 13m (H) with hydraulic hoist arrangement for lifting.

CWC is providing consultancy for vetting of designs & drawings for construction of the project. A total of 93 drawings related to the overflow blocks up to an elevation near sill level at the crest, spillway radial Gates, stop-log gates have been issued during 2021-22.





Isarda Project, Rajasthan

20) Indroka & Bastawa Mata dam , Rajasthan:

It 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 CE, Designs(NW&S) vide DoWR, RD & GR, MoJ's OM T-23011/1/2019-GW- Section (Part-I) dated 01.11.2021.

Status:

The dam sites were visited by the Committee on 13th to 14th November 2021. Six meetings of the Committee have been held till date. Major issues related to geological assessment, availability of construction material & its investigation, and layout of spill-channel have been deliberated upon.

To expedite the construction works at site and until the design test reports made available to CWC, an advance copy of drawing for excavation at Bastawa Mata dam was issued for preparing the site for construction (stripping depth 0.6 m).

After getting the design test reports from CSMRS, the Cut off trench (COT) & curtain and consolidation grouting drawings and Typical Cross section (Maximum) & Longitudinal section along the dam axis for Bastawa Mata has been finalized and under consideration for approval.

In order to avoid excessive excavation, Cascading type side channel spillway has been proposed for spilling facility and drawings for the same are being prepared.

21) RAJGHAT PROJECT

The Rajghat Dam is an inter-state dam project of the governments of Madhya Pradesh and Uttar Pradesh on the Betwa River about 14 km from Chanderi in Madhya Pradesh and 22 km from Lalitpur in Uttar Pradesh.

Project envisages construction of intake wells (cum pump house and Approach Bridge) for supply of drinking water to Lagaon and Jakhlaun group of villages separately in the reservoir of Rajghat dam.

Status :

Lagaon Group of villages:

- Design & drawings of Intake well and Approach Bridge for supply to Lagaon group of villages have been approved and issued.
- Revised Cofferdam design & drawings awaited.

Jakhlaun group of villages:

The design & drawings of Intake well and Approach bridge for supply to Jakhlaun group of villages were examined and observations issued. The compliance has been received on 4th January, 2022 and is under examination

22)) Navnera Barrage Project, Rajasthan:

Navnera Barrage is proposed under Eastern Rajasthan Canal Project, Phase-I (A) across river Kalisindh at village Abra tehsil Digod, Kota district, Rajasthan. River Kalisindh is a tributary of river Chambal.

The storage capacity of barrage is 226.65 Million Cubic Meter and the total length of barrage is 1404m having 522m concrete spillway (Overflow), 40m. non overflow portion and 832m earthen bund. The designed Hydro-mechanical equipment is suitable to pass the design flood discharge of 44592 Cumecs at MWL 217m.

An MOU has been signed between CWC and Department of Water Resources, Govt. of Rajasthan (Project Authorities) on 21.09.2021 to provide the Design consultancy work of vetting of Design & Drawings of Hydraulic Cylinder with Power pack and Hoist Supporting structure for Spillway Radial Gates of Navnera Barrage Project.

A total of 3 Design and 6 Drawings have been issued during 2021-22.

Status :

- Design & Drawing of Hydraulic Cylinder has been approved by CWC Vide letter dated 24.02.2022.
- 2 no's of designs/03 drawings in respect of Power Pack & Hoist Supporting Structure are under examination.

23) North Koel Reservoir Project, Mandal Dam (Bihar & Jharkhand)

CWC is providing consultancy services for vetting of design/drawings of hydro-mechanical components. Design and drawings of Low Level Sluice Gate, Intake service gate and Irrigation Sluice Gate have been approved. Further, The revised TOR, submitted by WAPCOS vide email dated 25/01/2021, for GPR Test to be conducted at Mandal Dam Site was examined and found generally in order, which was communicated to WAPCOS Ltd vide letter dated 04/02/2021.



24) Hirakud dam, additional spillway project under DRIP:

Hirakud Dam Project is a Multipurpose Project built across river Mahanadi about 15 km upstream of Sambalpur town in the state of Odisha. It is a composite dam of Earth, Concrete and Masonry structure. There are two spillways in the main dam on the left and right sides located on the two channels of the main river. The left spillway of the Hirakud dam has 40 no. of sluice gates and 21 no. of crest gates. The right spillway has 24 no. of sluice gates and 13 no. of crest gates. The total discharging capacity of both the spillways is 42450 m³/s. The project was commissioned in the year 1957. Central Water Commission (CWC) reassessed the inflow design flood with up to date data and revised the design flood to 69,632m³/s. In order to safely pass the additional flood of 27182m³/s, it is proposed to provide two additional spillways, first at the left bank 1st gap dyke of Hirakud Dam near 2nd saddle of Gandhi hillock with 5 nos. of spillway gates of size 15m x 15m each to discharge 9122m³/s and another additional spillway at Right dyke with 8 nos. of spillway gates.

Status:

- MoU has been signed with Project Authority.
- Spill Channel excavation drawings were submitted in the reaches where excess excavation of hill slopes is necessary. Accordingly, support system in this reaches were approved.
- Draft hydraulic model studies conducted by CWPRS have been reviewed and observations/comments were issued.

- In the meeting with Member D&R it was decided that the project authorities will come up with different alternatives to pass the excess flood and the same will be examined by CWC.
- Modified spillway alignment alternatives to be proposed by State Government are yet to be received. It is pending from August 2020.

25) KCC (Khetri) Tailings dam at KCC (Khetri Copper Complex)(Hindustan Copper Limited), Khetri ,Rajasthan :

Memorandum of Understanding (MoU) has been signed on 11th October 2021 between Hindustan Copper Limited, represented by General Manager, Khetri Copper Complex and Central Water Commission, represented by Director, Embankment (N&W)Dte, for providing Design consultancy for carrying out Design and preparation of construction stage Drawings for Raising the height of Tailing Dam at Khetri Copper Complex (Distt.- Jhunjhunu), Rajasthan from EL 406 m to 413 m.

Subsequently, a CWC team comprising Chief Engineer, Design (N&W), CWC, Director, Embankment (N&W), CWC and Deputy Director, Embankment (N&W), CWC visited KCC (Khetri Copper Complex) Tailings Dam Project site (Khetri Nagar, Distt.- Jhunjhunu) (Rajasthan) on 10-12-2021 in connection with the further raising the height of Tailings Dam from EL 406m.



CWC Team at Khetri Copper Complex's Tailing Dam Site, Khetri, Distt. Jhunjhunu, Rajasthan

26) Bhadbhut Barrage Project:

- A Barrage near Bhadbhut village of Bharuch taluka with a long span of 1.663 km on the Narmada river has been planned with an aim to create a reservoir having a storage capacity of 599 MCM and to prevent the tidal salinity ingress and soil erosion. It will also help in Groundwater quality improvement. The bridge on barrage will shorten the 18 km in transit between Dahej to Hajira (Surat) which will be resulted in saving time and energy. The MoU was signed between M/s WAPCOS Ltd. and CWC for Review/Vetting of the Construction Design and drawings of Bhadbhut Barrage Projects, earlier in the year 2019. Based on the analysis done in CWC, the design and drawings of sheet pile cofferdams have been scrutinized and recommendations were sent to WAPCOS Ltd. Similarly, design and drawings related to the bridge over barrage and Guide-wall were examined and comments/recommendations were sent to WAPCOS Ltd. Following works have been carried out during the year:
 - Consultancy work of Vetting of Bhadbhut Barrage Project is under progress. Hydraulic and structural aspects of various components of the project such as Flood Protection Embankments, Guide Wall, Bridge over Barrage, Fish Pass etc. have been examined using computational models developed in MIDAS GTSNX, MIDAS Civil and HEC RAS and comments have been issued accordingly.
 - Reports on Geotechnical Investigation have been examined and accordingly, Silt factors have been evaluated and recommendations were conveyed to WAPCOS Ltd.
 - The designs, analysis, and construction drawings of guide walls and other appurtenant hydraulic structures have been vetted and observations/ clearance issued to WAPCOS Ltd.

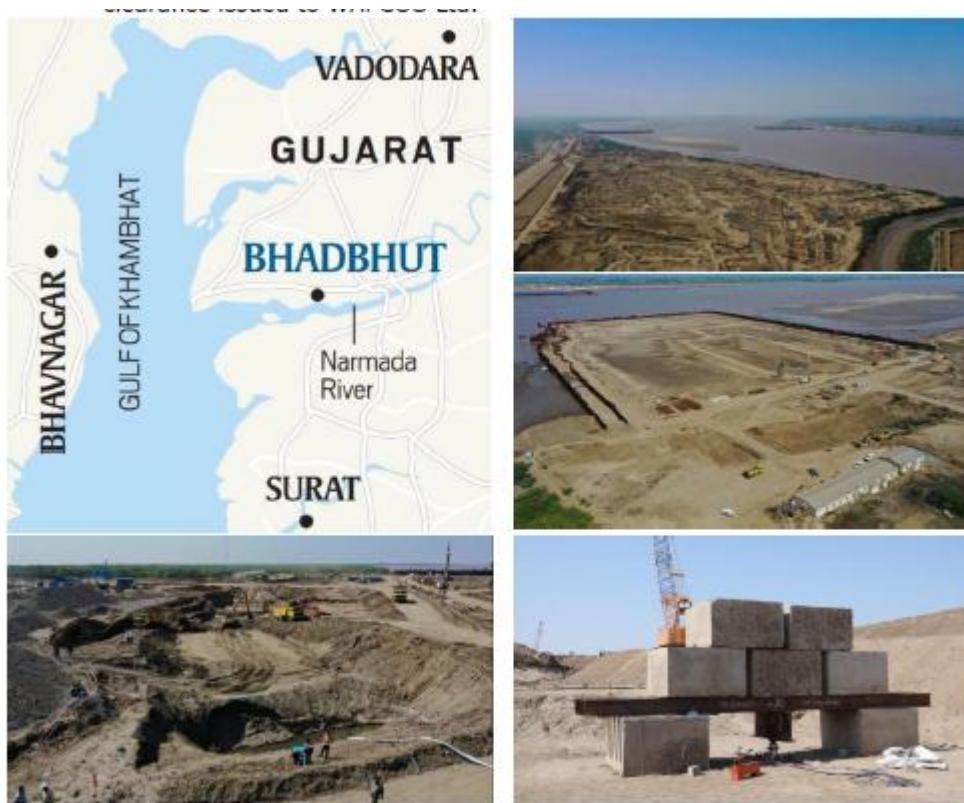


Figure 5: Bhadbhut Barrage Project Location and Construction overview

B. Projects at DPR Stage

1) Saptakosi & Sunkosi Multipurpose Project, Indo-Nepal

The Saptakosi High Dam Multipurpose Project, as per the preliminary studies carried out, 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. DPR stage design engineering for this project is being carried out by Central Water Commission.

2) Pancheshwar Multipurpose Project (Indo-Nepal):

An MoU has been signed by 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.

3. Barinium Hydro Electric Project (Jammu)

• The Barinium hydropower project is planned on river Chenab, downstream of Dugar HEP and upstream of Kirthai-I in Jammu & Kashmir near border of Himachal Pradesh. The project is in the initial stage of studying of various alternatives of general project layout. Two meetings with CWC, Jammu and a site visit in this regard were carried out. The different alternatives were suggested for which inputs related to geological and topographical survey were requested from CWC, Chandigarh. CWC. During the joint site visit of CWC, CSMRS and GSI, it was decided that location of Dam could be anywhere between RD 100m u/s to RD 600m u/s of the confluence of Ungai nalla with Chenab river. Geotechnical investigation works (drilling) has been carried out at tentative Dam axis which is about 220 u/s of the confluence of Ungai nalla with Chenab river. Dam location at 220 U/s of Ungai Nallah was found unsuitable for concrete dam as a large overburden of around 60m is observed During geological investigation. Three tentative dam locations forwarded by Jammu office, CWC is studied and two dam axis locations have been sent to Jammu office, CWC for carrying out investigation

4. Satyar Khad Medium Irrigation Project, Himachal Pradesh

Irrigation & Public Health Department, Govt. of Himachal Pradesh approached CWC for the design consultancy works related to DPR preparation of Satyar Khad Medium Irrigation Project. It is proposed to construct a 40 m high concrete dam for providing irrigation facility on Satyar Khad, a tributary of river Beas, at Parchhoo in tehsil Sarkaghat district Mandi, H.P. CWC has examined the proposal, thereafter prepared an estimate for the works of design & drawings and sent to the project authority. The same has been accepted by the project authority. Meanwhile, CWC has also conveyed a list of requisite surveys & investigations and field & laboratory tests related to the project site and material to the project authority

5. Damanganga (Val/Vagh)-Vaitarna (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).

Status:

- CWC is providing design consultancy to NWDA for preparation of DPR.
- Field surveys & investigations by NWDA is under progress. Most of the data related to Met dam has been received. Preparation of DPR of Met dam is under advance stage.
- The data received from NWDA in respect of other three dams are under examination

6. 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. Field survey & investigations by NWDA has been received. The data received from NWDA in respect of Ekdare dam is under examination.

7. Khudia reservoir Scheme, Jharkhand

Khudia Reservoir Scheme envisages construction of a 31.0 m high Dam across Khudia river near Gobindpur, Tundi in Dhanbad district of Jharkhand for irrigation of 3750 hectare (CCA) area in nearby villages besides providing drinking water to nearby villages. It is located in the north eastern part of Jharkhand, within the undulating Chhotanagpur Plateau. The entire catchment of the river is rain-fed. The Detailed project report including civil structure and its hydro-mechanical equipments of Birmati Reservoir Scheme has been prepared and issued to project authority.

8. Katakhal Irrigation Project, Assam:

- Katakhal Irrigation Project is being investigated by NEIC; Shillong in which a Barrage as head works is being planned.

- A team of officers from BCD (E&NE) Directorate, CWC along with officers from NEIC, CWC and GSI team undertook a joint visit to proposed Katakhal Irrigation Project site Hailakandi, Assam for finalising the Barrage Axis, on 23-03-2021.

Status :

- Project is under DPR preparation state.
- Design chapter, design and drawing for head works and canal are yet to be prepared.
- Data required for preparation of the DPR were communicated to NEIC, Shillong. Some of the data i.e. Index map, contour maps survey, hydrology report, preliminary GSI report, Geological Core Logging report etc. were submitted by NEIC to this office however, the remaining data i.e. command area, pond level etc. are yet to be received

9. Haora Dam Project, Tripura

- Preparation of DPR for Haora Dam Project at Champaknagar in Tripura is being undertaken by NEIC, CWC, Shillong.
- 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.
- The Culturable command area (CCA) being 250 Ha. The net area being irrigated annually from the project would be 210 Ha.

Status:

- Design team from CWC (HQ) visited the project site on 15.10.2019. List of data required at preliminary stage were communicated to NEIC, CWC, Shillong.
- Topographical survey data has been submitted by NEID, CWC.
- 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. Material properties are awaited.

10. Champai Cherra Dam Project, Tripura

Preparation of DPR for Champai Cherra Project at Ghampaibari in Tripura is being undertaken by NEIC, CWC, Shillong.

The project envisages construction of a 32.1 m high dam on the Champai Cherra with a canal from the Left bank.

The project on completion would extend irrigation facility to a Gross Command Area (GCA) of 810 Ha.

The Culturable command area (CCA) being 645 Ha. The net area being irrigated annually from the project would be 550 Ha. The gross Irrigable area is 1100 ha.

Status :

- Design team from CWC (HQ) visited the project site on 15.10.2019.
- List of data required at preliminary stage were communicated to NEIC, CWC, Shillong and the same was received on 22.07.2020
- 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. Material properties are awaited.

11. Ayodhya Barrage Project

Every year, in the months of October to June the water level in the Ghaghra is very low, because of which, sufficient water does not remain available near the Ghats of Ayodhya and pilgrims face great difficulty and disappointment.

To tackle the problem, a Barrage has been proposed to construct across River Ghaghra in Ayodhya, so that there is a continuous supply of water throughout the year at the Ghats.

Construction of a Barrage will also serve the purpose of Irrigation; fulfill drinking water requirement, and tourism development in the nearby areas.

Status of work:

- CWC had provided the design consultancy for the preparation of DPR for the proposed Ayodhya Barrage Project for which a Memorandum of Understanding (MoU) was signed between Planning Circle, Faridabad, CWC and Irrigation and Water Resources Department, Government of Uttar Pradesh on 26th March 2021..
- Officers from CWC (from D& R wing and Planning Circle, Faridabad, CWC) along with officers from IWRD, UP jointly visited the project site during 3rd - 5th March

2021 and 13th – 14th July 2021 followed by meetings with senior officers of IWRD, UP at Ayodhya&Lucknow.

- DPR stage design chapter & drawings were prepared by BCD (E&NE) Directorate, CWC and provided to Planning Circle, Faridabad by January 2022.
- The DPR has been completed and provided by Planning Circle, Faridabad, CWC to IWRD, UP in January /February 2022.



Proposed location of Barrage axis

12. 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 presented various alternatives for the project development and recommended an alternative of 2640 MW installed capacity with a high dam on Kuri-Gongri River d/s of confluence of tributary rivers with a reservoir for preparation of DPR.

In the 12th EJG Meeting held in March 2014, the work for preparation of DPR was entrusted to WAPCOS and it was decided that only d/s confluence of Kuri and Gongri rivers will be considered for development.

However, based on decisions taken in 13th EJG meeting held in September 2014, the DPR works were kept in abeyance for some time. However, the same was resumed w.e.f 1st June 2016.

Status:

- CWC is providing design consultancy for preparation of DPR which is under preparation.
- 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.
- Additional funding proposal for additional investigations was received and observations were issued on the same.

13. DEVELOPMENT OF FRESH WATER LAKE AT FLAT BAY, PORT BLAIR, A&N ISLAND:

The proposed Flat Bay Fresh Water Scheme is intended to be commissioned to cater the water supply needs of Port Blair Municipal Council area. The scheme would broadly deal with the following:

- Isolation of the bay from the marine environment
- Pumping out/ draining out the saline water of the bay
- Storing of rain water from surface runoff
- Intake arrangement and water supply scheme

Status:

- WAPCOS submitted basic engineering report. Final Report is awaited
- Visit of CWC Officers is proposed to be carried out on 12th April 2022.

14. 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, Gopiballabpur 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.

Status:

A presentation was made by officers of Planning Circle, CWC Faridabad (Nodal Office for S-M Link) on 24.02.2022 at CWC(HQ), New Delhi for having an overview of the project and guidance by experts organization for preparation of DPR in time

15. Ujh Multipurpose Project (UMP), Jammu & Kashmir:

The Jammu and Kashmir State Power Development Corporation (JKSPDC) has proposed UMP for generation of 186 MW (3x 62) + 26 MW (1x24 + 1x2) hydropower, providing water for irrigation to 16743 ha and 20 Cusec drinking water for Kathua district. The project, which was declared as a “national project” in the year 2008, involves the construction of 116-metre high concrete face rock fill dam (earlier proposal), a powerhouse of installed capacity 186 megawatts and a barrage 11.5 kilometres downstream of the dam. The irrigation benefits from the project will comprise annual irrigation of about 31,380 hectares. MoF requested DoWR, RD & GR (MoJS) to examine the feasibility of re-designing the Ujh Project, to enhance its socio-economic benefits leading to benefit cost (BC) ratio of at least 1.00 from 0.66.

In account of studies carried out with respect to increasing BC ratio of the project, revision of the power potential and also the project layout were carried out. Consequently, based on revised PPS, Dam toe scheme with the potential of annual energy generation of 175.13MU and installed capacity (IC) of 89.5MW (3x29+1x2.5) was found optimum. Subsequent to which, 19 drawings from aspects of hydel civil designs are prepared for the final layout.

Formerly, the proposed Concrete Face Rockfill dam (CFRD) at the river section with a side spillway is completely replaced by Concrete Gravity Dam with a centrally located sluice spillway and dam toe powerhouse having total installed capacity of 89.5 MW. Recently specification drawings of overflow section, non-overflow section, energy dissipation arrangement, and diversion arrangement for fresh proposal of Concrete Gravity Dams and Appurtenant Hydraulic Structures has been prepared and sent to M&A, CWC, Jammu.

16. Kishau Multipurpose Project, Uttarakhand:

Kishau (660 MW) is also one of the multipurpose project on river Tons (a major tributary of Yamuna river) at the border of district Dehradun (Uttarakhand) and district Sirmour (Himachal Pradesh). The command area of Kishau project is 97076 ha. The Scheme involves inter-state aspects of submergence of land in the territories of

Himachal Pradesh and Uttarakhand with submerged area of 2950 ha. The investigation reports were submitted to CWC vide letter dated 08/10/2020. Observations/ comments were issued on 04/11/2020. Observations/recommendations of CWC were sent to project authority, compliance with which is still awaited. Further, a meeting to discuss the scope of work for upgradation/revision of DPR of the project was held under the chairmanship of Member (WP&P), CWC.

17. Birmati Reservoir Scheme, Jharkhand

Birmati Reservoir Scheme envisages construction of a 20.0 m high Earthern Dam across Manjargila Nala near Birmati village for irrigation of 1000 hectare area in nearby villages. Birmati Reservoir Scheme is located in the north eastern part of Jharkhand, within the undulating Chhotanagpur Plateau. The entire catchment of the river is rain-fed. The Detailed project report including civil structures and its hydro-mechanical equipments of Khudia Reservoir Scheme has been prepared and issued to project authority.

18. Bhur Reservoir Scheme, Jharkhand :

The Bhur Reservoir scheme is proposed on Bhur River in Damodar River Basin, in District Ranchi. Bhur River is a right bank tributary of Damodar River within the undulating terrain of Chhota nagpur Plateau. The project envisages construction of a 16.5m high Earthen Dam with Concrete Spillway across river Bhur with benefits of irrigation, industrial & municipal water supply. The entire catchment of the river is rain-fed.

The DPR drawings (24 Nos.) for the preparation of DPR of Bhur Reservoir Scheme, Jharkhand have been prepared and issued to NEID-I, B&BBO, CWC, Silchar.

19. Bhuswa Reservoir Scheme, Jharkhand :

The proposed Bhuswa Reservoir scheme is located on Siwane River, a tributary of Damodar River, in District Hazaribagh. The project envisages construction of a 11m high earthen dam with concrete spillway across river Siwane with benefits of irrigation, industrial & municipal water supply. 05 Nos. of drawings related to Earthen dam for preparation of the Detailed Project Report (DPR) Bhuswa Reservoir Scheme have been prepared and issued to project authority.

20. Bhelwa Reservoir scheme, Jharkhand:

The proposed Bhelwa Reservoir scheme is located on Bhelwa River, a tributary of North Koel River, in Palamu District. The project envisages construction of a 10.5m high earthen dam with concrete spillway across river Bhelwa with benefits of irrigation, industrial & municipal water supply.

05 Nos. of drawings related to Earthen dam for preparation of the Detailed Project Report (DPR) Bhelwa Reservoir Scheme have been prepared and issued to project authority.

21. Barkattha Reservoir scheme, Jharkhand:

The proposed Barkattha Reservoir scheme is located on Patalsu River, a tributary of Damodar River, in District Hazaribagh. The project envisages construction of an 18m high earthen dam with concrete spillway across river Patalsu with benefits of irrigation, industrial & municipal water supply.

The DPR drawings for the preparation of DPR of Bhur Reservoir Scheme, Jharkhand have been prepared and issued to NEID-I, B&BBO, CWC, Silchar.

22. Sonadubi Reservoir scheme, Jharkhand:

The proposed Sonadubi Reservoir scheme is located on Sonadubi River; a tributary of Subernarekha River, in District Ranchi. The project envisages construction of a 11.5m Earthen Dam with Concrete Spillway across river Sonadubi with benefits of irrigation, industrial & municipal water supply. 05 Nos. of drawings related to Earthen dam for preparation of the Detailed Project Report (DPR) Barkattha Reservoir Scheme have been prepared and issued to project authority.

23. Khuntishot Reservoir scheme, Jharkhand:

The proposed Khuntishot Reservoir scheme is located on Khuntishot River, a tributary of North Koel River, in District Palamu. The project envisages construction of a 19m high earthen dam with concrete spillway across river Khuntishot with benefits of irrigation, industrial & municipal water supply. All the drawings pertaining to Earthen dam for preparation of the Detailed Project Report (DPR) Khuntishot Reservoir Scheme have been prepared and issued to project authority.

24. Shatoot Dam Project, Afghanistan:

The Shatoot Storage Dam project in Afghanistan is proposed to be constructed across Maidan River with the main objective of providing Drinking water supply of 85 MCM from Maidan River to the Kabul city, the capital city of Afghanistan with a quality that

meets WHO standards. Water from the reservoir will be conveyed to the Water treatment Plant (WTP) through a pipe line.

Shatoot Dam project envisages an approximately 98m high (from River bed level) Rockfill Dam. The project is situated at 25 km from Kabul. It consists of 7.5 km long (1.6 m diameter) domestic water conveyance pipe line up to water treatment plant. Total volume of reservoir is 146 MCM.

Initially, a DPR prepared by M/s Pooyab Consulting Engineers was received in Design (N&W) unit during 2017 for vetting. For finalizing the section/size of Rockfill Dam and other Civil structures, requirement of further field investigations was expressed by Design (N&W) unit. On CWC's recommendations, WAPCOS had carried out additional surveys & investigations and Reports were submitted to Design (N&W) unit. After technical examination, conditional clearance was given to Reports on Additional Surveys and Investigations during March 2021. Based on the results of the field investigation, WAPCOS was advised to carry out Dynamic analysis of proposed Rockfill Dam. Subsequently, the Final Report on "Seismic Response and Slope stability Analysis of Shatoot Dam, Afghanistan" prepared by IIT Roorkee as submitted by WAPCOS was technically examined and the Shatoot Rockfill dam section was finalized. The finalized dam section was conveyed to Project Appraisal Organisation, CWC / WAPCOS. During April 2021.

Subsequently, based on the the Design chapter and drawings for Modified DPR were modified by WAPCOS and submitted to Design (N&W) unit for vetting. Clearance to Modified Design chapter was given during December 2021.

25. Vetting of designs & Drawings of proposed weirs/barrages on National waterway-5, (5 Nos)

- Inland waterways Authority of India (IWAI) is planning to carry various developments and maintenance works on National waterway-5 for providing fairway for effective shipping and navigation.
- Dhamra-Talcher stretch on river Brahmani, Geonkhali-Charbatia stretch of East Coast Canal, Charbatia-Dhamra stretch of Matai River and Mangalgadi-Pratap stretch of Mahanadi Delta River for length of 588 km reach have been declared as National Waterway-5 in Nov.2008.
- The present study stretch is to develop the Pankapal to Padnopal section (72.3 km) on the river Brahmani on NW 5 for safe navigation. For this IWAI has engaged M/s Tractebel Engineering Pvt Ltd for preparing DPRs of 5

Weirs/Barrages with 3 navigation locks, 2 check dams & 1 Rubber Dam in consultation with concerned Govt of Odisha departments for construction.

- IWAI approached CWC for vetting consultancy of the DPR submitted by M/s Tractebel Engineering Pvt Ltd.
- MoU for various technical supports on various hydrological and river morphological issues involved in the development of inland water transport was entered between CWC and IWAI on 25.01.2022
- The vetting of 5 DPRs are under progress.

26. Panchnad Barrage, Uttar Pradesh:

- A barrage across Yamuna River in Auraiya district at just downstream of the confluence of five rivers viz Yamuna, Chambal, Sindh, Pahuj, and Kwari has been proposed for Irrigation and drinking water purposes. The Chief Engineer Ramganga, I&WRD, Uttar Pradesh had requested CWC to take up the consultancy for preparation of DPR of the project including design. The Chairman, CWC had accepted the request of UP I&WRD to take up the consultancy work for the designing and preparation of DPR of the project. For this work, it has been decided by the competent authority that:
 - a. The survey & investigation works of the said project shall be taken up by the Planning Circle, Faridabad, CWC.
 - b. The design works shall be taken up by the Design (N&W), CWC.
 - c. The Inter-State aspects may be examined by IMO, CWC.
- Planning Circle, CWC, Faridabad shall be the nodal office for coordinating with the various organizations involved in the work. This was intimated to project authorities and Planning Circle, Faridabad, CWC vide letter dated 01.10.2021.
- A draft MoU has been prepared and shared with I&WRD, UP by Planning Circle, CWC, Faridabad vide email dated. 01.11.2021, which is under consideration with the state government.

27. 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 NWDA suggested 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, Uttar Pradesh identified two new barrages in the downstream of Bariyarpur pick-up weir.
- Memorandum of Understanding (MOU) between NWDA and Designs (N&W) unit, D&R Wing of CWC for carrying out design, drawing and preparation of

design chapter for proposed two new barrages across Ken River in the D/S of existing Bariyarpur pickup weir in Uttar Pradesh was entered into on 31st day of May, 2021. The topographical, geotechnical, geophysical data etc. required for design and drawing of the barrages have been requested from the project authority vide CWC letter dated 21.06.2021.

A joint visit of Officers from CWC, GSI, CSMRS, WRD, UP and NWDA for taking various decisions regarding proposed two new barrages in the d/s of existing Bariyarpur Pickup weir i.e. Marauli and Pailani barrages under Ken Betwa link project phase-I, Banda district, Uttar Pradesh was undertaken from 09/11/2021 to 11/11/2021

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) 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.
- Recently, this office has designed & issued the drawings of Anti Erosion/ bank Protection works for the chainage 1500 m-3500 m at upstream left of Barrage in compliance of issue raised in 117th meeting of TAC during 21st- 23rd December 2021.

Photographs of Field visit during 117th TAC on 21st- 23rd December, 2021





2. BAGJOLA DRAINAGE DEVELOPMENT SCHEME, WEST BENGAL :

- Bagjola Drainage channel, running across the main city area for a length of 39 km and carrying a maximum discharge of 5000 cusec at its outfall into Bidyadhari River, plays a important role in draining out storm water from a thickly populated catchment of about 57 Sq.km of North Kolkata and its adjoining municipalities.
- This project is for augmentation of pump capacity by 4050 cusec of existing station of 1650 cusec at the outfall of Bagjola Khal, at Kulti, North 24 Paraganas District, West Bengal to relieve the North Bengal area from flood inundation.
- CWC signed MoU with GoWB on 04.12.2019 for Scrutiny / vetting of Mathematical model (1D, with HEC-RAS 5.0.7) and general arrangement drawings. Cost of consultancy is Rs.7,70,000/-.

Status:

- Consultancy for Bagjola drainage Development Scheme was completed and final report was shared with the Project Authorities on 24.01.2022.

3. 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 Gogorikhali 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.

Status :

- Amjur Drainage Development Project site visit by the officers from Central Water Commission (CWC) and Brahmaputra Board (BB) was undertaken as per request of BB authorities on 6th and 7th October 2021 and report on the same was shared with the BB Authorities.
- Vide this report, it was requested that G & D Data of Tulagram II, GDSQ site may be provided to BCD (E&NE) Dte so as to ascertain the effect of Turail HE Project on Amjur drainage Development Scheme.
- Reply is awaited from BB Authorities.

4. BINDU BARRAGE, JALDHAKA, H E PROJECT, WEST BENGAL

- A visit to Bindu Barrage was undertaken by officers from BCD (E & NE) Dte, CWC jointly with officers of West Bengal State Electricity Distribution Company Ltd (WBSEDCL) on 29th – 30th October 2021. The purpose of the visit was to preliminarily assess the Health of Civil Structure of Bindu Barrage in response to recommendations of DSRP team who visited the site on 23/03/2021.
- Recently a team of officers from Central Water Commission (CWC) and West Bengal State Electricity Distribution Company Limited (WBSEDCL) jointly visited the Bindu Barrage, Jaldhaka H.E. Project site on 8th – 11th March 2022 and report of the field visit was shared with the Project Authorities on 29.03.2022.



5. IMPHAL BARRAGE,MANIPUR

- The Imphal barrage is located at Oinam Sawombung of Imphal West district in the southern part of Manipur and is at a distance of 17 km from Imphal city.
- The barrage 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 operating since then.
- The Pond Level for project had been fixed as 778.0 m. There are 5 no's of 9m×6m Spillway Gates and 3 no's of Cross Regulator Gates (2 no's with 2.4 m Width & 1 no. with 2.3 m) to serve the intended objective of project.

Status:

- A team from Gates (E&NE) Dte, Central Water Commission and officials of WRD Manipur visited Barrage site on 13.02.2022 &14.02.2022.
- The visit was made to investigate the suitability of Gates & its Embedded Parts and their Hoisting Mechanism in context of Proposed Replacement of the five barrage gates, stop logs along with their operating arrangements under DRIP Phase II.
- Report of the field visit was shared with the Project Authorities on 28.02.2022.

6. TAPOVAN- VISHNUGAD HEP:

Tapovan-Vishnugad Hydro Power Project was hit by an unprecedented massive glacial debris flow on 7th February,2021. The devasting flood full of

debris/silt/boulder/ice/rock pieces/soil/trees etc. flooded the under-construction barrage of Tapovan Vishnugad Hydro Power Project. Huge quantity of muck along with debris, boulders etc. came along with the ice/water and got deposited in the Barrage, Intake Structure, De-silting Chamber, HRT, Silt Flushing Tunnel, HRT Intake Adit, SFT Adit, entrapping manpower and equipment/vehicles working in these areas for ongoing works. A team of experts from CWC along with experts from CEA, GSI and CSMRS visited the effected Tapovan-Vishnugad Project site on 16.03.2021 and 17.03.2021 along with NTPC officials to assess the project conditions. The visit report has been prepared and issued.

7. SARDAR SAROVAR DAM, GUJARAT:

Sardar Sarovar Nigam Limited requested to examine non-functioning of stop log gate of intake for Under Ground River Bed Power House and proposed single piece stop log with individual rope drum hoist of 110T.

Team of Experts (ToE) to suggest remedial measures for proper functioning of Penstock Stoplogs operated by 100T spillway Gantry Crane of RBPH, Sardar Sarovar Project, Gujarat. visited the dam site on 09.09.2021 and 10.09.2021 along with project officials and submitted its report for necessary action.

8. HATHNIKUND BARRAGE, RIVER YAMUNA, HARYANA:

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 suggested to construct a submersible weir at about 500 m downstream of Hathnikund barrage. Project authority has been requested to expedite the physical/numerical model study with CWPRS, Pune and provide other design inputs such as geotechnical investigation results etc. so that design work of the proposed weir could be initiated.

In the interim, temporary remedial measure in the form of CC Block protection work has been suggested upon being requested by project authority.

9. STUDY RELATED TO PROPOSAL OF UPGRADING KARCHAM WANGTOO HEP, HIMACHAL PRADESH FROM 1000MW TO 1200 MW

Detailed study to check the structural sufficiency and its feasibility from technical aspects of the existing components for upgrading Karcham Wangtoo HEP in Himachal Pradesh from 1000 MW to 1200 MW had been taken up by this office. Status Note was prepared and forwarded to Sr Joint Commissioner (PP), DoWR, RD & GR, MoJS. Four meetings including one with Secretary, DoWR took place. As per directions of Secretary, DoWR, the issue has now been referred to a committee. CWC conveyed observation on "Format for Monitoring of Operational Parameters of Karcham Wangtoo HEP (1000MW), Himachal Pradesh".

10. SHONTONG KARCHAM HEP (450 MW), HIMACHAL PRADESH

The Project with a barrage has faced issues of creeping on its right bank abutment. Consequently, the project authority, HPPCL, has approached CWC for vetting the concept design of the right bank slope stability problem prepared by AF consultants. HPPCL submitted "Basic Concept Design Report, November 2020" and "Design Creep Rate Report, November 2020" of right bank slope stability of Shontong Karcham HEP, Himachal Pradesh for vetting which was agreed by CWC. It is to highlight that both of these reports have been prepared with continuous interaction between CWC and M/s AF Consultant. Though, initially CWC resorted to observational/commenting approach and conveyed its suggestions/observations. However, considering the complexity of the problem, an interactive mode was adopted for addressing the issue. The final reports, as submitted, were the culmination of the technical interactive process of CWC & M/s AF Consult.

11. DAM SAFETY REVIEW OF GANDHI SAGAR RESERVOIR

Gandhisagar is the upper most water conservation structure among the series of three dams, name as Gandhisagar, Rana Pratap Sagar and Jawahar Sagar. During design flood review, spillway capacity has been found to be extremely inadequate and as such additional spillway capacity by constructing a tunnel of 5000 cumecs is required after observing precautions in Geology paragraph. CWC designed a bypass tunnel on the left bank of the dam as an additional spillway for hydrological safety of the dam.

The studies undertaken show that the dam (both Non-overflow and Overflow) blocks are structurally safe for the revised MWL of El.404.33m. The existing spillway capacity

provided is capable of managing the revised flood hydrograph. However, the adoption of some non-structural measures, like pre-depletion would keep MWL within desired limits. The other structural measures like providing tunnels, etc. have a limited effect. Besides the resulting increased discharge because it may affect the downstream projects. Based on this consideration, the recommendations were made and shared with DSM Directorate, CWC.

12. PREPARATION OF GUIDELINES ON SEDIMENT MANAGEMENT:

Works related to "Committee for formulating guidelines on planning of structures in HEPs on Sediment Management Considerations" with Member (D&R) as Chairman and Director, HCD (N&W) as Member secretary have been carried out and duly approved guideline was issued. Subsequently, with the approval of Chairman, CWC, a seven member committee was constituted to study and review the "Guidelines for Sediment Management in Water resources and Hydro Power Plants- Feb 2019" with CE, Design (E&NE) as the Chairman and Director, HCD (N&W) as the Member Secretary. Two meetings of the committee to review Guidelines have been held under the chairmanship of Chief Engineer, Designs (E&NE).

13. INDUS-COMMISSION RELATED WORKS

CWC helps Commissioner, Indus on Indus Water Treaty related issues of Hydro Power Projects, being referred regularly. Projects which has been examined from IWT includes Kiru, Drass etc

A. "Pakistan's Technical Bases for Freeboard" calculation in respect of Lower Kalnai HEP has been examined and views are shared with Senior Joint Commissioner (indus), MoJS.

B. Pakal Dul HEP - Examination of Technical Memorandum on its freeboard from NHPC

14. FAILURE OF FERRULE NO. 345 IN PENSTOCK DURING COMMISSIONING OF UHL HE PROJECT

The ferrule of penstock failed during load rejection test of EM unit while increasing the power output incrementally. Beas Valley Power Corporation Limited requested CWC to give its opinion on failure. To examine failure from civil design aspects information/data is requested. Data/information provided by project authorities is being examined in CWC to understand technical aspects of the failure of the penstock

and to study adequacy of proposed restoration/replacement measures as envisaged by HPSEBL. Few meetings also happened between HPSEBL engineers and CWC officers at New Delhi to discuss the related studies and investigations carried out by different agencies.

15. SHAHPURKANDI DAM PROJECT, J&K

CWC examined the proposal of the Government of Punjab for lowering the crest level of Ravi channel head regulator from EL 398.40 m to 397.50 m and comments/views on the same has been issued in Oct 2020. Revised Hydraulic Design Computation of Permanent Structure (Canal Siphon) to feed Kashmir Canal from 8 MW unit PP-III have been carried out.

The design calculations of discharging capacity of the Ravi canal Head Regulator, ShahpurKandi Project was examined using HEC RAS model and options were proposed for resizing the gate of the head regulator for firming up the required discharging capacity of the Head Regulator appropriately

16. NORTH KOEL RESERVOIR, PROJECT, JHARKHAND

A mathematical model study of replicating existing condition of North Koel Right Main Canal was developed in HEC-RAS, and results obtained were compared with that of actual design parameters. Based on the results, suitable modifications have been offered to the project authorities to run the canal at its full capacity.

17. EASTERN KOSI MAIN CANAL, KOSI-MECHI INTERSTATE LINK PROJECT, BIHAR

A proposal has been submitted by Govt. of Bihar to assess the pond level at head regulator and to fix FSL of Canal to pass design discharge. Comments on same have been issued on 25.02.2020. Compliance on same is awaited.

18. DURGAWATI RESERVOIR PROJECT

The objective of the project is to provide assured irrigation facilities to the fertile land lying between Kaimur hill range and Sone high level canal. Director, Monitoring, CWC, informed that the project authorities intend to reconstruct the damaged parapet wall at the d/s edge of Durgawati Earthen dam. CWC was requested to provide suggestions for the same. The project was earlier visited by CWC teams in January 2016 and July 2018 on the requests of the concerned officials from the Water Resources Department of Bihar Government to inspect the issues of settlement, gully formations, deep cuts,

seepage through d/s face, etc. Some remedial measures were suggested by the visiting teams to address the prevailing issues.

Subsequent to the above, the State Government informed about the damage of d/s parapet wall in 180m length between Ch 18 to Ch 26.

A virtual meeting was held with the State Government officials, Director, DSM, CWC and CSMRS scientists on 12-03-2021 for better appreciation of the site conditions.

In view of the repeated distress in the dam body particularly in the closure section, CWC in consultation with CSMRS has advised the project authorities to carry out some essential field and laboratory tests so that the problem can be analysed. The Data/inputs from Project authorities are awaited.

19. SRISAILAM HYDRO ELECTRIC PROJECT(EDA)

Issue: Erosion upstream of EDA

Status: The data/ information requested vide the letter dated 04.09.2020. A reminder in this regard has been forwarded to project authority dated 07.12.2021 to submit the desired data enabling us to expedite the remedial measures. The same is awaited.

20. REHABILITATION OF FOUR EXISTING DAMS; NAMELY RAVISHANKAR SAGAR, MURUMSILLI, DUDHAWA AND SONDUR 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.

Status:

A team of CWC officials visited the site during 8th- 10th Feb 2022. In order to carry out rehabilitation works requisite documents has been asked for from project authority.

Some documents/data have been provided by project authority during the visit which are under examination.



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 siphon 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 siphon 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.

Status:

Work shall be taken up once data pertaining to Borehole details, contour mapping, etc. will be provided by project authority.



Syphon Spillway of Murumsilli dam

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.

Status: Work shall be taken up once data pertaining to Borehole details, contour mapping, etc. will be provided by project authority.

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.

Status: Work shall be taken up once the data sought by CWC received by project authority.



Spillway of Sondur Dam

21. INDIRA SAGAR DAM MULTIPURPOSE PROJECT, MADHYA PRADESH

Issue: Efficacy of auxiliary spillway & its d/s channel is being studied for managing the flood discharge to downstream channel smoothly duly considering safety of tail race channel as well as downstream road bridge.

Status: 3D Physical Model study of the concerned components is being conducted by CWPRS for adopting appropriate remedial measures.

22. RK PUR AND VK PUR DAMS AND CANALS, ANDMAN

Issue: Cracks in dam body and canal due to earthquake on 26.12.2004

Status: The matter examined and additional data requested vide the letter dated 12.11.2020 is awaited from Project Authority.

23. ANALYSIS AND RESOLUTION OF DEFICIT DISCHARGE IN THE RAJASTHAN PORTION OF NARMADA MAIN CANAL

As per Narmada Water Dispute Tribunal Award of 1979, Rajasthan is entitled to 616.74 Mcum (0.5 Maf) of water from the Sardar Sarovar Project in Gujarat. The maximum discharge to be maintained in Narmada Main Canal at the Gujarat Rajasthan border is 73.62 Cumecs (2600 Cusecs). However, Narmada Control Authority (NCA) received complaints from Rajasthan, regarding inadequate releases of Narmada water in the command areas of Narmada Main Canal Project in Rajasthan which caused unrest

amongst the farmers in the command areas of Narmada Main Canal Project in Rajasthan. It was decided by Secretary (WR), in the 92nd Meeting of NCA held in August 2021 and chaired by Secretary (WR), that the Chairman, that the study regarding "Analysis and resolution of deficit discharge in the Rajasthan portion of Narmada Main Canal" may be entrusted to the Central Water Commission and CWPRS, Pune. The Central Water Commission will take the lead and the study may be conducted in the shortest possible time.

The required data for analysis was furnished by NCA to CWPRS and joint visit was carried out for collection of field data. CWPRS studied the issue through mathematical modelling. The HEC RAS model shared by CWPRS was examined by CWC and comments/observations were discussed in meeting dated 23.03.2022 to refine the model. Joint visits for collection for deficit data for calibrating the model were planned to be conducted in 2nd week of April 2022.

24. DODHARA CHANDNI MAIN CANAL, NEPAL

The techno economic possibility of conveying desired discharge of 10 m³/sec to Nepal through an underground pipe(s) in place of an open canal as envisaged in the DPR of Dodhara Chandni Main Canal (DCMC on Indian side) was studied and comments/observations were sent to Sr. Joint Commissioner (FM), MoJS for further necessary action.

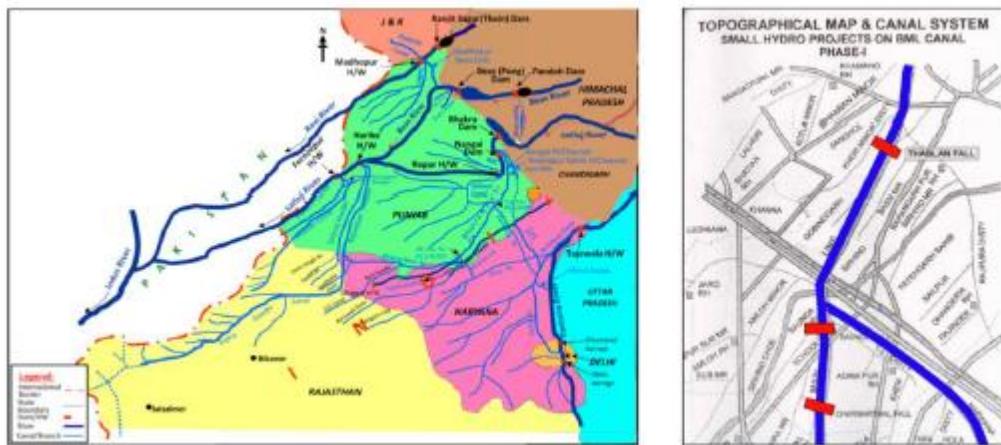
25. SETTING UP OF MINI HYDEL PROJECTS ON BHAKRA MAIN LINE (BML) CANAL AT 27 SITES WITH A TOTAL CAPACITY OF 63.75 MW IN PUNJAB:

The Bhakra Main Line (BML) canal system has several fall enroute. Proposals have been formulated to tap this energy, by constructing Mini Hydel Projects, which are currently being dissipated through stilling basin type energy dissipators. A total of 27 projects have been identified so far. However, the states of Haryana & Rajasthan have expressed their apprehension that the construction of these projects would cause siltation and in turn reduction in the BML canal flow. The Ministry of New and Renewable Energy (MNRE), accordingly requested CWC, vide its letter no. 2/1/2014-SHP, dated 23.06.2021(Annexure-I), to examine the issues of possible siltation and reduction in canal flow due to the setting up of the proposed 27 nos. of Mini Hydel Projects (MHPs) on BML. For this task, BBMB was to provide the required data on BML Canal.

Both the governments of Haryana and Rajasthan are of the view that the construction of these projects would cause siltation, and create fluctuation in the BML canal system. An analysis of the data provided by BBMB shows that the average silt load concentration of the coarse and medium-size particles is only 1.0 ppm which can be considered negligible. On perusal of the discharge, data shows that both non-monsoon and

monsoon discharges into the canal are fairly constant and there has been no reduction in the discharging capacity of both NHC & BML since their operation.

In view of the above, Design (N&W) Org., CWC has prepared a report on technical issues raised on setting up mini hydel projects on Bhakra main line canal at 27 sites with a total capacity of 63.75 MW in Punjab and communicated with officials of concern ministries/departments.



5.2.3 Technical Examination of Project

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.

	In India	In Foreign Country	Total
Hydro-Electric Projects			
Total Nos. of projects	47	2	49
Nos. of projects cleared	5	-	5
Nos. of projects in which comment issued	28	1	29

Projects under examination	14	1	15
Irrigation Projects			
Total Nos. of projects	18	2	20
Nos. of projects cleared	05	--	05
Nos. of projects in which comment issued	11	2	13
Projects under examination	02	--	02
Multi-Purpose Projects			
Total Nos. of projects	10	02	12
Nos. of projects cleared	00	--	00
Nos. of projects in which comment issued	08	02	10
Projects under examination	02	00	02

The list of projects is as under:

HYDRO ELECTRIC PROJECTS			
Sl. No.	Name of the State	Project's 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/ Comments issued
3	Arunachal Pradesh	Upper Subansiri H.E.Project	Comments issued
4	Assam	R&M and life extension of Khandong Power Station (2*23MW) for life Extention	Cleared
5	Assam	Lower Kopili HEP	Cleared

6	Bihar	Dagmara Multi Purpose HEP	Under Examination
7	Himachal Pradesh	Jangi Thopan Powari Project	Comments issued
8	Himachal Pradesh	Luhri Stage-II H.E.Project	Comments issued
9	Himachal Pradesh	Reoli Dugli H.E.Project (Pre-DPR)	Under Examination/ Comments issued
10	Himachal Pradesh	Dugar H.E Project (Pre-DPR)	Cleared
11	Himachal Pradesh	Purthi HEP H.E Project (Pre-DPR)	Comments issued
12	Himachal Pradesh	Bardang HEP	Comments issued
13	Himachal Pradesh	Gyspa Dam Project	Comments issued
14	Leh, Ladakh	Dubrok Shyok H.E.Project (19 MW)	Comments issued
15	Leh, Ladakh	Nimu Chilling H.E.Project (24 MW)	Comments issued
16	Leh, Ladakh	Drass HEP	Under Examination
17	Jammu & Kashmir	Ratan Nag, SHP 166 MW	Comments Issued
18	Jammu & Kashmir	Rongdoo, SHP 12 MW	Comments Issued
19	Jammu & Kashmir	Dessa, SHP 12 MW	Comments Issued
20	Jammu & Kashmir	Uphsi-II, SHP 13.5 MW	Comments Issued

21	Karnataka	Sharavanthy Pumped Storage Project (2000 MW)-PFR	Comments Issued
22	Karnataka	Standalone Pumped Storage component of Saundatti Integrated Renewable Energy Project,(1260MW)	Comments Issued/Under Examination
23	Odisha	Upper Indravati Pumped Storage Project (600 MW)-PFR	Comments issued
24	Odisha	Upper Kolab Pumped storage Project (UKPSP)	Comments issued
25	Odisha	Balimela Pumped Storage Project (500MW).	Comments issued
26	Uttarakhand	Sirkari Bhyol Rupsiyabagar H.E.Project (120 MW)	Under Examination
27	Uttarakhand	Devsari HEP(162 MW)	Comments issued
28	West Bengal	Teesta Intermediate HEP990 MW	Under Examination
29	West Bengal	Teesta-IV (500 MW)	Cleared
30	Arunachal Pradesh	Demwe Upper Stage-I H.E. Project	Comments issued
31	Jammu & Kashmir	Dulhasti Stage-II(258 MW) HE Project	Comments issued
32	Jammu & Kashmir	Uri-I (240 MW) HE Project	Comments issued
33	Himachal Pradesh	Sach Khas HE Project (Pre DPR)	Comments Issued/Under Examination
34	Arunachal Pradesh	Anjaw HEP (270)	Comments issued
35	Tamil Nadu	Sillahalla Pumped Storage HEP Stage-I (1000 MW)	Comments issued
36	Maharashtra	Warasgaon Pumped Storage Scheme (2*300 MW)-PFR	Comments issued
37	Maharashtra	Bhavali PSP91500MW	Under Examination

38	Madhya Pradesh	MP30 Gandhisagar Pumped Storage Project(1440MW)	Comments issued
39	Andhra Pradesh	Somasila PSP	Comments Issued/Under Examination
40	Andhra Pradesh	Karrivalasa PSP	Comments issued
41	Andhra Pradesh	Kurukutti PSP	Comments issued
42	Andhra Pradesh	Chitravathi FSP	Comments Issued/Under Examination
43	Andhra Pradesh	Owk FSP	Under Examination
44	Andhra Pradesh	Gandikota Pump Storage Project	Comments Issued/Under Examination
45	Andhra Pradesh	Yerravaram PSP	Under Examination
46	Arunachal Pradesh	Niare H.E.Project	Comments issued
47	West Bengal	PFR of Teesta Intermediate HE Project	Under Examination
48	Afghanistan	Shahtoot (Lalander) Dam Storage Project	Comments issued
49	Nepal	Lower Arun HE Project (669 MW)	Comments Issued/Under Examination

IRRIGATION PROJECTS

Sl. No	Name of the State	Project's Name	Status
1	Jharkhand	Burhai Reservoir Project	Comments issued
2	Jammu & Kashmir	Shahpurkandi Dam Project	Comments issued

3	Himachal Pradesh	Pihna Singh Irrigation Project	Comments issued
4	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/Cleared
5	Rajasthan	Eastern Rajasthan Canal Project	Comments issued
6	Madhya Pradesh	Parbati-Kuno-Sindh Link(ERCP-PKC)	Under Examination
7	Karnataka	Bhandura Nala Diversion Scheme.	Comments Issued
8	Karnataka	Kalasa Nala Diversion Scheme.	Comments Issued
9	Manipur	Loktak Lift Irrigation Project	Comments Issued
10	Meghalaya	Rukni Irrigation Project	Cleared
11	Manipur	Rejuvenation of Lamphelpat waterbody to alleviate urban flooding, providing sustainable water source for Imphal city and promoting Eco-Tourism at Manipur	Comments Issued
12	Assam	Amreng Irrigation Project (Medium) of KAAC	Comments Issued
13	Assam	DPR of Integrated Water Resources Management of Buridehing River Basin	Cleared
14	Madhya Pradesh	DPR of Erosion Protection work at Chitrakoot Dham, Distt. Satna	Comments Issued
15	Assam	DPR of Sonai Irrigation Project	Cleared
16	Jharkhand	North Koel reservoir project-Kandi Distributary	Under Examination

17	Jharkhand	North Koel reservoir project	Cleared
18	Himachal Pradesh	Pihna Singh Medium Irrigation Project	Cleared
19	Afghanistan	Shahtoot Storage Dam Project on Madian River	Comments Issued
20	Nepal	Detailed feasibility study or Nepal Gandhak Irrigation System Extension Project, Nawalparasi	Comments Issued

MULTI PURPOSE PROJECTS			
Sl. No.	Name of the State	Project's Name	Status
1	Karnataka	Mekedatu Balancing Reservoir cum Drinking Water Project (PFR)	Comments Issued
2	Karnataka	Upper Krishna Project, Stage-III	Under Examination
3	Madhya Pradesh	Comprehensive Report of Ken Betwa Link Project	Comments Issued
4	Odisha	Middle Kolab Multi Purpose Project	Comments Issued
5	Odisha	Tel Integrated Multipurpose Project.	Comments Issued
6	Odisha	Lower Vansadhara Project	Comments issued
7	Andhra Pradesh - Tamil nadu	Godavari(Inchampalli) - Cauvery (Grand Anicut) Link Project	Under Examination
8	Bihar	Dagmara Multipurpose H.E. Project	Comments issued
9	Rajasthan	Construction of Earthern Dams in Village Bastawa Mata & Indroka, Jodhpur	Comments issued

10	Rajasthan	Artificial Recharge Project in select water stressed areas of Rajasthan	Comments issued
11	Afghanistan	Shahtoot Storage Scheme/ Shahtoot Dam Storage Project	Comments issued
12	Indo-Nepal	Pancheswar M.P.Project	Comments issued

(A) PROJECTS UNDER TECHNICAL APPRAISAL/ RECENTLY CLEARED

1. LOWER KOPLI H.E. PROJECT, ASSAM :

- Memorandum of Changes (MoC) of Lower Kopli H.E. Project, Assam was received and cleared by HCD (E&NE) and GATES (E&NE) Directorate.

2. MEMORANDUM OF CHANGES IN RESPECT OF TEESTA-VI (500 MW), SIKKIM

- Teesta Stage-VI Hydroelectric Project located on Teesta River in Southern Sikkim is a run of river scheme with a diversion Barrage located about 100m downstream of L.D. Kazi Bridge at Sirwani.
- The project has an installed capacity of 500 MW with 4 Nos. units of 125MW each driven by vertical axis Francis turbines.

Status

- DPR cleared by CEA on 05.07.2021 subject to prior observation of Gates Design Directorate.

3. PFR OF ANJAW HYDROELECTRIC PROJECT (270 MW), ARUNACHAL PRADESH

- Anjaw HEP is proposed in the Anjaw District of Arunachal Pradesh having Latitude 28°02'34.35"N Longitude 96°34'49.43"E.
- The project envisages utilization of discharge of River Lohit, a major tributary of the mighty Brahmaputra.
- The river bed level at the Barrage site is about at EL.550.00 m. Surface powerhouse is proposed on the right bank of Lohit River just downstream of the barrage axis.
- The first consultation meeting was held on 31-03-2021 and during that meeting it was informed that alternate sites were also explored by the Project Authorities

Status:

- Final Comments issued on 14-10-2021 by BCD(E&NE)
- Latest comments issued on 04-01-2022 by HCD(E&NE)

4. PFR OF DEMWE H E PROJECT-I, ARUNACHAL PRADESH

- Demwe Upper Stage-I HEP is proposed in the Anjaw District of Arunachal Pradesh having Latitude 28°01'59"N Longitude 96°26'47"E.
- The project envisages utilization of discharge of River Lohit, a major tributary of the mighty Brahmaputra.
- The river bed level at the Barrage site is about at EL.442.00 m. Surface powerhouse is proposed on the right bank of Lohit River just downstream of the barrage axis.
- The first consultation meeting was held on 28-07-2021.

Status:

- Comments issued on 02-12-2021 by BCD(E&NE)
- Last comments issued on 09.03.2022 by HCD(E&NE)

5. NIARE H.E. PROJECT, ARUNACHAL PRADESH

- Niare Hydro Electric Project is planned as run-of-river scheme across Subansiri River, a major right bank tributary of Brahmaputra River. The project envisages the construction of about 100 m high concrete gravity dam across Subansiri River near Niare village 50 km upstream of Nacho town in Upper Subansiri District of Arunachal Pradesh.
- The catchment area up to the dam site is 11,181 sq. km and the catchment lies in two countries viz. China (Tibet) and India (Arunachal Pradesh).

Project proposal

The Niare HEP will utilize a gross head of 204 m and design discharge of 443.43cumecs for generation of 770 MW (4 units of 192.5 MW) and also utilize a gross head of 91.33 and design discharge of 114.01 Cumecs for the generation of 90 MW (2 units of 70 MW & 20 MW) in Upper Subansiri district of Arunachal Pradesh. Salient features of the project given below.

- A 115.58 m high Concrete Gravity Dam which will provide a gross storage of 14.92 MCM at FRL (EL 1259 m) and storage of 8.86 MCM at MDDL (EL 1242 m). The dam top has been kept at EL. 1261 m.

- River diversion is planned on the right bank with the help of 2 nos. of 11.0 m diameter horse shoe shaped Diversion Tunnels.
- Spillway comprising of (a) low level Orifice / Sluice spillway - 6 nos. of opening size 8.5 m X 11.0 m (w x h) with crest elevation at EL 1203.00 m and (b) upper level Sluice spillway of dimension 10.0 m X 12.0 m with crest elevation at EL 1259 m.

Status:

- Latest comments issued on 22-12-2021 by HCD (E&NE)

6. SONAI IRRIGATION PROJECT, ASSAM

- The Sonai River is a principal tributary of Barak River, which is one of the major rivers in Southern Assam.
- A gated barrage is proposed across river Sonai near Kashital Village in Cachar District of Assam. Two canals have been proposed to take off from the barrage, one on left side and another on the right side of the proposed structure.
- The project envisages irrigating a Gross Command Area of 15,305 Ha, lying on both the banks. Suitable head regulators for the controlled release of water into the canals have also been proposed on both the banks.
- The survey and investigation of the proposed irrigation project have been carried out by the North Eastern Investigation Division (NEID), CWC, Silchar.
- MoWR, RD&GR has assigned the works of Survey & Investigation and preparation of DPR to Brahmaputra & Barak Basin Organization (B&BBO). B&BBO, Shillong has prepared the DPR of the project and the design and drawing work for preparation of DPR was undertaken

Status:

- The DPR has been received in BCD (E&NE) Directorate and Gates (E&NE) Directorate for technical examination/appraisal of the design/drawings of barrage, canal, HM components and other associated structures.
- The DPR was cleared from BCD (E&NE) on 04-07-2021 and cleared from Gates (E&NE) directorate on 25-10-2021.

7. RUKNI IRRIGATION PROJECT, ASSAM

- Rukni Irrigation Project envisages construction of a barrage across River Rukni, a principal tributary of Barak River, which is one of the major rivers of southern Assam.
- The proposed Barrage location is in the d/s of confluence of Pancherra River with Rukni River, at Kulicherra Village in Cachar District of Assam. Rukni River flows in zigzag way in Mizoram and enters into Assam, where the river flows in a large cultivable command which is at presently deprived of irrigation facilities.
- Rukni Irrigation Project is proposed to serve a Culturable Command Area of 17421 ha through its left bank and right bank canals.
- MoWR, RD&GR has assigned the works of Survey & Investigation and preparation of DPR to Brahmaputra & Barak Basin Organization B&BBO. B&BBO has prepared the DPR of the project and the design and drawing work for preparation of DPR was undertaken.

Status:

- The DPR has been received in BCD (E&NE) Directorate and Gates (E&NE) Directorate for technical examination/appraisal of the design/drawings of barrage, canal, HM components and other associated structures.
- The DPR was cleared from BCD (E&NE) directorate on 19-08-2021

8. INTEGRATED WATER RESOURCES MANAGEMENT OF BURIDEHING RIVERBASIN, ASSAM

The Buridehing basin forms one of the major sub-basins of the river Brahmaputra and it covers nearly 2.3% catchment area of Brahmaputra basin, which exists in the North-Eastern part of Assam. Integrated water resources management of Buridehing basin project includes the flood and river bank erosion risk management work with structural intervention at selected priority reaches under Dibrugarh and Tinsukia Districts along the Buridehing River.

The length of dyke system on both banks of river is 219.24 km. The existing embankment system has been protecting a huge area from flood. Due to long wear and tear these embankment sections have become inadequate to withstand the flood pressure. Due to lack of fund no strengthening and raising according to new specifications was done. River has meandering characteristics from foot hills to outfall and the concave bends are affected by erosion. It is necessary to take up permanent strengthening and anti-erosion measures to the existing embankment. The estimated cost of project is 846.178 cr. and targeted time to complete the project is 2024.

This is to be added that a Detailed Project Report amounting to Rs.635.223 Cr. was submitted earlier and was approved by Different Directorates of CWC and was prepared for placing for getting techno-economic clearance.

However, this revised DPR was prepared for inclusion of additional length of anti-erosion work and increase in earth work section to accommodate provision of paver block road. The memo of work with these provisions was present in 82nd (special) meeting of state T.A.C. on dated 18th may 2021 and was recommended for onward submission.

Status:

- The DPR was technically examined and cleared on 09-12-2021 by BCD (E&NE) Directorate.

9. REJUVENATION OF LAMPHELPAT WATER BODY TO ALLEVIATE URBAN FLOODING, PROVIDING SUSTAINABLE WATER SOURCE FOR IMPHAL CITY AND PROMOTING ECO-TOURISM AT MANIPUR

Project Summary:

Central part of the Imphal City called Lamphel area consists of Lamphelpat wetland, which serve as a temporary flood detention reservoir for the huge amount of runoff water generated from the Northern hilly catchment of Nambul River catchment. The Lamphelpat water body drains into a natural drain named Samushang, which flows from East to West and finally flowing South joins the Nambul River.

Over the years, the Lamphelpat water body has lost its detention capacity because of heavy siltation into it and also due to reclamation of nearby land for the various residential and non-residential constructions. The Samushang stream has also lost its conveyance capacity due to siltation and growth of heavy vegetation into it. Lamphel area is severely affected by water logging, drainage congestion and backwater effects in existing drainage system during Monsoon season because of reduced detention capacity of the Lamphelpat water body and inadequate carrying capacity of the Samushang drainage system which further aggravates because of problematic adverse longitudinal slope of the Nambul River at many places.

To protect the flooding in the area, pumping is done to transfer the water from Samushang drain to Nambul River at the Samushang regulator, which exists at the confluence of Samushang drain and Nambul River. However, this arrangement is not sufficient enough to fully control the flooding issues in Lamphelpat area. The area remains waterlogged for days till the water level in the Nambul River recedes.

To tackle the problem, Government of Manipur has came up with the proposal which mainly consists of the following components

- Rejuvenation/ development of Lamphelpat Water Body by dredging the silt, constructing catch water drains and by constructing the 2m high embankment along the periphery of the water body.
- Restoring the carrying capacity of Samushang Drain by modifying the longitudinal section (L-section) and drain size (i.e. cross-section modification).
- Construction of an overflow weir in the water body.
- Construction of a bypass Channel joining Lamphelpat water body with the Samushang Drain.
- Construction of sluice gate just upstream of the junction of Samushang Drain with Nambul River.
- River training work (dredging) in Nambul River.
- Restoration of channels contributing from northern side of water body.
- Soil conservation activities in the catchment area treatment of Lamphelpat.
- Temporary pumping facilities for pumping out water from the proposed reservoir/ water body during construction phase as well as till the water supply scheme utilizing stored flood water in the reservoir is fully functional.
- Development plan and facilities around the lake including an arc bridge for connecting north-south of the lake.

Status:

- The Proposal was examined and final comments were issued by BCD(E&NE) Directorate on 09-06-2021.

10. LOKTAK LIFT IRRIGATION PROJECT, MANIPUR

- Loktak Lift Irrigation Project (LLIP) is a part of Loktak Multipurpose Project located at Bishnupur district of Manipur, which commissioned in 1986.
- The project was originally envisaged to lift 600 cusec of water using three pump stations to feed five canal systems i.e. (i) Imphal Main Canal (ii) Imphal Low Level Canal (iii) Imphal High Level Canal (iv) Moirang Low Level Canal and (v) Moirang High Level Canal to irrigate an annual area of 40000 ha in the

Culturable command area of 23,400 ha benefitting Bishnupur and Imphal west Districts of Manipur.

- Total length of the canal network was 101.10 Km.

As stated in the DPR, in last 33 years after commissioning the project, major repairing and periodical maintenance of the project have not been carried out due to financial constraints and insurgency/laws & order issues etc. Therefore, Major components of the project have become defunct and most of the structures are beyond repairs which resulted in the decrease of annual irrigation potential from 40000 Ha to 1800 Ha. The irrigation benefits have been dwindling because of the following reasons:

Technical:

- Pumps remained unrepaired over a long period of time due to lack of fund.
- Most of the outlets have not been properly sized for the areas under their command.
- Siltation in the canal bed, seepage in some reaches of the canals, Damage of bund.
- The gates of the head regulators of the Canals are stuck
- Cross drainage structures, bridges and culverts are damaged.

Non-technical:

- Reduction in the command areas due to various activities like human habitation, development of pond/tanks for pisciculture etc.
- The inundation caused by Loktak hydro Electric Project at the periphery of Loktak Lake also restricted full utilization of command area.
- Most farmers do not follow the full package of agronomical practices because of unreliable irrigation supplies.

Project authorities have proposed the phase-I ERM of the Project to restore the lost Annual Irrigation potential up to 17400 ha in a Culturable command area (CCA) of 12600 ha. In the present proposal only three canals out of five i.e. Imphal main canal, Imphal low level canal, Moirang low level canal have been taken under ERM having a total length of 51.1 km and serving a CCA of 12600 ha.

Status:

- The DPR was examined and final comments issued by BCD(E&NE) Directorate on 09-04-2021

11. DPR FOR EROSION PROTECTION WORK AT CHITRAKOOT DHAM, DISTT. SATNA, MADHYA PRADESH

- The Mandakini River, a small tributary of the Yamuna, originates from Satna district in Madhya Pradesh and joins the Yamuna River near Karvi in Uttar Pradesh. The total length of the river is near about 50 km.
- River Mandakini not carry a huge discharge, but in peak rainy season a flash flood severely occurring, which will be main causes of erosion of its Ghats and adjoining lands.
- The general public affected due to losses of their houses, agricultural land & submergence of valuable properties during floods.
- The proposed project is to provide flood protection works and anti erosion works of bank of river Mandakini.

Status

- The proposal was examined and Final comments were issued on 09.12.21 by BCD (E&NE) Directorate.

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 2021-22, technical examinations of hydrological aspects of DPRs in respect of 95 projects have been carried out in CWC. Out of this, 42 projects have been cleared and comments were issued for 39 projects. In addition, CWC has also carried out Design Flood Review Studies of the 47 projects in the following states.

S.No.	Name of the State	No of Projects
1	Andhra Pradesh	6
2	Chhattisgarh	2
3	Karnataka	29
4	Maharashtra	01
5	Odisha	01
6	Rajasthan	01
7	Telangana	03
8	Tamil Nadu	03
9	Uttar Pradesh	1

Consultancy works / special studies related to hydrological aspects

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

- Damanganga-Godavari Link Project
- Bhur, Basakattha, Khuntishot and Belwa Reservoir Scheme: Reservoir Sedimentation study and rating curve
- Damanganga-Vaitarna Godavari Link Project, Maharashtra
- Satyar Khad Medium Irrigation project
- Hydrological series for rescheduling of Monthly design energy of UPJVNL Power Station of Matatila Power station, Pipri , Obra Power station ,Sonebhadra & Khara Power station, Badshahibagh, Saharanpure.
- Design flood study of Kiccha Barrage & Khamariya Regulator

Technical Assistance / Advice tendered

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 2021-22 are as under:

- Consultancy work to study the issue of floods and siltation in river Ganga due to Farraka barrage (under NHP): The consultancy work was awarded to RMSI pvt Ltd. The Inception Report and Data Compilation Report on the consultancy work have been accepted by the Committee constituted by MoJS under the chairmanship of Chairman, CWC. Cross section survey work has also been completed by the end of January 2022.

- Consultancy services of physical based mathematical modelling for estimate of sediment rate and sediment transport in 7 river basins of India (under NHP): The consultancy work was awarded to M/s Haskoning DHV Consulting Pvt Ltd. and a Technical Advisory and Review Committee (TARC) under the chairmanship of CE, HSO to monitor progress, guide consultant and accept reports submitted by the consultant was constituted with the approval of Chairman, CWC. The Inception Report and Data Compilation Report have been accepted by the committee. During 2021-22, three 5-day Training and two 2-day Workshops have been organized under Capacity Building component of the work with participation of CWC Officers as well as representatives from State Governments.

Trainings/Workshop/ Seminar

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

Review of BIS code:

HSO has been involved in providing inputs for updating BIS codes which come under the purview of WRD 01 (Hygrometry Sectional Committee) and WRD 10 (Reservoirs and Lakes Sectional Committee). In FY 2021-22, revision of IS 4410 & IS 5477 were carried out as per the deliberations of the Committee.

5.4 Dam Safety Aspects

Dam Safety Organization is looking after 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
- National Committee on Dam Safety (NCDS)
- 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 Mullaperiyar Dam (MPD) is a masonry gravity dam constructed across the Periyar river in 1895, is situated in Thekkady District in Kerala. As per the lease agreement 1886 between Maharaja of Travancore and the Secretary of State for India in Council, 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.



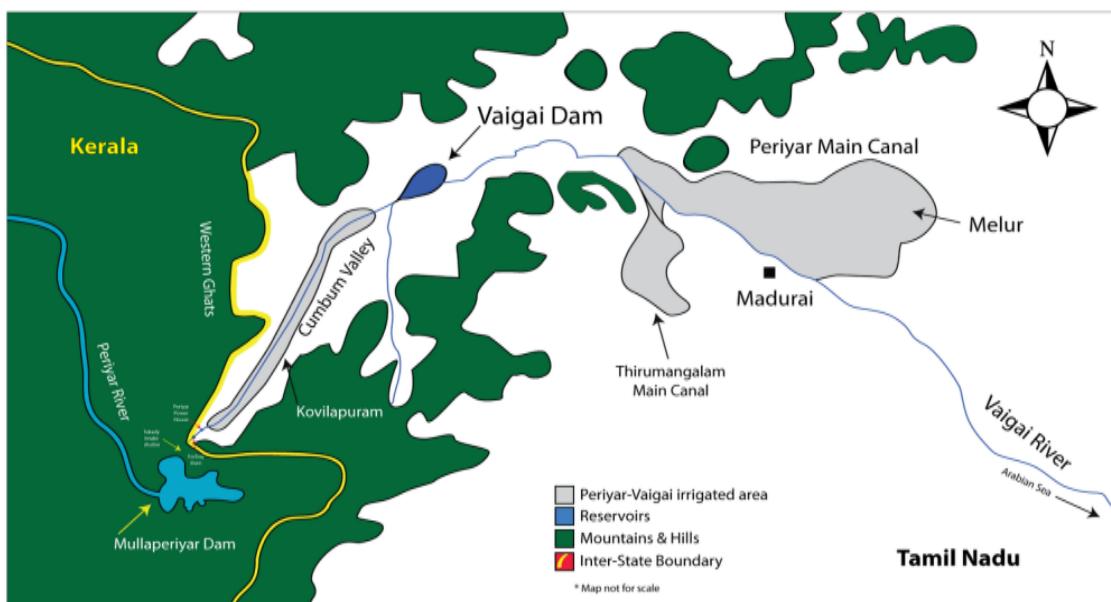
Mullaperiyar Dam

In 1979, in pursuance of the request from Kerala Government, the then Chairman, CWC inspected the dam and held a meeting on 25th November, 1979 with the officers of Kerala and Tamil Nadu. In that 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. This led to the filing of number of writ petitions in the Kerala High Court as well as in the Madras High Court sometime in 1998 on the issue for and against raising of water level in the Mullaperiyar reservoir and the safety of the dam.

Hon'ble Minister (WR) convened an Inter-State meeting on 19.5.2000 but no consensus could be reached in the meeting as well, hence decided in the meeting, to constitute an Expert Committee under Member (D&R), CWC with representatives from both the States to study the safety of the dam. The Expert Committee gave its final report of 16th March, 2001. In its report, the Expert Committee had opined that water level in the Mullaperiyar reservoir could be raised to 142 ft. as that will not endanger the safety of

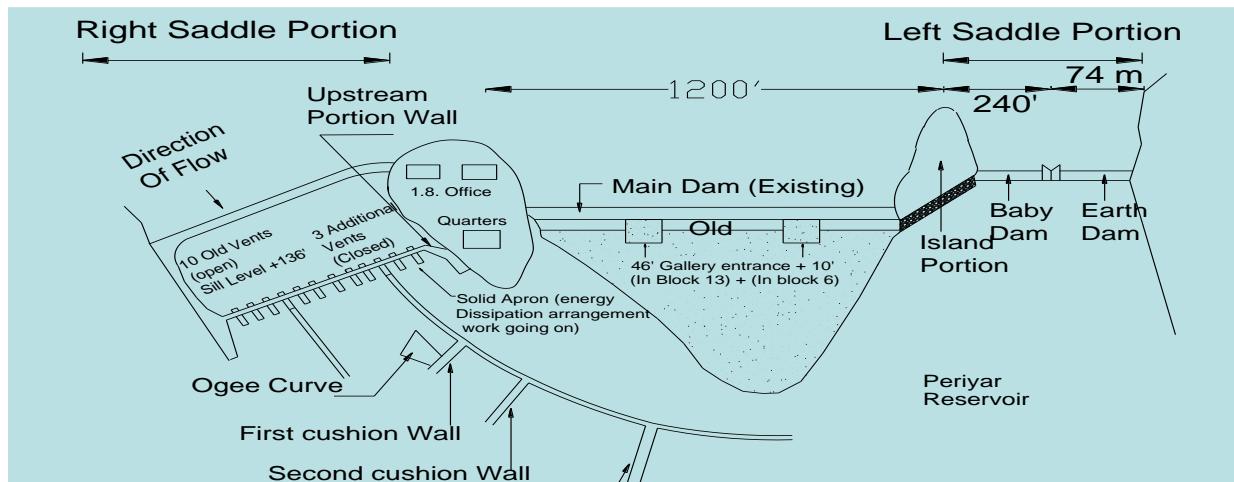
the main dam, including spillway, baby dam and earthen bund. Further raising the water level to 152 ft. will be considered after balance strengthening measures are completed. Hon'ble Supreme Court delivered its orders on 27.02.2006, permitting the water level in the Mullaperiyar dam to be raised up to 142 ft.

Further, Hon'ble Supreme Court vide its order dated 18th February, 2010 constituted an Empowered Committee (EC) on Mullaperiyar Dam under the Chairmanship of Justice Dr. A.S. Anand, former Chief Justice of India to look into all the issues in relation to Mullaperiyar 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. A new independent Expert Committee may look into the need of raising the FRL beyond 142 ft.



Location of Mullaperiyar Dam

The Hon'ble Supreme Court in its Judgment of 07.05.2014, in the matter of Original Suit No. 3 of 2006 of India, held that the dam is safe and hence permitted to raise the reservoir water level upto 142 ft. Further on completion of balance strengthening works as per Hon'ble Court's judgment dated 27.02.2006 and on examination of the same by the independent experts, the water level is permitted to be raised upto 152 ft.



General Layout of the Mullaperiyar Dam

The Hon'ble Supreme Court in its Judgment of 07.05.2014, in the matter of Original Suit No. 3 of 2006 of India, held that the dam is safe and hence permitted to raise the reservoir water level upto 142 ft. Further on completion of balance strengthening works as per Hon'ble Court's judgment dated 27.02.2006 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 in its judgment of 07.05.2014 also directed to constitute a Supervisory Committee to allay the apprehensions of Kerala- though none exists - about the safety of the Mullaperiyar 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. The Supervisory Committee has met and inspected the dam 14 times since the Supreme Court judgment of 2014. The last meeting was held in February, 2021. So far any sign of distress has not come or brought to the notice of the Committee.

Further under the directions of Hon'ble Supreme Court dated 11.01.2018, a Sub Committee headed by Secretary, 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.

In the case of WP (C) 880 of 2020 and other connected matters, Hon'ble Supreme Court vide Order dated 08.04.2022 has directed to reconstitute the existing Supervisory Committee for the purpose of its strengthening. The two technical experts has to be made part of the existing Supervisory Committee, one each from the State of Kerala and State of Tamil Nadu, who must be well-versed in dam management, reservoir operation, instrumentation, etc.

Further, Hon'ble Court has also directed that until the regular National Dam Safety Authority (NDSA) becomes functional in terms of Section 8 of the Dam Safety Act 2021,

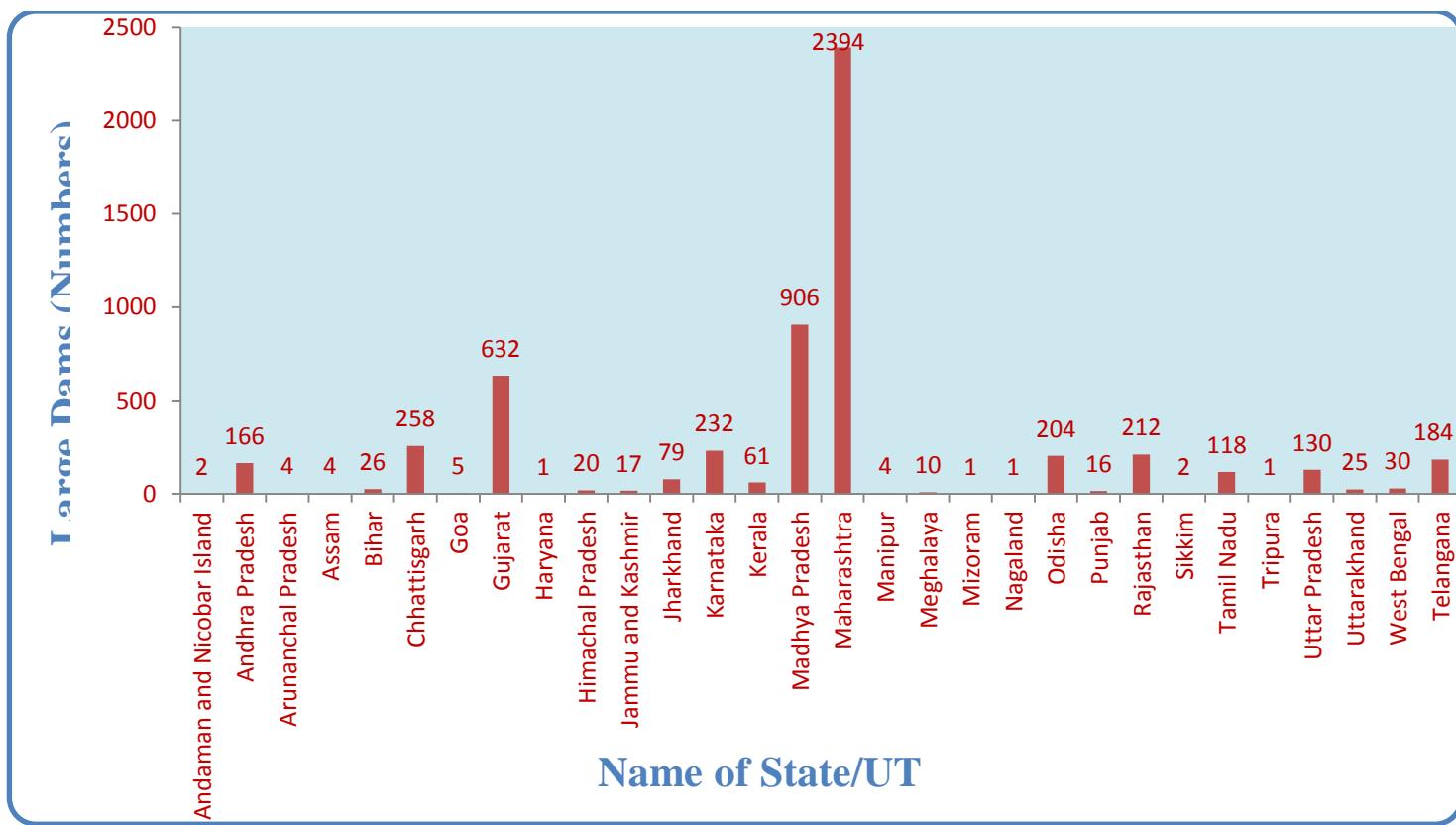
till such time, the reconstituted Supervisory Committee would be in a position to discharge all the functions and also exercise all the powers which otherwise are required to be exercised by the NDSA for ensuring safety of the Mullaperiyar Dam, as also, prevention of dam failure related disasters.

5.4.2 National Register of Large Dams

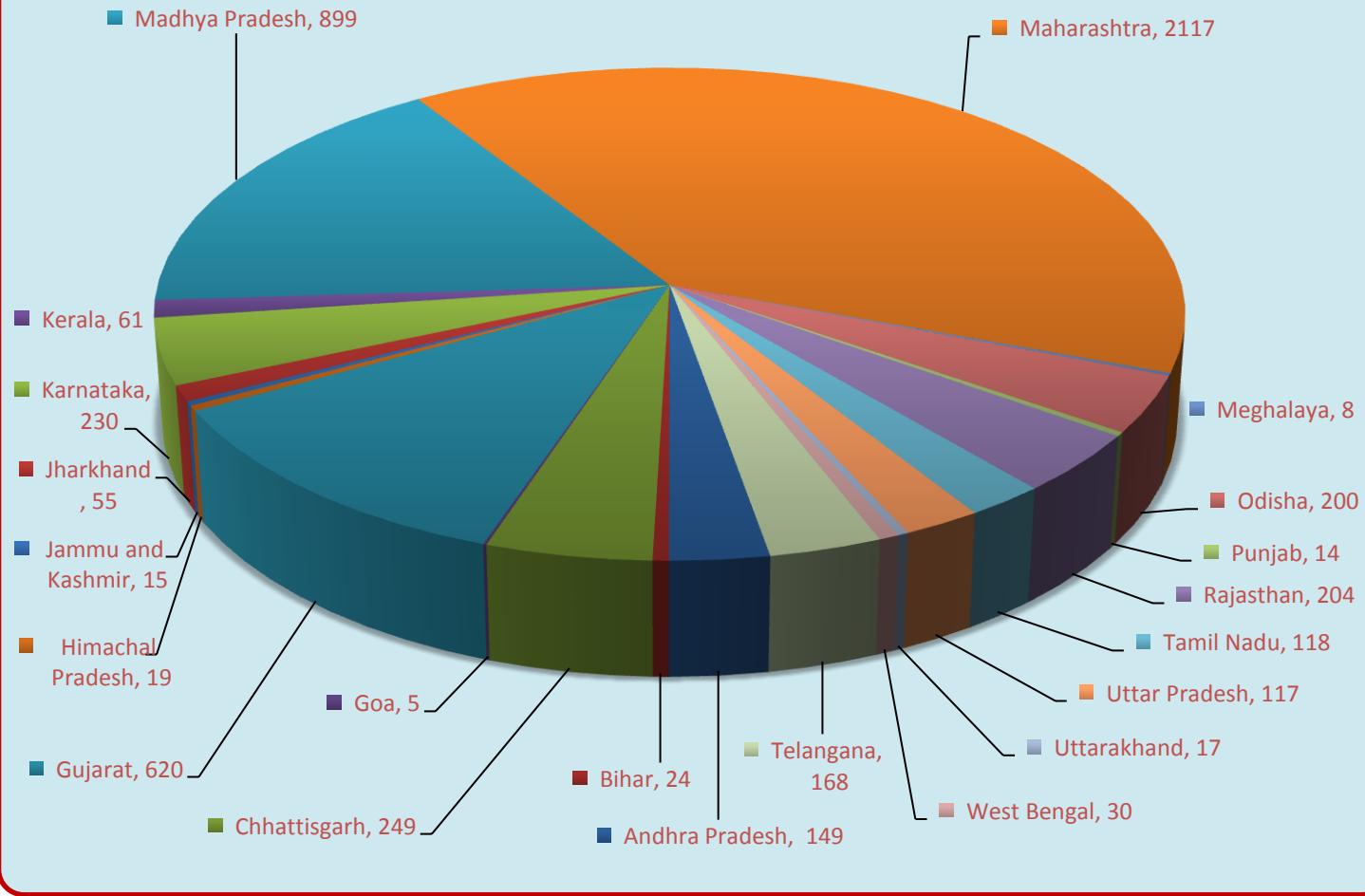
Dam Safety Organisation, CWC compiles and maintains nation-wide register of large dams based on input provided by dam owners, which contains information regarding ownership, age, salient features and other important data of dams. NRLD 2019 was released by Chairman, CWC on 27th June 2019, which can be viewed at <http://cwc.gov.in/publication/nrld>



STATE-WISE DISTRIBUTION OF LARGE DAMS (EXISTING & ONGOING) IN INDIA
Total No. of dams = 5745

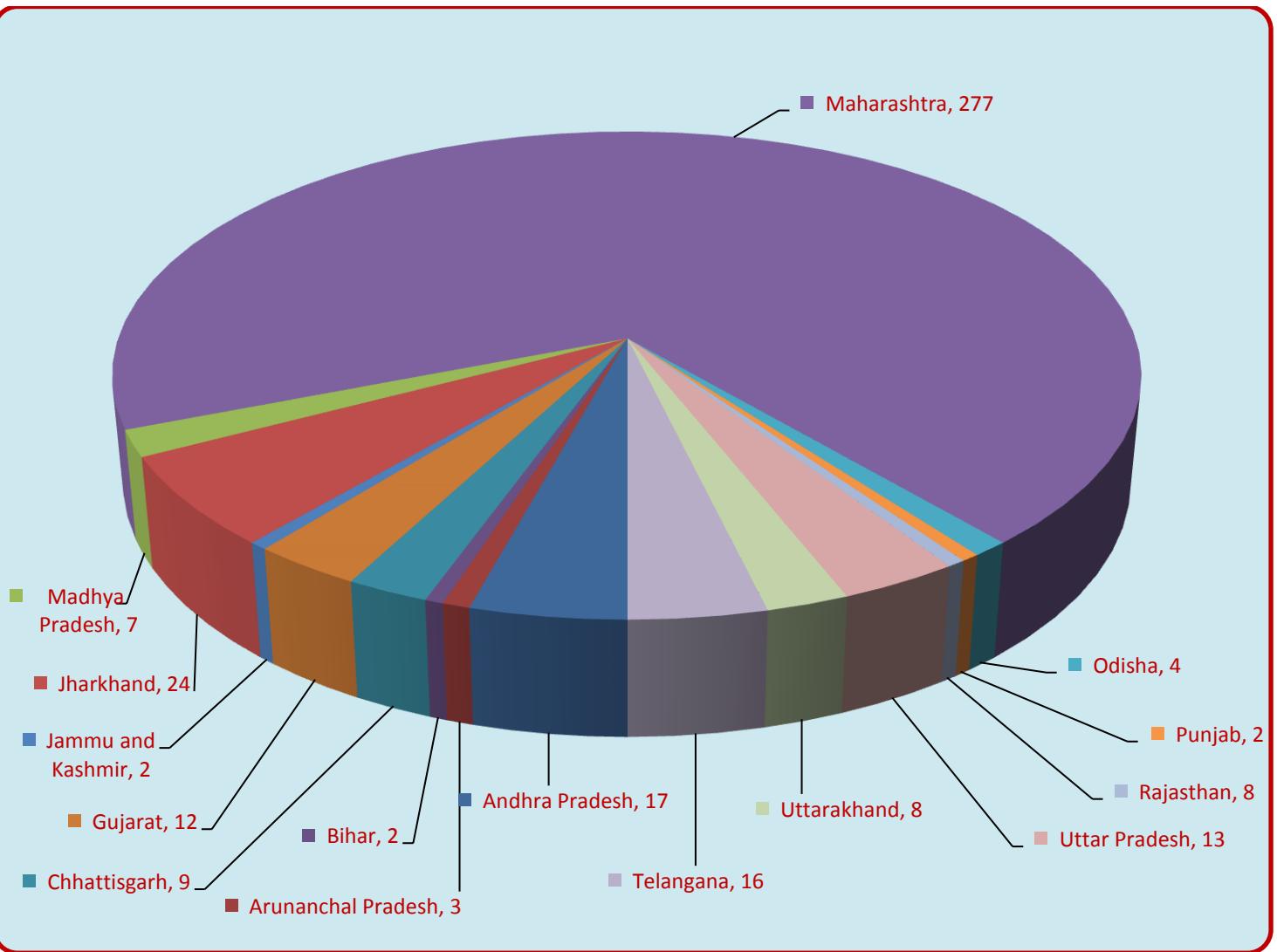


STATE-WISE DISTRIBUTION OF CONSTRUCTED LARGE DAMS IN INDIA
 Total No. of Constructed dams = 5334



*Other States includes: Andaman and Nicobar Island (2), Arunanchal Pradesh (1), Haryana (1), Manipur (3), Mizoram (1) Nagaland (1), Sikkim (2), Tripura (1), Assam (3)

STATE-WISE DISTRIBUTION OF UNDER-CONSTRUCTED LARGE DAMS IN INDIA
Total No. of Under-Constructed dams = 411



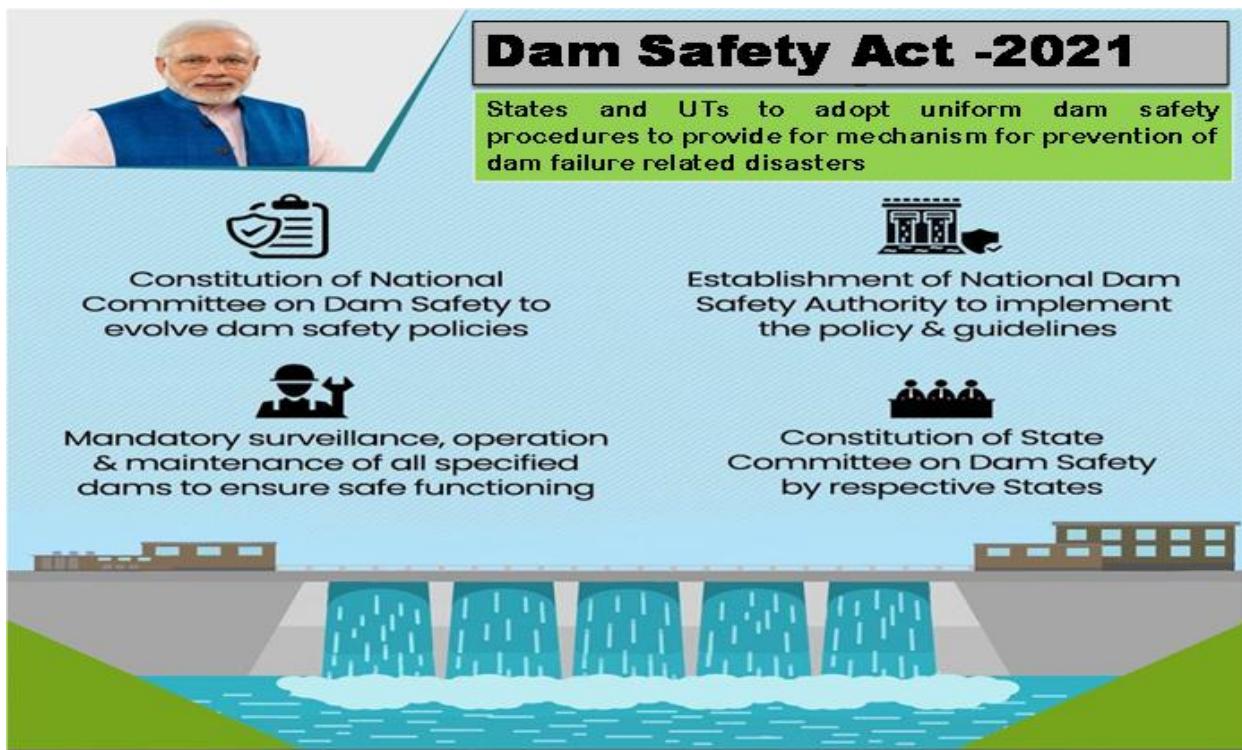
*Other States includes: Assam (1), Himachal Pradesh (1), Karnataka (2), Manipur (1) and Meghalaya (2)

5.4.3 DAM SAFETY ACT, 2021

The Dam Safety Act, 2021 has been notified in the Gazette of GOI on 14th December 2021 and vide Gazette notification dated 28th December 2021, the Central Government appointed 30th December 2021 as the date on which the provisions of the said act shall come into force.

The Government of India, keeping the importance of safety of dams, constituted a standing committee in the year 1982 to review the existing practices and to evolve

unified procedure for safety of dams in India. The Standing Committee in its report dated 10th July 1986 recommended for unified dam safety procedure for all dams in India and the necessary legislation on dam safety.



Accordingly, the Dam Safety Bill, 2018 was prepared for coverage across whole of India incorporating the recommendations of the Parliamentary Standing Committee. However, with dissolution of the Sixteenth Lok Sabha, the Dam Safety Bill, 2018 lapsed. Hence, the present Bill, namely the Dam Safety Bill, 2019 was passed by Lok Sabha on August 2, 2019 and by Rajya Sabha on 4th December 2021 which has been published in the Gazette dated 14th December 2021 as the Dam Safety Act, 2021.

In view of the above, the Dam Safety Bill, 2018 was prepared for coverage across whole of India incorporating the recommendations of the Parliamentary Standing Committee on the Dam Safety Bill, 2010 and was introduced in Lok Sabha. However, with dissolution of the Sixteenth Lok Sabha, the Dam Safety Bill, 2018 lapsed. In line of Dam Safety Bill, 2018, the Dam Safety Act, 2021 has been enacted by the Parliament and the provisions of the Act have come into force w.e.f 30th December 2021.



Hon'ble Minister of Jal Shakti presenting Dam Safety Bill in the Parliament

In brief the important provisions provided in the aforesaid Act are as follows—

- a) Constitution of the National Committee on Dam Safety (NCDS) to discharge functions to prevent dam failure related disasters and to maintain standards of dam safety and it shall evolve dam safety policies and recommend necessary regulations as may be required for that purpose.
- b) Establishment of the National Dam Safety Authority (NDSA) as a regulatory body to implement the policy, guidelines and standards for proper surveillance, inspection and maintenance of specified dams and address unresolved points of issues between the State Dam Safety Organisation of two States, or between the State Dam Safety Organisation of a State and the owner of a dam in that State, and in certain cases, such as dams extending in two or more States or dams of one State falling under the territories of another State. It shall also perform the role of State Dam Safety Organisation thereby eliminating potential causes for inter-State conflicts.
- c) Constitution of the State Committee on Dam Safety (SCDS) by the State Governments to ensure proper surveillance, inspection, operation and maintenance of all specified dams in that State and ensure their safe functioning.
- d) Establishment of the State Dam Safety Organisation (SDSO) in States having specified dams which will be manned by officers with sufficient experience in the field of safety of dams.
- e) An obligation upon every owner of a specified dam to establish operational and maintenance set up to ensure continued safety of such dams, to earmark sufficient and specific funds for maintenance and repairs of the dams, for undertaking pre-monsoon and post-monsoon inspections and special inspections during and after

floods, earthquakes, etc., to carry out risk assessment studies at such intervals as specified by the National Committee on Dam Safety.

- f) An obligation upon the concerned State Dam Safety Organisation to keep perpetual surveillance, carry out inspections and monitor the operation and maintenance of specified dams under its jurisdiction to ensure their safety; and to classify each dam under their jurisdiction as per the vulnerability and hazard classification in accordance with the regulations.
- g) An obligation upon the National Dam Safety Authority to forward its Annual Report to the Parliament and the National Disaster Management Authority and the State Dam Safety Organisation to forward their Annual Reports on safety status of dams to the concerned State Legislative and State Disaster Management Authority.
- h) Functions of the National bodies and the State Committees on Dam Safety have been provided in Schedules to the Bill. These Schedules can be amended by a government notification.
- i) An offence under the Bill can lead to imprisonment of up to two years, or a fine, or both, on a complaint by NCDS/NDSA/SCDS/SDSO.

The Ministry of Jal Shakti has notified in the Gazette of India the constitution of National Committee of Dam Safety (NCDS) and established the National Dam Safety Authority (NDSA) along with the rules. Both the Committee and Authority shall come into force w.e.f 18th February 2022. On the similar lines, as per the provisions in the Dam Safety Act 2021, the State Governments also have to constitute a State Committee on Dam Safety (SCDS) & State Dam Safety Organisation (SDSO) within a period of 180 days from the date of commencement of this Act.



Vide OM No. N-5201/2//2021-BM/PR, dated 25.04.2022, Ministry of Jal Shakti has established the NDSA under the relevant provision of the DSA 2021 (Section 8 thereon), the Chairman and the Members of NDSA have assumed charge on additional basis. The composition of NDSA is as under:

S.No.	Name & Designation	Additional Charge of NDSA
1	Sh. J Chandrashekhar Iyer Member (D&R), Central Water Commission	Chairman
2	Sh. Gulshan Raj Chief Engineer (DSO), Central Water Commission	Member- Policy & Research
3	Sh. S.K. Sibal Chief Engineer, Designs (N&W), Central Water Commission	Member- Technical
4	Sh. S.K. Sibal Chief Engineer, Designs (NW&S), Central Water Commission (Addl Charge)	Member- Disaster & Resilience
5	Sh. Vijay Saran Chief Engineer, Designs (E&NE), Central Water Commission	Member- Regulation
6	Ms. Richa Misra Joint Secretary & Financial Advisor, DoWR, RD&GR	Member- Administration & Finance

To support the NDSA four regional offices (Northern Region, Eastern & North-Eastern Region, Western Region & Southern Region) have been established.

5.4.4 National Committee of Dam Safety (NCDS)

The Dam Safety Act, 2021 has been enacted by the Parliament and the provisions of the Act have come into force w.e.f. 30th December, 2021. As per the provision under section 5 (1) of the Dam Safety Act 2021, Central Govt. has notified the constitution of National Committee on Dam Safety (NCDS) on 17th February 2022 to evolve uniform dam safety policies, protocols, and procedures and other mandated functions. The functions of NCDS are given in first schedule of the National Dam Safety Act, 2021. As per notification the Composition of NCDS is as follows:

1	Chairman, Central Water Commission, Ministry of Jal Shakti, Government of India	Chairperson, ex officio
2	Chairman, National Dam Safety Authority	Member, ex officio
3	Member (Design & Research), Central Water Commission, Ministry of Jal Shakti, Government of India	Member, ex officio
4	Member (Hydro), Central Electricity Authority, Ministry of Power, Government of India	Member, ex officio
5	Representative of D/o of Water Resources, River Development & Ganga Rejuvenation, Ministry of Jal Shakti, Government of India not below the rank of Joint Secretary	Member, ex officio
6	Representative of National Disaster Management Authority, Ministry of Home Affairs, Government of India not below the rank of Joint Secretary	Member, ex officio
7	Representative of Ministry of Environment, Forest and Climate Change, not below the rank of Joint Secretary, Government of India;	Member, ex officio
8	Director General, India Meteorological Department, Ministry of Earth Science, Government of India	Member, ex officio
9	Director General, Geological Survey of India, Ministry of Mines, Government of India	Member, ex officio
10	Director, National Remote Sensing Centre, Department of Space, Indian Space Research Organisation, Government of India	Member, ex officio
11	Director, National Geophysical Research Institute, Ministry of Science and Technology, Government of India	Member, ex officio
12	Seven (7) representatives of the State	Member, ex officio

	Government of the level of Engineer-in-chief or equivalent by rotation	
13	Three (3) specialists in the field of dam safety and allied fields	Member
14	Member (Policy and Research), NDSA, Government of India	Secretary

FUNCTIONS OF NATIONAL COMMITTEE ON DAM SAFETY (As per First Schedule of the Act)

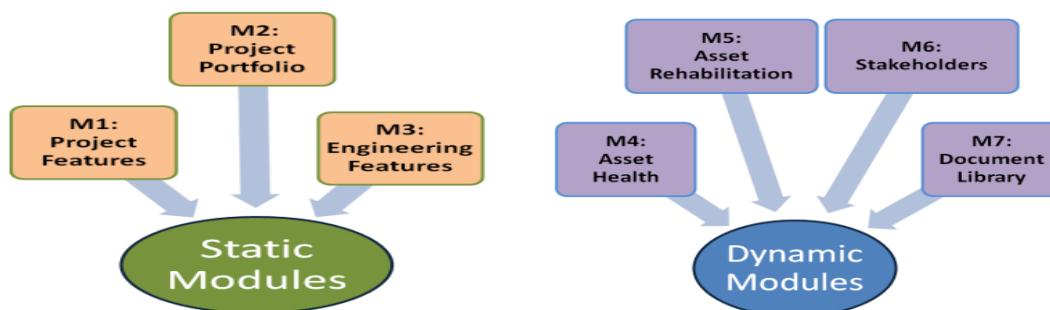
1. For the purposes of maintaining standards of dam safety and prevention of dam failure related disasters, evolve dam safety policies and recommend necessary regulations as may be required.
2. Act as a forum for exchange of views on techniques to be adopted for remedial measures to relieve distress conditions in specified dams and appurtenant structures.
3. Analyse the causes of major dam incidents and dam failures and suggest changes in the planning, specifications, construction, operation and maintenance practices in order to avoid recurrence of such incidents and failures.
4. Evolve comprehensive dam safety management approach as an integration of dam safety evaluation, risk assessment and risk management for the desired level of safety assurance; and also explore compensations, by means of insurance coverage for the people affected by dam failures.
5. Render advice on any specific matter relating to dam safety which may be referred to it by the Central Government or the State Government, as the case may be.
6. Make recommendations on a request by the Central Government on safety measures in respect of dams located outside the territory of India.
7. Make recommendations on the rehabilitation requirements of ageing dams.
8. Provide strategic supervision for such dam rehabilitation programmes that are executed in States through central or externally aided funding.
9. Identify areas of research and development for dam safety and recommend for provision of funds.
10. Make recommendations on the coordinated reservoir operations of cascading dams and

11. Any other specific matter relating to dam safety which may be referred to it by the Central Government.

5.4.5 Dam Health and Rehabilitation Monitoring Application

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, which is functional now. This is a step towards application of Artificial Intelligence (AI) in dam safety to smartly manage our existing water assets. This tool has various levels of access at Central and State Levels. 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.



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, 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).

DHARMA was launched in January 2018. There has been good progress in the implementation of DHARMA, with more than 1000 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 transferred into DHARMA. A total of 31 training programs have been conducted in various states in India to provide hands-on

training for entering data into DHARMA and over 1100 dam officials have been trained. Licenses have been given to 27 implementing agencies in 18 states to use DHARMA.

5.4.6 Dam Rehabilitation & Improvement Project (DRIP) Phase II

In April 2012, erstwhile Ministry of Water Resources initiated World Bank assisted Dam Rehabilitation and Improvement Project (DRIP), to improve the safety and operational performance of selected dams, coupled with institutional strengthening through a system wide management approach. The Scheme had provision to rehabilitate 223 dams, located in 7 States Jharkhand, Karnataka, Kerala, Madhya Pradesh, Odisha, Tamil Nadu and Uttarakhand, with 10 Implementing Agencies on board. The completion cost of the Scheme is Rs 2567 Cr. **The Scheme successfully closed in March 2021.** The performance rating by World Bank is Satisfactory.

Another externally aided Scheme DRIP Phase II and Phase III has been approved by Govt. of India. This Scheme has rehabilitation provision of 736 dams at the budget outlay of Rs 10211 Cr, having 10 years duration, to be implemented in two phases of 6 years duration with two years overlap. 19 States and three Central Agencies are part of this Scheme. **The Scheme has been declared effective in October 2021.**

Cost and Funding: The budget outlay is Rs 10,211 Cr (Phase II: Rs 5107 Cr; Phase III: Rs 5104 Cr). The external loan assistance is Rs 7000 Cr (US\$ 1 Billion) and balanced Rs 3211 Cr is counterpart funding to be borne by concerned Implementing Agencies. The loan for Phase II and Phase III is US\$ 500 M each.

Funding Pattern: It is 80:20(Special Category States), 70:30(General Category States) and 50:50(Central Agencies). The Scheme also has provision of Central Grant of 90% of loan amount for special category States (Manipur, Meghalaya and Uttarakhand).

Project Components: (i) 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 (ii) Dam safety Institutional Strengthening to strengthen the dam safety institutional setup in participating States as well as on a Central level, (iii) **Incidental Revenue Generation for sustainable operation and maintenance of dams**, and (iv) Project Management.

DRIP Phase II: Co-financed by two multi-lateral funding Agencies - **World Bank and Asian Infrastructure Investment Bank (AIIB)**, with funding of US\$ 250 million each. The Loan Signing with World Bank (US\$ 250 M) was held in August, 2021 in which 10

States (Gujarat, Kerala, Madhya Pradesh, Maharashtra, Manipur, Meghalaya, Rajasthan, Odisha, Tamil Nadu and Chhattisgarh) participated. The Phase II has been declared effective by the World Bank in October 2021. Loan Negotiations for another US\$ 250 million with AIIB held on February 17, 2022.

Scheme Progress: The preparatory activities including Design Flood Review, Inspection by Dam Safety Review Panel, preparation of Project Screening Template and its approval by World Bank, publication of tenders and its award, etc are already in full swing. So far, DFR of 326 dams, DSRP Inspection of 301 dams, PST of 189 dams costing Rs 5325 Cr have been prepared. The tenders amounting to Rs. 2150 Cr has been published. The contract(s) for Rs 1077 Cr have been awarded. The cumulative expenditure up to March 2022 is Rs. 246 Cr.

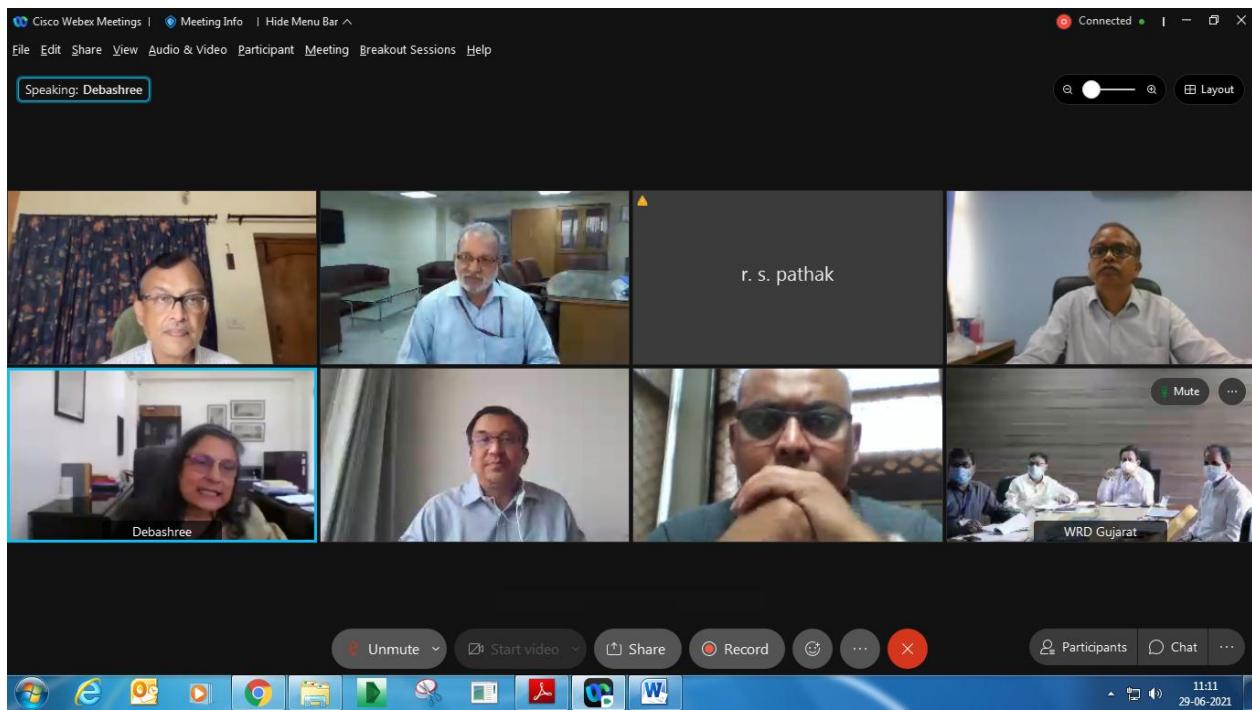
DRIP ACTIVITIES

❖ **DEA-AIIB Tripartite Portfolio Review Meeting (TPRM), May 25, 2021**

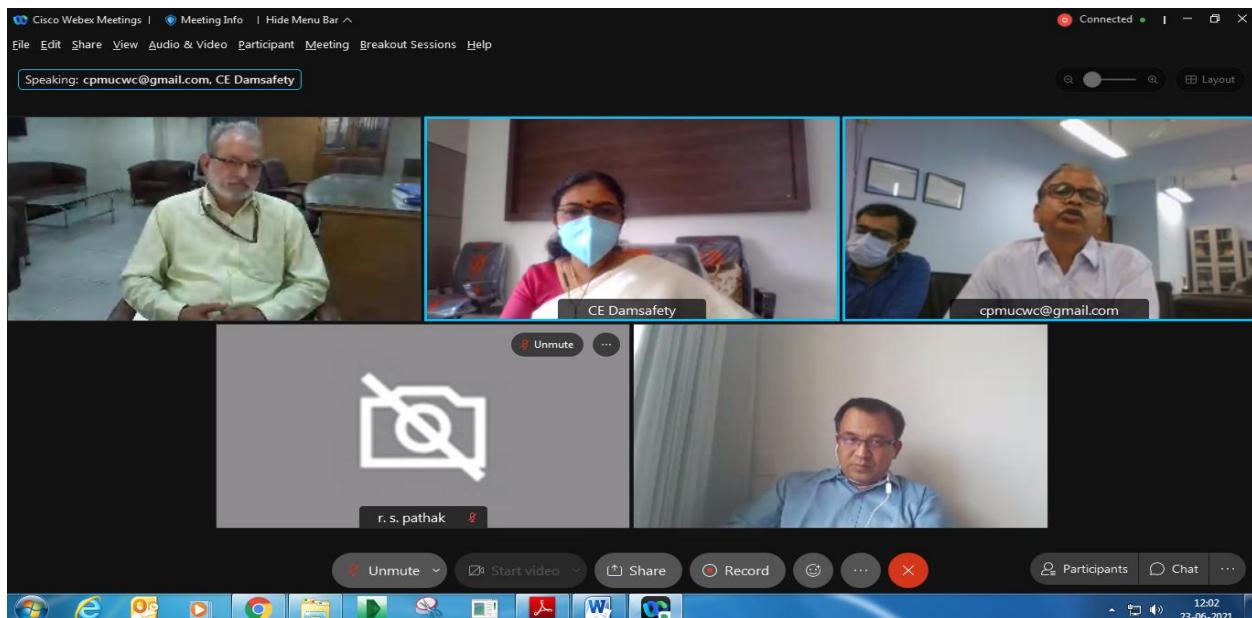
Virtual Tripartite Portfolio Review Meeting (TPRM) was organized by DEA, Ministry of Finance on May 25, 2021 with Asian Infrastructure Investment Bank (AIIB) to review the readiness of partner States of DRIP Phase II to negotiate the loan with AIIB. During the meeting, it was informed that DEA readiness criteria for loan negotiation with AIIB for funding of US\$ 250M is likely to be fulfilled by July 2021. The meeting was attended by representatives of DEA, AIIB, Ministry of Jal Shakti and CWC.

❖ **Meeting to Review the Progress of Partner Agencies of DRIP Phase II and Phase III**

Joint Meetings to review the progress of the agencies of DRIP Phase II were held virtually with Rajasthan WRD, UJVNL, Manipur WRD, Meghalaya Power Generation Corporation Limited (MePGCL), Kerala WRD, KSEB and Gujarat NWR, WS & KD on June 11, June 15, June 16, June 18, June 23, June 25, June 29, 2021 respectively. Deliberations were done on the progress achieved by the partner agencies and action plan to fulfill the readiness Criteria of DEA which requires award of civil contracts for a minimum of 30% of cost estimate for loan signing with World Bank. The meetings were attended by the officials of Ministry, CPMU, World Bank and State representatives.



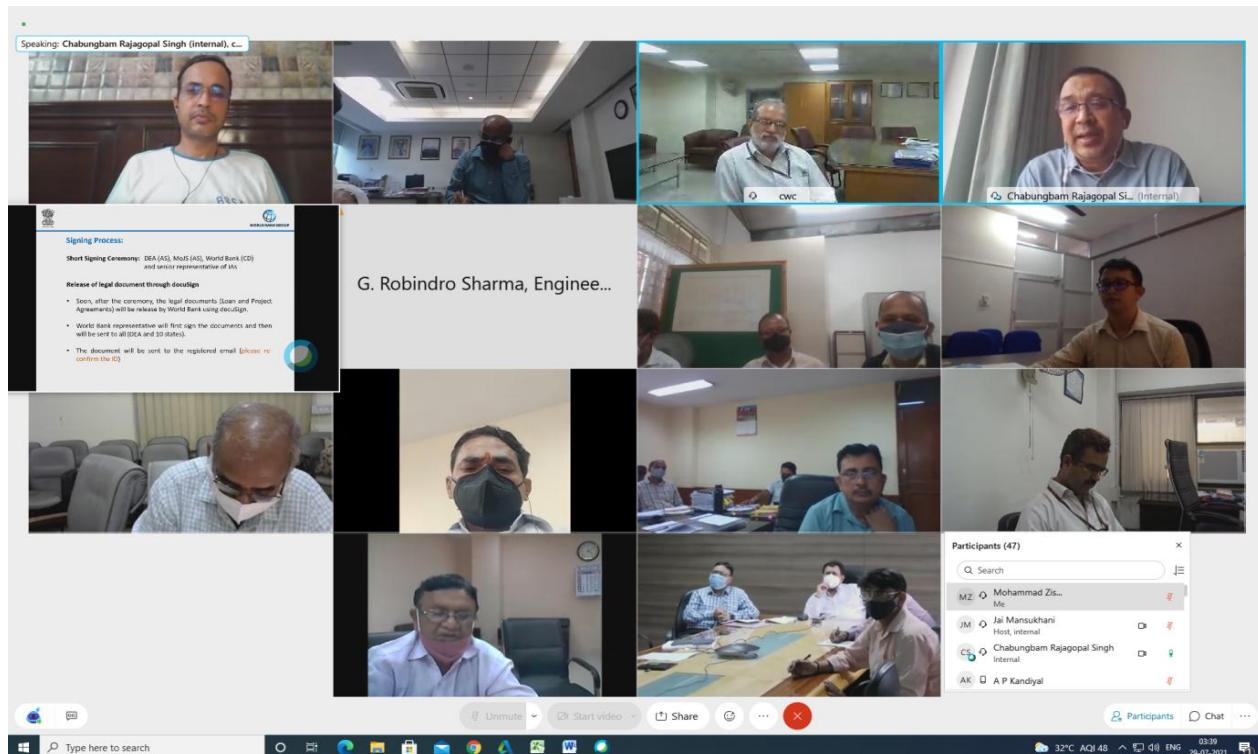
Review Meeting with NWR, WS & KD, Gujarat on June 29, 2021



Meeting with KSEB to review the progress under DRIP Phase II, 23rd June 2021

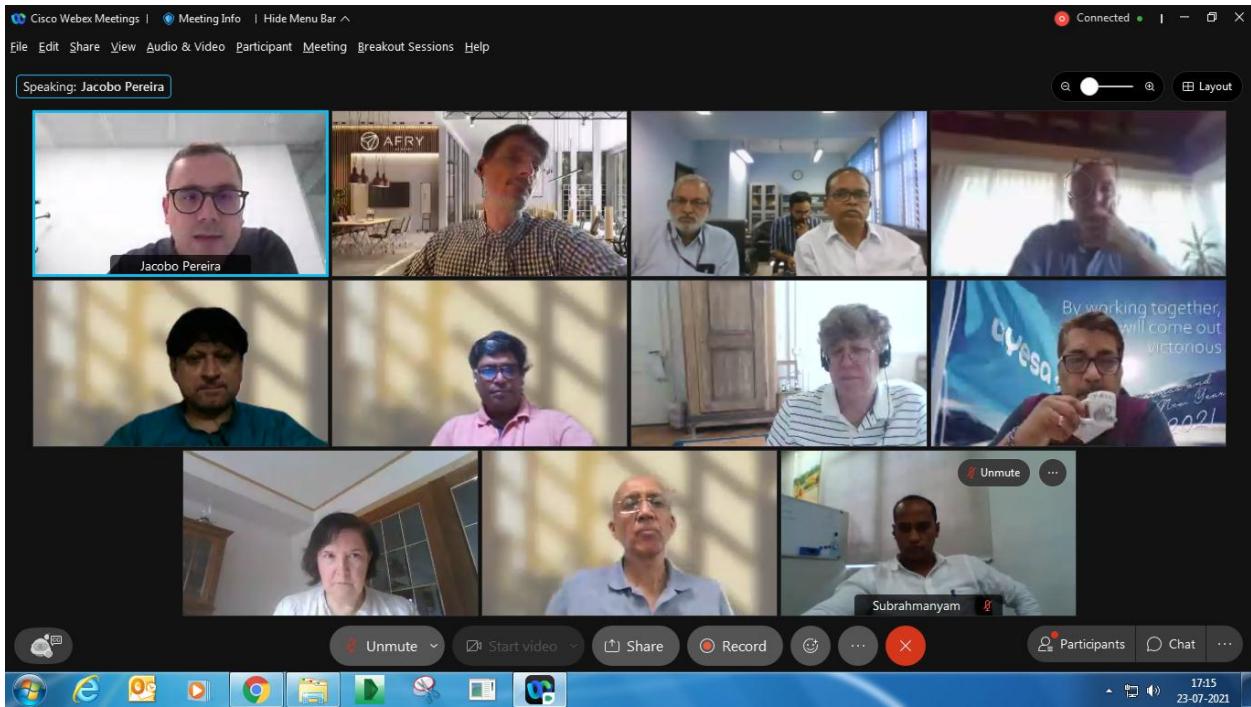
❖ Pre-loan signing meeting with IAs

A meeting was held virtually on July 29, 2021 to review the readiness of the partner agencies of DRIP Phase II for scheduled Loan Signing with World Bank on August 4, 2021. Loan Agreement will be signed by DEA and World Bank and Project Agreement will be signed by 10 partner States (Gujarat, Manipur, Meghalaya, Chhattisgarh, Madhya Pradesh, Rajasthan, Odisha, Kerala, Maharashtra and Tamil Nadu) with World Bank for a loan of US \$ 250 Million under DRIP Phase II. The meeting was attended by the officials of CWC, World Bank and DRIP Phase II Partner States.



❖ Pre proposal conference regarding RFP for Consultancy Services under DRIP Phase II and Phase III

A Pre-Proposal Conference regarding Request for Proposal (RFP) for hiring of EMC for CPMU under DRIP Phase II & Phase III was held virtually on July 23, 2021. During the meeting, the Short Listed Agencies were clarified on various queries regarding published revised RFP document. The meeting was attended by CPMU officials and representatives of shortlisted agencies.



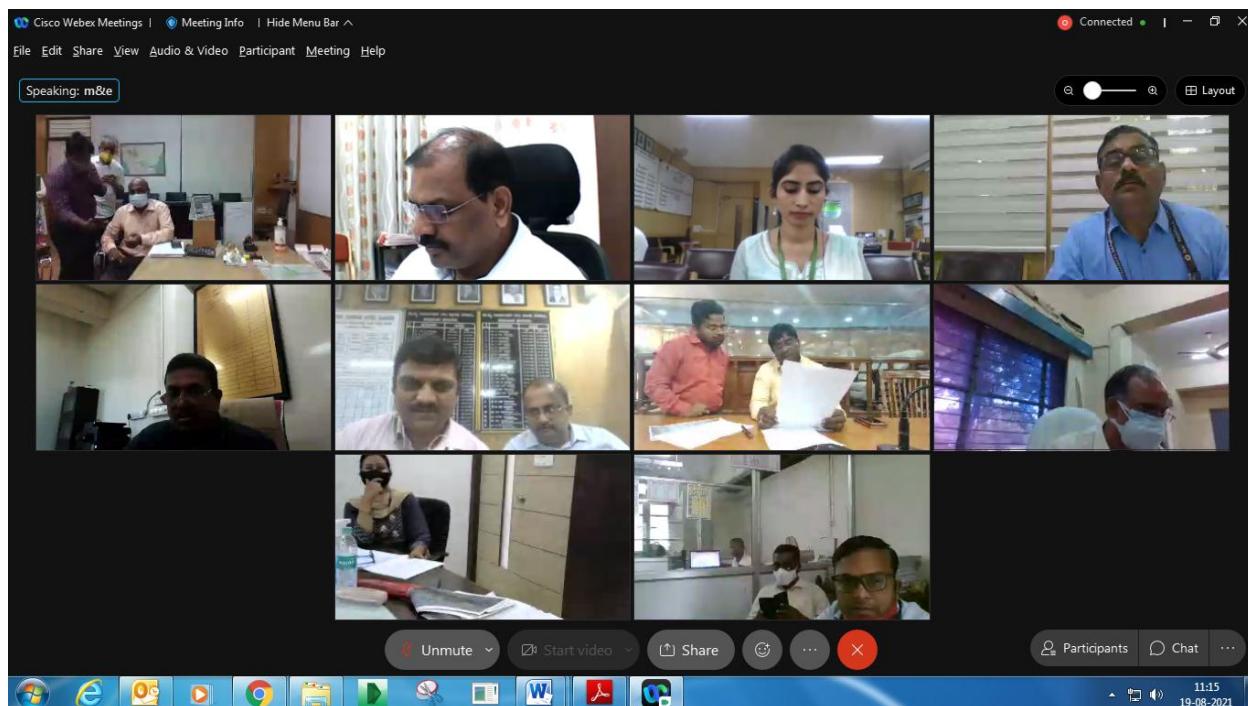
❖ Loan Signing with World Bank for DRIP Phase II

Loan signing ceremony with World Bank for loan amounting US \$ 250 Million was held on August 04, 2021. Loan Agreement was signed by DEA and World Bank and Project Agreement was signed by 10 partner States (Gujarat, Manipur, Meghalaya, Chhattisgarh, Madhya Pradesh, Rajasthan, Odisha, Kerala, Maharashtra and Tamil Nadu) with World Bank. Ministry of Jal Shakti was represented by Smt. Debashree Mukherjee, Additional secretary, DOWR, RD & GR, World Bank by Sh. Junaid Kamal Ahmad, Country Director, World Bank and DEA by Sh. Rajat Kumar Mishra, Additional secretary, Ministry of Finance.



❖ **Stakeholder Consultation Meeting for the implementation of published EAP for Hidkal dam of Karnataka WRD on August 19, 2021.**

Stakeholder Consultation Meeting to disseminate the published Emergency Action Plan (EAP) for Hidkal dams of Karnataka WRD, as a part of implementation requirement was held virtually on August 19. This program is a part of risk mitigation strategy to communicate the associated risks to all stakeholders. The meeting was attended by officials of CWC, NDMA, SDMA, IMD, NRSC, GSI, All India Radio, District Authorities and villages in the downstream of the dam. Under DRIP, EAPs have been published for 207 no. of dams and Stakeholder Consultation Meetings have been conducted for 102 no. of dams.



❖ **Joint Review meeting with Karnataka WRD, August 26-27, 2021**

A Joint Meeting was held on August 26, 2021 at Bengaluru, Karnataka to review the project readiness criteria of Karnataka WRD for DRIP Phase II, followed by a field visit to KRS dam for inspecting the works being carried under DRIP. The central team was headed by Smt. Debashree Mukherjee, Additional Secretary, DoWR RD & GR and Karnataka was represented by Sh. Rakesh Singh, Additional Chief Secretary, WRD, Govt. of Karnataka.



❖ **Training cum Workshop on 'Procurement Management under externally aided Scheme DRIP Phase II**

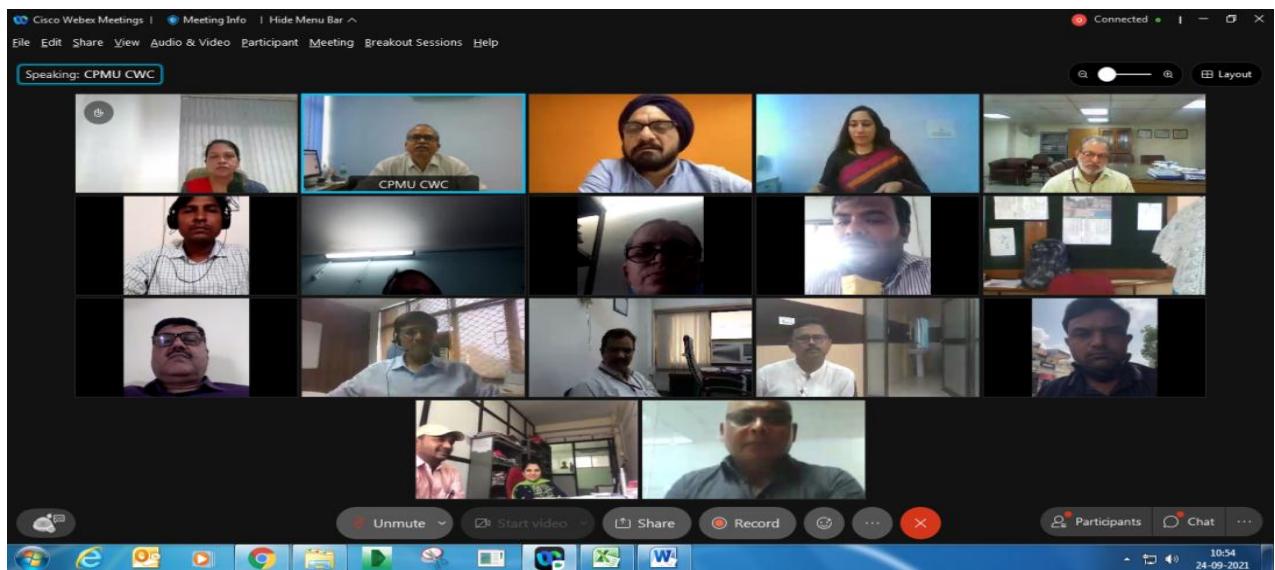
As a part of Dam Safety Institutional Strengthening component of DRIP Phase II, Central Project Management Unit (CPMU) organised 2 day training cum workshop programme on "**Procurement Management under DRIP-2**" in two batches for 17 States during **September 20-21 and 27-28, 2021**. CPMU and World Bank experts delivered lectures on various aspects of procurement covering various topics inter-alia Procurement Regulations of World Bank, Project Procurement Strategy for Development (PPSD), Procurement Management Manual, Standard Bidding Document and its important provisions, Technical Specifications, DRIP Phase I experience and challenges. The programme combined lectures, case studies and interactive sessions.



❖ Training Cum Workshop on Environmental and Social Safeguards under DRIP Phase-II

Training Cum Workshop on **Environmental and Social Safeguards** was organised by CPMU for DRIP Phase II Implementing Agencies in three batches during September 24-25, October 11-12 and October 4-5, 2021. CPMU and World Bank experts deliberated upon various topics of Environment and Social (E&S) Safeguards including Environment and Social Management Framework (ESMF), Environment and Social Commitment Plan (ESCP), Stakeholder Engagement Framework (SEF) and two dam specific documents viz Environment and Social Due Diligence (ESDD) and Environment and Social Management Plan (ESMP). The workshop saw an active

participation of almost 470 participants from various states. The programme combined lectures, case studies and interactive sessions.



❖ **Training cum Workshop on “Financial Management” under externally aided Scheme DRIP Phase II**

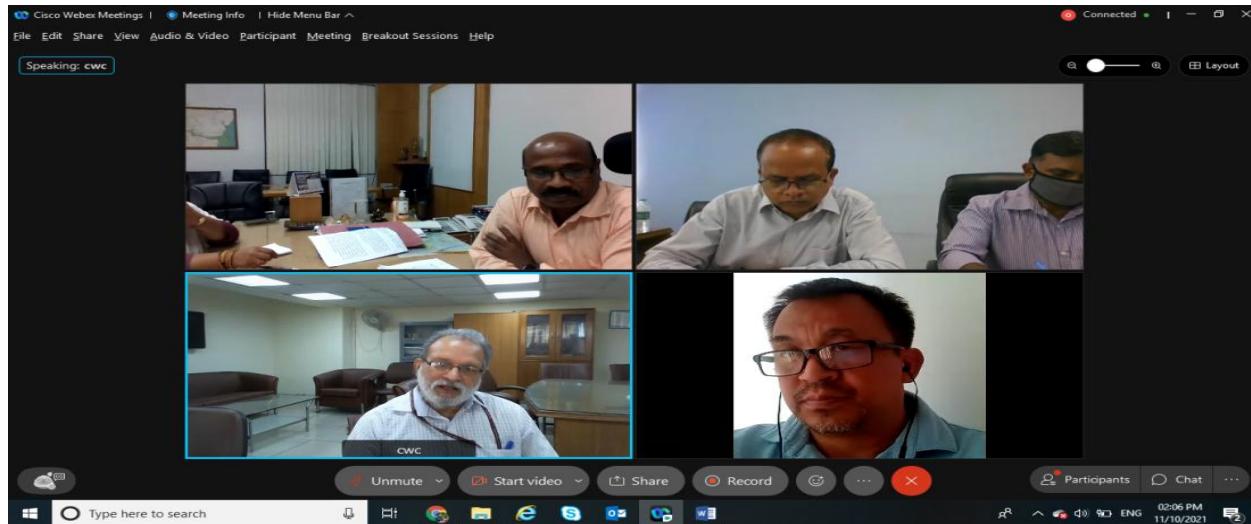
Training Cum Workshop on **Financial Management** was organised by CPMU for DRIP Phase II Implementing Agencies in two batches on October 25, 2021 and November 01, 2021. CPMU deliberated upon various topics of “Financial Management” inter alia Booking of Expenditure, Preparation of IUFR, Maintenance of Physical and Financial Status, Inspection of existing Cash Book and methods of reporting etc. The workshop

saw an active participation of almost 250 participants from various states.



❖ **Meeting to review the progress of Karnataka WRD under DRIP Phase II, October 11, 2021**

A meeting to review the progress of Karnataka WRD under DRIP Phase II was held on October 11, 2021. During the meeting, Karnataka WRD was requested to expedite the tendering and award of contracts amounting Rs. 225 Cr to fulfil the readiness criteria of DEA for joining the Scheme. The meeting was attended by officials of World Bank, CPMU and Karnataka WRD.



❖ **Training on Operation and Maintenance aspects regarding Hydro-Mechanical and Control System Issues in Dams, Nov 22-26, 2021**

Training on “Operation and Maintenance aspects regarding Hydro-Mechanical and Control System Issues in Dams” was organized by CPMU in collaboration with Hydro Exploitation SA, Switzerland during November 22-26, 2021 at New Delhi. The training comprised of lectures, hands on trainings, case studies, field visit to Narora barrage of Uttar Pradesh and interactive sessions. The training was attended by officials from CWC, World Bank, State of Rajasthan, Karnataka, Manipur and Meghalaya.



❖ **Inspection of Hydraulic Model of Maneri dam at IRI, Roorkee**

CPMU officials carried out an inspection visit on November 18, 2021 at Irrigation Research Institute (IRI), Roorkee to inspect the hydraulic model of Maneri dam, UJVNL developed by IRI and to discuss its model study report along with the officials from Uttarakhand Jal Vidyut Nigam Ltd. (UJVNL). During the inspection, certain modifications were suggested to carry out the model study.



❖ World Bank Review Mission for DRIP Phase II

World Bank Review Mission for DRIP Phase II was held in hybrid mode with eleven (11) Implementing Agencies during November 30 – December 21, 2021, followed by a Wrap-up meeting on December 22, 2021 at New Delhi under the Chairmanship of Smt. Debashree Mukherjee, Additional Secretary, DOWR, RD & GR. During these meetings, States were sensitized about Project Implementation requirements and other important aspects related to procurement, finance, social and environment. Discussion was held with each agency regarding implementation of project including physical & financial progress, dam safety inspections, design flood review, procurement status and issues and timeline for remaining activities. In respect of Implementing Agencies from State of Meghalaya, Manipur, Gujarat, Odisha, Uttarakhand, Rajasthan, Kerala, the mission was held physically at Delhi. However, for the State of Chhattisgarh, Karnataka, Maharashtra and West Bengal, the review mission was held in their respective States. The Review Meetings were attended by official of World Bank, CWC and Implementing Agencies.



❖ **Review Meeting with MePGCL under DRIP Phase II, January 07, 2022**

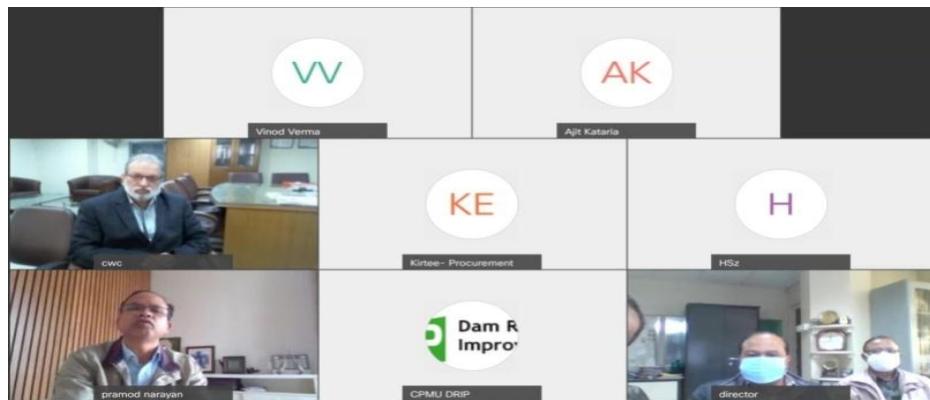
A joint review meeting with Meghalaya Power Generation Corporation Limited (MePGCL) was held on January 07, 2022 to discuss the way forward for re-floating of two (2) tenders under DRIP Phase II and III. The meeting was attended by CPMU officials led by Sh. Gulshan Raj, CE DSO and MePGCL officials led by Sh. M. Shangliang, Director, Generation, MePGCL.

❖ **Presentation by World Bank on Dam Safety Institutional Structure and Financing, January 13, 2022**

A workshop on "Dam Safety Institutional Structure and Financing" was conducted by World Bank on January 13, 2022. Brief presentation was given by World Bank, covering topics including Dam Safety Act 2021 and Institutional Arrangements, Prioritization of dam portfolio for effective management, Centres of Excellence Network on Dam Safety, Financing Dam Safety – National Dam Safety Fund and support from the World Bank for effective dam safety management in India. The workshop was attended by Mrs. Debashree Mukherjee, Additional Secretary, DoWR RD & GR and Dr. R K Gupta, Member (D&R), CWC along with other officials of DSO, CWC.

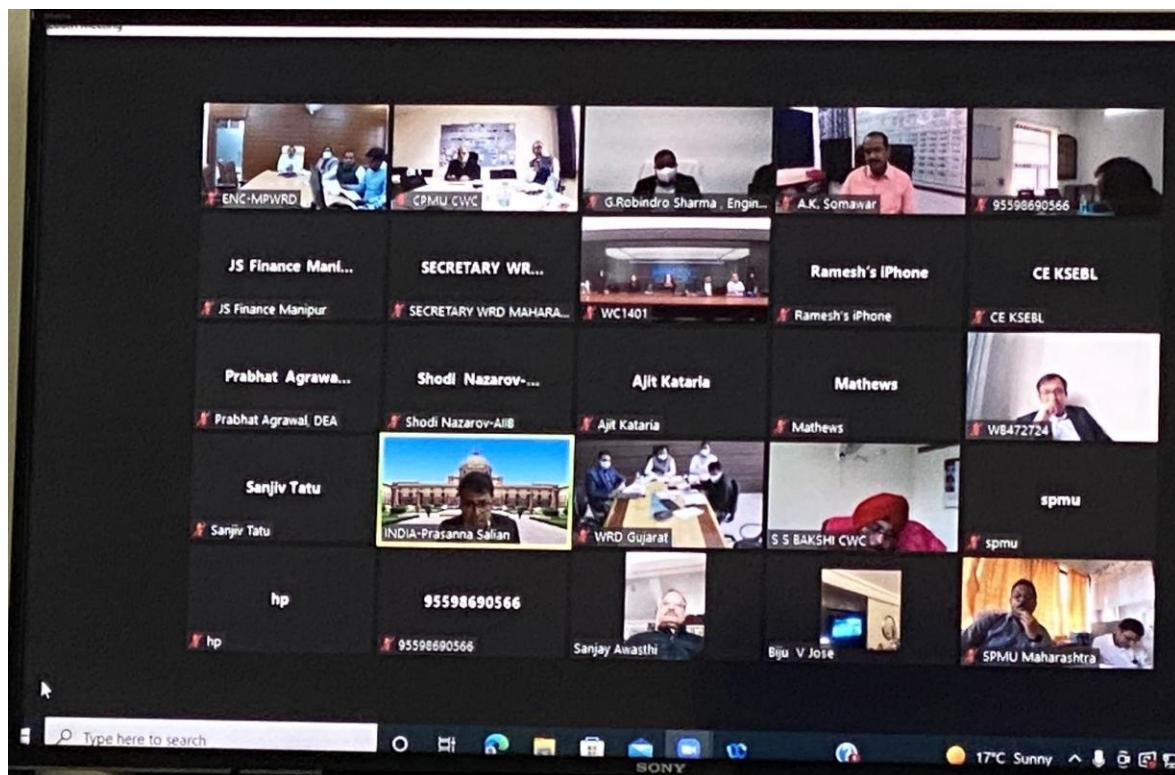
❖ **Meeting to discuss Integrated Reservoir Operation for a basin in Kerala, January 31, 2022**

A meeting to provide technical support for developing an Integrated Reservoir Operation in the state of Kerala was held on January 31, 2022. Chalakudy Basin in the State of Kerala was selected to carry out this study. The meeting was attended by officials of World Bank, CWC, Japan Water Agency, International Centre for Water Hazard and Risk Management (ICHARM), Kerala WRD and Kerala State Electricity Board.



❖ Loan Negotiation meeting with AIIB, February 17, 2022

A Loan Negotiation Meeting was held on February 17, 2022 for the loan of US \$ 250 Million from Asian Infrastructure Investment Bank (AIIB) for co-financing DRIP Phase II. The meeting was attended by representatives of the AIIB, World Bank, DEA, Ministry of Jal Shakti, CWC, the State of Chhattisgarh, Gujarat, Kerala, Madhya Pradesh, Maharashtra, Manipur, Meghalaya, Odisha, Rajasthan, and Tamil Nadu. All important terms and conditions of loan were deliberated and other documents were negotiated and finalised.



❖ **Meeting with IIT Roorkee regarding Centre of Excellence for Dams, February 08, 2022**

A virtual meeting was held on February 08, 2022 to discuss draft tripartite MoU between Irrigation Research Institute (IRI), Govt. of Uttarakhand, Roorkee, IIT Roorkee and CWC regarding utilization of the physical modeling facilities of IRI Roorkee at Bahadrabad by IIT Roorkee under the aegis of Centre of Excellence for Dams proposed to be started at IIT Roorkee under DRIP-II. Team of IRI, Roorkee lead by Sh. S.K.Saha, SE, IRI, delegation of IIT Roorkee led by Sh. N. K. Goel, Prof., IIT Roorkee and delegation of CPMU led by Sh. Gulshan Raj, CE, DSO participated in the meeting. CPMU clarified its view point on various provisions of draft MoU shared by IRI Roorkee. It was decided that IIT Roorkee and IRI Roorkee will jointly sit together and prepare mutually agreed draft which then could be shared with CPMU for further discussion and finalization. Draft proposal on CoE by IIT Roorkee was also discussed in the meeting and it was requested that IIT Roorkee may revise the draft in line with the suggestions given in the meeting.

❖ **Meeting with IISc Bangalore regarding Centre of Excellence in Dam Engineering, February 18, 2022**

CPMU, DRIP-II, CWC held a virtual meeting with IISc on February 18, 2022 to identify and discuss possible broad research areas for "Centre of Excellence in Dam Engineering" proposed to be started under DRIP-II in IISc. IISc delegation led by Sh. Ananth Ramaswami, Chair, Dept. of Civil Engg and CPMU delegation led by Sh. Gulshan Raj, CE, DSO participated in the meeting. CPMU suggested certain emerging research areas related to seismic hazard analysis, sedimentation management, risk analysis etc. for consideration. IISc agreed to formulate a draft proposal of CoE based on the discussions held in the meeting.

❖ **Construction Site visit to kuttiyadi dam and Karapuzha dam of Kerala WRD**

Construction Supervision and Quality Assurance (CS&QA) visit was carried out during March 25-26, 2022, to inspect the rehabilitation activities carried out under DRIP Phase II at Kuttiyadi dam and Karapuzha dam. Recommendations were given by the CWC team on quality control and various bottlenecks of the project. The Inspection visit was undertaken by the CWC officials led by Chief Engineer, DSO along with officials from Kerala WRD, Independent Experts and representatives of concerned contractor.



Inspection Visit on March 26, 2022 at Karapuzha dam

5.4.7 National Committee on Seismic Design Parameters

The National Committee on Seismic Design Parameters (NCSDP) was constituted by 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.

During 2021-2022, No meeting of NCSDP has been held. During 2021-2022 Technical Evaluation of 18 Site specific seismicity report appraised in FE&SA Directorate which are as follows: -

1. Bhadbhut project, Gujarat Last Observation Issued on 20-10-2021
2. Dhulasti Stage-II, J&K Observation Issued on 10/08/2021
3. Uri-I Stage-II, J&K Observation Issued on 10/08/2021
4. Ukai Project, Gujarat Observation Issued on 16/12/2021

5. Khudia Project, Jharkhand Last Observation Issued on 29/06/2021
6. Jamunia Project, Jharkhand Last Observation Issued on 29/06/2021
7. Kirthai-II HEP, J&K Observation Issued on 17/01/2022
8. Rukni Project, Assam Observation Issued on 23/12/2021
9. Sonai Project, Assam Observation Issued on 17/12/2021
10. Lower Arun HEP, Nepal Observation Issued on 27/07/2021
11. Panam Project, Gujarat Observation Issued on 03/03/2022
12. Hir Project, Gujarat Observation Issued on 07/03/2022
13. Dharoi Project, Gujarat Observation Issued on 07/03/2022
14. Mach Project, Gujarat Observation Issued on 03/03/2022
15. Saundatti PSP Project, Karnataka Observation Issued on 30/03/2022
16. Shetrunji Dam, Gujarat Observation Issued on 03/01/2022
17. Mawblei project, Meghalaya Observation Issued on 30/03/2022
18. Kadana Dam, Gujarat Observation Issued on 03/01/2022

5.4.8 Technical Examination of Projects for Seismic and Foundation Aspects

During 2021-22, Detailed Project Reports of 21 nos. of river valley projects of various states were dealt, which are as follows:-

S.No	Name of the Project	Date of Observation/ Recieved	Status
1.	Anjaw HEP (270MW), Arunachal Pradesh	15.04.2021	Observation Issued
2.	Upper Sileru Pumped Storage Project (9 x150 MW), Andhra Pradesh	31.05.2021	Compliance awaited

S.No	Name of the Project	Date of Observation/ Received	Status
3.	Demwe Upper Stage-I HEP ,Arunachal Pradesh	28.07.2021	Compliance awaited
4.	MP 30 Gandhi Sagar Pumped Storage Project (1440MW), Madhya Pradesh	06.08.2021	Observation Issued
5.	Dulhasti Stage-II (258 MW) HE Project,J&K	14.09.2021	Observation Issued
6.	Uri-I Stage-II (240 MW) HE Project,J&K	14.09.2021	Observation Issued
7.	Warasgaon Pumped Storage Project (4x300MW), Maharashtra	14.09.2021	Compliance awaited
8.	Sach Khas Hydro Electric Project, Himachal Pradesh	07.03.2022	Compliance awaited
9.	Somasila PSP (4x225 MW), Andhra Pradesh	22.02.2022	Comments issued shortly
10.	Owk PSP (4x200 MW), Andhra Pradesh	21.03.2022	Comments issued shortly
11.	Gandikota PSP (4x250 MW), Andhra Pradesh	02.11.2021	Compliance awaited
12.	Kurukutti PSP (5x240 MW), Andhra Pradesh	23.02.2022	Compliance awaited
13.	Karrivalasa PSP (4x250 MW), Andhra Pradesh	23.02.2022	Observation Issued
14.	Yerravaram PSP (4x300 MW), Andhra Pradesh	07.03.2022	Compliance awaited
15.	Chitravathi PSP (2x250 MW), Andhra Pradesh	08.11.2021	Compliance awaited
16.	Niare HEP (770 MW + 90 MW), Arunachal Pradesh	24.02.2022	Compliance awaited
17.	Lower Arun HE Project (669MW), Nepal	28.02.2022	Compliance awaited
18.	REOLI DUGLI Hydro-Electric Project, Himachal Pradesh	01.04.2022	Compliance awaited
19.	Rukni Irrigation Project, Assam	11.11.2021	Compliance awaited
20.	Sonai Irrigation Project, Assam	25.11.2021	Compliance awaited
21.	Dagmara Multipurpose Project, Bihar	16.07.2021	Compliance awaited

5.4.9 Special Studies

CWC 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 2021-2022, Dam Break Analysis of Lower Wunna (Wadgaon) Project (Maharashtra), Upper Wardha Project (Maharashtra) and Mullaperiyar Dam (Kerala) have been carried out and report has also been shared with respective dam owning authorities.

Glacial Lake Outburst Flood (GLOF) study of Dagmara Project (Bihar), Dulhasti Stage-II HEP (Jammu & Kashmir), Bajoli Holi HEP (Himachal Pradesh) and Sirkari Bhyol Rupsiabagar HEP (Uttarakhand) has been carried out, while the observations for GLOF study of Tandi HEP (Himachal Pradesh), Rashil HEP (Himachal Pradesh), Bardang HEP (Himachal Pradesh), Reoli Dugli HEP (Himachal Pradesh), Purthi HEP (Himachal Pradesh) and Sach Khas HEP (Himachal Pradesh) have been issued with the respective project authorities.

Reservoir routing of Maniyari Dam (Chhattisgarh) has been carried out and the report shared with the concerned project authority.

5.4.10 Consultancy Services on Instrumentation in Hydraulic Structures

- Construction Stage Projects**

- 1. Polavaram Project**

The 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 is envisaging 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:

- Earth dam in Gap I on left bank of river.
- Earth cum rock fill dam in Gap II located in main flow channel of Godavari River.
- Concrete dam in Gap III located on right bank.
- Spillway located on right bank along with connecting approach channel and spill channel.

Central Water Commission has been entrusted with the works of vetting of the designs & drawings of the Polavaram Irrigation Project submitted by the Project Authority. Instrumentation drawings for concrete Dam in Gap-III (Dam Section at Block no 4 - Instrumentation Block) have been submitted for examination. The same was examined and comments/observations were communicated to project authorities. On receipt of compliance report from the project authority, the Instrumentation drawings were cleared.

2. Punatsangchhu-II H.E. Project, Bhutan

The Punatsangchhu-II H.E. Project envisages construction of 86 m high concrete gravity dam with an installed capacity of 1020 MW. The dam is located 29 km downstream of the Wangdue Bridge and 3 km downstream of TRT outfall of PHEP-I on Wangdue Tshirang National Highway. The dam comprises of seven sluice blocks and five non-overflow blocks. The length of the dam is 213.00m. 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. The gross storage capacity of the reservoir formed by dam construction is 7.0 MCM and the live storage capacity is 4.64 MCM. Instrumentation drawing has been submitted for vetting which has been examined and cleared.

3. Isarda Dam Project in Tonk District ,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 Sawai madhopur 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 services for vetting of design/drawings for Isarda Dam. Instrumentation Drawing for OF & NOF Section submitted by the project authorities has been vetted and issued.

4. Polavaram Irrigation Project Andhra Pradesh

The 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 is envisaging 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:

- a) Earth dam in Gap I on left bank of river.
- b) Earth cum rock fill dam in Gap II located in main flow channel of Godavari River.
- c) Concrete dam in Gap III located on right bank.
- d) Spillway located on right bank along with connecting approach channel and spill channel.

CWC is providing consultancy services for vetting of design/drawings for Polavaram Project. Instrumentation Drawing for Gap-III dam Section submitted by the project authorities has been vetted and issued.

- **DPR Stage Projects**

- i. **Dugar H.E. Project, Himachal Pradesh**

Dugar hydroelectric project (500 MW), a run of the river scheme is located on Chenab river in Luj village, Pangi Tehsil in Chamba District of Himachal Pradesh between the Sach khas HEP (267 MW) at its upstream and the Kirthai-I HEP (390 MW) at downstream. It comprises of 128 m high concrete gravity dam (from deepest foundation level) with FRL at El 2114.00 m and Minimum Draw Down Level (MDDL) at El 2102.35 m.

The DPR has been examined w.r.t instrumentation aspects and the comments/observations on the same were communicated to project authorities. On receipt of the compliance to the observations, the DPR of the aforesaid project has been cleared w.r.t Instrumentation aspects.

- ii. **Pinnapuram Standalone Pumped Storage Project (1200 MW), A.P**

This project conceived as the World's First & Largest Gigawatt Scale integrated project with solar, wind and pumped storage components that can supply Schedulable Power On Demand (SPOD) which is Dispatchable & Schedulable Renewable Energy for the first time to consumers across India.

Presently, Government of Andhra Pradesh (GoAP) has approved the project with 1000 MW Solar, 550 MW Wind & 1200 MW of Standalone Pumped Storage capacities to be developed initially with possibility to enhance capacities in subsequent stages to 3000 MW Solar, 2000 MW Wind & 2400 MW Standalone Pumped Storage depending on technical feasibility, site suitability and associated requirements and demand from various State DISCOMs/STUs and other consumers. GoAP has also allocated 1 TMC of water for establishing the 1200 MW Pumped Storage component storage capacity initially and process has been initiated to increase the allocation to 1.3 TMC for facilitating 10 hour storage capacity.

The DPR has been examined w.r.t instrumentation aspects and the comments/observations on the same were communicated to project authorities. On receipt of the compliance to the observations, the DPR of the aforesaid project has been cleared w.r.t Instrumentation aspects.

iii. Rukni Irrigation Project, Assam

Rukni Irrigation Project is across the river Rukni near Kulicherra Village in Cachar District of Assam envisages construction of a gated barrage and canals. The barrage has been designed for 100 year return period flood discharge of 1701 cumec. The length of envisaged barrage is 102.00 m with a height of 10.00 m above river bed level up to top of pier.

This project envisages irrigating a Culturable Command Area of 17566 Ha lying on both the banks. Two lined canals viz. 48.725 km left bank canal and 21.428 km right bank canal have been proposed to take off from the pondage of the barrage.

The DPR has been examined w.r.t instrumentation aspects and the comments/observations on the same were communicated to project authorities for compliance. The Compliance is awaited from the Project authorities.

iv. Sonai Irrigation Project, Assam

Sonai Irrigation Project is across the river Sonai near Kashithal Village in Cachar District of Assam envisages construction of a gated Barrage and Canals. The barrage has been designed for 100 year return period flood discharge of 3779 cumec. The length of envisaged barrage is 170.00m with a height of 10.00m above river bed level up to top of pier. The barrage is proposed to be constructed in two units, each having five bays of 15 m width.

This project envisages irrigating a Culturable Command Area of 10850 Ha lying on both the banks. Two lined main canals viz. 18.85 km left bank canal and 27.32 km right bank canal have been proposed to take off from the pondage of the barrage.

The DPR has been examined w.r.t instrumentation aspects and the comments/observations on the same were communicated to project authorities for compliance. The Compliance is awaited from the project authorities.

V. Transfer of Rajasthan's share in Yamuna water from Tajewala head Haryana to Rajasthan and its Utilization in Jhunjhunu and Churu District of Rajasthan.

This project has been proposed in two phases. In Phase-I, on priority basis, the DPR comprises of works for transfer of water from Tajewala (Hathnikund) to Rajasthan, its storage in a Raw Water Reservoir (RWR) within Rajasthan boundary and utilization of

it by PHED for drinking water schemes. The conveyance system in Phase-I will cater for conveyance of 348 MCM for drinking water. To carry ultimate quantity of 577 MCM of water in a year in Phase-II, a set of underground pipelines has been proposed. This flow can be achieved with a set of 6 Nos. of pipelines with pumping at Hathnikund Head. The distance from Tajewala (Hathnikund) to Raw Water Reservoir (RWR) in Rajasthan is about 263.5 Km.

In the submitted DPR, the Supervisory Control and Data Acquisition (SCADA) is proposed for effective control and monitoring of the system during operation and maintenance period (O&M). Further a reservoir has also been proposed at Rajgarh block in Churu District of Rajasthan. Project Authorities have been requested to incorporate the instrumentation details for earthen embankment reservoir in the DPR.

vi. Revised DPR of Transfer of Rajasthan share of Yamuna Water at Tajewala Headworks to Churu and Jhunjhunu districts of Rajasthan by Underground Conveyance System (Rajasthan)

It envisages transfer of water from Tajewala (Hathnikund) to Rajasthan, its storage in a Raw Water Reservoir (RWR) within Rajasthan boundary in Phase-I and utilization of it by PHED for drinking water schemes. In Phase-II, water will also be available for irrigation. Total allocated quantity of water, i.e., 577 MCM will be distributed in drinking water and irrigation sectors.

In revised DPR, instrumentation being proposed is for automation and introduction of SCADA system. The same has been examined and cleared w.r.t instrumentation aspects.

vii. Lower Arun HE Project (669 MW), Nepal

This Project have been planned and designed to receive and conduct 344.68 cumecs of water from tail race outfall of Arun-3 HE Project. The project will generate 669 MW in a surface power house utilizing a gross head of 229.44 m. The main works of the project envisage a gated intake structure for diverting 344.68 cumecs of flow emerging from Tail Race of Arun-3 Hydroelectric Project located on the left bank of river Arun at Diding. The water after entering Lower Arun Intake structure, flows through a 10.50 m diameter horse shoe shaped 17.3 km long Head Race Tunnel, lying on the left bank terminating into a 117.50 m deep, 30 m diameter open to sky Surge Shaft. Downstream of surge shaft, the water next flows into two steel lined pressure shafts. Each pressure

shaft further bifurcates into two branch penstocks, near the power house to feed four generating units of surface power house.

The DPR has been examined and cleared with respect to Instrumentation aspects.

viii. Rukni Irrigation Project, Assam

The proposed Rukni Irrigation Project across the river Rukni near Kulicherra Village in Cachar District of Assam envisages construction of a gated barrage and canals. The Rukni River is a principal tributary of river Sonai which joins Barak river, which is one of the major rivers in Southern Assam. The barrage has been designed for 100 year return period flood discharge of 1701 cumec. After considering the elevation of command area to be served head losses till command area etc., NEID-I, CWC, Silchar, has recommended to keep the pond level at EL 33.50m. The Same pond level of EL 33.50 m has been adopted for design. It envisages irrigating a Culturable Command Area of 17566 Ha lying on both the banks. The length of envisaged barrage is 102.00 m with a height of 10.00 m above river bed level up to top of pier.

The DPR has been prepared by CWC. Instrumentation Chapter along with instrumentation drawings have been prepared by Instrumentation Directorate and submitted to project authorities.

ix. Sonai Irrigation Project, Assam

The proposed Sonai Irrigation Project is situated across the river Sonai near Kashital Village in Cachar District of Assam envisages construction of a gated Barrage and Canals. The Sonai River is a tributary of river Barak, which is one of the major rivers in Southern Assam. The barrage has been designed for 100 year return period flood discharge of 3779 cumec. Two lined main canals viz. 18.85 km left bank canal and 27.32 km right bank canal have been proposed to take off from the pondage of the barrage. This project envisages irrigating a Gross Command Area of 13,563 Ha lying on both the banks. The length of envisaged barrage is 170.00m with a height of 13.70 m above river bed level up to top of pier.

The DPR has been prepared by CWC. Instrumentation Chapter along with instrumentation drawings have been prepared by Instrumentation Directorate and submitted to project authorities.

X. Dagmara H.E. Project, Bihar

The project envisages construction of a concrete barrage and earthen dam across Kosi River. It is Run of the River scheme project. In this Surface Power house having total installed capacity 130.10 MW is proposed. The FRL of barrage is at El. 65.50 m. The length of envisaged barrage is 753.0 m. The barrage has been proposed with 36 nos. of spillway/under sluice gates and 1 fish pass. 23900 cumecs design flood discharge has been considered in this study as per approval from CWC. The submergence area, which generally remains submerged during monsoon even without the proposed project is confined within existing flood embankments on both banks. As such there is no new area which will come under submergence.

The DPR has been examined and cleared with respect to instrumentation aspects.

xi. Reoli Dugli H.E Project (456 MW) Himachal Pradesh

It is a run of the river type development proposed to harness the hydel potential of river Chenab. It has a live storage of 4.73MCM to utilize it for peaking during lean season. The project is located between the proposed Seli Hydro Electric Project in the upstream and the proposed Purthi Hydro Electric Project in the downstream in the district of Lahaul & Spiti. Height of the Dam above deepest foundation is 79m and Dam length at top is 143m.

The Project authority has been requested to submit the requisite compliance to the observations of Instrumentation Directorate.

5.4.11 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). CWC is represented by its officers of the rank of Chief Engineer and Director in the 17 Sectional Committees of WRDC and 13 Sectional Committees of CEDC. Foundation Engineering and Special Analysis (FE&SA) Directorate is the Nodal Directorate in CWC dealing with works of WRDC and 08 Sectional Committees of CEDC. Design Standards Dte. liaison with the BIS and representatives of CWC in the different Sectional Committees of WRDC and CEDC during the process of finalization of draft Standards and Amendment of IS codes.

During the 2021-22, 04 Nos. of draft standards/amendments to IS Codes have been approved by Chairman for adoption and printing, which are as follows: -

S.No.	Code	Subject
1.	IS 9451:1994	Guidelines for Lining of Canals in Expansive Soils Third Revision
2.	IS 9401(Part 19):2022	Method of Measurement of Works in River Valley Projects (Dams and Appurtenant Structures) Part 19 Electro Mechanical Works
3.	IS 2951:Part 2:1965	Recommendation for Estimation of Flow of Liquids in Closed Conduits: Part 2 head loss in valves and fittings
4.	IS 2951: Part 1: 1965	Recommendation for estimation of flow of liquids in closed conduits: Part 1 head loss in straight pipes due to frictional resistance

5.5 International Cooperation:

Expertise in Design helps D&R wing 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 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 / after 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 Geotextiles 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.

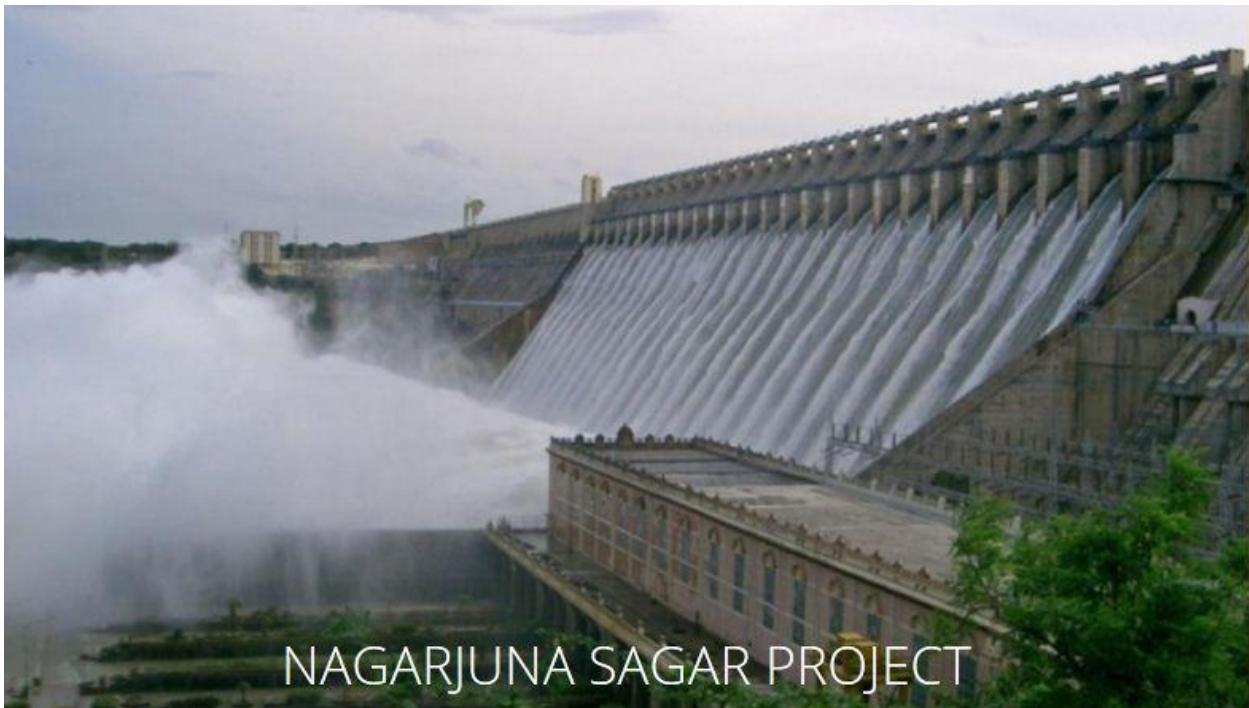
5.7.1 COORDINATION OF RESEARCH, DEVELOPMENT AND CAPACITY BUILDING ACTIVITIES

Under this head, following activities are noteworthy:

a. BIS Works

- i. BIS has formed a new Sectional Committee under the aegis of Water Resources Division Council as COASTAL WATER MANAGEMENT SECTIONAL COMMITTEE, WRD 28. Director, Coastal Management Directorate is the Principal Member and Director, Morphology & Climate Change Dte. is the alternate Member from CWC.

- ii. WRD 24: Environmental Assessment and Management of Water Resources Project - Director, Basin Planning-1 Dte. has been made an Alternate Member from CWC. Director, EM Dte. Is already a Principal Member.
- iii. Chief Engineer, HSO, CWC has been nominated as Committee Member for Chairman, Advisory Group ISO/TC 113/CAG.
- iv. WRD-22: Flood Management, Erosion Management and Diversion Works - Deputy Director, FM-1 Dte., CWC has been nominated as an Alternate Member from CWC. Director, FM-1 Dte. is already a Principal Member.
- v. CED 48: Rock Mechanics - Director, HCD (NW&S), CWC and Deputy Director, HCD (N&W), CWC has been made Principal and Alternate Members respectively.
- vi. WRD-8 titled "Foundations and Foundation Treatment" of BIS: Embankment (N&W) Directorate is the alternate member.
- vii. WRD-16 titled "Hydraulic Structures Instrumentation" of BIS: Embankment (N&W) Directorate is the alternate member.





CHAPTER-VI**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 2021-2022 (1st June, 2021 - 22nd April (till date), 2022), Central Water Commission (CWC) has added 10 more reservoirs under CWC monitoring. Thus presently, CWC is monitoring 140 reservoirs having live storage capacity of 175.957 BCM which is about 68.25% of the live storage capacity of 257.812 BCM estimated to have been created in the country. The status is given in Table 6.1.

Table 6.1
Storage Status of Current Year vis-a-vis Previous Year

Description	Water Year (1 st June -31 st May)			
	2020-21 (1 st June -31 st May)	2021-22 (1 st June -31 st May)		
Number of Reservoirs monitored (Nos)	130	140		
Total Designed live storage in BCM	174.233	175.957		
ACTUAL STORAGE	On June, 1 st (Start of Monsoon)	In BCM	57.993	52.288
		In % of Designed Live Storage	33.3	30
		In % of last 10 Years Avg. Live Storage	163	133
	On September, 30 th (End of Monsoon)	In BCM	150.234	139.885
		In % of Designed live Storage	86.2	79.50
		In % of last 10 Years Avg. live Storage	151	104

Weekly bulletin on storage status of important reservoirs of country was successfully issued during the Water Year 2021-22 regularly even during the lockdown period due

to COVID-19 pandemic crisis. 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 2020-21, CWC has issued advisory to 2 States namely Himachal Pradesh and Punjab for judicious use of available water.

6.2 Interaction with Ministry of Agriculture

Central Water Commission 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 130 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 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 are taken up, for which the works have been awarded and the survey works are in progress. In phase -II, 87 reservoirs across the country have been shortlisted and tender related works are under progress.

Publication of Compendium on Silting of Reservoirs in India

A Compendium on sedimentation of Reservoirs in India has been published 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 during 2021-22 are as under:

1. So far Remote Sensing Directorate has completed 179 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" has been floated for outsourcing. CWC also conducts in-

house sedimentation studies using Remote Sensing techniques. During 2021-22, sixteen in-house studies were taken up. The details of these are given in the table below:

In-house Reservoir Sedimentation Studies approved in year 2021-22	
Konar (Jharkhand)	Srisailam (Telangana)
Panchet Hill (Jharkhand)	Khadavsala (Maharashtra)
Tilaiya (Jharkhand)	Rengali (Odisha)
Dudhawa (Chhattisgarh)	Bhadar (Gujarat)
Balimela (Odisha)	Dhom (Maharashtra)
Harangi (Karnataka)	Tehri (Uttarakhand)
Sriram Sagar (AP)	Jhakam (Rajasthan)
Ukai (Gujarat)	Nagarjuna Sagar (TL & AP)

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 also can 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. 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 year time to complete.

6.4 Project Performance Evaluation

Performance Overview and Management Improvement Organization (PO&MIO), Central Water Commission has been undertaking Post Project Performance Evaluation and Water use Efficiency studies of completed major/medium irrigation 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 Major/ Medium Irrigation 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 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 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 studies.

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

Further, process has been initiated to carry out PES in respect of another 10 MMI projects during the period 2021-2026 by engaging WALMIs or other such institutes.

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 in irrigation sector is relatively low. Central Water Commission has undertaken water use efficiency

studies of 35 nos. completed major/medium irrigation 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 Water Use Efficiency into following broad components:

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

The studies showed that the overall average water use efficiency 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 Water Use Efficiency studies.

Further, process has been initiated to carry out WUE studies in respect of another 10 MMI projects during the period 2021-2026 by engaging WALMIs or other such institutes.

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 by 20%. 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 during 2021-22 which have been scrutinized and comments conveyed to NWM. 08 DFRs have been finalized and the remaining are under compilation which shall be soon available. In addition, meetings have been held with WALAMTARI, Hyderabad & NERIWALM, Tezpur to discuss and clarify on various aspects of the Studies in order to expedite the works.

6.4.4 Efficiency Studies under International Cooperation:

India- European Union Water Partnership (IEWP) - One of the priority areas 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 Phase-II has 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. Chief Engineer (POMIO), CWC has been nominated as the nodal officer from Indian Side for this particular pillar. A Joint Technical Working Committee headed by CE (POMIO) has been constituted to oversee the development of protocol.

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. Subernarekha Irrigation Project (Odisha) has been identified for carrying out this pilot study by Australian side. A steering committee under the Chairmanship of Member (WP&P) has been constituted for this particular study. 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.

6.4.4 Support for Irrigation Modernization Programme (SIMP)

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 the 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. 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. 3-4 MMI projects for preparation of Irrigation Modernization Plans (IMPs). The entire process including the preparation of IMPs, Detailed Project Report (DPRs), detailed designs and final implementation/ project execution is expected to be completed by Phase- 4. Total 57 nos. proposals have been received from 14 States/ 2 UTs for inclusion under SIMP. ADB has proposed its Technical Assistance (TA) grant funds for preparation of IMPs.

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.

SIMP Ph-I has been successfully implemented in collaboration with ADB which concluded in December'2021. Several meetings have been held with ADB/ Consultants' Team and concerned State Authorities along with Review Meetings taken by Member (WP&P) in order to identify the Batch-1 Projects to be taken up for Modernization. An ADB Mission for SIMP has also been launched with a kick-off meeting held on 18.02.22 under Chairman, CWC. Purpose of the Mission is to hold discussions with the identified State's WRDs, Finance Departments and senior officers from the Government of India including Secretary (WR, RD & GR) and Chairman, CWC. Mission meetings have been convened with Secretary (WRD), Rajasthan and senior officers from WRD, Maharashtra on 08.02.2022 and 09.02.2022 respectively.



CHAPTER-VII

APPRAISAL OF PROJECTS

7.1 Project Appraisal

One of the important activities assigned to Central Water Commission 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 1596 projects have been considered and accepted by the Advisory Committee of Ministry of Water Resources on Irrigation, Flood Control and Multipurpose projects till March 2022.

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/ Multipurpose Irrigation Projects

During the year 2021-22, 24 major/ multipurpose projects have been appraised up to 31st March 2022. Out of that, 05 major/ multipurpose projects have been accepted by the Advisory Committee of MoWR. A Pie chart showing state-wise distribution of major irrigation/ multipurpose projects under appraisal during 2021-22 is shown at Fig-7.1

7.3 Appraisal of Medium Irrigation Projects

During the year 2021-22, 15 medium irrigation projects have been appraised in field units of CWC. No medium project was considered by the Advisory Committee of MoWR 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.

State-wise Distribution of Major / Multipurpose Projects Appraised During the Year 2021-22

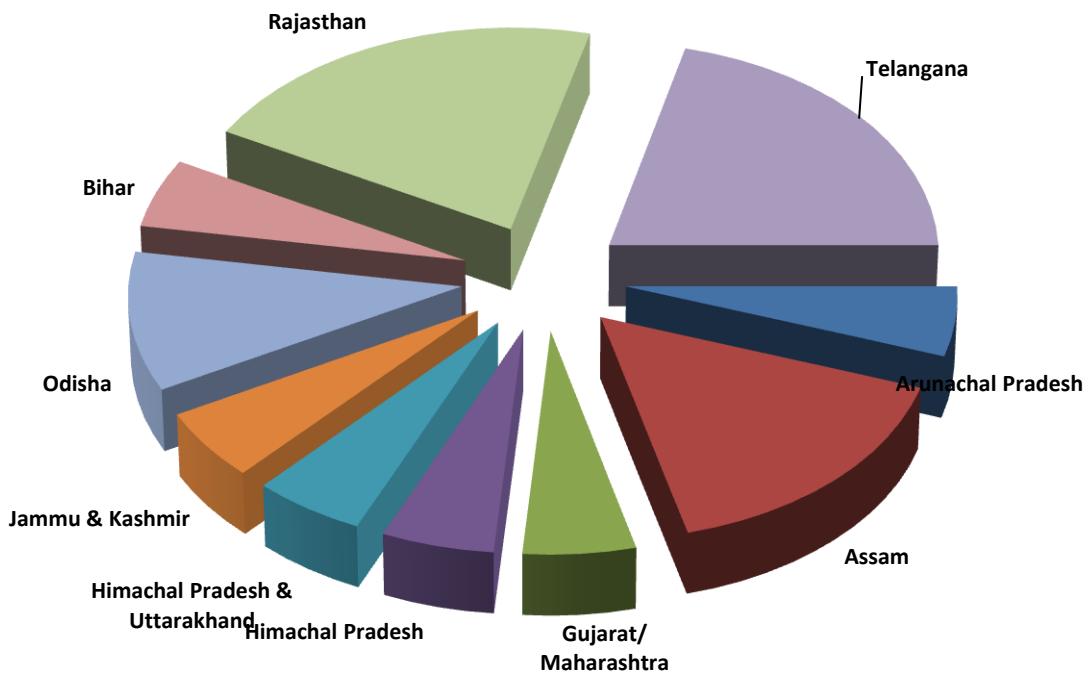


Fig. 7.1 State-wise distribution of major irrigation / multipurpose projects under appraisal during 2021-22

7.4 Meeting of the Advisory Committee

During year 2021-22, the Advisory Committee of DoWR, RD & GR, under the Chairmanship of Secretary (WR) accepted 6 projects comprising 05 Major & Medium Irrigation / Multipurpose projects and 1 Flood Control schemes in 2 meetings. The list of major & medium irrigation/ multipurpose projects and flood control schemes accepted by the Advisory Committee of DoWR is enclosed as **Annexure-7.1** and **Annexure-7.2** respectively.

The irrigation projects accepted during 2021-22 envisages annual irrigation benefits to about 3.2 Lakh hectares in 3 States of the country. The Flood Control Schemes accepted during 2021-22 envisages protection to a population of about 3650 persons & area of about 181.5 hectares in the 1 States of the country. Pie Chart showing State-wise distribution of 05 Nos. major & medium irrigation/ multipurpose projects accepted by the Advisory Committee during the current year is enclosed as **Fig. 7.2**.

**State-wise Distribution of Major/ Medium/ Multipurpose Projects
Accepted by the Advisory Committee of MoWR, RD&GR during the Year
2021-22**

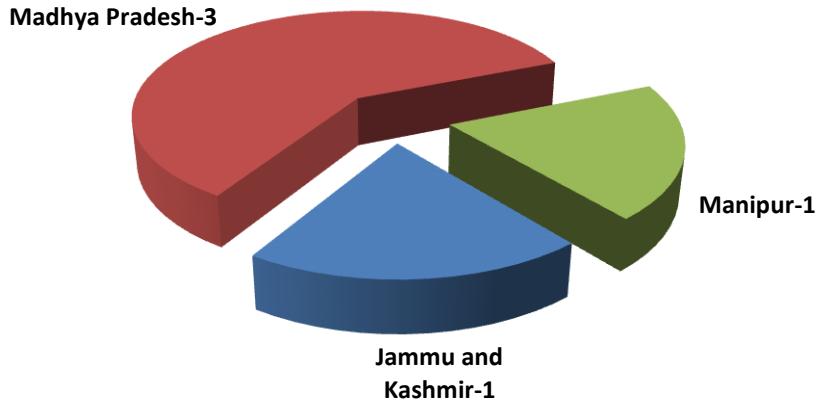


Fig. 7.2: State-wise Distribution of Major/ Medium/Multipurpose Projects Accepted by the Advisory Committee of MoWR, RD&GR during the Year 2021-22

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 02 (DPR-2 , RCE-0). Hydro-Electric Projects has been done in CWC during the period of 2021-22. Other aspects of Hydro-Electric Projects are appraised in Central Electricity Authority (CEA) and Techno-Economic Clearance (TEC) to the project is also accorded by CEA. During 2021-22, CEA has accorded TEC to 4 Nos. Hydro-Electric Projects having total installed capacity of 1976 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 list of projects is at Annexure 7.4.

Ministry of Water Resources had issued guidelines for implementation of scheme of National Projects in February 2009. Ministry of Water Resources had issued guidelines for implementation of scheme of National Projects in February 2009. Later, the Ministry had issued modification in the guidelines of the same on 28.09.2012. Recently, Department of Water Resources, River Development and Ganga Rejuvenation, Ministry of Jal Shakti vide letter dated 07.02.2022 issued

Guidelines for Pradhan Mantri Krishi Sinchayee Yojana -Accelerated Irrigation Benefit Programme (PMKSY-AIBP) and National Projects.

As per latest guidelines, the criteria for selection of National Projects are as under:

- a) International projects where usage of water in India is required by a treaty or where planning and early completion of the project is necessary in the interest of the country.

or

- b) Inter-State projects which are dragging on due to non-resolution of Inter-State issues relating to sharing of costs, rehabilitation, aspects of power production etc., including river interlinking projects.

or

- c) Inter-State projects with additional potential of more than 2.0 Lakh Ha and with no dispute regarding sharing of water and where hydrology is established.

or

- d) Extension, Renovation and Modernization (ERM) projects envisaging restoration of lost irrigation potential of 2.0 Lakh ha or more subject to:

- i. Command Area Development and Water Management (CAD&WM) works shall be ensured in the entire command area of the ERM project.
- ii. CAD&WM works shall be taken up simultaneously with the ERM works so as to facilitate achievement of the benchmark efficiency for water use.
- iii. The management of command area system by Water User's Association (WUA's) after the ERM works will be necessary.
- iv. Independent evaluation of the project will be carried out after project implementation and the project should achieve the benchmark water use efficiency in practice as prescribed by Central Water Commission.

Initially, such projects were provided financial assistance @ 90% of cost of irrigation & drinking water component of the project in the form of central grant for its completion in a time bound manner. As per the approval for continuation of scheme

of National Project in XII Plan issued on 12.09.2013, the proportion of central assistance has been revised and the same was to be provided as 75% and 90% of the cost of balance works of Irrigation and Drinking Water Component for Projects of Non-Special Category State and Special Category States, respectively. 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.

The Government of India declared 14 projects as National Projects in February 2008. The Cabinet Committee on Infrastructure approved inclusion of Saryu Nahar Pariyojna in the scheme of National Project on 3rd August, 2012. Later, the Government of India also declared Polavaram Irrigation Project as a National Project in its Gazette published on 01.03.2014.

Out of 16 projects included in the scheme of National Projects, five projects, namely, Gosikhurd Project of Maharashtra, Shahpur Kandi of Punjab, Teesta Barrage Project of West Bengal, Saryu Nahar Pariyojna of Uttar Pradesh and Indirasagar Polavaram Irrigation Project of Andhra Pradesh are under implementation. Goshikhurd and Shahpur Kandi projects have been provided grant amounting to Rs. 3631.641 crore and Rs. 282.6498 crore, respectively, up to March, 2022. Teesta Barrage Project started receiving funds under the scheme of National Project during 2010-11 and grant amounting to Rs. 178.20 crore has been provided for the project till March 2012. Saryu Nahar Paryojana started receiving funding under the scheme of National Project since 2012-13 and an amount of Rs. 2243.10 Crores has been released up to March 2022. The Indirasagar Polavaram Irrigation Project started receiving funding under the scheme of National Project since 2014-15 and an amount of Rs. 12027.26 Crores has been released upto March 2022. Saryu Nahar Paryojna (Uttar Pradesh) and Gosikhurd Irrigation Project (Maharashtra) have been included under the 99 priority projects under PMKSY-AIBP. Saryu Nahar Paryojana (Uttar Pradesh) was inaugurated by the Hon'ble Prime Minister Shri Narendra Modi on 11th December, 2021.

The Status of other projects are as under:

- 1. Lakhwar Multipurpose Project (Uttarakhand):** Revised Cost Estimate (RCE) of the Lakhwar Multipurpose Project at Estimated cost of Rs. 5747.17 Crore @ PL July 2018, has been accepted by Advisory Committee in its 141st meeting held on 11.02.2019. Environment clearance has also been issued by MoEF&CC on 02.02.2021. 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.

2. **Ken Betwa (KB) link Project Phase-I (Madhya Pradesh):** K-B Link Phase-I has been accepted in 129th meeting of TAC held on 08.07.2016. A comprehensive report on Ken Betwa Link Project (KBLP) including (Phase I&II) having estimated cost of Rs. 35111.24 Cr at PL 2017-18 has been prepared by NWDA and forwarded to State Govt. of M.P./UP on 18.10.18. NWDA submitted the Comprehensive Report to CWC on 13.08.2019. NWDA further, vide letter dated 28.08.2019, informed that some changes are likely to be expected in the above mentioned report after resolving of water sharing issues related to non-monsoon season between the states of Madhya Pradesh & Uttar Pradesh. All the three projects namely Kotha Barrage, Lower Orr and Bina complex under KBLP Phase- II have been accepted by Advisory Committee of DoWR, RD & GR in its 148th meeting held on 17.01.2022 for the project cost at PL 2017-18 of amounting to Rs. 709.47 Cr., Rs. 2657.04 Cr. and Rs. 3353.62 Cr. and BC ratio 1.63, 1.54 and 1.502 respectively. Funding of Ken-Betwa Link Project has been approved by Cabinet Committee of Economic Affair (CCEA) in its meeting held on 08.12.2021. Ken Betwa Link Project Authority (KBLPA) and steering committee constituted via Gazette notification dated 09.02.2022. An amount of Rs. 4639.46 Cr has been released for the project in the month of March, 2022.
3. **Ujh, Multipurpose Project (MPP):** Modified DPR of Ujh, MPP of J&K, with an estimated cost of Rs. 9,167 Crore (Price level (PL) Dec, 2019), was accepted by Advisory Committee on Irrigation, Flood Control and Multipurpose Projects of DoWR, RD & GR in its 144th meeting held on 08.05.2020, subjected to various conditions viz. forest clearance, tribal clearance etc.

Ministry of Finance vide letter dated 30.03.2021 has, conveyed that an average annual outgo of about Rs 1,280 Crore (total Central Assistance Rs 8340 Crore & Completion time of Project -78 months) may cause severe stress on the fiscal position of Government in case of entire central funding of Project. It has been requested to examine the possibility of re-designing the Ujh project, to enhance socio-economic benefits leading to BC Ratio of at least 1.00, so that the project could be taken up for funding by NABARD under its long term LTIF thus easing pressure on the fiscal position of the Government.

The modified Ujh MPP Proposal was accepted by Advisory Committee of DoWR, RD & GR in the 148th TAC meeting held on 17.01.2022 for RCE of Rs 11907.77 Cr at PL 2019 PL.

4. **Renuka Dam Project (Himachal Pradesh):** RCE of the project amounting to Rs. 6,946.99 Cr (PL October 2018) has been accepted by Advisory Committee in its 143rd meeting held on 09.12.2019. However, forest clearance phase II is to be obtained by the Project Authority, and further Upper Yamuna

River Board (UYRB) has to coordinate with co-basin beneficiary States to deposit their respective share of money for the project. Funding of Renukaji Dam Project has been approved by Cabinet Committee of Economic Affairs (CCEA) in its meeting held on 15.12.2021. UYRB vide letter dated 24.01.2022 requested beneficiary states to deposit their respective share money towards Renukaji Dam Project.

Central Assistance of Rs. 446.96 Cr & Rs. 10.61 Cr was released vide order dated 03.10.2016 and 11.08.2021, respectively for payment of compensation to the oustees whose land has been acquired for the project. Further, on Account Payment of Grant Component of Central Assistance under AIBP Capital Asset (PMKSY) for the State Annual Plan 2021-22 for Rs 1037.925 Cr were issued vide DoWR, RD & GR Letter dated 03.03.2022. The share money so deposited will be adjustable against their final share in the project cost.

5. DPR of Kishau Multipurpose Project (Himachal Pradesh & Uttarakhand):

DPR of Kishau Multipurpose Project was submitted to CWC in 2010 by UJVNL for appraisal. Compliances to most of the observations of CWC/CEA are awaited since 2011. In view of the fact that this DPR was prepared in June, 2010, since then technology and design philosophy has changed considerably and it was decided by the Project Authority to update the DPR. Director (Projects) & Director (Tech) Kishau Corporation Limited (KCL), vide its letter dated 01.06.2020 has requested to convene a web meeting for finalizing scope of work for upgradation / revision of DPR of Kishau Multipurpose Project. Thereafter, a meeting among CWC/CEA/UYRB and Project Authorities to discuss the scope of work for upgradation / revision of DPR of Kishau Multipurpose Project was held under the Chairmanship of Member (WP&P), CWC on 17.07.2020 through video-conferencing. Member (WP&P) stressed for submitting the time line for preparation of Revised DPR to CWC and start consultation with GSI / Survey of India / NIH during this period. Revised DPR is under preparation by Project Authority. A timeline of 24 months for preparation and clearance of DPR has been submitted by Kishau Corporation limited (KCL) vide letter dated 16.12.2020.

During the meeting of 13th HPSC held on 06.12.2021, Secretary (DoWR, RD&GR, MoJS) directed UJVNL to send a note in respect of seed money issue to DoWR, RD & GR (MoJS). KCL vide letter dated 15.02.2022 submitted note in respect of seed money contribution by beneficiary states, vide which, KCL has requested to arrange the release of 1st instalment of their share by beneficiary states.

Inception Report' in view of up gradation/revision of Kishau DPR has been submitted by KCL vide letter dated 18.04.2022.

6. **Noa Dihing Project:** The DPR of the Noa Dihing Project was prepared by Brahmaputra Board and its appraisal was carried out by CWC. However, as the ownership of the project and the source of funding were not clear and overall economic viability of the project could not be established, the Advisory Committee in its 135th meeting had deferred this project till the ownership issues are resolved. Department of Power, Government of Arunachal Pradesh (GoArP) vide letter dated 09.01.2019 informed that the project ownership will be of GoArP. The project was discussed in the 12th HPSC meeting for implementation of National Projects under the Chairmanship of Secretary (WR) held on 24.11.2020. Secretary (WR) desired that GoArP may carry out the overall economic viability study of the project and if required, guidance from Brahmaputra Board/ Central Electricity Authority/ Central Water Commission can be obtained. Hon'ble Minister of Jal Shakti vide D. O. letter no. X-45011/13/2020-B&B-MoWR dated 02.07.2021 has requested Hon'ble CM of ArP for implementation of this national project at the earliest after obtaining the mandatory clearances in an expeditious manner by the project authority of GoArP.
7. **Kulsi Dam Project (Assam):** Govt. of Assam & Meghalaya is to decide upon the ownership and source of funding of the Project and to sign an Agreement/MoU between the State of Assam & Meghalaya. Hon'ble Minister of Jal Shakti vide D. O. letter no. X-45011/13/2020-B&B-MoWR dated 02.07.2021 has requested Hon'ble CMs of Assam & Meghalaya to take up the matter to resolve the issue of ownership of the project so that same may be executed and its benefit are accrued at the earliest.
8. **Bursar Project (J&K):** The project was discussed during the 13th meeting of HPSC held on 06.12.2022 vide which it was stated that under the provision of Indus Water Treaty an additional irrigation potential of 4.31 lakh acres can be harnessed indirectly through a storage of 0.5 MAF in the project. In the meeting issue of additional command area which was to be identified for the project on J&K side still remains unidentified was flagged. Information from J&K and Himachal Pradesh is yet to be received
9. Two projects, viz. Upper Siang Project and Gyspa Project (Himachal Pradesh) are at DPR preparation stage.
10. 2nd Ravi Beas Link Project is at PFR stage.

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:

- i. To recommend implementation strategies for National Projects.
- ii. To monitor implementation of National Projects.
- iii. 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

Ministry of Jal Shakti, DoWR, RD & GR (erstwhile Ministry of Water Resources, RD & GR), Government of India had approved a State Sector Scheme for Repair, Renovation & Restoration (RRR) of Water Bodies with two components, one with domestic support and another with external assistance for implementation during XI Plan.

Under the scheme with domestic support, a total of 3341 water bodies were taken up for restoration in 12 States. Out of this, restoration of 3114 water bodies have been completed. So far, a central grant amounting to Rs. 917.259 Crore has been released to the States for the completion of works on these water bodies.

Under the scheme with External Assistance, 8747 water bodies were taken up for restoration in the States of Andhra Pradesh/Telangana (2364), Karnataka (1047), Odisha (324) and Tamil Nadu (5012). So far, restoration of 8054 water bodies has been completed.

XII Plan & onwards:

The Pradhan Mantri Krishi Sinchayee Yojana (PMKSY) was launched in 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. Har Khet Ko Pani (HKKP) is one of the components of PMKSY.

Government of India is committed to accord high priority to water conservation and its management. To this effect, Pradhan Mantri Krishi Sinchayee Yojana (PMKSY) has been formulated with the vision of extending the coverage of irrigation under

'Har Khet ko pani' and improving water use efficiency under 'More crop per drop' in a focused manner with end to end solution on source creation, distribution, management, field application and extension activities. The Cabinet Committee on Economic Affairs chaired by Hon'ble Prime Minister has accorded approval of Pradhan Mantri Krishi Sinchayee Yojana (PMKSY) in its meeting held on 1st July, 2015.

PMKSY has been formulated amalgamating ongoing schemes viz. Accelerated Irrigation Benefit Programme (AIBP) of the Ministry of Water Resources, RD & GR, Integrated Watershed Management Programme (IWMP) of Department of Land Resources (DoLR) and the On Farm Water Management (OFWM) of Department of Agriculture and Cooperation (DAC). The scheme "RRR of water bodies" is now part of PMKSY (Har Khet ko pani, HKKP). During 2021-26, RRR of Water Bodies component of PMKSY-HKKP targets to create 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 of RRR of Water Bodies during its implementation in 2021-26.

As per the "Guidelines for the scheme RRR of water bodies under PMKSY (HKKP) January 2022", 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 under the scheme with an objective of revival of irrigation potential by improvement and restoration of water bodies by enhancing the tank storage capacity.

Funding pattern as per the "Guidelines for the scheme RRR of water bodies under PMKSY (HKKP) January 2022", is as given below:

Category	Funding Pattern
All Union Territories (UTs)	100 % Central funding for UTs without legislature 90 (Centre) : 10 (State) for UTs with legislature
Seven North-Eastern States including Sikkim & Hilly States (Himachal Pradesh, Uttarakhand)	90 (Central): 10 (State)
All others	60 (Central) : 40 (State)

Further, as per “Guidelines for the Scheme on Repair, Renovation and Restoration (RRR) of Water Bodies under PMKSY-HKKP” issued in January,2022, after approval of the DPR by the State TAC, approval of SLSC will be needed to submit the proposal to the concerned regional/field offices of CWC. The field office of CWC shall forward the same to Ministry of Jal Shakti with a copy to CWC (HQ).

Since XII Plan, restoration works in respect of 2516 water bodies has been included for funding under the scheme of RRR of Water Bodies (as on 31.03.2022), out of which, works in respect of 1651 water bodies have been reported to be completed. So far, Central Assistance of Rs.495.73 Crore has been released to the States for completion of works of these water bodies. The details are given in Table 7.1. During FY 2021-22, 287 (Andhra Pradesh: 135, Rajasthan: 37, Tamil Nadu: 115) water bodies were included for restoration and funding under the scheme of RRR of water bodies. The details are given in Table 7.2. Total Central Assistance of Rs. 26.05 Crore was released during 2021-22

Table 7.1
Status of Water Bodies & Funds released under Scheme of RRR of Water Bodies
Since XII Plan (as on 31.03.2022)

Sl. No.	Name of State	No. of Water Bodies	Estimated Cost	Committed Central Share (CA)	Irrigation Potential to be restored (ha)	Central Fund Released during 2021-22	Total Central Fund Released since XII Plan	Cumulative expenditure	Rs. in Crore	
									No. of Water Bodies Completed	Irrigation Potential Restored (ha)
1	Andhra Pradesh	235	137.49	82.48	12993	-	2.70	-	-	-
2	Bihar	93	161.91	89.46	26090	8.623	26.70	29.2	6	17873
3	Gujarat	61	102.91	61.74	11364	-	8.81	8.047	3	140
4	Madhya Pradesh	125	183.24	93.01	33305	-	37.70	152.14	124	33000
5	Manipur	4	65.44	58.90	1197		34.63	38.31	-	-
6	Meghalaya	9	11.43	10.29	1096	-	5.18	8.99	8	876
7	Odisha	863	449.03	246.46	51261	-	145.18	337.38	810	47964
8	Rajasthan	105	309.85	159.95	20425	-	62.18	137.58	68	10192
9	Tamil Nadu	367	200.62	120.22	6598	17.43	51.68	113.07	195	4719

10	Telangana	575	459.18	272.02	29010	-	104.56	188.3	429	20061
11	Uttar Pradesh	74	83.41	52.99	10003	-	16.41	44.41	8	2354
12	Uttarakhand	5	12.49	11.24	450	-	-	1.58	-	
Total		2516	2177	1258.76	203792	26.05	495.73	1059	1651	137179

Table 7.2
Details of projects included for funding under the scheme for RRR of Water Bodies during 2021-22

Sl. No	State	No. of Water Bodies	Estimated Cost (Rs in Crore)
1	Andhra Pradesh	135	70.72
2	Rajasthan	37	124.71
3	Tamil Nadu	115	71.89
Total		287	267.32

7.8 Surface Minor Irrigation (SMI) Scheme

The scheme “Surface Minor Irrigation (SMI)” is a part of PMKSY – Har Khet Ko Pani (PMKSY-HKKP). Since XII Plan, 6933 SMI schemes have been taken up under the programme (till 31.03.2022). Out of this, 3916 schemes have been reported to be completed. So far, Central Assistance amounting to Rs. 8696.62 Crore has been released for completion of these schemes (till 31.3.2022). Out of this, an amount of Rs 739.58 Crore was released during 2021-22 (till March 2022). The details are as given in Table 7.3. During FY 2021-22, 1142 (Assam (BTC); 100, Himachal Pradesh: 14, Meghalaya: 75, Mizoram: 9, Nagaland: 213, Sikkim: 309, Uttarakhand: 422) SMI projects were included for funding under the scheme SMI. The details are given in Table 7.4.

Table 7.3
Details of Projects under implementation since XII Plan under Surface Minor Irrigation Scheme (till 31.03.2022)

Sl No.	Name of State	No of schemes included	Irrigation Potential Planned ha	Estimated Cost	Committed Central Share (CA)	CA Released during 2021-22	Cumulative CA released during XII plan & onwards	Cumulative expenditure	No of Schemes completed	Irrigation Potential Achieved ha	Rs. in Crore
1	Arunachal Pradesh	919	42018	716.316	644.684	142.73	473.39	255.51	329	22076	

S1 No.	Name of State	No of schemes included	Irrigation Potential Planned ha	Estimated Cost	Committed Central Share (CA)	CA Released during 2021-22	Cumulative CA released during XII plan & onwards	Cumulative expenditure	No of Schemes comple- ted	Irrigation Potential Achieved ha
2	Assam	1110	465348	5475.68	4928	275.20	3752.46			
								3314.8	711	241088
3	Bihar	176		351.620	274.071					
			77538				174.358	242.946	170	75094
4	Chhattisgarh	147	50513	722.17	433.2	-	200.37			31900
								720.72	106	
5	Himachal Pradesh	168	35190	878.25	449.339	60.31	417.01	430.46	97	18433
6	Jharkhand	82	8982	75.324	56.493	-	19.38			
								66.775	82	8730
7	Karnataka	465	39104	594.9188	456.342	-	162.42	481.519	347	33811
8	Madhya Pradesh	276	111343	1817.39	1325.47	-	987.69		256	66130
								1771.34		
9	Manipur			397.07	357.36	75.98	249.78	222.11	102	18689
		477	22545							
10	Meghalaya	335	58961	1049.36	944.23	100.47	464.93	550.39	162	26820
11	Mizoram	45	3249	50.98	45.88	4.66	33.90	34.81		2217
12	Nagaland	917	36235	652.91	587.62	40.89	404.89		494	
								348.55		24854
13	Sikkim	690	19901	278.566	250.714	9.71	110.39	112.81	381	
										12203
14	Tripura	58	11907				89.65	97.99	29	1317
				145.822	131.24					
15	Uttarakhand	651	59945	870.01	782.99	29.63	466.40		509	
								455.89		38289
16	UT of Jammu & Kashmir	396	104971	1177.47	1059.724		607.948	607.97	135	79646
17	UT of Ladakh	21	7289.17	100.18	90.16		81.55	86.71	6	6434
Total		6933	1155039	15354.04	12817.52	739.58	8696.62	9801.3	3916	707721

Table 7.4
Details of SMI projects included for funding under the scheme SMI
during 2021-22

Sl. No.	State	No. of SMI Schemes	Estimated Cost (Rs. in Crore)
1	Assam (Bodoland Territorial Council(BTC))	100	500.34
2	Himachal Pradesh	14	378.988
3	Meghalaya	75	346.713
4	Mizoram	9	8.509
5	Nagaland	213	133.209
6	Sikkim	309	163.545
7	Uttarakhand	422	349.39
Total		1142	1880.69

CHAPTER-VIII

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. During 2020-21, 106 (99+7 Phases) ongoing priority projects under PMKSY-AIBP were targeted for monitoring by CWC. Out of the these priority projects, 7 are Major Inter-State, which are being monitored under PMKSY-AIBP by CWC field Units as well as by CWC (HQ). CWC made monitoring visits to the projects in accordance with these targets. State-wise and project-wise list of these projects proposed for AIBP monitoring is given at **Annexure-8.1**

The status of monitoring visits to the projects made by CWC during the year 2021-22 is as under:

S. No.	Item	Target	Achievement
1	PMKSY-AIBP Monitoring by Regional Offices	106 (99+7 Phases)	37
2	PMKSY-AIBP Monitoring by CWC(HQ) for interstate Project	2	1
		Total	38

In addition to above, The PMKSY-AIBP (including CADWM) scheme was extended for a period of 2021-2026. Inclusion of some new projects for funding under this scheme was also approved. In this regard, physical monitoring visits for 22 new projects were also undertaken by field offices of CWC for assessment of their status and readiness for their implementation and inclusion under PMKSY-AIBP scheme. CWC field offices completed the monitoring of the 22 projects in time bound manner and submitted the reports to DoWR, RD & GR, MoJS. The List of 22 projects is enclosed as Annexure-8.8

The number of monitoring visits for PMKSY-AIBP projects during 2021-22 has been reduced due to prevailing COVID-19 pandemic, completion of more projects (46 out of 106 projects). Further, Monitoring visits are made to those projects which are active and wherein substantial progress has been made since last visit. Rest projects are monitored on the basis of progress report submitted by the respective project authority.

During 2021-22, 8 Special Package Irrigation Projects of Maharashtra and 2 Special Package Projects of Punjab (i.e. Relining of Sirhind Feeder & Relining of Rajasthan Feeder) were targeted to be monitored by CWC. State-wise and project-wise list of these projects proposed for Special Package monitoring is given at **Annexure-8.2**

The status of monitoring visits to the Special Package Irrigation Projects of Maharashtra and Special Package Projects of Punjab made by CWC during the year 2021-22 is as under:

S. No.	Item	Target	Achievement
1	Special Package Projects of Maharashtra Monitoring by Regional Offices	8	7
2	Special Package Projects of Punjab Monitoring by Regional Offices	2	2

The second visit cum review meeting of the Expert Project Review Committee led by Member (WP&P) was done on 10.12.2021 to review the progress of works in respect of Relining of Rajasthan Feeder from RD 179000 ft to 496000 ft and Sirhind Feeder from RD 119700ft to 447927ft.

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. As per the revised guidelines, the central assistance would be in the form of central grant for new and ongoing projects which would be

- (i) 90% Central Assistance (CA) of project cost (works Component) in case of special category States, and KBK region of Odissa
- (ii) 75% CA of project cost in Special Area i.e. Major/Medium projects benefiting drought prone area, desert prone area, tribal area and flood prone area in non special category states and
- (iii) 25% CA of project cost in case of Non-special category States except for (ii) above. The same could be enhanced upto 50% for new projects subject to condition that the States carry out water sector reforms.

The balance funds were to be arranged by the State Governments from their own resources. MoU between Central and State Government was also slightly modified with insertion of the Para for the CAD works. CWC has been 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, 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, 46 projects have been reported completed as on 31st March, 2022 and 27 projects have progress above 90%. The list of 46 projects reported as completed is given at **Annexure - 8.4**

Central Assistance totalling to Rs. 754.64 Crores has been released to 12 Projects, out of 99 priority projects, under PMKSY-AIBP during 2021-22. Since the inception of AIBP, the cumulative total Central Loan Assistance / Grant provided to States under AIBP/PMKSY-AIBP is Rs. 67507.91 Crores till 31.03.2022 to 297 projects. As reported by the State Governments, 11.13 Mha of additional irrigation potential has been created under AIBP since the start of the scheme till March, 2022.

PMKSY-AIBP (including CADWM) scheme was valid till March, 2021. The proposal for its extension for the period 2021-26 was approved by the Expenditure Finance Committee (EFC), in its meeting held on 6th August, 2021. The Cabinet Committee on Economic Affairs (CCEA) too has approved the continuation of Pradhan mantra Krishi Sinchai Yojana (PMKSY) for 2021 to 2026 on 15th December, 2021 with an **outlay of Rs. 93,068.0 crore including Rs. 37,454 crore Central Assistance to States**. However, state wise/ project wise details of budget allocation is not available in this office since they are not predetermined and are made by the respective State governments on annual basis. Under the continuing scheme 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. Irrigation potential creation target through major/medium 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 Pradhan Mantri Krishi Sinchayee Yojana - Accelerated Irrigation Benefits Programme (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.
- (ii) 60 % CA of project cost Projects in other States

Subsequent the approval of continuation of PMKSY, including the AIBP component, A Screening Committee of DoWR, RD & GR was constituted under the Chairmanship of Secretary, DoWR for the inclusion of new Major/Medium Irrigation Project and Modernisation (ERM) project 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. The Details of five new projects are given at Annexure 8.7. Central Assistance totalling to Rs. 59.20 Crores has also been released to 4 new Projects, out of these 5 newly included projects, under PMKSY-AIBP during 2021-22. Total Central Assistance released under PMKSY-AIBP since 2016-17 to March 2022 is Rs. 13813.24 Crore.

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 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. Central Assistance totalling to Rs. 569.76 Crores has been released to Maharashtra Projects under Special Package during 2021-22.

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.620.41 Cr for Rajasthan Feeder) in addition to Rs 155.84 Cr of Central Assistance earlier released for these projects. Central Assistance totalling to Rs. 118.29 Crores has been released to Relining of Sirhind Feeder and Relining of Rajasthan Feeder Project of Punjab under Special Package during 2021-22.

Project-wise details of these 10 Major and Medium Irrigation projects indicating Central Assistance released and Irrigation Potential details is enclosed at **Annexure-8.5 & 8.6**.

8.3 Review of progress of Bargi Diversion project

The issue of poor progress of works in Bargi Diversion Project included under PMKSY (primarily due to Tunnel Boring Machine stuck up in Sleemanabad Tunnel) was flagged by Hon'ble Minister for Jal Shakti and directed that the issue needs to be resolved at the earliest, for which a technical team from CWC may visit the site and provide guidance on the way ahead, in consultation with the State Government Officers.

In view of the above, the Chairman CWC decided that the Chief Engineer (PMO), CWC may convene a virtual meeting with the Project Authorities to review the current status of the Project, action taken on earlier Reports, their road map for completion of the Project. A Team from CWC Bhopal Office may visit the Project to ascertain ground situation, since CWC Bhopal Office is already monitoring this Project.

It was noted that earlier the Government of Madhya Pradesh had constituted a multi-disciplinary Team under the Chairmanship of Chief Engineer, Design (N&W) with

representatives from NHPC, GSI and CSMRS, which had visited the Project and submitted its Report in June 2019 comprising of a number of recommendations to accelerate the Project Progress. Subsequently, Chief Engineer, Upper Narmada Zone, Narmada Valley Development Department, Jabalpur entrusted a Study, "Alternative study" for water transfer in Bargi Right main canal" to M/s WAPCOS Ltd". The M/s WAPCOS Ltd. also submitted its Report in May 2020. Apparently, the Government of Madhya Pradesh has not taken follow up actions on these Reports/recommendations resulting into the Project continuing under limbo with no substantial progress resulting into no irrigation benefits accruing in the command area in the districts of Jabalpur, Katni, Satna and Rewa with Madhya Pradesh not able to utilize its share of water from Narmada rivers and the Central Assistance given under PMKSY getting converted into Loan to the State Government due to delay in project completion.

During September, 2021 a Virtual meeting was held with Project authorities under the Chairmanship of Chief Engineer (PMO), CWC, New Delhi to review the current status of the Bargi Diversion Project, action taken on earlier Reports, their road map for completion of the Project. During the virtual meeting, the Chief Engineer, Upper Narmada Zone, NVDA, Jabalpur apprised that on the basis of recommendations of an Expert Committee, the State Government of Madhya Pradesh decided to go for tunneling in place of open cut canal to cross over Sleemanabad ridge. Unfortunately due to inadequate geotechnical investigations by the Department, Narmada Valley Development Authority and also by the EPC Agency M/s Patel-SEW JV, numerous tunneling problems were encountered resulting into very poor work progress of Sleemanabad tunnel. Even though tunneling from both upstream and downstream ends was started, the progress had been very slow. After the review by the Hon'ble Chief Minister of Madhya Pradesh in March 2021, several commercial decisions were taken including engagement of M/s DMRC as a Consultant, which expedited tunnelling works with a targeted progress of about 275m per month. The Project Authority has indicated that the tunnel is expected to be completed by June 2023. Tenders for remaining works of Phase-III and Phase-IV have also been prepared with an objective to complete the Project by December, 2024. The State Government has requested to consider the delay as a force Majeure and accord extension till December, 2024 under PMKSY.

8.4 North Koel project

North Koel project is situated on North Koel River which is a tributary of Sone River. The construction was originally started in the year 1972 and continued till 1993 when the work on the project 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 MoWR, RD & GR as Project Management Consultant (PMC). The execution of the project will be monitored by an Empowered Committee of Government of India headed by CEO, NITI Aayog.

In pursuance to the approval of the Cabinet for completion of the North Koel Reservoir Project, MoWR, RD & GR vide Office Memorandum dated 18.09.2017 and dated 25.09.2017 had re-constituted the Empowered Committee (EC) to monitor the implementation of the balance works of North Koel Reservoir Project with CEO, NITI Aayog as its Chairman and its first meeting was held on 08.11.2017 at New Delhi.

MoWR, RD & GR had also constituted a Technical Evaluation Committee (TEC) 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, 25 meetings of TEC have been held, the last one being on 16.01.2020, to discuss and decide on the various technical issues of the project.

The 7th Revised Cost Estimate (RCE) of Project was approved during 142nd meeting of Advisory Committee of DoWR, RD & GR held on 08.07.2019 at CWC, New Delhi for an estimated cost of Rs. 3042.16 Crore @ PL 2019. The balance cost as on 01.04.2016 as per 7th RCE is Rs. 2273.07 crore which is about Rs. 650 crore more than balance cost as on 01.04.2016 as per 6th RCE. The approval of 7th RCE by Union Cabinet is yet to be taken up. Also, the decision on the report submitted by Technical Team, wherein WRD, Govt. of Bihar have differences in opinion on issue related to canal lining of the project is still pending.

The NOC for the commencement of works at Dam site has been granted by the Forest Department, Govt. of Jharkhand during Nov 2019. The work at dam site is likely to begin shortly. The scheduled completion has been proposed as 30.06.2021. The progress of works on Barrage and LMC are 80% and 62% respectively. The target date for completion of both Barrage and LMC is 30.04.2020. The tender for lining of RMC in Jharkhand portion has been awarded by WAPCOS and work has been started.

8.5 Assessment of Irrigation Potential created under AIBP

8.5.1 Use of Satellite Technology

It has been decided to take the services of Bhaskaracharya Institute for Space Application and Geoinformatics (BISAG) under Department of Science & Technology, Government of Gujarat for assessment of year wise/ season wise cropped area in the command of 99 PMKSY-AIBP projects from 2012-13 to 2016-17. Requisite details of command of the projects in the digitized format have been provided to them and study is underway.

BISAG has agreed to make a GIS based application for monitoring of 99 AIBP projects. As per the agreement, the following activities will be done through BISAG:

1. Development of GIS based application for monitoring of 99 prioritized projects under AIBP:

- i. The available Google satellite imagery shall be used by BISAG to digitize the works completed in respect of all 99 prioritized projects. NIC shall provide the concerned file with sequence of the projects in this regard to BISAG.
- ii. The provision for incremental progress to be digitized on monthly basis based upon availability of updated data from Google shall be made by BISAG.
- iii. A separate layer would be generated for the status of drought prone areas of Bundelkhand, KBK, Marathwada, Vidarbha etc.
- iv. A provision for generating status report for projects benefitting the drought prone areas shall be made.
- v. A mobile app for capturing the geo-tagged photographs which has already been prepared by NIC shall be integrated with the above application.

2. Analysis of cropped area under prioritized projects using LANDSTAT data
3. Development of MIS/GIS based application for water bodies included for funding under RRR scheme. The mobile application shall have facility for capture of geo-tagged photographs/videos of such water bodies.

8.5.2 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).





Member, WP&P, CWC and Chief Engineer, PMO, CWC Visited the Project Site on 10.12.2021 to review the progress of works in respect of Relining of Rajasthan Feeder from RD 179000 ft to 496000 ft and Sirhind Feeder from RD 119700ft to 447927ft.



Chief Engineer, PMO, CWC and Director, Monitoring (North), CWC Visited the Project Site to review the progress of Subarnarekha Project, Jharkhand from 22 February, 2022 to 25 February, 2022

CHAPTER-IX

PLANT & EQUIPMENT PLANNING AND CONSTRUCTION SCHEDULING

9.1 PLANT & EQUIPMENT PLANNING & CONSTRUCTION SCHEDULING

Control Board (CB) and Plant & Machinery (P&M) Directorate (On merger of P&M Directorate with Control Board and transfer of work of Construction Machinery Consultancy Directorate) formerly under the Central Mechanical Organization (CMO), is presently under the Performance Overview & Management Improvement Organization (POMIO) of CWC. CB&P&M Directorate is actively involved in the following activities:

- 1) Techno-economic appraisal of Major & Multipurpose Irrigation and Hydro-Electric Projects
 - 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 advise the preparation of BIS/IS code for new construction equipments by updating of the old BIS/IS code.

9.2 Project Appraisal

During the year, 12(twelve) project reports of Major & Multipurpose Irrigation Project and Hydro-Electric Power of various states of the country as well as international projects

were techno-economically examined from the Construction Scheduling, Plant Planning & other aspects. Out of these 12 (twelve), 03 projects reports were considered acceptable from plant planning & other aspects including one international project and 02 (two) projects were returned to Project Authorities due to various shortfalls.

State Projects:

Sl. No.	Project Name	State	Outcome
1	Dugar Hydro Electric Project (449 MW)	Himachal Pradesh	Cleared; With provision of Rs 284.40 Lakh kept under Q. Spl. T&P were found acceptable and project was cleared from plant planning aspect, clearance conveyed to PA(N) Dte. vide letter dated 08-07-2021
2	Standalone Pinnapuram Pumped Storage Project (1200 MW)	Andhra Pradesh	Cleared; With provision of Rs 289.53 Lakh kept under Q. Spl. T&P were found acceptable and project was cleared from plant planning aspect, clearance conveyed to PAC Dte. Central Electricity Authority vide letter dated 12-10-2021

International Projects:

Sl. No.	Project Name	Country	Outcome
3	Shatoot Storage Scheme	Afghanistan	Cleared; With provision of Rs 238.26 Lakh kept under Q. Spl. T&P were found acceptable and project was cleared from plant planning aspect, clearance conveyed to Director, PA (S) Dte. vide letter dated 03-12-2021
4	Punatsanchuu-I Hydro Electric Project (1200 MW)	Bhutan	Comments Issued to Managing Director Punatsangchhu-I Hydroelectric Project Authority Bhutan vide letter dated 13.10.2021

9.3 Consultancy

No consultancy work for equipment planning in Irrigation and Multipurpose project was taken up during the Year 2021-22.

CHAPTER-X

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 2021-22, 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 MoWR, RD & GR to supervise the operation of Babhali Barrage vide its O.M. dated 24th October 2013. The composition of the Committee is as under:

(a)	Member, CWC	- Chairman Ex-officio
(b)	Principal Secretary to Government (Projects), Irrigation & CAD Deptt., Government of A.P.	- Member Ex-officio
(c)	Principal Secretary, WRD, Government of Maharashtra.	- Member Ex-officio

Later as per order of the Hon'ble Supreme Court, the composition of Committee was modified to include the representative of Telangana also.

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 Babbali 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 Babbali 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 Babbali Barrage should not exceed 2.74 TMC of which 0.6 TMC forms the common submergence of Pochampad Reservoir & Babbali Barrage.
- d) Maharashtra does not periodically utilize 2.74 TMC from time to time.
- e) Maharashtra releases 0.6 TMC of water to A.P. on 1st March every year.

Five meetings of Supervisory Committee have been held on 27.02.2014, 30.06.2014, 17.10.2014, 04.02.2015 and 23.06.2016. No meeting of the Committee was held during the year 2021-22. However, as per direction of Member (WP&P), CWC and Chairman of Supervisory Committee on Babbali Barrage, the opening and lowering of the gates at the beginning and end of monsoon period and releasing of the water on 1st March as per the order of the Supreme Court were carried out during 2021-22.

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 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 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, 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.

10.1.3 Vansadhara River Water Dispute:

The State of Orissa filed a complaint under Section 3 of the Inter-State River Water Disputes Act, 1956 with the 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.

The Tribunal has submitted a report and decision under Section 5(2) of the Act on 13.09.2017. The report of the Tribunal was examined in CWC and certain issues requiring clarifications from Tribunal were identified and submitted to MoWR, RD & GR in November 2017. Accordingly, the Central Government has filed a reference under Section 5(3) of the ISRWD Act, 1956 on 12.12.2017. VWDT has submitted the further report 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 Disputes Water 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 (<http://egazette.nic.in/writeReadData/2020/216437.pdf>). The term of the Tribunal has been extended for a further period of one year w.e.f. 20.08.2021 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 (formerly MoWR 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 Third meeting of the Management Committee of the MoJS Research Chair was held on 8th September, 2021 under the Chairmanship of Chairman, CWC. The discussions held during the meeting are as under:

- Annual Report (Consolidated) Report of the MoJS Research Chair for advice and inputs to the Research Chair.
- The Proposed Activities under the Renewable Proposal 2021-26 prepared as per the Recommendation of the Second Management Committee Meeting.
- Publication and the dissemination of the research output.

The draft documents, "Updated compilation of interstate river water cooperation agreements 2021" and "A synthesis paper on India's interstate river water cooperation track record" submitted by Research Chair were examined and comments on the same were furnished in September 2021.

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. Further, on request of KWDT-II, in exercise of the powers conferred under the provision to sub-section (3) of section 5 of the Inter-State River Water Disputes Act, 1956, the Central Government vide Gazette Notification dated

20.07.2021 extended the period of submission of report and decision by the KWDT-II for a period of one year with effect from 1st August, 2021.

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. DoWR, RD & GR vide letter dated 03.03.2021 sought additional information for taking further action in the matter. CWC vide its letter dated 16.03.2021 requested party States i.e. State of Tamil Nadu, Karnataka, Andhra Pradesh and UT of Puducherry to furnish the information. The same is still awaited.

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. Report of Mahadayi Water Disputes Tribunal (Vol.-I to Vol.-XII)
15. 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 Water Resources is the Chairman of the Board and the Union Minister of Power, Union Minister of State for Water Resources, 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.

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 latest estimated cost of project is Rs. 1582.94 crore at 2009 price level. The total expenditure for an amount of Rs. 2024.046 crores up to March, 2020 has been incurred on the project.

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 and 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.

Revised Cost Estimate of Bansagar Dam Project and proposal for O&M setup required after completion of the Dam

(A) Revised Cost Estimate of Bansagar Dam Project:

A Committee was constituted under the Chairmanship of Chairman, CWC to work out the cost of Bansagar including the cost of Rehabilitation and related issues of O&M Cost by MoWR, RD & GR on 02.06.2015.

The Committee circulated its draft report of "Apportionment of cost of Bansagar Multipurpose Project and Rationalization of operation & Maintenance Expenditure" to all concerned for their views/observation. The report of the Committee could not be finalized due to divergent views of the States. Subsequently a meeting was held under the Chairmanship of Secretary, MoWR, RD & GR on 09.03.2018 to discuss the draft report of "Apportionment of cost of Bansagar Multipurpose Project and Rationalization of operation & Maintenance Expenditure". During this meeting following decision were taken:

- (i) Capital Expenditure incurred on Bansagar project (Unit-1) upto March-2015 was treated as the capital cost.
- (ii) O&M cost is to be fixed @45.00 Cr per annum from 2015-16 to 2017-18 (for 3 years).
- (iii) A Committee will be constituted by MoWR, RD&GR comprising representative of the party States and the Ministry to assess the realistic manpower required for the O&M works of Bansagar project, decide the O&M cost for the next ten years from 2018-19 onwards and review the status of work charged and daily wages employees and take appropriate decision to reduce their numbers.

(B) : Proposal for O&M set up required after completion of the Dam :

As per decision taken in the meeting, held under the Chairmanship of Secretary, DoWR, RD & GR, MoJS on 09.03.2018, a Committee was constituted by DoWR, RD&GR, MoJS under the Chairmanship of Commissioner (CAD), DoWR, RD&GR, MoJS by vide letter dt. 22.04.2020.

The final report of the Committee was submitted on 9.11.2020 and accepted by all beneficiaries States (MP, UP & Bihar). The main decisions of this meeting are:

- (i) The sharable O&M establishment setup of Bansagar dam shall comprise of one Division for Civil works and one Division for Electrical & Mechanical (E&M) works. Each Division shall comprise of two Sub-Divisions, and total number of Sub-Divisions shall thus be limited to four.
- (ii) The maximum manpower strength for Civil-O&M Establishment shall be 91, including staff strength of Division office, project hospital and project school, and excluding the staff strength of Circle office and Land Acquisition & Rehabilitation (LA&R) Set-up.
- (iii) The maximum regular manpower strength for E&M-O&M Establishment shall be 40; including staff members of Division office.
- (iv) Regarding the work charged and daily wages employees
 - (a) From 2018-19 till such times the total strength of work-charged and daily wages employees come down to only 370 (i.e. 45% of 826)

Sharable cost of work charged & daily wage employee in a particular year =	$(370/N) \times C$ Where N is the total strength of work charged & daily wage employee in the particular year; And C is the Actual expenditure in respect of total strength of work charged and daily wage employees in that particular year
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(b) For period when the total strength of work charged & daily wage employees is 370 or below:

Sharable cost of work charged & daily wage employee in a particular year =	Actual expenditure in respect of total strength of work charged and daily wage employees in that particular year
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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 92nd meeting of Executive Committee of Betwa River Board was held on 23.07.2021 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 ($15 \times 3 = 45$ MW) 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 2021-2022 is 731.01 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 2021-22 is placed below:

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		

The reservoir (FRL 371.00) filled up to 371.00 m during the year 2021-2022.

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 Ministry of Water Resources, Northern Railway, Central Water Commission and Irrigation Departments of the State of Punjab, Haryana and Rajasthan.

The 32nd meeting of Ghaggar Standing Committee was held under the chairmanship of Member (RM), CWC at 11.30 AM on 12/10/2021 through video conferencing in order to discuss the final CWPRS Technical report No.5950 titled "Mathematical model studies to safely pass flood in river Ghaggar in the States of Haryana and Punjab." In this meeting it was concluded that:

- Technical report No.5950 titled "Mathematical model studies to safely pass the flood along river Ghaggar in Haryana and Punjab States" was submitted by

CWPRS, Pune on 21/09/2021 and soft copies were given to the States and hard copies will also be received by them shortly.

- Short term measures, recommended in case 2(d), which involves widening of river from 60m-90m at some feasible reaches along with limiting water level rise to 2 m at both banks by constructing embankments, in model study report is an optimal solution and needs to be adopted by State Govts.
- State Governments may act appropriately and in time bound manner as per the recommendations made in the final model study report by CWPRS, Pune.

Duly approved compliance report was sent to EE, UYD, CWC to file the affidavit in Hon'ble Supreme Court vide letter dated 22-Oct-21. The affidavit has been filed by EE, UYD, CWC to hon'ble Supreme Court on 02-Nov-21.

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 at 10:30 AM 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 Udyam - a part of Amrut Bio-Diversity Park" Project at village Indraprasth near Pragati Maidan, New Delhi, subjected to some conditions.

'Nav Bharat Udyam' 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.

CHAPTER-XI

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 three 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. The projects are:

- i. Ukai Project (Gujarat)
- ii. Eastern Kosi Canal Project (Bihar)
- iii. Tawa Project (Madhya Pradesh)

The Post Project EIA Studies have been completed for above three projects during 2021-22.

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.

11.4.1 Constitution of NEMCRVP

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

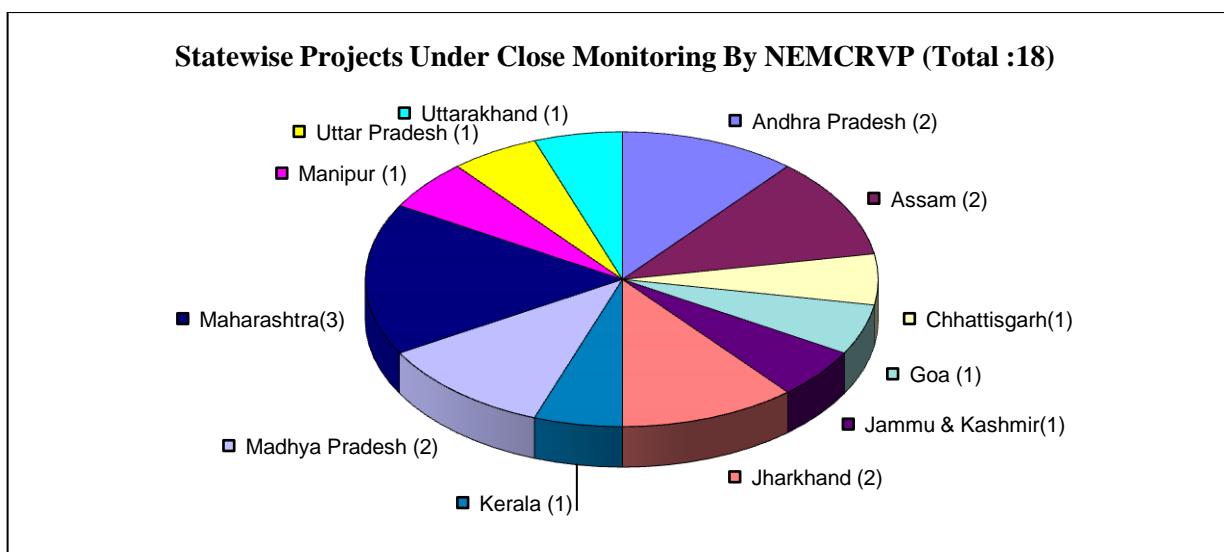


Fig.1 (State wise Projects under Close Monitoring by NEMCRVP)

11.4.2 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).



CHAPTER-XII

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 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 Central Water Commission

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

Sixteen Concept Note/ Preliminary Project Report & two Detailed Project Report (DPR) of externally aided irrigation and multipurpose project have been appraised in CWC during 2021-22. The details of these 18 projects are as:

A. Concept Note/ PPR stage**A1. Concept Note/ PPR stage pertains to MoJS**

Sl. No.	Name of Project	Receiving Date	Status	Remarks
1.	Small Multipurpose Reservoirs in Meghalaya (SMRM) submitted by Govt. of Meghalaya for ADB Funding	08.12.2020	The PPR (in DEA format) of the proposal was received from DoWR, RD & GR. CWC has considered and recommended the proposal to DoWR, RD & GR, MoJS for in principle approval in the 6th Screening committee of CWC on 17.05.2021 with some subject to condition for preparation of DPR.	Recommended
2.	Support to Ganga Rejuvenation II Submitted by DoWR RD & GR for World Bank Funding	06.07.2021	PPR of the said proposal (in DEA format) was received in CWC through DoWR, RD & GR vide their e-mail dated 07.07.2021. The preliminary comments of the PPR/ Concept note was conveyed to DoWR, RD & GR vide letter dated 26.07.2021.	Observation has been sent to Ministry
3.	West Bengal Accelerated Development of Minor Irrigation Project Phase-II Submitted by Govt. of West Bengal for World Bank Funding	20.07.2021	PPR of the said proposal (in DEA format) was received in CWC through DoWR, RD & GR vide their e-mail dated 20.07.2021. The preliminary comments of the PPR/ Concept note were also conveyed to DoWR, RD & GR vide letter dated 06.08.2021, 09.08.2021 and 10.08.2021.	Pending for compliance from Project Authority
4.	Climate Adaptation in Vennar Sub basin in Cauvery Delta Project 2 Submitted by Govt. of	23.09.2021	PPR of the said proposal (in DEA format) was received in CWC through DoWR, RD & GR vide their e-mail dated	Pending for compliance from Project Authority

	Tamil Nadu for ADB Funding		23.09.2021. The preliminary comments of the PPR/ Concept note was conveyed to DoWR, RD & GR vide letter dated 01.11.2021.	
5.	Rajasthan Rural water Supply and Fluorosis Mitigation Project (Phase-II) submitted by Govt. of Rajasthan for JICA funding	10.03.2021	Preliminary Project Report (PPR) (in DEA format), was received from EA& IC Desk, DoWR, RD & GR.	Observation has been sent to Ministry
6.	Isarda - Dausa Water Supply Project submitted by Govt. of Rajasthan AFD funding	10.03.2021	Preliminary Project Report (PPR) (in DEA format), was received from EA& IC Desk, DoWR, RD & GR.	Observation has been sent to Ministry
7.	Greater Pynursla Combined Water Supply Scheme submitted by Govt. of Meghalaya for JICA funding	10.03.2021	Preliminary Project Report (PPR) (in DEA format), was received from EA& IC Desk, DoWR, RD & GR.	Observation has been sent to Ministry
8.	Karnataka Rural Drinking Water Supply Project submitted by Govt. of Karnataka for World Bank funding	27.01.2022	Preliminary Project Report (PPR) (in DEA format), was received from EA& IC Desk, DoWR, RD & GR.	Observation has been sent to Ministry
9.	Kerala Sustainable Coastal Protection and Climate Resilience Planning Project Submitted by Govt. of Kerala for ADB Funding	07.02.2022	Preliminary Project Report (PPR) (in DEA format), was received from EA& IC Desk, DoWR, RD & GR.	Under Examination
10.	Additional Financing for Resilient Kerala Program-Coastal Protection Project (Phase II) Submitted by Govt. of Kerala for World Bank Funding	11.03.2022	Preliminary Project Report (PPR) (in DEA format), was received from EA& IC Desk, DoWR, RD & GR.	Under Examination
11.	Song Dam Drinking Water project Submitted	02.09.2021	The PPR (in DEA format) of the proposal was received	Recommended by Screening

	by Govt. of Uttarakhand for AFD funding		from DoWR, RD & GR. CWC has considered and recommended the proposal to DoWR, RD & GR, MoJS for in principle approval in the 7th Screening committee of CWC on 29.10.2021 with some subject to condition for preparation/updation of DPR.	Committee.
12	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.	Observation has been sent to Ministry

A2) PPR pertaining to Other Line Ministry

Sl. No.	Name of Project	Central Line Ministry	Status	Remarks
1.	Project proposal titled "Tapi River front and Rejuvenation Project Phase-I" submitted by the Govt. of Gujarat for World Bank funding	Ministry of Housing and Urban Affairs	The PPR (in DEA format) of the proposal was received from DoWR, RD & GR. CWC has considered and recommended the proposal to DoWR, RD & GR, MoJS for in principle approval in the 6th Screening committee of CWC on 17.05.2021 with some subject to condition for preparation of DPR.	Recommended
2.	Project proposal titled "GEF livable cities in India -	Ministry of Housing and Urban Affairs	The PPR (in DEA format) of the proposal was received from	Recommended

	Restoration of Biodiversity and Ecosystem Services in Kadapakkam Lake in Chennai Kosasthalaiyar Basin" submitted by Government of Tamil Nadu for ADB funding		DoWR, RD & GR. CWC has considered and recommended the proposal to DoWR, RD & GR, MoJS for in principle approval in the 6th Screening committee of CWC on 17.05.2021 with some subject to condition for preparation of DPR.	
3.	Resilient Kerala Development Programme- Phase 2 (RKDP-2)- Submitted by Govt. of Kerala for AFD Funding	Ministry of Finance	Preliminary Project Report (PPR) (in DEA format), was received from EA& IC Desk, DoWR, RD & GR.	Observation has been sent to Ministry
4.	Providing Water and Sanitation facilities to five towns of Himachal Pradesh namely; Manali, Palampur, Bilaspur, Nahan and Karsog. Submitted by Govt. of Himachal Pradesh for AFD Funding	Ministry of Housing and Urban Affairs	Preliminary Project Report (PPR) (in DEA format), was received from EA& IC Desk, DoWR, RD & GR.	Observation has been sent to Ministry

B. DPR/ Feasibility Study Report

Sl. No.	Name of Project	Status	Remarks
1	<p>Rejuvenation of Lamphelpat water body to alleviate urban Flooding, providing sustainable Water Sources for Imphal City and Promoting Eco-Tourism, submitted by Govt. of Manipur for World bank Funding</p> <p>Estimated Cost: Rs 650 Cr.</p>	<p>DPR examined and final comments of CWC were forwarded to EA&IC Section of DoWR RD&GR on 09.06.2021.</p>	<p>EA&IC DoWR RD&GR accorded in-principle clearance for DPR on 02.07.2021</p>
2.	<p>DPR of the proposal namely "Improvement to Swarnamukhi Anicut System" under Andhra Pradesh Irrigation & Livelihood Improvement Project Phase-2 (APILIP-II) for JICA funding.</p> <p>Estimated Cost: Rs. 60 Cr</p>	<p>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.</p> <p>The DPR of the same is under appraisal at various specialized unit of CWC.</p> <p>It is proposed to take up the said project with balance fund of JICA assistance under the APILIP-II, which was considered and accepted by Advisory Committee of MoWR, RD & GR on major & medium irrigation, flood control and multi-purpose project during its 135th meeting held on 12.03.2018. with an estimated cost of Rs. 2000.00 crore for JICA assistance</p>	<p>Draft TAC note has also been prepared and it is under consideration.</p>

CHAPTER-XIII

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, Kama, 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:

- I. **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 8 times so far and the last meeting was held on 11th January, 2019 at New Delhi. 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.

- II. 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. Lt. Commissioner (Ganga), MoWR as Member Secretary from Indian side. The first meeting of JSTC was held during 8th - 9th December, 2008 at New Delhi under the Chairmanship of Chairman GFCC. The JSTC has met six times so far and the last meeting was held on 9-10th January, 2019 at New Delhi in which all outstanding technical issues between the two countries were discussed.

- III. 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 (JCFM). 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.

- IV. 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. Based on the JTE recommendation, an Inter-Ministerial Meeting (IMM) held on 29th August 2019 has decided to extend the tenure of JPO-SKSKI beyond 31st August, 2019 till next Indo-Nepal Secretary level Joint Commission on Water Resources (JCWR) meeting.

13.2.1 Status of projects jointly implemented by India and Nepal

I. 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 beyond 31st August, 2019 till next Indo- Nepal Secretary level Joint Commission on Water Resources (JCWR) meeting.

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.

II. 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 MoWR O.MNo.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. 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 matter has also been discussed at various other fora during the year 2018-19, including Indo-Nepal Joint Committee on Irrigation and Flood Management (JCIFM) and Joint Committee on Water Resources (JCWR).

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 35 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 and modified in 1988 and further reconstituted in August, 1992 with Chief Engineer (B&BBO), CWC, as Team Leader from Indian Side. However, recently 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.

The 35th meetings of Joint Expert Team (JET) was held during 6th- 7thMarch 2019 at Paro, Bhutan

A Joint Group of Experts (JGE) on Flood Management headed by Commissioner, Brahmaputra & Barak Basin (B&BB), 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, Shillong as its Team Leader (Indian

Side). So far, six meetings of the reconstituted Joint Technical Team (JTT) between Government of India and Royal Government of Bhutan (RGoB) have been held. The last meeting was held during 12th- 13th September, 2019 at Chalsa, Jalpaiguri, West Bengal. Chief Engineer (BBO), CWC is the Team Leader at present.

CWC is providing technical assistance for development of hydropower potential in Bhutan. Bhutan Investigation Division (BID), CWC, Phuentsholing 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.

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. 37th meeting of the JRC was held at New Delhi in March, 2010, 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 BRICS Water Forum & BRICS Water Ministers' Meet:

Under India's BRICS Chairmanship 2021, the first BRICS Water Forum was organized by the Ministry of Jal Shakti in hybrid mode at Sushma Swaraj Bhawan, New Delhi during 16-17 November 2021. During the BRICS Water Forum, the representatives from the 5 BRICS nations submitted and presented Country Papers on the following sub-themes:

- a. Climate Change Impacts–Challenges and Opportunities in Water sector
- b. Technological Innovation in Water Management
- c. Addressing the Water, Food and Energy security

The BRICS Water Forum provided a wonderful platform to the presenters and other participants from the 5 countries to showcase their progress and prowess in-line with the sub-themes of the event and also in the light of the Sustainable Developmental Goals (SDG-6). Various ongoing initiatives by the BRICS countries, success stories, case studies, specific problems encountered, best practices, region-specific issues, technological innovations etc. were shared and deliberated upon. It was learnt that a

major chunk of the problems faced by the BRICS countries are similar, while certain countries facing unique problems owing to their regional settings. The BRICS countries highlighted the need for the BRICS countries to work shoulder-to-shoulder for capacity building, technology transfer and knowledge sharing for jointly dealing with the various issues faced by the water sector.

The BRICS Water Form was followed by the first BRICS Water Ministers' Meet on 18th November 2021. The **Joint Declaration** was adopted during the meet showing utmost mutual trust and future cooperation intent, while committing to future co-operation to address the water woes of all nations involved. The BRICS countries stressed that corporation amongst the BRICS countries is the need of the hour for solving the common problem being faced in the water sector.





BRICS Water Forum



BRICS Water Ministers' Meet

CHAPTER-XIV

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 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.

As on September 2021, CWC also operates 187 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. Monitoring reports were prepared and sent to Brahmaputra & Barak Wing, Indus Wing and Flood Management Wing of DoWR, RD&GR, MoJS and concerned State Governments.

As per the Monitoring Report of 2021, cloud free data of 468 GL/WBs was available during the monsoon period of 2020. Amongst these, 175 GL/WBs have shown decrease in water spread area, 158 have shown increase, 135 have not shown any significant

change (+/-5%). 58 out of 175 have decreased by more than 20% and 68 out of 158 water bodies have shown increase in area by more than 20%.

Glacial lakes and water bodies need to be assessed for their vulnerability, which depends on their location, size and human habitation & water resources project downstream. CWC has assessed vulnerability of glacial lakes/water bodies with area greater than 50 ha. Glacial lakes/water bodies with water spread area greater than 50 Ha have been prioritized based on vulnerability assessment and stability of lakes for taking up GLOF studies. As per priority, glacial lakes in Sikkim under Teesta River Basin are assessed as most vulnerable and therefore, CWC has carried out GLOF study and prepared advisory sheet. This advisory sheet provides information about the various scenarios of Glacial Lake bursts and the corresponding water level/discharges rise at locations near human settlements and water resources projects.

14.3 Coastal Management Information System (CMIS):

Considering the importance of collection of data on coastal processes relevant for evolving plans and coastal protection measures, a new component namely "Coastal Management Information System (CMIS)" to be implemented by CWC under the Plan Scheme "Development of Water Resources Information System (DWRIS)" was approved by Ministry of Water Resources, Government of India. In this regard, it was proposed to set 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 view of above, deliberations were held with the maritime State/UT Governments and Expert Institutes/Agencies during the "One day Brainstorming Workshop on Implementation & Creation of CMIS" organized by CWC on 13th May, 2014 at New Delhi. As per suggestion emerged during the workshop, implementation of CMIS was envisaged through signing of a tripartite Memorandum of Understanding (MoU). In the tripartite MoU, 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.

With the approval of Ministry, a tripartite MoU was signed among CWC, IIT Madras and respective States/UTs (Kerala, Tamil Nadu and Puducherry) in Oct, 2016 for establishment of one coastal data collection site in each participating State/UT over a period of 2 years. The total estimated cost of above work was Rs 896.05 Lakhs. The implementation of CMIS in these States expired in June 2019. All the deliverables enshrined in the MoU was completed and intended targets achieved. All the remaining payments, as per MoU, was made to IITM, Chennai. Approval 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. 414.31 lakhs for a period of one year was received from DoWR, RD&GR. Accordingly, a tripartite Memorandum of Understanding (MoU) was signed in January 2020 between CWC, IIT Madras and respective states (Kerala, Tamil Nadu and Puducherry) and an advance payment amounting to Rs 140 lakhs was made to IIT Madras in February 2020. 1st PMC meeting was held through VC on 21st December, 2020 and 2nd PMC meeting held through VC on 2nd March, 2021. One week online training on CMIS was conducted during January 2021. Amount paid by CWC in the second phase of CMIS was Rs.355 lakhs. Establishment of three nos. of coastal data collection sites (Devanari-Tamil Nadu, Karaikal-Puducherry and Ponnani-Kerala) has been completed and sites were taken over from the project executor, IITM, Chennai on 31.05.2021. Data collection has been started by CWC from the above sites in the month of June 2021.

CMIS is also being implemented by National Institute of Oceanography (NIO), Goa for the States of Goa and Southern Maharashtra (for three sites) and by CWPRS Pune in States of Gujarat and Maharashtra (for two sites). The Competent Authority in DoWR, RD & GR has approved the Project Proposal of CWPRS, Pune amounting to Rs.695.531 lakh for the implementation of CMIS at 2 sites, 1 in Gujarat and 1 in Northern Maharashtra. A Tripartite Memorandum of Understanding (MoU) between 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. Advance payment amounting to Rs 208.66 lakhs for the project was made to CWPRS, Pune in June 2019. First Project Monitoring Committee (PMC) meeting in this regard was held at CWPRS, Pune in September, 2019. Establishment of 2 sites, one at Satpati in North Maharashtra and another at Nanidanti-Motidanti in South Gujarat is in progress under this project. Second PMC meeting was held via VC on 11.08.2020 and 3rd PMC meeting was held via VC on 04.06.2021. Two on-line training workshops have been

organized viz. Installation and Operation of Coastal Equipments which was organized in August 2020 and Role, Method and Importance of Coastal Data Collection for CMIS Activities in North Maharashtra and South Gujarat which was organized in February 2021. Similarly, two Fields trainings have been organized during testing of equipments and their installation. First year balance payment amounting to Rs.253.62 lakhs has been made to CWPRS, Pune in the month of June 2021. Third PMC meeting for the implementation of CMIS in the State of Maharashtra and Gujarat was held through Video Conferencing on 04.06.2021. Procurement of most of the equipments have been completed and data collection has been started in this project.

NIO, Goa had 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 the same at an estimated cost of Rs. 1376.60 lakh was signed between CWC as Project Implementer, NIO, Goa as Project Executer and Government of Maharashtra and Government of Goa as Project Facilitator in March 2019. Approval for the revalidation of sanction for making advance payment of Rs.412.98 lakhs to NIO, Goa for the implementation of Coastal Management Information System (CMIS) at two sites in the state of Goa and at one site in the State of Maharashtra was received from DoWR, RD & GR. Accordingly, advance payment of Rs 412.98 lakhs was made to NIO Goa. 1st Project Monitoring Committee (PMC) meeting in this regard was held at NIO, Goa in January 2020. 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. Second PMC meeting was held via VC on 16.06.2020 and 3rd PMC meeting was held via VC on 03.02.2021. First Training in the form of Webinar was conducted by NIO, Goa on 25.09.2020. Bathymetry, beach profiling, shoreline change, coastal sediment Coastal bed sediments, suspended sediment and beach sediment measurements are being conducted as per schedule. The procurement of various equipments is under progress. Fourth PMC meeting for the implementation of CMIS in the State of Maharashtra and Goa was held in Goa on 08.03.2022.

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 1000 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 2021-22 were as under:

1. Maintenance and Management of the existing IT hardware/ software/ network resources in CWC.
2. Implementation of Human Resources Management System (eHRMSDoPT) and SANDES in CWC
3. Award of work for AMC of CWC website.
4. Successful installation and commissioning of DC-DR system at CWC HQ and Pune.
5. Procurement of IT consumables as per requirement of office.
6. Procurement and distribution of Laptop for CWC officers through GeM portal.
7. Processing case and tendering on GeM portal for procurement of 100 computers for CWC.
8. Management of strong IT helpdesk to resolve e-governance related issues of all CWC users in CWC HQ and all regional offices.
9. Procurement of other IT T&P items as per requisition.
10. Implementation of SPARROW for Group C employees.
11. Regular management of NIC email ids of around 3500 employees.

12. Management of APAR management system for the employees who are not yet in SPARROW.
13. Management of hardware and software component of AEBAS (AADHAAR Enabled Biometric Attendance System).
14. 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.
15. Processing Tender for AMC of Development of Workflow based System and Dashboard for Project Appraisal Management System (ePAMS).
16. Arranging to provide APIs for Open Govt. Data Platform (OGD).
17. Management of DGQI report card of DGQI 2.0 for CWC prepared by NITI Aayog.
18. Integrated Water and Crop Information and Management System (IWCIMS) Advisory and Monitoring Committee - Compilation of project details documents for IT systems.

4. Physical and Financial Progress during FY 2021-22:

(Rs in Lakhs)

Budgetary Sub-Head	RE 2021-22	Actual Expenditure for the month March, 2022	Cumulative Expenditure up to the month	% of expenditure up to the month against BE	Remarks
Major Head -2701: Major and Medium Irrigation 80.800.11- Development of Water Resources Information System					
11.00.13 -OE	19.00	0	18.68	98.32 %	Purchase of T&P items
11.00.27 - MW	50.00	3.32	35.69	71.38 %	Hiring of Manpower & MTNL Bills
11.00.28 Professional Services	10.00	0	9.72	97.20 %	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	Purchase of T&P articles.
Major Head -2701: Information Technology 80.800.11- Development of Water Resources Information System					
11.99.13 -OE	169.00	7.28	167.06	98.85 %	Purchase of T&P items, Software and IT consumables.
11.99.27 - MW	39.70	0	38.87	97.90 %	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	13.65	0	0	0	Purchase of T&P articles
Total	301.35	10.6	270.02	89.60 %	

CHAPTER-XV**TRAINING****15.1 Training**

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, and 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. It also arranges apprenticeship training for fresh engineering graduates/ diploma holders/ vocational certificate holders in collaboration with Board of Apprenticeship Training, Kanpur. A few students of engineering degree courses are given practical training in CWC every year.

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, and 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 34 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 off-campus at the client locations. NWA has also 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 had suspended training programme midway and also had cancelled a few already announced programmes in March 2020. However, in view of the importance of capacity building, NWA administration decided to continue delivering their services on virtual mode during COVID-19 pandemic. NWA quickly shifted its activities to Distance Learning Mode by adopting very simple and easily available tools. Popular platforms like Google Classroom and YouTube were chosen for posting the courses/ programs. For interaction and resolving technical issues, it was decided to use the commonly available WhatsApp.

Since its inception in the year 1988, NWA has conducted a total of 832 training programs up to 31st March 2022 and trained total 41144 officers. During the year 2020-22, 86 training programs through Distance Learning were conducted at National Water Academy, CWC, Pune. 14973 officers have been trained in these programs with 11605 man-weeks of training.

Course name	No. of Courses	Beneficiaries
Technical Trainings	27	5374
Drainage & Watershed Modelling; Flood Forecasting & Mike Modelling; Hydro-meteorological observation, Irrigation Planning & preparation of DPR; Flood Assess Mapping; Project Hydrology; Irrigation Asset Mapping using GIS; Flood Forecasting, Modelling & Disaster Management; Andriod App Development; Hydrologic Modelling System HEC-HMS; Google Earth Engine; Financial, Procurement & Contract Management; River Analysis System (HEC-RAS); NCCPIM; Workshop on PIM; Big Data application in WRs & Hydro-informatics; Python Programming & its application in WRM; Land use Land Cover Mapping using Remote Sensing		
Cadre Trainings	4	170
MCTP SRA; MCTP JEs of BB; MCTP JTS; MCTP AD-I/SDE		
Faculty Development	1	20
Building Competencies in Personnel Excellence (Through AOL)		
Water Policy Issues	17	2248
Webinar Series on “International Water Cooperation in India ” – 17 Webinars (period 07 June 21 to 27 Sept 2021) successfully conducted		
Non - Technical Trainings	4	523
Writing of APAR for CWES Officers; Smart Working MS Office Tools; Awareness Generation Exercise on Sexual Harassment of Women at Workplace (Prevention, Prohibition and Redressal) Act 2013; Dr B R Ambedkar and his life's contribution in Water,		

Power Policy and Water Resources Development in India		
Mass Awareness Trainings	32	6547
For School Teachers and DIET Faculty, Media Professionals from all the States and UTs, PRI representatives etc.		
International Training	1	91
As Regional Training Centre of WMO		
Total	86	14973

Hon'ble Union Minister of Jal Shakti Shri Gajendra Singh Shekhawat reviewed the activities of National Water Academy (even when he was recuperating from Corona virus) on 23rd July 2020 and praised the efforts of the NWA officials especially for adopting and expanding effectively during pandemic situation. He further directed to take up awareness programmes up to Gram Panchayat level for which due actions have been taken and programs are being launched.

The list of training courses, workshops and seminars organized / conducted/ coordinated by Training Unit of CWC and by NWA during 2020-21 are given at Annexure - 15.1 and Annexure 15.2 respectively.

15.4 Other Important Activities/ Achievement of NWA

A. New Areas of Training

- I. Irrigation Planning Aspects for Preparation of Detailed Project Reports
- II. Building Competencies for Personal Excellence in Public Governance
- III. Webinar Series on International Water Cooperation in Water Sector of India
- IV. Flood Forecasting, Modelling and Disaster Management
- V. Hydrologic Modelling System HEC-HMS
- VI. Google Earth Engine and its Application in Water Resources Management
- VII. River Analysis System (HEC-RAS)
- VIII. Introduction to Python Programming and its Application in Water Resources Sector
- IX. National Certificate Course on Participatory Irrigation Management (Hindi and English Version) : As per the directions of DoWR, RD & GR, NWA has been assigned with the responsibility of starting the CCPIM in association with Indian Network on Participatory Irrigation Management (IndiaNPIM). The course will

be conducted in on-line mode, modules will be uploaded in English and Hindi. The course is aimed to fulfill the long-standing need of PIM literacy amongst farmers and Government field functionaries engaged in implementing PIM through formation and strengthening of Water User Associations.

- X. Big Data applications in water resources and hydro informatics
- XI. Legal and Institutional Framework for Dam Safety in India'
- XII. Land Use Land Cover Mapping Using Remote Sensing
- XIII. "Water Insight/ जल अंतर्दृष्टि - Talk by Eminent Water Experts" _ Considering that India's Water sector is facing huge challenges in respect of providing it in sufficient quantity to the users - of requisite quality - and in the time of their need. Such situation has always been so though with different issues, different actors, different solutions which sometimes resolved fully, sometimes partially and may be sometimes couldn't cross bureaucratic hassles. Officers of Central Water Engineering Services have always been main actors or sometimes side actors in facing Water sector issues domestically or with neighboring countries. 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 With this objective "Water Insight/ जल अंतर्दृष्टि - Talk by Eminent Water Experts" CWES Officials has been started considering this would be of immense benefit to the sector and will equip the Officials to deal with various situations using your experiences more effectively. In this background, NWA commenced with Weekly webinar talk series titled as "Water Insight/ जल अंतर्दृष्टि - Talk by Eminent Water Experts". One experience sharing on day of Week at 1100 hrs, preferably of 90 minutes followed by interaction with participants. Webinar is being held in on-line mode using CISCO Webex meeting platform. Total of 18 series have been planned, till March 2022 Series have been successfully completed.

Shri A B Pandya, Former Chairman, CWC	https://youtu.be/HXTA2nBSzyU
Shri Chetan Pandit,Former Member, CWC	https://youtu.be/7Lp8lhu_tUQ
Dr D V Thareja, Former Member, CWC	https://youtu.be/0r2a2Fc0E9Y

B) Linkages

1. National Water Academy, Pune has been identified as Nodal Agency for conducting Mid Career Training Program (MCTP) for CWES Group A officers. Accordingly, NWA has collaboration with national and international organizations as below;

- i. Indian Institute of Management, Ahmedabad
- ii. Indian Institute of Technology - Roorkee
- iii. Indian Institute of Management, Bengaluru
- iv. Indian Institute of Science, Bengaluru
- v. Indian Institute of Management, Kolkata
- vi. Asian Institute of Technology, Bangkok
- vii. IHE- Delft, The Netherlands

Other National & International Collaborations are

- i. International Commission on Irrigation & Drainage
- ii. World Meteorological Organisation, COMET UCAR
- iii. World Bank (NHP, DRIP)
- iv. India-EU Water Partnership
- v. IHE - Delft
- vi. Indian Technical & Economic Cooperation Scheme of MEA for developing countries
- vii. Royal Government of Bhutan

2. Representation of NWA:

- i. Governing Council/ TAC: HIRMI, Kurukshetra; WALMI, Aurangabad; IMTI, Trichy; NERIWALM, Tezpur; NEHARI, Guwahati
- ii. BIS Water Resources division (WRD) 10: Reservoirs & Lakes
- iii. National Hydrology Project - HISMG Group
- iv. India-EU Water Partnership - PR7 Group
- v. International Commission on Irrigation & Drainage - Working Group on Capacity Development Training & Education

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

In pursuance of the last WALMI Meet held at Pune during 2016 and further, the role of WALMIs was also discussed in detail during the second meeting of INCID chaired by Chairman, CWC held online during July and October 2021. The National Water Academy, CWC, Pune is conducting WALMIs Meet -2022 in on-line mode. The WALMI Meet 2022 commenced from February 2022. One Week – one institute are making presentation and discussion are being held in on-line

mode The Meet will be in on-line mode using the CISCO Webex which will be facilitated by NWA. Total of 14 Meets were planned, out of the total 14 Meet, till 31st March 2022 six meets were held as given below:

#	Name of WALMI/IMTI	Date of Meet	YouTube Link
1	NERIWALM, Tezpur	22 February 2022	https://youtu.be/F-ctHyhxzIk
2	WALMI, Maharashtra	04 March 2022	https://youtu.be/BZcO8Qw80PU
3	WALMI, Odisha	08 March 2022	https://youtu.be/JyU-GFFP9j0
4	WALMI, Patna	24 March 2022	https://youtu.be/o08I9yoQ5fo
5	IMTI, Trichy	25 March 2022	https://youtu.be/YqanN6Nu9mc
6	WALMI, Karnataka	29 March 2022	https://youtu.be/d7C6xfYGu7g

D) Faculty Development & Exchange

1. The following faculty of NWA, Pune attended DoPT Sponsored Training course under TDP viz "Introduction to Systematic Approach to Training (SAT)" organized by Yashada Pune during 09-11 August 2021
 - i. Shri A K Kharya, Chief Engineer
 - ii. Shri S N Pande, Director
 - iii. Shri Milind Panpatil, Director (A&C)
 - iv. S P Singh, Deputy Director
2. Chief Engineer, NWA delivered lecture on the topic of "WRM - Different Government Organisations, their Role and Responsibilities" during the Second Training Program on Integrated Water Resources Management & Sustainable Habitat for Scientific Technologists organized by IIPA in the on-line mode targeting Scientist & Technologists working in various scientific institutions of GoI on 08.11.2021.
3. Chief Engineer, NWA delivered a presentation on "Water Security and Climate Change - a few suggestions" in International Water Security and Climate Change Conference 2021 on 16th November 2021 at New Delhi.

E) Publications

- i. Chief Engineer, NWA Co-chaired the session on "Climate Change Impacts: Challenges and Opportunities in Water Sector" on 16 November 2021 during the first BRICS Water Ministers' Meet held during 16-18 November 2021
- ii. A comprehensive Chapter on "History of Irrigation India" was prepared and sent to ICID for inclusion publication on Historical Water Sustainability in the World.

iii. NWA contributed a paper on “Surface Water Resources of Maharashtra – Potential, Development and Management Issues”.

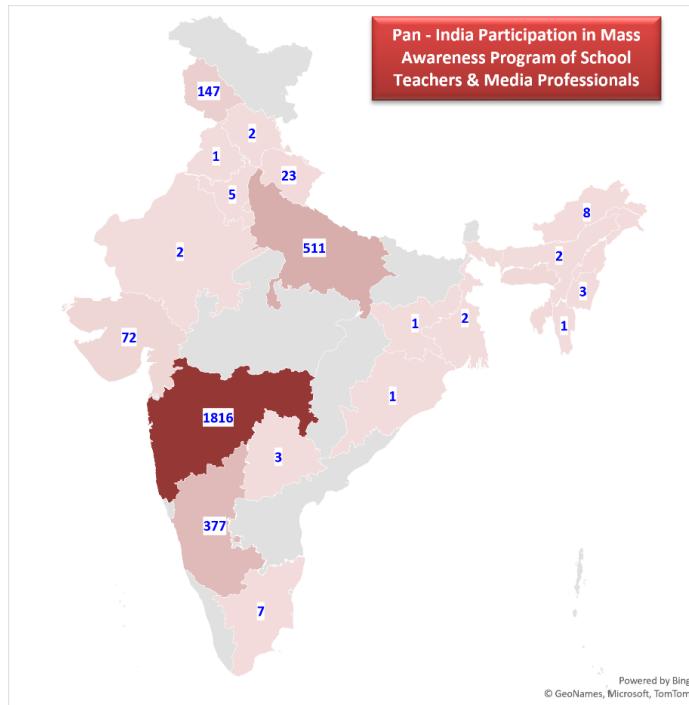
F) Summer Internship

Five students from SVNIT, Surat were appointed as Interns for the period of two months. NWA has brought out two Reports viz.

- i. Trend Analysis of Reservoir Storage
- ii. Catchment Delineation and Creation of GIS layers

G) Mass Awareness Activities.

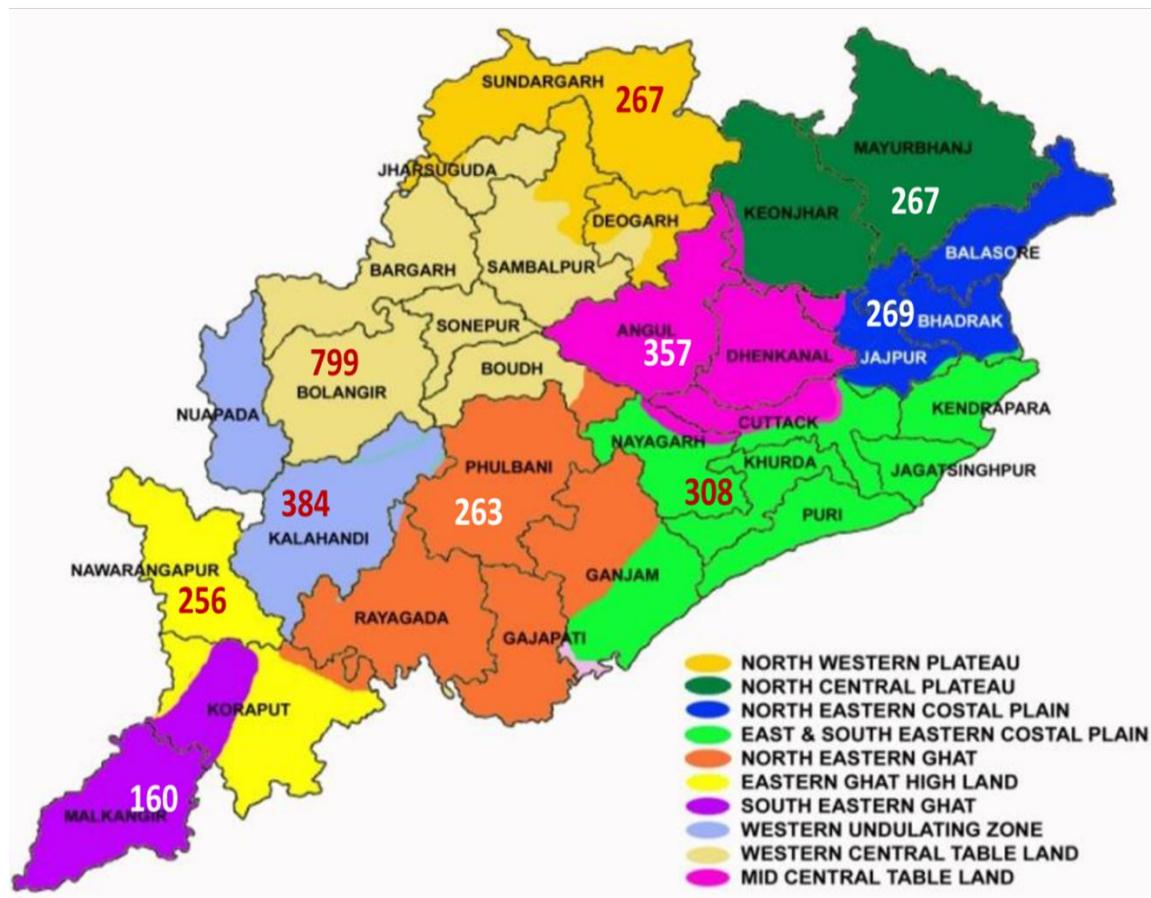
1. In addition to the technical programs and Mandatory Cadre Training programs, mass awareness activities are also taken up by NWA for promoting Water Conservation and Management. During the year 2021-22 batches of program on topic “Overview of Water Resources Sector of India” were conducted wherein 3193 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; one program on the topic “Overview of Water Resources Sector of India” was conducted for media professionals, wherein 35 media professionals (Print and Electronic) attended the program.



2. As per the directions of the Hon'ble Union Minister, Ministry of Jal Shakti, it was emphasized that awareness on overall water Resources scenario as well as its conservation and management should reach to the grassroot level. Hon'ble Minister suggested that, NWA should conduct Mass Awareness Program on “Water Conservation and Management” for the Zilla Parishad, Block Level and Panchayat Officials etc., such programs could be conducted in vernacular also. During the year, 2021-22 NWA, Pune in association with WALMI, Odisha conducted Training-cum-

Webinar on “Water Conservation and Management’ covering the 10 Agroclimatic Zones of Odisha through its 10 program. Total of 3330 officials representing PRIs of ZP, Block Level & Panachayat Officials, Office Bearers of Pani-Panchayat, Farmers attended these 10 programs.

#	Details	Dates	Duration in Weeks	No of Participants
i.	North Western Plateau	11-12 Nov 2021	0.4	267
ii.	North Central Plateau	17-21 Nov 2021	0.4	267
iii.	North Eastern Plateau	25-26 Nov 2021	0.4	269
iv.	East and South Eastern Coastal Plain	02-03 Dec 2021	0.4	308
v.	North Eastern Ghat	09-10 Dec 2021	0.4	263
vi.	Eastern Ghat High Land	16-17 Dec 2021	0.4	256
vii.	South Eastern Ghat	06-07 Jan 2022	0.4	160
iii.	Undulating	13-14 Jan 2022	0.4	384
ix.	Western Central Table Land	20-21 Jan 2022	0.4	799
x.	Western Central Table	27-28 Jan 2022	0.4	357
Total Participants attended the Program				3330



H) Visit of Foreign Delegates –

Due to COVID-19 pandemic no physical visit was permitted as per GoI India norms.

I) Distance Learning Program

Fourth International Distance Learning Course in Advanced Topics in Hydraulics, Hydrological Sciences and Hydrometeorology for Asian Region (WMO RA-II) as RTC of WMO – 91 officers participated in this Distance Learning Program. .

CHAPTER-XVI

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 2021-22, all new cases were taken up with the commitment of "Zero Tolerance against Corruption".

16.2 Observation of Vigilance Awareness Week

Vigilance Awareness Week was observed in CWC (Headquarters) along with all its field offices from 26th October to 01st November, 2021 with the theme "**Independent India @ 75 : Self Reliance with Integrity**".

CHAPTER-XVII**REPRESENTATION OF CENTRAL WATER COMMISSION 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. No.	Name of Committees/Boards/Panel of Experts/Technical Groups etc.	Representation of CWC	
		Officer	Position in Committee
1	Science and Technology Advisory Committee (STAC- MOWR)	Chairman, CWC	Member
2	Standing Advisory Committee(SAC) for R&D Programme	Chairman, CWC	Member
3	Indian National Committee on Surface Water	Chairman, CWC Member (D&R)	Chairman Member
4	National Water Board	Chairman, CWC Member (WP&P)	Member Member-Secretary
5	Water Resources Division Council (WRDC) of BIS	Chairman, CWC	Chairman
6	CEDC(Civil Engineering Divisional Council)	Member (D&R)	Member
7	Governing Council of CWPRS	Chairman, CWC	Member
8	Technical Advisory Committee to the Governing Council for Central Water and Power Research Station, Pune.	Chairman, CWC	Chairman

Sl. No.	Name of Committees/Boards/Panel of Experts/Technical Groups etc.	Representation of CWC	
		Officer	Position in Committee
9	Governing Council for Central Soil & Materials Research Station.	Chairman, CWC Member (D&R)	Member Member
10	Standing Technical Advisory Committee (STAC) to the Governing Council for CSMRS, New Delhi.	Member (D&R)	Chairman
11	National Institute of Hydrology Society (NIH Society)	Chairman, CWC Member(D&R)	Member Member
12	Governing Body of NIH	Chairman, CWC Member(D&R)	Member Alternate Member
13	Technical Advisory Committee of National Institute of Hydrology.	Chairman, CWC Member(D&R)	Chairman Member
14	High Powered Steering Committee for Implementation of National Projects.	Chairman, CWC Member (D&R)	Member Sp. Invitee
15	National Water Development Agency Society.	Chairman, CWC Member(D&R) Member(WP&P)	Member Member Member
16	Governing Body of National Water Development Agency.	Chairman, CWC Member(D&R) Member(WP&P)	Member Member Member
17	Special Committee for Interlinking	Chairman, CWC	Member
18	Taskforce for Interlinking of Rivers	Chairman, CWC	Member
19	Technical Advisory Committee of National Water Development Agency.	Chairman, CWC Member(WP&P) Member(D&R)	Chairman Member Member
20	Advisory Committee for consideration of Techno Economic viability of Major & Medium Irrigation, Flood Control and Multipurpose project proposals.	Chairman, CWC Member(WP&P) Member(D&R) Member(RM)	Member Sp. Invitee Sp. Invitee Sp. Invitee
21	Committee of CEA to accord of techno-economic appraisal of Power Schemes.	Member (D&R)	Permanent Special Invitee

Sl. No.	Name of Committees/Boards/Panel of Experts/Technical Groups etc.	Representation of CWC	
		Officer	Position in Committee
22	Brahmaputra High Powered Review Board	Chairman, CWC Member(RM)	Member Pmt. Invitee
23	Brahmaputra Board	Member(RM)	Member
24	Standing Committee of Brahmaputra Board	Member(RM)	Member
25	Pancheshwar Development Authority (PDA)	Chairman, CWC	Special Invitee
26	Narmada Control Authority (NCA)	Chairman, CWC	Invitee
27	National Level Steering Committee for World Bank assisted National Hydrology Project	Chairman, CWC	Member
28	National Crisis Management Committee (NCMC)	Chairman, CWC	Member
29	Indian Meteorological Department (IMD)	Member (D&R)	Hydrological Advisor
30	Governing Body of National Institute of Rock Mechanics (NIRM)	Member (D&R)	Member
31	National Committee on Dam Safety(NCDS)	Chairman, CWC Member(D&R)	Chairman Vice Chairman
32	National Committee on Seismic Design Parameters of River Valley Projects (NCSDP)	Member (D&R)	Chairman
33	Cauvery Technical Committee	Chairman, CWC	Chairman
34	Betwa River Board	Chairman, CWC	Member
35	Executive Committee of Betwa River Board	Chairman, CWC	Chairman
36	Bansagar Control Board	Chairman, CWC	Member
37	Executive Committee of Bansagar Control Board	Chairman, CWC	Chairman
38	Governing Body of NERIWALM	Chairman, CWC	Member
39	Sahibi Standing Committee	Member(RM)	Chairman
40	Ghaggar Standing Committee	Member(RM)	Chairman
41	Yamuna Standing Committee	Member(RM)	Chairman
42	Upper Yamuna River Board	Member(WP&P)	Chairman
43	Upper Yamuna Review Committee	Member(WP&P)	Member Secretary

Sl. No.	Name of Committees/Boards/Panel of Experts/Technical Groups etc.	Representation of CWC	
		Officer	Position in Committee
44	World Meteorological Organization	Member (D&R)	Principal Representative
45	Sardar Sarovar Construction Advisory Committee	Chairman, CWC	Member
46	India-Nepal Joint Team of Experts (JTE) on SaptaKosi high dam Multipurpose Project and Sun Kosi storage-cum-diversion scheme	Member(RM)	India Team Leader
47	Board of Directors of Tehri Hydro Development Corporation	Member (D&R)	Part Time Director
48	Board meeting of Punatsangchhu-I H.E. Project Authority (PHPA)	Member (D&R)	Permanent Invitee
49	Technical Coordination Committee (TCC) for Punatsangchhu - I H.E Project, Bhutan	Member (D&R)	Co-Chairman
50	Programme Advisory Committee (PAC) for Fly Ash Unit constituted by Department of Science and Technology	Member (D&R)	Member
51	Technical Advisory Committee of the Farakka Barrage Project.	Member (D&R)	Chairman
52	Farakka Barrage Project Advisory Committee (FBP-AC).	Member (D&R)	Chairman
53	Punatsangchhu-II Hydro Electric Project Authority Meetings.	Member (D&R)	Permanent Invitee
54	Technical Co-ordination Committee (TCC) of Punatsangchhu-II Hydro Electric Project	Member (D&R)	Co-Chairman
55	Mangdechhu HE Project Authority Meetings.	Member (D&R)	Permanent Invitee
56	Technical Co-ordination Committee (TCC) Mangdechhu HE Project	Member (D&R)	Co-Chairman
57	Empowered Joint Group meetings (EJG) (for monitoring of implementation of Hydro-power projects in Bhutan).	Member (D&R)	Permanent Invitee
58	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

Sl. No.	Name of Committees/Boards/Panel of Experts/Technical Groups etc.	Representation of CWC	
		Officer	Position in Committee
59	Committee of International Commission on large dams, India (INCOLD)	Member (D&R)	Member
60	National Environmental Monitoring Committee for River Valley Projects (NEMCRVP)	Member (WP&P)	Chairman
61	Programme Advisory Committee, NWA	Chairman, CWC	Chairman
62	Technical Evaluation Committee (TEC) on North Koel Project	Member (WP&P)	Chairman
63	Committee on Implementation of Shahpur Kandi Dam	Member (WP&P)	Chairman
64	Joint panel of CWC-ICAR	Chairman (CWC) Member (WP&P)	Chairman Member
65	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)	Chairman
66	Steering Committee for implementation of Ken-Betwa Link Project	Member (WP&P)	Chairman
67	Expert Committee on Polavaram Project	Member (WP&P)	Chairman

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 2021-22 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 acceptance during 2021-22.

In 2018, DoWR, RD & GR established *“Research Chair on Water Sector Conflicts and Governance at Centre for Policy Research, New Delhi”* for duration of three years. The deliverables of the above research scheme, i.e. (a). a monograph on Supreme Court’s intervention in Inter-state water disputes and their implications on policy formulations; (b) An updated compilation of inter-state water sharing agreements in India as a collaborative publication of CPR & CWC; (c) a policy brief based on analysis of interstate water sharing agreements, has been submitted and are under review.

ii. 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. Karmen Vella, Member of EU for Environment, Maritime Affairs & Fisheries.

As a follow-up action on the MoU, vide its note of 21.02.2017 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 1, the flexible IEWP Action Plan was tackling Nine Priority Areas for technical implementation. RBM approaches and mechanisms of the European Union have been blended with the ones in India in order to achieve sustainable practices that support the management of Indian River basins. In the IEWP Phase 2, 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 1 into one cluster that fosters the holistic management of river basins in India based on EU good practices that are merged with Indian approaches. This work area includes activities regarding the further implementation of the RBM cycle, the development of a RBM Toolbox and the detailing of the Tapi RBM Plan.
- Irrigation and Efficient Water Use
- Environmental Flows Assessment in a Ganga River sub-basin, and
- 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). Hands-on training of approaches and methods will be undertaken in combination with the implementation of individual activities, as relevant. 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			
Continued Implementation of the RBM Cycle		Facilitation towards piloting of EU Technologies		
Develop/Disseminate RBM toolbox			Opportunities for Indian Water Sector and Research / EU Horizon 2020	
Detailing of Tapi RBM Plan and gradual implementation			Trainings and knowledge dissemination	
Surface water / Groundwater				Involve EU and Indian partners to improve EU-India Policy dialogue
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: Organisation of the IEWP Phase 2 work areas as basis of a flexible Action Plan.

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. 116th meeting of TAC of FBP was held during 18th – 19th December 2020.

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. 35 meetings of STAC have been held so far. The last meeting of STAC was held on 18th June 2020.

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 members from NIH and Government of Bihar was constituted by DoWR, RD & GR in January 2020, to get an independent study

done by an independent Consultant on the issue of flood and siltation in River Ganga due to Farakka Barrage in the state of Bihar. The Committee has been assigned the task of finalizing Terms of Reference (ToR), Expression of Interest (EoI) and Request for Proposal (RFP) for the study as well as supervise/monitor the progress of the study.

ToR & RFP for the study were finalized in consultation with Government of Bihar. A Tender Evaluation Committee (TEC) was formed to finalize the criteria for bid evaluation and to carry out the Technical and Financial Evaluation of the submitted bids. Second meeting of the 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" was held on 05th Feb, 2021 under the chairmanship of Chairman, CWC. The meeting was attended by officers from Government of Bihar & NIH, Patna and other members of the Committee from CWC & DoWR, RD &GR (MoJS). Director, Hydrology(C) apprised the committee of the developments since the first meeting which was held on 20.02.2020. It was also informed that based on the technical and financial evaluation, the TEC has recommended the award of work to M/s RMSI Pvt. Ltd.

Subsequently, the contract was awarded to RMSI Pvt. Ltd with Balaji Surveyors as sub consultant. The time period for the study shall be 12 months starting from the date of effectiveness of the contract (1st April, 2021).

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):

It involves the study of Ramganga, Barak, Narmada, Cauvery & west Flowing Rivers in Western Ghat - Kuttiadipuzha Basin, Peechi Basin, Mangalam Basin. The primary objective of the project 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 seven river basins in India. The study will try to understand the behaviour of sediment entering into a storage reservoir and getting deposited progressively with the passage of time, thereby reducing the dead as well as live storage capacity of the reservoir and how this sediment affects the braiding and erosional characteristics & course of alluvial rivers impacting the ecology and biology of the nearby settlements.

The consultancy contract for the Project was signed on 14th October 2020 and commenced on 16th November 2020 with mobilization of project team at CWC (HQ). The project is being monitored by a Technical Advisory and Review Committee (TARC)

formed by Chairman, CWC. The Inception Report has been submitted by the Consultant on 16.03.2021.

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 Chairman 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 13 Sectional Committees of CEDC. FE&SA and CMDD (NW&S) are the Nodal Directorates in CWC dealing with works of WRDC & CEDC of Bureau of Indian Standards, respectively at CWC.

Since Chairman, CWC is the Chairman of WRDC, the approval of draft codes and amendments to BIS Codes for adoption and printing are processed in CWC and approval of Chairman is communicated to BIS. During the current year, 13 draft standards/amendments to BIS codes have been approved by Chairman for adoption and printing.

17.4 International Commission on Irrigation and Drainage

International Commission on Irrigation and Drainage (ICID), with its headquarters at New Delhi, is an International scientific, technical, not-for profit, non-governmental organization with representation from about 80 countries. ICID was established in the year 1950 and India is one of the founding Members. It is a knowledge-sharing and facilitation platform comprising of a professional network of global experts in the field of irrigation, drainage and flood control. The mission of the ICID is to stimulate and promote the development of arts, science, techniques of engineering, agriculture, economics, ecology and social sciences in managing irrigation, drainage, flood control and river training applications including research and development and capacity building, adopting comprehensive projects and promote state-of-the-art techniques for sustainable agriculture in the world.

The Indian National Committee for Irrigation & Drainage (INCID) was reconstituted in August, 2019 by DoWR, RD & GR as National committee for ICID which is engaged in bringing the technological improvements in irrigation sector in India. Its Chairman is Chairman, CWC and Member-Secretary is Chief Engineer (EMO) with secretariat at Remote Sensing Directorate of CWC. The activities/ achievement under the platform are as under:

1. A virtual online meeting of INCID was held on 06.08.2020 regarding the role of INCID and its proposed collaborative possibilities and opportunities with States and Professionals working in the field of Irrigation and Drainage. Also, suggestions from States / Members to discuss the engagement of States and Professionals in the activities of INCID were highlighted.
2. The 75th International Executive Council (IEC) and 25th Congress of ICID is scheduled to be held at Vishakhapatnam, Andhra Pradesh in November, 2023. The ICID events are happening in India after a long gap of 57 years. The discussion with A.P. Government officers were held regarding the same.
3. India received its first WatSave Award (2020) for Micro irrigation with Fertigation (Andhra Pradesh) awarded to Sh. Mekala Siva Shankar Reddy in the Farmer category of WatSave award.
4. Moreover, 4 nominations submitted by India for the WHIS awards 2020 namely Cumbum Tank (A.P), Porumamilla Tank (A.P), Dhamapur Lake (Maharashtra), and K-C Canal (A.P) were chosen as winners of the World Heritage Irrigation Structure (WHIS) award for 2020, from India.

17.5 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 activities/ achievement under the platform during the year 2021-22 are as under:

- A. The second meeting of INCID was held in July, 2021 (first part) and October, 2021 (second part) wherein deliberations were held on action plan to take forward the Terms of Reference (ToRs) of INCID and the preparedness for organizing 25th ICID International Congress and 75th IEC (International Executive Council) meeting scheduled in November' 2023 at Vishakhapatnam (A.P.) being organized in India after about 56 years.

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. In 2021, India won the highest number (**4 no**) of WHIS awards which are listed below:

- i. Dhukwan Weir, Uttar Pradesh
- ii. Grand Anicut, Tamil Nadu
- iii. Veeranam Tank, Tamil Nadu
- iv. Kaligarayan Anicut & Channel System, Tamil Nadu



Dhukwan Weir (Uttar Pradesh)



Grand Anicut (Tamil Nadu)



Veeranam Tank (Tamil Nadu)



Kaligarayan Anicut & Channel System (Tamil Nadu)

B. The 25th Congress and 75th International Executive Committee (IEC) Meeting of ICID are scheduled to be held in Vizag, Andhra Pradesh in November 2023. The Congress is being held in India after more than five decades. The INCID in association with ICID and the state govt of Andhra Pradesh is actively engaged in the planning of the various aspects of the event including the theme, venue finalization, event schedule, logistics etc. The visit to Vizag was made during 8-10 March 2022 to identify the venue for hosting the event. The event is likely to have participation of about 1200 delegates (including about 500 international delegates) from all over the globe.

C. INCID and NWA, Pune have started organising the WALMI - Meet 2022, commencing from 22.02.2022. The event has **One Week - One Institute** Webinar presentations for faculty/officials of all the WALMIs/IMTIs etc. The event has been planned in view of the huge gap between the technological developments vis-à-vis its application in water sector on one hand and need for behavioural change in water conservation and utilization practices by the people at large on the other.

CHAPTER –XVIII

PUBLICITY AND PUBLICATION

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 7 publications have been constituted with the approval of Member (WP&P), CWC. The details of publications are given below:

i. 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 the publication is collected from various Directorates of CWC, various Ministries/Departments and other organizations. The important information included in the publication is as under:

- Per Capita Average Annual Availability of Water in India during 2025 & 2050
- Basin-wise Storage in India
- State-wise Live Storage Capacity
- Storage Position of Important Reservoirs of India
- State-wise details of Hydrological Observations Sites
- Basin-wise details of Hydrological Observations Sites
- Basin/State-wise details of Hydro-Meteorological Observations Stations of Central Water Commission
- State/Basin-wise details of Hydro-Meteorological Observations Stations of Central Water Commission
- State-wise Ground Water Resources of India, 2020
- State-wise Categorization of Blocks/Mandals/Talukas in India during 2020
- State-wise Ultimate Irrigation Potential
- Abstract of Large Dams (State-wise & Decade-wise)
- Details of Plan-wise Position of Irrigation Potential Created and Utilized (in Mha)
- Irrigation Potential Creation of MMI, Minor Irrigation Projects and other Schemes

- State-wise Irrigation Potential Created by Major and Medium Irrigation Projects under AIBP-PMKSY
- State-wise Number of Major, Medium and ERM Irrigation Projects
- Physical Achievements of Field Channels under CAD Programme by States.
- List of Water Resources Projects declared as National Projects
- Percentage of Rural Population getting Safe and Adequate Drinking Water within their premises through Pipe Water Supply (PWS)
- Percentage of Rural Population getting Safe Drinking Water using Improved Drinking Water Sources
- Status of Hydro Electric Potential Development - Region and State-wise
- Status of Hydro Electric Potential Development – Basin-wise
- Hydro Electric Power Installed Capacity and Generation - All India (Utilities)
- Accelerated Irrigation Benefits Programme (AIBP)
- Command Area Development & Water Management Programme (CAD&WM)
- Pradhan Mantri Krishi Sinchayee Yojana (PMKSY)
- Repair Renovation and Restoration (RRR) of Water Bodies Scheme
- Central Sector Water Resources Projects including Namami Gange Projects
- Namami Gange Programme
- Year-wise Central Assistance Released to States for Major, Medium and ERM Projects under AIBP-PMKSY
- Expenditure Status of 99 Priority Projects under PMKSY-AIBP
- Central Assistance and Irrigation Potential Status of 99 Priority Projects under PMKSY-AIBP
- CAD&WM Inclusion Status
- State-wise Status (Expenditure Progress) of Proposal on CAD&WM Component for 99 Prioritized Projects
- State-wise Status (Financial and Physical Progress) of Proposal on CAD&WM Component for 99 Prioritized Projects
- State-wise and Plan-wise Financial Expenditure on Minor Irrigation (Institutional)
- Fund Released to States for the Water Bodies included during XII plan & onwards under RRR of Water Bodies Scheme
- State/UTs - wise Water Rates for Flow Irrigation
- State/UTs - wise Water Rates for Lift Irrigation
- Flood Damage during 1953 To 2019
- State-wise Damage due to Flood During 2019
- Flood Forecasting Information in India

- Comparative Flood Forecasting Performance from 2000 To 2019
- Site-wise “Forecast Performance” of Flood Forecasting Sites of CWC in Flood Season, 2019
- Extreme Flood Events in India under CWC FF&W Network - 2019 Flood Season
- Above Normal and Severe Flood Events on main Ganga and its tributaries- 2019 Flood Season
- Above Normal and Severe Flood Events on main Brahmaputra and its tributaries- 2019 Flood Season
- Above Normal and Severe Flood Events on Various River Systems (Excluding Ganga and Brahmaputra Basins) 2019 Flood Season

The latest available edition of this publication is of October, 2021 which is available at the website of CWC.

ii. Compilation of Status of Ongoing major and Medium Projects (Periodicity: Annual)

The publication titled ‘Compilation of Status of Ongoing Major and Medium Projects’ is brought out on annual basis. This is a revised version of erstwhile publication ‘Handbook on Water and Related Information’. This publication provides the following information collected from the various Directorates of CWC, NWIC and CAD&WM Wing of M/o Jal Shakti, D/o WR, RD & GR:

- Irrigation & Multi-purpose (Major & Medium) Projects under Appraisal in CWC
- Details of Irrigation & Multi-purpose (Major) Projects under Appraisal in PAO, CWC
- Map depicting locations of Irrigation & Multi-purpose (Major) projects under appraisal in PAO, CWC
- Projects Accepted By Advisory Committee of M/o Jal Shakti, D/o Water Resources, RD & GR
- Projects which have been accorded Investment Clearance by M/o Jal Shakti, D/o Water Resources, RD & GR
- Status of Major, Medium and ERM Irrigation Projects
- Details of Projects for XII Plan Formulation
- Central Loan Assistance (CLA)/Central Assistance (CA) released for Major, Medium, ERM projects under AIBP
- State-wise maps depicting locations of Major, Medium and ERM projects under AIBP
- Project-wise Irrigation Potential Created under AIBP

- Declared National Projects
- Map depicting locations of declared National projects
- Projects included under the scheme RRR of Water Bodies
- Status of Water Bodies & Funds released under the RRR of Water Bodies Scheme
- Central Assistance Released under CAD&WM Programme
- Water User Associations formed and Area covered

The latest available edition of this publication is of December, 2020 which is available at the website of CWC. The next edition of this publication for the year 2021 is under submission for approval.

iii. 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. This is a revised version of erstwhile publication "Integrated Hydrological Data Book" (Non-classified River Basins). The important information included in the publication is as follows:
- List of all non-classified basins, assessment of water resources and an account of per capita availability of water
- Salient features of each basin like geographical location, topology, topography, major tributaries, soil characteristics, availability of minerals, major industries, urban centers and important irrigation projects
- An account of average annual flow, estimated utilizable flow and total storage capacity 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 ten years
- Time series 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, Maximum and Minimum values of water quality parameters site-wise in a river basin.
- Land use statistics in the form of land utilization pattern of the non-classified river basins, gross and net area irrigated source wise and basin-wise.

- 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.

iv. Financial Aspects of Irrigation Projects in India (Periodicity 5 Year)

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 is 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
- Plan-wise and State-wise Cumulative Irrigation Potential Created/Utilized in respect of Major & Medium Irrigation Projects

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 available edition of this publication is of December, 2020 which is available at the website of CWC. The next edition will be available in 2025.

v. Comprehensive Flood Management in India (Periodicity five years):

The publication is brought out at quinquennial basis (once in 5 years) and it intended to provide documentation of available data on comprehensive flood management in India. This is a revised version of erstwhile publication 'Financial Aspects of Flood Control, Anti-Sea Erosion and Drainage Projects'. 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 September, 2018 which is available at the website of CWC. The publication is due in 2023.

vi. Pricing of Water in Public System in India (Periodicity 5 years):

This publication is brought out on quinquennial basis (once in 5 years) and contains information on water rates for Lift and Flow Irrigation and Gap in revenue assessed & realized 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:

- Water Rates, Revenue and Operational Expenses
- System of Assessment and Collection of Revenue
- Financial Aspects of Major & Medium Irrigation Projects
- States/UTs-wise flow and lift Irrigation rates for all crops
- States/UTs-wise water rates (flow & lift) for specific crops viz paddy, wheat, sugarcane, cotton etc.
- Gap in Revenue assessed and Realised for States/UTs

The latest available edition of this publication is of March, 2017 which is available at the website of CWC. The latest publication for the 2022 is under submission for approval.

vii. **Abstract on Water Sector (Periodicity: Annual)**

The present publication 'Abstract on Water Sector' is a new initiative for providing a gist of water resources and related aspects at all India level. It is to be brought out on annual basis. The first edition of this publication is released in December, 2020 which is available at the website of CWC. This publication provides a gist on the following 8 Sections:

- National Water Policy
- Water Resources at a Glance
- Navigation-Inland Water and Transport
- Land-Use Statistics
- Hydro-Electric
- Flood Management
- Financial Aspects
- International Treaties and Cooperation

The next edition of this publication is under submission for approval for the year 2021.

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 2021-22, following Volumes were published:

Bhagirath (English) Journal	Annual Issue 2019
Bhagirath (Hindi) Journal	Annual Issue 2019

CWC has developed an online system, namely, e-Bhagirath to streamline the process of collection, compilation, editing and verification of various articles under Bhagirath. This system can be used by any user for submission of his article.

<http://202.159.215.252:85/>

This system also hosts the previous publications of Bhagirath.

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 2021-22, total of twelve monthly newsletters (from April-21 to March-2022) 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 was also required so that more people could understand and know about the functions of CWC. The Hindi translation of Jalansh is also 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 Chairmanship 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 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 water sector. Due to COVID-19 pandemic, no visits of school children were organised. However, on behalf of DoWR, RD&GR, MoJS, CWC participated in the exhibition related with water resources sector viz Signing Uttar Pradesh 2021 at Varanasi, UP from 19-21 Oct, 2021, Agro Vision 2021 from 16th to 18th December, 2021 at Indian Institute of Sugarcane Research, Lucknow, UP, Agro Vision

2021, 24th to 27th December, 2021 at Nagpur, Maharashtra, World Expo at Dubai from 20-26 March, 2022, Shining Maharashtra 2022 from 25-27 March, 2022 at Phaltan, Maharashtra and Jal Prahari Samman Samaroh 2022" 30th March, 2022 at Constitution Club Rafi Marg, New Delhi.

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 was commenced on 12th March 2021 starting a 75- week countdown to our 75th anniversary of independence and will end post a year on 15th August 2023. CWC is celebrating Azadi Ka Amrit Mahotsav by organising events/exhibitions and performing various activities at HQ and Field offices.



Exhibition of images of Freedom Fighters by IBO, Chandigarh



Public awareness on the principles of Mahatma Gandhi by MTBO, Gandhinagar



Mass awareness programme on Drip Irrigation and Rainwater Harvesting by UGBO, Lucknow



Public Showcasing of achievements in Early warning (Flood Forecast) by IBO, Chandigarh



18.7 Mass Awareness Activities:

On behalf of Ministry of Jal Shakti, Department of Water Resources, River Development and Ganga Rejuvenation Central Water Commission successfully participated in the program "Exhibition of SHINING MAHARASHTRA -2022 from 25th to 27th March, 2022 at Shubharambh Lawns, Phaltan, Maharashtra.



18.8 Publication of Water Resources at a Glance - 2022:

CWC is bringing this annual compilation to cover the details of various information like Land and Water Resources of India, Water Resource Potential of River basins in India, Storage capacities of reservoirs across India, information about large dams,

status of irrigation potential created and utilized, expenditure on Major & Medium Irrigation projects, status of Hydroelectric potential and its development, various projects approved by the Advisory Committee of Ministry, Summary of Hydro-met Observations and Flood Forecasting sites of CWC, details about the projects under Pradhan Mantri Krishi Sinchayee Yojana(PMKSY)/ AIBP, physical achievement under Flood Management works, National Projects, External assistance for WR projects, Morphological studies of rivers, Dam Rehabilitation and Improvement Project(DRIP) etc. This can be accessed from the following link:

<http://cwc.gov.in/sites/default/files/latest-water-resources-glance-2022.pdf>

18.9 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 159 publications were registered during April, 2021 to March, 2022.

Annexure - 5.1**List of Consultancy Projects in D&R Wing during the Year 2021-22**

Sl. No.	Name of Project
Construction Stage Projects	
Andhra Pradesh	
1	Polavaram Irrigation Project
Chhattisgarh	
2	Arpa Bhaisajhar Barrage Project (Arpa river)
Gujarat	
3	Garudeshwar Weir Project
4	Bhadbhut Barrage Project Phase I
Haryana	
5	Adi Badri Dam, Somb Saraswati Barrage Project
Himachal Pradesh	
6	Phina Singh Medium Irrigation Project
Jharkhand	
7	North Koel Reservoir Project (Mandal Dam)
8	Icha Dam Under Subarnarekha M.P.Project
Karnataka	
9	Rehabilitation of sluice gates for Krishna Raja Sagar
Meghalaya	
10	Ganol H.E.Project
Odisha	
11	Anandpur Barrage Project
12	Chheligada Irrigation Project
13	Hirakund H.E Project Additional Spillway
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
Uttar Pradesh	

Sl. No.	Name of Project
19	Arjun Sahayak Pariyojna
20	Kanhar Irrigation Project
21	Vetting of Designs & Drawings of intake well & Approach Bridge in Rajghat reservoir
Uttarakhand	
22	Tehri Pump Storage Project
23	Lakhwar Multi-Purpose Project
24	Vishnu gad Pipalkoti HEP
25	Dhukwan SHP
Bhutan	
26	Punatsangchu Stage-I H.E. Project
27	Punatsangchu Stage-II H.E. Project
Nepal	
28	Arun-3 HEP
DPR Stage Projects	
Andaman & Nicobar Islands	
1	Development of Fresh Water Lake at Flat Bay, Port Blair
Assam	
2	Katakhali Irrigation Project
Himachal Pradesh	
3	Satyar Khad Project
Jammu & Kashmir	
4	Barinium Hydroelectric Project
5	Ujh Multi Purpose Project
Jharkhand	
6	Bhuswa Reservoir Scheme
7	Barkattha Reservoir Scheme
8	Bhelwa Reservoir Scheme
9	Khuntishot Reservoir Scheme
10	Bhur Reservoir Scheme
11	Sonadubi Reservoir Scheme
12	Khudia Reservoir Scheme
13	Birmati Reservoir Scheme

Sl. No.	Name of Project
Maharashtra	
14	Daman Ganga, Ekdare-Godavari Inter State Link
15	Daman Ganga (Val/Vagh)-Vaitarna -(Upper Vaitarna)-Godaveri (Kadva-Dev) Intra State Link Irrigation Projects.
Orissa	
16	Vetting of Designs & Drawings of proposed Weirs/Barrages on National Waterways-5.
Tripura	
17	Haora Dam Project
18	Champai cherra Projects
Uttarakhand	
19	Kishau Multi Purpose Project
Uttar Pradesh	
20	Ayothya Barrage Project
21	Two barrages across Ken River in the downstream of existing Bariyapur pickup weir, Uttarpradesh 2nos
22	Consultancy for Design & Preparation of the DPR for the proposed Panchnad Barrage of Yamuna River in District, Auraiya, Uttar Pradesh.
West Bengal & Odisha	
23	Subarnarekha- Mahanadi Interlinking Project
Afghanisthan	
24	Shatoot dam Project
Bhutan	
25	Kuri Gongri H.E.Project
Indo- Nepal	
26	Sapta Kosi Multi-Purpose Project
27	Sun Kosi Multi-Purpose Project
Sp. Problem Projects	
Andra Pradesh	
1	Polavaram Irrigation Project
Arunachal Pradesh	
2	Ranganadi HEP (3*35MW)
Assam	
3	Khandong Power house (2*23MW)
4	Kopili HE Project (200 MW)
5	Amjur Drainage Development Scheme

Sl. No.	Name of Project
Bihar	
6	Durgawati Dam Project
Gujarat	
7	Sardar Sarovar H.E. Project
Haryana	
8	Remedial measures to check recurring damages on D/S side of Hatnikund Barrage on river Yamuna
Himachal Pradesh	
9	Shong tong Karcham H.E. Project (450 MW) H.P
10	Karcham Wangtoo HEP (1000 MW)
Little Andaman	
11	RK Pur and VK Pur
Madhya Pradesh	
12	Spillway Tunnel of Gandhisagar Reservoir
13	Indra Sagar Dam Muniiti Purpose Project
Odisha	
14	Upper Indravati hydro Elcetric Project
Punjab	
15	Setting up of Mini Hydel Projects on Bhakra Main Line (BML) Canal at 27 sites with a total capacity of 63.75 MW
Rajasthan	
16	Analysis and resolution of Deficit discharge in the Rajasthan portion of Narmada Main Canal
Telengana	
17	Nagarjuna Sagar Project left main canal
18	Srisailam Project Hydro Electric (EDA)
19	Srisailam Left Bank Hydro electric Project
Uttarakhand	
20	Tapovan Vishnugad HEP
Uttar Pradesh	
21	Dodhara chandni Main Canal (DCMC on Indian Side)
West Bengal	
22	Bagjola Daraiaage Development Scheme
23	Farakka Barrage Project

Sl. No.	Name of Project
24	Bindu Barrage, Jaldhaka, H.E Project

Annexure-7.1**List of the Irrigation / Multipurpose Projects Accepted by the Advisory Committee of DoWR, RD & GR during 2021-22**

Sl. No.	Project Name	State	Type of the project	Est. Cost (Rs. in Crore)	Irrigation Benefits (in Ha)
1	Bina Complex Irrigation and Multi-Purpose project (A component of Ken-Betwa Link Project, Phase-II)	Madhya Pradesh	Multipurpose	3353.62 (PL 2017-18)	CCA-96000 Ha Power- 25MW Drinking -19.2 MCM Industrial-25 MCM BC Ratio- 1.502
2	Lower Orr Dam Project under Ken Betwa Link Project (Phase-II)	Madhya Pradesh	Multipurpose	2657.04 (PL 2017-18)	CCA-90000 Ha Drinking -6 MCM Power-19 MW (solar) BC Ratio- 1.54
3	Kotha Barrage Project under Ken Betwa Link Project (Phase-II)	Madhya Pradesh	Irrigation (Major)	709.47 (PL 2017-18)	CCA-20000 Ha Power- 8 MW (solar) BC Ratio- 1.63
4	Modified Ujh Multipurpose Project	Jammu & Kashmir	Multipurpose	11907.77 (PL December, 2019)	CCA-40716 Ha Power-89.5 MW Drinking-18.92 MCM Industrial-20.00 MCM BC Ratio- 0.79
5	RCE of ERM of Loktak Lift Irrigation Project, Phase-I	Manipur	Irrigation (Major ERM)	81.59 (PL Dec, 2020)	CCA-12600 Ha BC Ratio- 4.20

Annexure - 7.2

**List of the Flood Control Schemes Accepted by the Advisory Committee of
DoWR, RD&GR during 2021-22**

S.R No.	Name of the Project	State	Type of the project	Estimated Cost (in crore)	Intended Benefits
1	Erosion protection at right bank & ghat construction work at left bank of Mandakini river in Chitrakoot Distt. Satna	Madhya Pradesh	Flood Control	30.09 (PL: April,2021)	Population benefitted- 3650 Area benefitted- 181.5 ha BC ratio- 1.11

Annexure - 7.3**The list of H.E Project accepted by TEC during 2021-22**

S1 No.	Project Name	State	Capacity (MW)
1.	Wah-Umium Stage-III	Meghalaya	85
2.	Thana plaun	Himachal Pradesh	191
3.	Dugar	Himachal Pradesh	500
4.	Pinnapuram	Andhra Pradesh	1200
Total			1976

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 (in CroresRs.)	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=95.714 Total= 3631.638	Project is under execution.
2.	Shahpurkandi, Punjab	1) 0.37 lakh 2) 206MW 3) 0.012MAF 120.88 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 Total= 282.6498	Project is under execution..
3.	Teesta Barrage, West Bengal	1) 9.23 lakh 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.

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 (in CroresRs.)	Status
4.	Renukaji, HP	1) Drinking water 2) 40 MW 3) 498.33 MCM (Live)	2018-19=446.96 2021-22=1048.535 Total= 1495.495	<p>Revised cost finalised as 6946.99 Cr. at price level October, 2018. One-time special grant of Rs 446.96 Cr was provided as per order of Hon'ble Supreme Court.</p> <p>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 as a grant under PMKSY - HKKP in the matter of Regular First Appeal RFA 161/2019 in compliance to Hon'ble High Court Order dated 30.07.2021.</p> <p>On Account Payment of Grant Component of Central Assistance under AIBP Capital Asset (PMKSY) for the State Annual Plan 2021-22 for Rs 1037.925 Cr were issued vide DoWR, RD & GR Letter dated 03.03.2022.</p>

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 (in Crores Rs.)	Status
5.	Lakhwar Multipurpose Project, Uttarakhand	1) 0.338 2) 300MW 3) 587.84 MAF	-	<p>RCE of the project amounting to Rs. 5747.17 Cr. at PL 07/2018 was accepted during 141st Advisory Committee meeting held on 11.02.2019.</p> <p>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.</p> <p>Funding of Lakhwar MPP has also been approved by Cabinet Committee on Economic Affairs (CCEA) in its meeting held on 15.12. 2021.</p>
6.	Kishau, HP/ Uttarakhand	1) 0.97 Lakh 2) 600 MW 3) 1824 MCM (Gross)	-	<p>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).</p> <p>Inception Report' in view of upgradation/revision of Kishau DPR has been submitted by KCL vide letter dated 18.04.2022.</p>

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 (in CroresRs.)	Status
7.	Ken Betwa, Madhya Pradesh	1) 9.04 Lakh 2) 130 MW 3) 3495 MCM	2021-22=1495.495	<p>Funding of Ken-Betwa Link Project has been approved by Cabinet Committee of Economic Affair (CCEA) in its meeting held on 08.12.2021.</p> <p>KBLP Phase- II have been accepted by Advisory Committee of DoWR, RD&GR in its 148th meeting held on 17.01.2022.</p> <p>Ken Betwa Link Project Authority (KBLPA) and steering committee constituted via Gazette notification dated 09.02.2022.</p>
8.	Bursar, J&K	1) 1.74 lakh (indirect) 2) 800 MW 3) 616.74 MCM	-	Under appraisal in CWC/CEA.
9.	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.
10.	2 nd Ravi Vyas Link, Punjab	Harness water flowing across border (about 715.42 MCM. in non-monsoon period)	-	Under PFR stage
11.	Ujh Multipurpose Project, J&K	1) 0.77 lakh 2) 196 MW 3) 925 MCM (Gross)	-	Estimated cost of Rs. 11907.77 Cr. (at December, 2019-PL) was accepted by Advisory Committee of DoWR, RD & GR in its 148 th Meeting held on 17.01.2020.

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 (in Crores Rs.)	Status
12.	Kulsi Dam Project, Assam	1) 0.0395 lakh GIA 2) 55 MW 3) 525.64 MCM (Gross)	-	Under appraisal in CWC / CEA. The State is to decide ownership, funding of their part and enter into Memorandum of Agreement (MoA) with the State of Meghalaya.
13.	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.
14.	Upper Siang, Arunachal Pradesh	1) Indirect 2) 9750 MW 3) 1.44 MAF 4) Flood moderation	-	DPR under preparation
15.	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 Total = 2243.105	Project is under execution. The project was inaugurated by the Hon'ble Prime Minister Shri Narendra Modi on 11 th December, 2021.
16.	Polavaram Irrigation Project, Andhra Pradesh	1) 4.68 lakh ha 2) 960 MW 3) 1.73 MAF 4) 23.44 TMC of water to Vizag city for drinking and Industrial Purpose and Diversion of 84.70 TMC to Krishna.	2014-15= 250.00 2015-16= 600.00 2016-17= 2514.16 2017-18= 2000.00 2018-19= 1400.00 2019-20= 1850.00 2020-21= 2234.20 2021-22= 1178.90 Total= 12027.26	Project is under execution. Central Assistance of Rs. 562.47 Cr also provided under AIBP prior to declaration of National Project.

Annexure - 8.1

State-Wise and Project-Wise List of Projects under AIBP - Target & Achievements of Monitoring Visits during 2021-22

Sl. No	State/Project Name	Major/ Medium/ ERM	Date of Visit	Remarks
	ANDHRA PRADESH			
1	Yerrakalva Res.	Med.	--	Ongoing
2	Tadipudi LIS	Maj.	--	Ongoing
3	Pushkara LIS	Maj.	--	Ongoing
4	Gundlakamma	Maj.	05.07.2021	Ongoing
5	Thotapally Barrage	Maj.	--	Ongoing
6	Tarakaramathirtha Sagaram	Med.	--	Ongoing
7	Musurumilli	Med.	--	Ongoing
8	Maddigedda Res. Project			Completed
	TOTAL=08			
	ASSAM			
9	Dhansiri	Maj.	--	Ongoing
10	Champamati	Maj.	--	Completed
11	Borolia	Med.	--	Ongoing
	TOTAL=03			
	BIHAR			
12	Durgawati	Maj.	20-22.10.2021 28-29.03.2022	Ongoing
13	Punpun	Maj.	--	Ongoing
	TOTAL=02			
	CHHATISGARH			

Sl. No	State/Project Name	Major/ Medium/ ERM	Date of Visit	Remarks
14	Kelo Project	Maj.	28-30.03.2022	Ongoing
15	Kharung	ERM	15-16.07.2021	Completed
16	Maniyari Tank (ERM)	Maj	17.01.2022	Completed
	TOTAL=03			
	GOA			
17	Tillari	Maj.	--	Ongoing
	TOTAL=01			
	GUJARAT			
18	Sardar Sarovar	Maj.	--	Ongoing
	TOTAL=01			
	UNION TERRITORY OF JAMMU & KASHMIR			
19	Rajpora Lift	Med.	--	Completed
20	Tral Lift	Med.	22.06.2021	Completed
21	Restoration & Mod. Of Main Ravi Canal	ERM	--	Completed
	UNION TERRITORY OF LADAKH			
22	PrakashikKhows Canal	Med.	18.09.2021	Ongoing
	TOTAL=04			
	JHARKHAND			
23	Subernarekha Multipurpose	Maj	22-25.02.2022	Ongoing
	TOTAL=01			
	KARNATAKA			
24	Karanja	Maj.	--	Completed
25	Bhima LIS	Maj.	--	Completed
26	Upper Tunga Irrigation Project	Major	--	Ongoing
27	Sri Rameswar Irrigation	Major	--	Completed
28	NLBC System Project(New ERM)	ERM	--	Ongoing
	TOTAL=05			

Sl. No	State/Project Name	Major/ Medium/ ERM	Date of Visit	Remarks
	KERALA			
29	Muvattupuzha	Maj.	--	Ongoing
30	Karapuzha	Med.	--	Ongoing
	TOTAL=02			
	MADHYA PRADESH			
31	Indira Sagar Unit II (Ph I &II)	Maj.	--	Completed
32	Indira Sagar Canal Ph. III	Maj.	--	Ongoing
33	Indira Sagar Unit IV	Maj.	--	Ongoing
34	Indira Sagar Unit V	Maj.	--	Completed
35	Bansagar Unit-II	Maj.	--	Completed
36	Sindh Phase II	Maj.	--	Completed
37	Mahi	Maj.	--	Ongoing
38	Bariarpur LBC	Maj.	--	Completed
39	Mahan	Maj.	--	Completed
40	Omkareswar, Ph.-II	Maj.	--	Completed
41	Omkareswar, Ph.-III	Maj.	--	Ongoing
42	Omkareswar, Ph.-IV	Maj.	--	Completed
43	Bargi Diversion Ph- I	Maj.	--	Completed
44	Bargi Diversion Ph -II	Maj.	--	
45	Bargi Diversion Ph -III	Maj.	25.08.2021	Ongoing
46	Bargi Diversion Ph-IV	Maj.	26.08.2021	Ongoing
47	Pench Div-I	Maj.	--	Ongoing
48	Sagar (Sagad)	Med.	--	Completed
49	Singhpur	Med.	--	Completed
50	Sanjay Sagar (Bah)	Med.	--	Completed
51	Mahuar	Med.	--	Completed

Sl. No	State/Project Name	Major/ Medium/ ERM	Date of Visit	Remarks
	TOTAL=14 (including phases 21)			
	MAHARASHTRA			
52	Gosikhurd [NP]	Maj.	24-26.06.2021	Ongoing
53	Waghur	Maj.	--	Ongoing
54	Upper Pen Ganga	Maj.	--	Ongoing
66	Bawanthadi [IS]		--	Completed
56	Lower Dudhna	Maj.	--	Completed
57	Tillari		--	
58	Warna	Maj.	--	Completed
59	Lower Wardha	Maj.	--	
60	Khadakpurna	Maj.	--	Completed
61	Dongargaon	Med.	--	Completed
62	Bembla	Maj.	10-11.08.2021	Ongoing
63	Sangola Branch Canal	Maj.	--	Ongoing
64	Tarali	Maj.	--	Ongoing
65	Dhom Balakwadi	Maj.	--	Completed
66	Morna (Gureghar)	Med.	--	Ongoing
67	Arjuna	Med.	--	Ongoing
68	Lower Pedhi	Maj.	--	Ongoing
69	Upper Kundalika	Med	--	Completed
70	Wang Project	Med	--	Ongoing
71	Lower Panzara	Med	--	Completed
72	Aruna	Med	--	Ongoing
73	Krishna Koyana Lift	Maj.	--	Ongoing
74	Naradave (Mahammadwadi)	Med	--	Ongoing
75	Gadnadi	Med	--	Ongoing

Sl. No	State/Project Name	Major/ Medium/ ERM	Date of Visit	Remarks
76	Kudali	Med	--	Ongoing
77	Nandur Madhmeshwar Ph-II		--	Completed
	TOTAL=26			
	MANIPUR			
78	Thoubal	Maj.	--	Ongoing
79	Dolaithabi Barrage	Med.	--	Completed
	TOTAL=02			
	ORISSA			
80	Upper Indravati (KBK)	Maj.	--	Completed
81	Subernarekha	Maj.	10-11.02.2022	Ongoing
82	Anandpur Barr./ Integrated Anandpur Barr.	ERM	--	Ongoing
83	Lower Indra(KBK)	Maj.	--	Completed
84	Telengiri (KBK)	Maj.	--	Completed
85	RET Irrigation (KBK)	Med.	--	Completed
86	Kanupur	Maj.	--	Ongoing
87	Rukura-Tribal	Med	27.12.2021	Completed
	TOTAL=08			
	PUNJAB			
88	Kandi Canal Extension (Ph.II)	ERM	--	Completed
89	Rehabilitation of 1 st Patiala Feeder and Kotla Branch Project	ERM	--	Completed
	TOTAL=02			
	RAJASTHAN			
90	Narmada Canal	Maj.	--	Completed
91	Mod. of Gang Canal	ERM	--	Completed

Sl. No	State/Project Name	Major/ Medium/ ERM	Date of Visit	Remarks
	TOTAL=02			
	TELANGANA			
92	Indiramma FFC of SRSP	ERM	22.09.2021 04.03.2022	Ongoing
93	SRSP St.II	ERM	28.07.21 14.03.2022	Ongoing
94	Ralivagu	Med.	24.08.2021	Completed
95	Gollavagu	Med.	24.08.2021	Completed
96	Mathadivagu	Med.	24.09.2021	Completed
97	Peddavagu at Jagannathpur	Med.	25.08.2021 11.01.2022	Ongoing
98	J. ChokkaRao LIS	Maj	24.09.2021 09.12.2021	Ongoing
99	Neelwai (Peddavagu)	Med.	24.08.2021 10.01.2022	Ongoing
100	Sri KomaramBheem	Med.	25.08.2021 11.01.2022	Ongoing
101	Palemvagu	Med.	06.09.2021 08.12.2021	Ongoing
102	Rajiv Bhima LIS	Maj	07.07.2021 16.03.2022	Ongoing
	TOTAL=11			
	UTTAR PRADESH			
103	Saryu Nahar NP	Maj	23-24.06.2021 03-06.08.2022	Ongoing
104	Bansagar Canal	Maj.	--	Completed
105	Madhya Ganga Canal Ph-II	Maj.	21-23.07.2021	Ongoing
106	ArjunShyak	Maj.	16-18.08.2021	Ongoing
	TOTAL=04			
	Grand Total	106 (99+7 Phases)	38	Completed- 46 Remaining- 60

Annexure - 8.2

**State-Wise and Project-Wise List of Projects under Special Package Monitoring
Visits during 2021-22**

Sl. No	State/Project Name	Major/ Medium/ ERM	Date of Visit*	Monitoring Field Unit
1	Tembhu LIS Dist. Satara	Major	24-25.02.2022	Ongoing
2	Urmodi Dist. Satara	Major	27.01.2022	Ongoing
3	Sulwade Jamphal Kanoli L.I. Scheme Dist. Dhule	Major	-	Ongoing
4	Shelgaon Barrage Medium Project, Dist.Jalgaon	Medium	11.10.2021	Ongoing
5	Ghungshi Barrage LIS Akola	Medium	29.09.2021	Ongoing
6	Purna Barrage No.2 (Nerdhamana) Dist. Akola	Medium	06.01.2021	Ongoing
7	Jigaon Dist. Buldhana	Major	04-05.01.2021	Ongoing
8	Warkhed Londhe Dist. Jalgaon	Medium	12.10.2021	Ongoing
9	Relining of Rajasthan Feeder canal	Major	11.05.2021	Ongoing
10	Relining of Shirind Feeder canal	Major	11.05.2021	Ongoing
	Monitoring Target by(FU)	10	9	

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. of Jamuna Irr.	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
	CHHATISGARH		

S. No.	State/Project Name	Year of Inclusion in AIBP	Year of Completion
20	HasdeoBango	1997-98	2006-07
21	Shivnath Diversion	1997-98	2002-03
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

S. No.	State/Project Name	Year of Inclusion in AIBP	Year of Completion
43	WRCP	1996-97	2006-07
	HIMACHAL PRADESH		
44	Changer Lift Irr. Project	2000-01	2012-13
	JAMMU & KASHMIR		
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	Igophey Irr. 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	Ghataprabha St.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

S. No.	State/Project Name	Year of Inclusion in AIBP	Year of Completion
	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
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

S. No.	State/Project Name	Year of Inclusion in AIBP	Year of Completion
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
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
	ORISSA		
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

S. No.	State/Project Name	Year of Inclusion in AIBP	Year of Completion
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
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

S. No.	State/Project Name	Year of Inclusion in AIBP	Year of Completion
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
	UTTRAKHAND		
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 31.3.2022**

S. 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
	CHHATISGARH		
3	Maniyari Tank (ERM)	2011-12	2017-18
4	Kharung (ERM)	2010-11	2018-19
	UNION TERRITORY OF JAMMU & KASHMIR		
5	Rajpora Lift	2000-01	2018-19
6	Restoration & Mod. of Main Ravi Canal	2011-12	2021-22
7	Tral Lift Irrigation Project	2000-01	2021-22
	KARNATAKA		
8	Sri Rameswar Irrigation	2014-15	2017-18
9	Bhima LIS	2009-10	2018-19
10	Karanja	1997-98	2020-21
	MADHYA PRADESH		
11	Sagar(Sagad)	2011-12	2017-18
12	Singhpur	2011-12	2017-18
13	Mahuar	2013-14	2017-18
14	Sindh Phase II	1998-99	2018-19
15	Bariarpur LBC	2000-2001	2018-19
16	Bansagar Unit-II	2003-04	2018-19
17	Sanjay Sagar (Bah)	2011-12	2018-19
18	Indira Sagar Unit II (Ph I & II)	1996-97	2018-19

19	Indira Sagar Unit V	2014-15	2018-19
20	Omkareswar, Ph.-IV	2014-15	2018-19
21	Bargi Diversion Ph - I	2001-02	2018-19
22	Mahi	2000-01	2020-21
23	Mahan	2003-04	2020-21
	MAHARASHTRA		
24	Bawanthadi [IS]	2004-05	2017-18
25	Lower Panzara	2009-10	2017-18
26	Dongargaon	2005-06	2017-18
27	Warna	2005-06	2017-18
28	Nandur Madhmeshwar	2006-07	2018-19
29	Upper Kundalika	2008-09	2018-19
30	Lower Dudhna	2005-06	2019-20
31	Dhom Balaakwadi	2007-08	2019-20
32	Khadakpurna	2006-07	2019-20
	MANIPUR		
33	Dolaithabi	2002-03	2020-21
	ORISSA		
34	Upper Indravati (KBK)	1996-97	2017-18
35	Rukura-Tribal	2009-10	2017-18
36	RET Irrigation(KBK)	2003-04	2018-19
37	Upper Indravati Extn (KBK)	1996-97	2019-20
38	Telengiri	2003-04	2019-20
	PUNJAB		
39	Kandi Canal Extension (Ph.II)	2002-03	2017-18
40	Rehabilitation of Ist Patiala Feeder and Kotla Branch Project	2007-08	2017-18
	RAJASTHAN		

41	Narmada Canal	1998-99	2018-19
42	Mod. of Gang Canal	2000-2001	2018-19
	TELANGANA		
43	Gollavagu	2006-07	2017-18
44	Ralivagu	2006-07	2017-18
45	Mathadivagu	2006-07	2017-18
	UTTAR PRADESH		
46	Bansagar Canal	1997-98	2018-19

Annexure - 8.5**Central Assistance to MMI Projects included under Special Package for Maharashtra**

S. No	Project Name	Districts Benefitted	Total CA released					Ultimate Irrigation Potential in Ha	Potential created in Ha as on 31.03.2022
			For CA proposal of 2018-19	For CA proposal of 2019-20	For CA proposal of 2020-21	For CA proposal of 2021-22	Total CA released		
1	Tembhu LIS Dist. Satara	Satara, Sangli, Solapur	25.00	69.79	77.56	108.01	280.36	111856	102235
2	Warkhed Londhe Dist. Jalgaon	Jalgaon	10.41	19.345	26.03	23.68	79.47	7919	0
3	Sulwade Jampthal Kanoli L.I. Scheme Dist. Dhule	Dhule	0.23	0.00	95.97	108.55	204.75	52720	0
4	Shelgaon Barrage Medium Project, Dist.Jalgaon	Jalgaon	15.22	13.99	47.15	43.59	119.94	11318	0
5	Ghungshi Barrage LIS Akola	Akola (V)	3.27	2.55	3.84	10.43	20.10	6660	0

6	Purna Barrage No.2 (Nerdhamana) Dist.Akola		0.00	0.00	12.43	0.74	13.17	6954	0
7	Jigaon Dist. Buldhana	Buldhana, Akola (V)	262.02	17.01	39.53	336.42	654.98	101088	0
8	Urmodi Dist. Satara	Satara	13.27	10.63	0.00	14.35	38.25	32000	14400
	Total MMI		329.43	133.31	302.52	645.77	1411.02	330515	116635

Annexure – 8.6**Central Assistance to MMI Projects included under Special Package for Punjab**

S. No	Project Name	Districts Benefitted	Total CA released			Ultimate Irrigation Potential in Ha
			CA released till March 2016 under AIBP	CA released during 2016-2022 under PMKSY	Total CA released	
1	Relining of Rajasthan Feeder RD 179000 to 496000	Mukatsar & Faridkot	105.84	359.27	465.11	93120
2	Relining of Sirhind Feeder RD119700 to RD 447927	Mukatsar & Faridkot	50.00	269.18	319.18	34550
	Total		155.84	628.45	784.29	127670

Annexure -8.7**Details of Five Newly Included Projects under PMKSY-AIBP**

S.N.	Name of Project	CCA	Estimated Balance cost as on 01.04.2021 with central share	target date	benefitted districts
01	Parwan Major Multipurpose project, Rajasthan	2.01 Lakh Ha	Balance cost of works: Rs. 3554.25 Cr. Central Share:- Rs. 733.86 Cr.	December 2023	Kota, Baran, Jhalawar
02	ERM of Sukla Irrigation Project, Assam	CCA: 12150 Ha UIP: 17900Ha	Balance cost of works: Rs. 258.47 Cr. Central Share:- Rs. 232.62 Cr.	March 2024	Baksa
03	Formation of Flood Carrier Canal from Kannadian Channel to drought prone areas of sathankulam, Thisayanvilai by interlinking Tamiraparani, Kurumeniyar and Nambiyar rivers	CCA: 23040 Ha. UIP: 23040 Ha	Balance Cost of Works: Rs 96.13 Cr. Central Share: Rs 44.22 Cr.	September 2022	Assembly constituency areas of Palayamkottai, Nanguneri and Radhapuram in Tirunelveli District and two assembly constituency areas of Srivaikundam and Tiruchendur in Thoothukud District will be benefitted.
04	Guruvarya Late Laxmanraoji Inamadar Lift Irrigation Scheme (Jihe Kathapur Lift irrigation Scheme), Maharashtra	CCA: 35540 Ha UIP: 27500 Ha	Balance Cost of works: 647.69 crore Central Share: 247.34 crore	June, 2025	Satara
05	Nadaun Medium Irrigation Project, Himachal Pradesh	CCA: 2979.72Ha UIP: 6471.4Ha	Balance Cost of works: Rs. 12.68 crore Central Share: Rs. 11.41 crore	March, 2023	Hamirpur

Annexure-8.8**List of 22 projects for urgent monitoring along with their proposed dates of visit**

Projects & State/UT	Date of Visit	Report submission
1. Pula Subbaiah Veligonda Project (A.P.) 2. Y.C.P.R Korisapadu Lift Irrigation Scheme (A.P.)	25-27 Aug 2021 (KGBO, Hyderabad)	Yes
3. Sina Madha LIS Major Project (Maharashtra) 4. Deoghar Medium Project (Maharashtra)	20-21 Aug 2021 (MCO, Pune) 23-25 Aug 2021	Yes
5. Pandhari Medium Project (Maharashtra) 6. Kanhan Nadi Project (Kochi Barrage) (Maharashtra) 7. Chichdoh Barrage (Maharashtra)	24 August 2021 (MCO) 25 August 2021 27-28 August 2021	Yes
8. Takli Medium Irrigation (Rajasthan) 9. ERM of Sawan Bhadon Medium Irrigation (Rajasthan) 10. Gararda Medium Irrigation Project (Rajasthan) 11. Gagrin Medium Irrigation Project (Rajasthan) 12. Parwan Lift Scheme (Rajasthan)	(YBO-M&A Jaipur) 24 th August 2021 to 26 th Aug 2021	Yes
13. Badaun Irrigation Project (U.P.)	25-27 th August 2021 (UGBO, Lucknow)	Yes
14. Nadaun Medium Irrigation Project (H.P.) 15. Phina Singh Medium Irrigation Project (H.P.)	24-27 th August 2021 (IBO)	yes
16. Sonthi Lift Irrigation Scheme (Karnataka) 17. ERM of UKP Stage-I and II Extension Thimmapur LIS, Ramthal (Marol) LIS, Budihal-Peerapur LIS,	17-18 th August 2021 (MSO, Bangalore)	Yes

Nandawadagi LIS and NRBC 9(A) Distributary - Karnataka	24-26 th August 2021	
18. Formation of Flood Carrier canal from Kannadian Channel to Drought Prone areas of Sathankulam, Thisayanvilai by interlinking Tamirabarani, Karumeniyar and Nambiyar Rivers (Tamil Nadu)	25-27 Aug 2021 (CSRO, Coimbatore)	Yes
19. Increasing capacity of WJC Main Branch canal from Indri Head to Munak Head (RD 0-154500) (Haryana).	24 th August 2021 (IBO, Chandigarh)	Yes (Project Completed)
20. Rengali Irrigation Project (Right Bank Canal system) (Odisha) 21. Deo Irrigation Project (Odisha) 22. Lower Suktel (Odisha)	21-28 th August 2021 (MERO)	Yes

Annexure - 15.1**Training Activities Organised / Coordinated by CWC during 2021-22**

Due to Nationwide lockdown to contain the spread of Novel Corona Virus COVID-19 and maintaining of social distancing, physical training courses could not be held at CWC (HQ). However, the following trainings were conducted by Training Dte. both online and offline.

S. No.	Topic of Programme	Period	Venue/ Organized by	Participants
1.	“Customized training on MIKE-11 for Central Water Commission Officers” organized by DHI (India) Water & Environment Pvt Ltd, New Delhi.	22- 26 March, 2021 and 5 - 9 April, 2021	Computer Center, RDC2, Gr Floor, WB-II, CWC	15 Officers
2.	Online Training programme on “Coastal Erosion Prevention and Control”	6-9 April, 2021	Online/ESCI Hyderabad	15 Officers
3.	Online training programme on “Water Resources Development using Artificial Neural Network”	05-07 July, 2021	Online/ESCI Hyderabad	06 Officers
4.	Online training programme on “Project Management using MS Project and Primavera Software”	12-16 July, 2021	Online/ESCI Hyderabad	02 Officers
5.	Online training programme on “Flood Forecasting, Modelling and Disaster Management”	13-30 July, 2021	Online/NWA, Pune	About 100 Officers
6.	Virtual Training on “Hydro Tunnel Specifics in Design and Construction”	25 th Aug., 2021	Online/TAI, New Delhi	05 Officers
7.	One week training for SWAs of PCP Dte	06-10 Sept., 2021	Computer Hall, FFM Dte., CWC	08 Participants
8.	An online lecture on “Flow Transition Design in Hydraulic Structures” delivered by Prof. S. K.	13 th Sept., 2021	Online/Cisco Webex	Open to all

S. No.	Topic of Programme	Period	Venue/ Organized by	Participants
	Mazumder			
9.	An on-line lecture on "Writing of Annual Performance Appraisal Report (APAR) for CWES Officers" delivered by Shri Chandan Mukherjee, Deputy Secretary, DoWR, RD&GR, MoJS	17th Sept., 2021	Online/Cisco Webex	Open to all
10.	Two day Virtual training/workshop on "Earthquake and Dam Safety" organized by ICOLD/CBIP	23-24 Sept., 2021	Online/INCOL D	22 Officers
11.	8 CWC Officers were nominated for Young Water Professionals Programme under NHP	10-12 month Course	Online/AIWC	8 officers
12.	Virtual Training Program on "Risk Analysis applied to Dam Safety Management"	14 th Oct., 2021	Online/INCOL D	11 Officers
13.	2-Weeks Mandatory Level-II Training for SRAs of CWC	20-29 Oct., 2021	Online/NWA	33 Officers
14.	Two day online Workshop on "RESERVOIRS AND SEISMICITY"	21-22 Oct., 2021	Online/INCOL D	28 Officers
15.	Virtual workshop on "Applicability and Feasibility of Roller Compacted Concrete Dams"	10-12 Nov., 2021	Online/INCOL D	10 Officers
16.	Virtual "International Water Security & Climate Change Conference 2021"	15-17 Nov., 2021	Online/GCTC	13 Officers
17.	Online programme on "Water Audit, Water Conservation and Management Techniques"	17-18 Nov., 2021	Online/NPC, Jaipur	04 Officers
18.	Virtual Workshop on "Reservoirs triggered Seismicity"	02-03 Dec., 2021	Online/INCOL D	16 Officers
19.	Virtual International Conference on "Recent Advances in Geotechnics	09-11 Dec., 2021	Online/ISEG & NHPC	14 Officers

S. No.	Topic of Programme	Period	Venue/ Organized by	Participants
	(EGCON2021)"			
20.	Awareness Generation Exercise webinar on "Sexual Harassment of Women at Workplace (Prevention, Prohibition & Redressal) Act 2013	09 th Dec., 2021	Online/NWA, CWC, Pune	Open to all
21.	First Batch Level-1 Mandatory Cadre Training Program for JTS Level Officers of CWES (Group-A)	13-31 Dec., 2021	NWA, Pune, IIT Roorkee and IIM Ahmedabad	25 Officers
22.	Virtual training Session on the topic "Transport Tunnel Specifics in Design and Construction"	15 th Dec., 2021	TAI, New Delhi	01 Officer
23.	Virtual Workshop on "Seismic Safety of Existing Dams"	16-17 Dec., 2021	Online/INCOL D	16 Officers
24.	Virtual workshop on "Construction of Dams in Weak Rocks"	18-19 Jan.,2022	Online/INCOL D	8 Officers
25.	Virtual Workshop on "Multiple Hazards Caused by Strong Earthquakes to Dams and Appurtenant Structures"	20-21 Jan., 2022	Online/INCOL D	16 Officers
26.	Online Certificate Course on "Dam and Network Safety Assurance"	6 months	Online Course	09 Officers
27.	Batch-3 Level-2 MCTP for Assistant Director-II/ AE/SDEs	07 th Feb- 04 th March, 2022	Online /NWA, Pune	80 Officers
28.	Roorkee Water Conclave-2022	02-04 March, 2022	Hybrid mode/IIT Roorkee	6 Officers
29.	2 Week ITP for Newly recruited MTS of CWC (HQ) in two batches	14 th March to 08 th April, 2022	Training Hall, Library Building, CWC	56 Staff
30.	32nd ITP of JTS Officers of CWES Gr-A for 32 Week	28 March – 04 Nov., 2022	NWA, Pune	02 Officers

Participation of CWC Officers in Training/Workshop/Webinar/Talks Organized by other Institutions

S. No.	Topic of Programme	Period	Venue/ Organized by	Participants
1.	A Webinar on “Role of ICT technologies for sustainable irrigation management and scheduling (MENA Region- Case studies)”	7 th April, 2021	Webinar/ ICID	Open to all
2.	7 th Water Tech Talk on “TERI Advanced Oxidation Technology (TADOX) to treat Waste Water and Enhance Water Reuse”	9 th April, 2021	Cisco Webex/NWM, MoJS	Open to all
3.	25 th Water Talk on “Catch the Rain- Importance of Water Literacy”	16 th April, 2021	Cisco Webex/NWM, MoJS	Open to all
4.	Online Workshop on “Innovations in Non-contact Hydrometry”	23 rd April, 2021	Zoom meeting/IIT Roorkee	Open to all
5.	Virtual International Workshop on “COASTAL INFORMATION SYSTEM- MANAGEMENT AND ENGINEERING”	06 th May, 2021	Online/IIT Madras	Open to all
6.	8 th Water Tech Talk on “Employment of State-of-the-Art Technology Tools for resolving indeterminate Snow-Ice Water Resources for the sustenance of Himalayan Ecosystem”	14 th May, 2021	Cisco Webex/NWM, MoJS	Open to all
7.	Online Inception Workshop on “Glacio-Hydrological Modeling and Integrated Water Management of Bhagirathi Basin, Uttarakhand”	18 th May, 2021	Microsoft teams/ Swiss Agency for Development and Cooperation (SDC)	Open to all
8.	26 th Water Talk on “Raising Water Table: Prerequisite to Jal Jeevan Mission”	21 st May, 2021	Cisco Webex/NWM, MoJS	Open to all

S. No.	Topic of Programme	Period	Venue/ Organized by	Participants
9.	9 th Water Talk on " Isotope application in Water Resources Development and Management"	11 th June, 2021	Cisco Webex/NWM, MoJS	Open to all
10.	27 th Water Talk on "CELEBRATING 'WOMEN WATER CHAMPIONS' FROM THE GRASSROOTS"	18 th June, 2021	Cisco Webex/NWM, MoJS	Open to all
11.	A Webinar on "Yoga for Immunity" in collaboration with Isha Foundation	20 th June, 2021	Youtube Channel	Open to all
12.	A workshop on "Esri Arc GIS Platform- New Hydro Horizon for Water Resources Management" for CWC Officials	23 rd June, 2021	Microsoft Teams/ESRI Noida	Open to all
13.	A Workshop/ programme in collaboration with Art of Living Foundation, Bengaluru on "River Rejuvenation through Community Participation"	24 th June, 2021	Online/ Art of Living Foundation, Bengaluru	Open to all
14.	A webinar on "Geophysical Methods for Dam Investigations & Health Checks"	26 th June, 2021	Online/Aqua Foundation, New Delhi	Open to all
15.	A Webinar on "Water Policy Since Independence- Implications for Rural India"	05 th July, 2021	Zoom meeting/ NIRDPR, Hyderabad	Open to all
16.	9 CWC Officers were sponsored for pursuing 2 year M.Tech Course at IISC, Bengaluru, IIT Roorkee and Anna University, Chennai for 2021-2023	May-July, 2021	Bengaluru/ Roorkee/Chennai	9 Officers
17.	10 th Water Tech Talk on "Some thoughts on Advancement of Groundwater Management practices in India"	9 th July, 2021	Cisco Webex/NWM, MoJS	Open to all

S. No.	Topic of Programme	Period	Venue/ Organized by	Participants
18.	28 th Water Talk on "SOLVING INDIA'S WATER PROBLEMS"	16 th July, 2021	Cisco Webex/NWM, MoJS	Open to all
19.	A virtual ESRI India User Conference "GIS: Creating a Sustainable Future"	28-29 July, 2021	Online/ESRI, Noida	Open to all
20.	Launch event of Celebrating one year of National Education Policy 2020	29 th July, 2021	Online/ Ministry of Education	Open to all
21.	11 th Water Tech Talk	13 th Aug., 2021	Cisco Webex/NWM, MoJS	Open to all
22.	Virtual conference on "Second Edition Hydro Power Asia, August 17-18, 2021	18-17 Aug., 2021	Online/ India Infrastructure Publishing Pvt Ltd	05 Officers
23.	29 th Water Talk	20 th Aug., 2021	Cisco Webex/NWM, MoJS	Open to all
24.	Webinar on "Efficient Design and Infection control in Healthcare facilities"	8 th Sept., 2021	Online	Open to all
25.	12 th Water Tech Talk on "Sharing Data to Share Water"	10 th Sept., 2021	Cisco Webex/NWM, MoJS	Open to all
26.	Online training course on "Advanced Techniques for Bathymetry Survey" conducted by CWPRS, Pune	16-17 Sept., 2021	Online	Open to all
27.	30 th Water Talk on "Urban Water Management in India- Issues and the way Forward"	17 th Sept., 2021	Cisco Webex/NWM, MoJS	Open to all
28.	ESRI, Noida, is organizing a workshop on "Latest tools in ArcGIS for Dam Safety and Solutions"	30 th Sept., 2021	Microsoft Teams/ESRI, Noida	Open to all
29.	13 th Water Tech Talk on "GLOBAL ASPECT OF RAINWATER HARVESTING"	08 th Oct., 2021	Cisco Webex/NWM, MoJS	Open to all
30.	Virtual Technical Session on	12-13 Oct.,	Online	Open to all

S. No.	Topic of Programme	Period	Venue/ Organized by	Participants
	WRF-Hydro modelling system	2021		
31.	31 st Water Talk on “Creating a people’s movement for Water Conservation”	15 th Oct., 2021	Cisco Webex/NWM, MoJS	Open to all
32.	भारतीय नदियों के अंतर्योजन के तकनीकी, आर्थिक और पर्यावरणीय आयाम पर संगोष्ठी राष्ट्रीय जल विकास अभियान (NWDA), नई दिल्ली द्वारा पुस्तकालय सभागार, केंद्रीय जल आयोग	25 th Oct., 2021	Auditorium, New Library Building, CWC	08 CWC Officers
33.	14 th Water Tech Talk on “Application of Artificial Intelligence and Digital Twin technologies for Water Management”	12 th Nov., 2021	Cisco Webex/NWM, MoJS	Open to all
34.	32 nd Water Talk on “Conserving the Critical Common - Water.”	19 th Nov., 2021	Cisco Webex/NWM, MoJS	Open to all
35.	Virtual International Financial Services Centres Authority (IFSCA), under the aegis of Government of India and in partnership with GIFT City Gujarat & Bloomberg is going to organize first global Fin Tech event “InFinity Forum”	03-04 Dec., 2021	Online/ Bloomberg	Open to all
36.	15 th Water Tech Talk on “Climate Resilient, Natural Farming and Learning from AP Community Managed Natural Farming”	10 th Dec., 2021	Cisco Webex/NWM, MoJS	Open to all
37.	Physical based Mathematical Modelling for Estimation of Sediment Rate and Sediment Transport in Seven (7) River Basins- Workshop #2	16-17 Dec., 2021	MS Teams/CWC	Open to all
38.	33 rd Water Talk on “Digitally enabled strategy to enhance	17 th Dec., 2021	Cisco Webex/NWM,	Open to all

S. No.	Topic of Programme	Period	Venue/ Organized by	Participants
	community resilience toward water security”		MoJS	
39.	16 th Water Tech Talk on “Rooftop rainwater harvesting by easiest and cheapest techniques”	14 th Jan., 2022	Cisco Webex/NWM, MoJS	Open to all
40.	2 nd Training on “GIS using QGIS and Morphological Analysis”	17-21 Jan., 2022	MS Teams/CWC	Open to all
41.	34 th Water Talk on “NEW VISION FOR A COMMUNITY-LED, DEMAND-DRIVEN, SCALABLE WATER CONSERVATION PROGRAM”	21 st Jan., 2022	Cisco Webex/NWM, MoJS	Open to all
42.	Online Training Programme on “Flood Management and Erosion Control”	27-28 Jan., 2022	Cisco Webex/NERI WALM, Tezpur	Open to all
43.	A webinar on the topic "Dr B R Ambedkar and his life's contribution in Water, Power Policy and Water Resources Development in India"	31 st Jan., 2022	Cisco Webex/NWA, CWC, Pune	Open to all
44.	Webinar on "WETLAND ACTION FOR PEOPLE AND NATURE"	02 nd Feb., 2022	Cisco Webex/ NERIWALM, Tezpur	Open to all
45.	A Webinar on “Awareness activity on River Interlinking Programme”	02 nd Feb., 2022	Google Meet/NWDA, Hyderabad	Open to all
46.	Virtual National Workshop on “Mountain Hazards & Lessons Learnt from 7th Feb 2021 Uttarakhand Disaster”	07 th Feb., 2022	Online/NDMA	Open to all
47.	17 th Water Tech Talk on “Conglomerative measure to enhance Water Use Efficiency in irrigation Sector”	11 th Feb., 2022	Cisco Webex/NWM, MoJS	Open to all
48.	35 th Water Talk on “Natural	18 th Feb.,	Cisco	Open to all

S. No.	Topic of Programme	Period	Venue/ Organized by	Participants
	Farming & Water Conservation”	2022	Webex/NWM, MoJS	
49.	Webinar on 'Legal and Institutional Framework for Dam Safety in India'	09-10 March, 2022	Cisco Webex/NWM, MoJS	Open to all
50.	18 th Water Tech Talk on “Conserving Wetlands and Rivers: Challenges and opportunities”	11 th March, 2022	Cisco Webex/NWM, MoJS	Open to all

Annexure - 15.2**Details of Training Programs undertaken by National Water Academy, Pune during 2021-22**

#	Details`	Dates	Duration (Weeks)	Officers Trained	Manweeks	Training Days	Mandays
1	Purpose Oriented Training through Distance Learning on "Drainage & Watershed Delineation and Jurisdiction Demarcation using GIS	19-30 April 2021	2	44	88	10	440
2	Purpose Oriented Training Program through Distance Learning on Flood Forecasting and MIKE Modelling	19-30 April 2021	2	92	184	10	920
3	Training-cum-Workshop on Overview of Water Resources Sector in India through Distance Learning for Media Professionals	26-30 April 2021	1	24	24	5	120
4	Purpose Oriented Training Program through Distance Learning on Hydrometeorological Observation at Site	10-21 May 2021	2	184	368	10	1840
5	Purpose Oriented Training Program on Irrigation Planning Aspects for Preparation of Detailed Project Reports through Distance Learning	10-21 May 2021	2	133	266	10	1330
6	Mandatory Cadre Training Program for Junior Engineers of Brahmaputra Board	07-21 May 2021	2	32	64	10	320
7	Fourth International Distance Learning Course in Advanced Topics in Hydraulics, Hydrological Sciences and Hydrometeorology for Asian Region	31 May 2021 - 16 July 2021	7	91	637	35	3185
8	Flood Assess Mapping using GIS	31 May 2021 to 04 June 2021	1	112	112	5	560
9	Distance Learning Program on Water Resources Sector of India for School Teachers - Batch I	24-26 May 2021	0.6	213	127.8	3	639

10	Distance Learning Program on Water Resources Sector of India for School Teachers - Batch II	25-27 May 2021	0.6	189	113.4	3	567
11	Distance Learning Program on Water Resources Sector of India for School Teachers - Batch III	26-28 May 2021	0.6	196	117.6	3	588
12	Distance Learning Program on Water Resources Sector of India for School Teachers - Batch IV	31 May -02 June 2021	0.6	196	117.6	3	588
13	Distance Learning Program on Water Resources Sector of India for School Teachers -V	01-03 June 2021	0.6	187	112.2	3	561
14	Distance Learning Program on Water Resources Sector of India for School Teachers -VI	02-04 June 2021	0.6	199	119.4	3	597
15	Distance Learning Program on Water Resources Sector of India for School Teachers -VII	07-09 June 2021	0.6	183	109.8	3	549
16	Distance Learning Program on Water Resources Sector of India for School Teachers -VIII	08-10 June 2021	0.6	178	106.8	3	534
17	Distance Learning Program on Water Resources Sector of India for School Teachers-IX	09-11 June 2021	0.6	162	97.2	3	486
18	Purpose Oriented Training Through Distance Learning on Project Hydrology	07-18 June 2021	2	92	184	10	920
19	Purpose Oriented Training through Webinar Series on e-Governance Tools	07-11 June 2021	1	291	291	5	1455
20	Training Program on Building Competencies for Personal Excellence in Public Governance with Art of Living Foundation, Bengaluru in online mode (Batch-I)	22-25 June 2021	0.8	20	16	4	80
21	Webinar 1 :International Cooperation in water Sector of India: Role of Department of Water Resources, River Development & Ganga Rejuvenation, Ministry of Jal Shakti	07 June 2021	0.2	188	37.6	1	188
22	Webinar 2 : History of Development of International Water Law; Water Allocation in Transboundary basins; Helsinki Rules (1966), Berlin	14-Jun-21	0.2	179	35.8	1	179

	Rules(2004)						
23	Webinar 3 : International Water Law: The UN Water courses Convention 1997 and other instruments	21-Jun-21	0.2	164	32.8	1	164
24	Webinar 4 : Indus Water Treaty Surviving the odds	28-Jun-21	0.2	168	33.6	1	168
25	Webinar 5 : Working of Indus Treaty between India and Pakistan : Case Studies of Baglihar & Kishanganga	5-Jul-21	0.2	203	40.6	1	203
26	Webinar 6 : Ganga Water Treaty (1996) and existing institutional mechanisms for transboundary water cooperation between India and Bangladesh	12-Jul-21	0.2	129	25.8	1	129
27	Purpose Oriented Training Program on Irrigation Assets Mapping using GIS - Batch I	05-09 July 2021	1	157	157	5	785
28	Purpose Oriented Training Through DL on Flood Forecasting, Modelling and Disaster Management	13-30 July 2021	2	338	676	10	3380
29	Purpose Oriented Training Program on Andriod App Development for Water Sector	12-23 July 2021	2	52	104	10	520
30	Purpose Oriented Training Program on Irrigation Assets Mapping using GIS - Batch II	12-16 July 2021	1	156	156	5	780
31	Purpose Oriented Training Program through Distance Learning on Hydro meteorological Observation Site	19-30 July 2021	2	288	576	10	2880
32	Webinar 7 :Kosi (1954,1966) and Gandak (1959) Agreements, Treaty (1996) and existing institutional mechanisms Mahakali for transboundary water cooperation between India and Nepal	19-Jul-21	0.2	176	35.2	1	176
33	Purpose Oriented Training Program through Distance Learning on Hydrologic Modelling System HEC-HMS	26-30 July 2021	1	327	327	5	1635
34	Webinar 8 : Transboundary Cooperation on Water Resources between India and	26-Jul-2021	0.2	136	27.2	1	136

	Bhutan						
35	Webinar 9 : Transboundary Cooperation on Water Resources between India and China	02 Aug 2021	0.2	137	27.4	1	137
36	Webinar 10: International Transboundary Water Cooperation outside South Asian Region.	09 Aug 2021	0.2	133	26.6	1	133
37	Webinar 11 : International Cooperation in Water Sector with other Countries (not in neighbourhood)	16 Aug 2021	0.2	85	17	1	85
38	Training Program on Google Earth Engine and its Application in Water Resources Management	16-23 Aug, 2021	1.2	562	674.4	6	3372
39	Financial Management, World Bank Procurement Procedures, Contract Management (under National Hydrology Project) in the Distance Learning Mode	17-18 Aug 2021	0.4	63	25.2	2	126
40	Webinar 12 : Challenges of International Issues in Interlinking of River Projects	23 Aug 2021	0.2	102	20.4	1	102
41	Webinar 13 : Murray-Darling Basin: Inter-state Water Conflict and Cooperation	30 Aug 21	0.2	88	17.6	1	88
42	Webinar 14 : A shifted baseline : The Changing context of Cooperation in the Mekong River Basin	06 Sept 21	0.2	108	21.6	1	108
43	Webinar 15 : International Water Cooperation in Water Sector- Role of Asian Development Bank, Past, Present and Future	13 Sept 21	0.2	76	15.2	1	76
44	Webinar on Writing of Annual Performance Appraisal Report (APAR) for CWES Officers	17 Sept 21	0.2	159	31.8	1	159
45	Webinar 16 : International Cooperation in Irrigation and Drainage - Role of ICID	20 Sept 21	0.2	77	15.4	1	77
46	Training Program on Smart Working MS Office Tools	23-24 Sept 21	0.4	49	19.6	2	98
47	Webinar 17 : The World Bank Engagement in Water - Past Present and Future	27 Sept 21	0.2	99	19.8	1	99

48	Distance Learning Program on Water Resources Sector of India for School Teachers - Batch A	04-05 Oct 21	0.4	211	84.4	2	422
49	Distance Learning Program on Water Resources Sector of India for School Teachers - Batch B	05-06 Oct 21	0.4	105	42	2	210
50	Distance Learning Program on Water Resources Sector of India for School Teachers - Batch C	06-07 Oct 21	0.4	125	50	2	250
51	Distance Learning Program on Water Resources Sector of India for School Teachers - Batch D	07-08 Oct 21	0.4	110	44	2	220
52	Distance Learning Program on Water Resources Sector of India for School Teachers - Batch E	11-12 Oct 21	0.4	122	48.8	2	244
53	Distance Learning Program on Water Resources Sector of India for School Teachers - Batch F	12-13 Oct 21	0.4	120	48	2	240
54	Distance Learning Program on Water Resources Sector of India for School Teachers - Batch G	13-14 Oct 21	0.4	122	48.8	2	244
55	Distance Learning Program on Water Resources Sector of India for School Teachers - Batch H	18 & 20 Oct 21	0.4	114	45.6	2	228
56	Distance Learning Program on Water Resources Sector of India for School Teachers - Batch I	20-21 Oct 21	0.4	118	47.2	2	236
57	Distance Learning Program on Water Resources Sector of India for School Teachers - Batch J	21-22 Oct 21	0.4	83	33.2	2	166
58	Distance Learning Program on Water Resources Sector of India for School Teachers - Batch K	25-26 Oct 21	0.4	119	47.6	2	238
59	Distance Learning Program on Water Resources Sector of India for School Teachers - Batch L	26-27 Oct 21	0.4	141	56.4	2	282
60	Mandatory Cadre Training Program for Senior Research Assistants of Central Water	20-29 Oct 21	1.6	33	52.8	8	264

	Commission						
61	Purpose Oriented Training through DL on River Analysis System (HEC-RAS)	25-29 Oct 21	1	90	90	5	450
62	Training -cum-Webinar on "Water Conservation and Management" in association with WALMI, Odisha - Program 1 (Covering districts of North Western Plateau Agro-climatic Zone)	11-12 Nov 21	0.4	267	106.8	2	534
63	Training -cum-Webinar on "Water Conservation and Management" in association with WALMI, Odisha - Program 2 (Covering districts of North Central Plateau Agro-climatic Zone)	17-18 Nov 2021	0.4	267	106.8	2	534
64	Training -cum-Webinar on "Water Conservation and Management" in association with WALMI, Odisha - Program 3 (Covering districts of North Eastern Plateau Agro-climatic Zone)	25-26 Nov 21	0.4	269	107.6	2	538
65	Training -cum-Webinar on "Water Conservation and Management" in association with WALMI, Odisha - Program 4 (Covering districts of East and South Eastern Coastal Plain Agro-climatic Zone)	02-03 Dec 21	0.4	308	123.2	2	616
66	Training -cum-Webinar on "Water Conservation and Management" in association with WALMI, Odisha - Program 5 (Covering districts of North Eastern Ghat Agro-climatic Zone)	09-10 Dec 21	0.4	263	105.2	2	526
67	Webinar on Awareness Generation Exercise on Sexual Harassment of Women at Workplace (Prevention, Prohibition and Redressal) Act 2013	9-Dec-21	0.2	86	17.2	1	86
68	MCTP Level 1 - for JTS (one Week at NWA+ One Week at IIM-Ahemedabad + One Week at IIT-Roorkee)	13-31 Dec 21	3	25	75	15	375

69	Introduction to Python Programming and its Application in Water Resources Sector	13-24 Dec 21	2	735	1470	10	7350
70	Training -cum-Webinar on "Water Conservation and Management" in association with WALMI, Odisha - Program 6 (Covering districts of Eastern Ghat High Land Agro-climatic Zone)	16-17 Dec 21	0.4	256	102.4	2	512
71	National Certificate Course on Participatory Irrigation Management (English Version)	27 Dec 21-28 Jan 2022	5	10	50	25	250
72	"सहभागी सिंचाई प्रबंधन" पर राष्ट्रीय प्रमाणपत्र पाठ्यक्रम (हिंदी संस्करण)	27 Dec 21-28 Jan 2022	5	20	100	25	500
73	Purpose Oriented Training Through Distance Learning on "Hydro-Meteorological Observation at Site	03-07 Jan 2022	1	72	72	5	360
74	Training-cum Webinar on "Water Conservation and Management" in association with WALMI, Odisha - Program 7 (Covering districts of South Eastern Ghat Agro-climatic Zone)	06-07 Jan 2022	0.4	160	64	2	320
75	Training-cum-Webinar on "Water Conservation and Management" in association with WALMI, Odisha - Program 8 (Covering Western Undulating Agro-climatic Zone)	13-14 Jan 2022	0.4	384	153.6	2	768
76	Big Data applications in water resources and hydro informatics	17-21 Jan 2022	1	300	300	5	1500
77	Training-cum-Webinar on "Water Conservation and Management" in association with WALMI, Odisha - Program 9 (Covering Western Central Table Land Agro-climatic Zone)	20-21 Jan 2022	0.4	799	319.6	2	1598
78	Training-cum-Webinar on "Water Conservation and Management" in association with WALMI, Odisha - Program 10 (Covering	27-28 Jan 2022	0.4	357	142.8	2	714

	Western Central Table Land Agroclimatic Zone)						
79	"Dr B R Ambedkar and his life's contribution in Water, Power Policy and Water Resources Development in India" 48th week for India@75 celebration	31-Jan-22	0.2	229	45.8	1	229
80	Mandatory Cadre Training Program for Assistant Director -I/Sub Divisional Engineers of CWES Group B Officers	07 Feb - 04 Mar 22	4	80	320	20	1600
81	Webinar on 'Legal and Institutional Framework for Dam Safety in India'	09-11 Mar 22	0.6	319	191.4	3	957
82	Series 1 : "Water Insight/ जल अंतर्दृष्टि – Talk by Eminent Water Experts"	2-Mar-22	0.2	127	25.4	1	127
83	Series 2 : "Water Insight/ जल अंतर्दृष्टि – Talk by Eminent Water Experts"	9-Mar-22	0.2	94	18.8	1	94
84	Workshop on Roadmap for Online National PIM Certificate Course & Strategic Partnerships for PIM Capacity Building	14-Mar-22	0.2	14	2.8	1	14
85	Land Use Land Cover Mapping Using Remote Sensing	15-17 March 22	0.6	633	379.8	3	1899
86	Series 3 : "Water Insight/ जल अंतर्दृष्टि – Talk by Eminent Water Experts": Water resources project Formulation - Needs Devotion, its health nurturing - Needs Emotions & to Secure it for the nation - Needs Strategy Challenges and Opportunities	30-Mar-22	0.2	69	13.8	1	69
Total			77.6	14973	11605	388	58026
