

ANNUAL REPORT

2019-2020

CENTRAL WATER COMMISSION



सत्यमेव जयते



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)	1105mm (3880 BCM)
•	Annual Rainfall (2018)	1074mm
•	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	182.2 M ha
•	Gross Sown Area (2014-15)	198.4 M ha
•	Net Sown Area (2014-15)	140.1 M ha
•	Irrigation Potential Created (upto March 2012)	113.5 M ha
•	Gross Irrigated Area (2014-15)	96.5 0M ha
•	Net Irrigated Area (2014-15)	68.4 M ha

HYDRO-POWER

•	Ultimate Hydropower Potential	148701 MW
•	Potential Developed by 31.3.2018 (Installed Capacity of plants above 25 MW)	45293 MW



FROM CHAIRMAN'S DESK

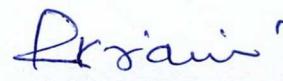
I feel highly delighted to bring out the Annual Report of Central Water Commission (CWC) for the year 2019-20. As has been done during the previous years the Annual Report for the year 2019-20 also gives an overview of the functions and activities of CWC in the field of water resources in the country & 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 2019-20, CWC has provided design consultancy for preparation of DPR and construction of projects in respect of 94 water resources development projects in India and neighbouring countries namely Bhutan and Nepal. During the period, 13 water resources development projects comprising of 07 major & medium irrigation projects and 06 flood control projects were accepted by the Technical Advisory Committee. To fulfil the goal of providing "Har Khet Ko Pani" under PMKSY, 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 35 Major and Medium Irrigation Projects to the tune of Rs. 1351.14 Crore under PMKSY-AIBP programme.

CWC has also been monitoring storage position of 123 reservoirs in the country which has helped the States in planning water utilisation during non-monsoon period. We have started Flood Forecasting service at 76 new stations during 2019-20. The timely issue of 9754 flood forecasts during the monsoon period of 2019 has helped concerned authorities/society in effective flood fighting and relief. During the year, 12 nos of 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.


(Rajendra Kumar Jain)
Chairman
Central Water Commission

HIGHLIGHTS OF THE YEAR 2019-20

❖ DESIGNS

- CWC provided design consultancy to States / Project Authorities for 94 water resources development projects involving detailed designs and preparation of drawings of various types of hydraulic structures.

❖ RIVER MANAGEMENT

- Carried out hydrological observations at 1569 sites and meteorological observation at 76 sites in different basins spread over the entire country.
- 21 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 325 flood forecasting stations (including 128 inflow forecasting stations) spread over 20 major river systems in the country. During the flood season 2019, 9754 flood forecasts (6004 level forecast and 3750 inflow forecasts) were issued, out of which 8451(86.64%) forecasts were within prescribed limits of accuracy. Daily flood bulletins and weekly flood news letters were also issued during the flood season.
- Provided technical assistance to Royal Government of Bhutan for maintenance of 32 Hydro-Meteorological sites in Bhutan.

❖ WATER PLANNING

- During the year 2019-20, 41 major / medium irrigation projects were under appraisal in CWC. 13 projects comprising 07 major/ medium irrigation projects and 06 flood control projects were accepted by the Technical Advisory Committee.
- CWC monitored 47 Irrigation projects under General Category and 149 Irrigation projects (including Extension/Renovation/Modernization (ERM) projects) receiving grants under PMKSY-AIBP.
- Storage positions of 123 important reservoirs, with total live storage of about 171.090 BCM, were monitored on weekly basis.
- CWC processed proposals for release of CA amounting to Rs. 1351.14 crore in respect of 35 Major and Medium Irrigation Projects under PMKSY-AIBP.

❖ HRM

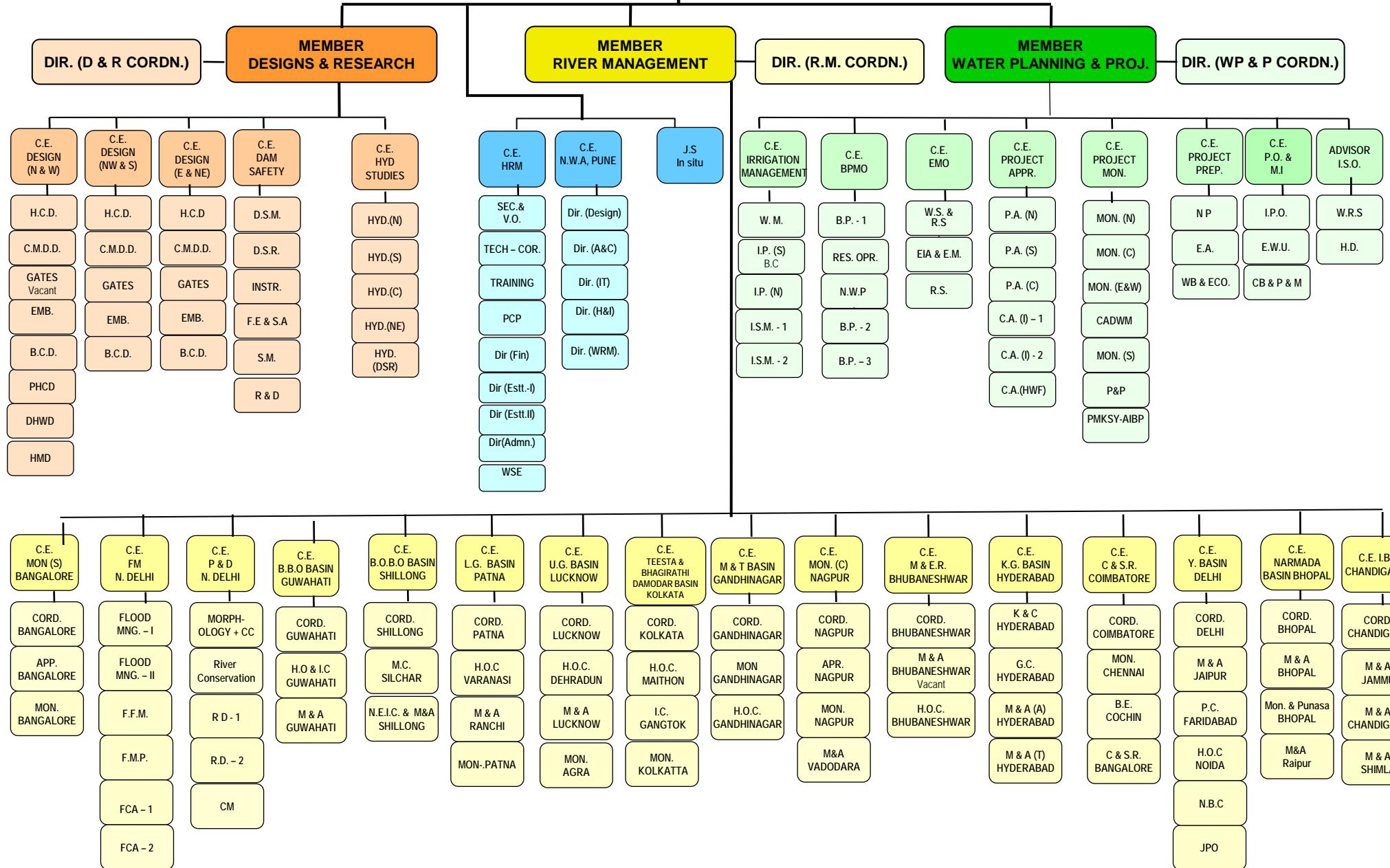
- National Water Academy, CWC, Pune conducted 29 training programmes during 2019-20 including Workshop/Seminar for officers of Central / State Governments and Public sector undertakings with a total number of man weeks accomplished to the tune of 2188.80. Besides it a number of in-house trainings for officials of CWC at CWC(HQ) and field offices were conducted throughout the year as the the Annual training calendar to enhance and refresh various skills in the field of water resources sector.

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Chairman, CWC



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

1.2 ORGANISATION

CWC is headed by a Chairman, with 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 with 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 it. 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 these 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 of Central and State in-service engineers and functions directly under the guidance of Chairman. 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 2019-20 were:

1. Chairman, CWC	:	Sh. S. Masood Husain	(01-04-2019 to 30-06-2019)
		Sh. A. K. Sinha	(01-07-2019 to 31-10-2019)
		Sh. R. K. Jain	(01-11-2019 to 31-03-2020)
2. Member (D&R)	:	Sh. N. K. Mathur	(01-04-2019 to 03-06-2019)
		Sh. A. K. Sinha	(01-07-2019 to 28-10-2019)
		Sh. R. K. Jain	(29-10-2019 to 31-12-2019)
		Sh. R. K. Gupta	(17-01-2020 to 31-03-2020)
3. Member (RM)	:	Sh. R. K. Sinha	(01.04.2019 to 31.03.2020)
4. Member (WP&P)	:	Sh. S. K .Haldar	(01.04.2019 to 31.03.2020)

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 eighteen organizations, each headed by a Chief Engineer at CWC headquarters, New Delhi. Out of this, nine organizations are under WP&P wing, six 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 13 regional offices, each headed by a Chief Engineer. The offices are located at Bangalore, Bhopal, Bhubaneswar, Chandigarh, Coimbatore, Delhi, Gandhi Nagar, Hyderabad, Lucknow, Nagpur, Patna, Shillong, and Kolkata.

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. Under AIBP, as on 2015-16, there were 149 on-going projects which were receiving grant and are being monitored by CWC.

The Government of India has 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. 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 PMKSY-AIBP, during 2015-16, DoWR, RD&GR has prioritized 99 projects amongst the 149 ongoing projects under AIBP for early completion. Out of these 99 priority projects, 40 projects have been reported completed 25 projects have been declared as foreclosed and 16 projects are scheduled for completion by March 2021.

Central Grant totalling to Rs. 1330.02 Crores has been released to 34 Projects under PMKSY-AIBP during 2019-20. Since its inception, the cumulative total Central Loan Assistance / Grant provided to States under AIBP/PMKSY-AIBP is Rs. 66702.84 Crores till 31.03.2020 to 297 projects.

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.

Flood Management Programme

The "Flood Management Programme (FMP)" a State Sector scheme amounting to Rs. 8,000 crores under Central Plan proposed by MoWR, RD&GR was approved by Government of India during XI Plan (Nov. 2007). The flood management programme has been approved by the Government of India during XII Plan with an outlay of Rs 10,000 crore and revised guidelines in this regard were issued in October, 2013.

The programme on "River Management Activities & Works related to Border Areas (RMBA)" was started as a Central Sector Scheme with an outlay of Rs 820 Cr during XIth plan for taking up non -structural measures such as Hydrological Observation and Flood Forecasting works on rivers forming common border rivers, payment to

neighbouring countries (China) for supplying HO data on common rivers, investigation of WR projects in neighbouring countries, activities of GFCC and Pancheswar Development Authority (PDA). In addition to above activities, 100% Central Assistance was also provided for taking up structural measures such as Anti Erosion/Flood Management schemes on rivers on international borders and Union Territories. The scheme with an outlay of Rs 740 Cr was again approved for continuation during XII Plan. A Central Assistance (as grant in aid) of Rs 563.61 Cr was released during XI & XII Plan (XI plan-Rs 340.41 Cr and XII Plan-Rs223.2 Cr).

The above two schemes were merged and 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 Activities & Works related to Border Areas (RMBA) schemes during XII Five Year Plan has been approved by the Union Cabinet on 07-Mar-2019 and aims at completion of the on-going projects already approved under FMP.

A total of 522 schemes were approved during XI & XII Plan. Out of these schemes, 235 schemes have been physically and financially completed; 168 schemes were physically completed with outstanding financial liability; 36 schemes foreclosed and shifted, 83 schemes are on-going. A Central assistance of Rs 562.67 Cr, Rs 428.2 Cr and Rs 546.09 Cr was released during the financial year 2017-18, 2018-19 and 2019-20 respectively. Thus, since start of XI Plan, total Central Assistance released is Rs 6410.03 Cr till 31-Mar-20. An outlay of Rs 2642 Cr has been kept for period 2017-20 under this component.

Central Water Commission coordinates the release of funds for scheme under FMP in areas other than Ganga and Brahmaputra basin. The details of fund released during 2019-20 to States for areas other than Ganga basin is given in Table 3.2.

Table 3.2

State-wise fund released under Flood Management Programme during 2019-20		
Sl No.	Name of State	Amount released (Rs. in Crore)
1	Assam	85.03
2	Bihar	0.00
3	Himachal Pradesh	176.41
4	Jammu & Kashmir	92.81
5	Uttar Pradesh	39.15

6	Uttarakhand	35.58
7	West Bengal	117.12
	Total	546.09

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)
	Total

An amount of Rs69.61 Cr was released (as grant in Aid) under RMBA component of FMBAP during year 2019-20.

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

National Projects

Government of India is implementing 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, Ministry of Water Resources had issued modification in the guidelines on 28.09.2012.

Initially, such projects were provided financial assistance at 90% of the 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 XIIth 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 in 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 receive 90% central assistance.

Out of 16 projects included in the scheme of National Projects, five projects, namely, Gosikhurd Project of Maharashtra, Shahpur Kandi Project of Punjab, Teesta Barrage Project of West Bengal, Saryu Nahar Pariyojna of Uttar Pradesh and Indirasagar Polavaram Irrigation Project of Andhra Pradesh have started receiving funds under the scheme of National Projects. Goshikhurd and Shahpur Kandi projects have been provided grant amounting to Rs. 3400.69 crore and Rs. 86.04crore, respectively, up to March, 2020. 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. No further Central Assistance has been released since March, 2012. Saryu Nahar Paryojana started receiving funding under the scheme of National Project during 2012-13 and an amount of Rs. 1884.80Crore has been released upto March 2020. The Indirasagar Polavaram Irrigation Project started receiving funding under the scheme of National Project during 2014-15 and an amount of Rs. 8614.16Crore has been released upto March 2020. Besides Saryu Nahar Paryojna (Uttar Pradesh) and Gosikhurd Irrigation Project (Maharashtra) have also been included under the 99 priority project under PMKSY-AIBP.

The details of other National Projects are as under:

1. Lakhwar Multipurpose Project (Uttarakhand) was accepted by Advisory Committee of MoWR, RD & GR in its 116th meeting held in December 2012. The

project was accorded investment clearance for an amount of Rs. 3966.51 Cr by Investment Clearance Committee (under the Chairmanship of Secretary, MoWR, RD & GR) in its meeting held on 24.02.2016. Further, RCE of Lakhwar Multipurpose Project was again submitted to CWC for appraisal. The same was accepted by Advisory Committee of MoWR, RD & GR for Irrigation, Flood Control & Multipurpose Projects in its 141st meeting held on 11.02.2019 for Rs. 5747.17 Cr (PL July, 2018).

2. Ken Betwa link Project Phase-I (Madhya Pradesh) has been accepted by the Advisory Committee of MoWR, RD & GR during the 129th meeting held on 08.07.2016. Project was accepted for investment clearance of Rs. 18,057.08 Crore (2015-16 PL) on 10.02.2017 by Investment Clearance Committee of MoWR, RD & GR. The DPR of Ken Betwa Link Project Phase-II was also submitted for appraisal in CWC/CEA. Further, as per the decision taken in the review meeting convened by Hon'ble Union Minister (WR, RD & GR) on 25th September, 2017 a draft comprehensive report on Ken Betwa Link Project prepared by NWDA has been submitted in CWC on 13.08.2019. NWDA 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. However, the Memorandum of Understanding between the States of Madhya Pradesh & Uttar Pradesh is yet to be signed.
3. The Detailed Project Report (DPR) of Ujh Multipurpose Project, J&K was initially prepared by IBO, Central Water Commission, in 2013. The DPR was considered in the 131st meeting of Advisory Committee of MoWR, RD & GR wherein the project was agreed 'In- Principle'. Subsequently the DPR of the project was revised so as to address the concerns regarding submergence of land. The revised DPR of the project was accepted by the Advisory Committee of DoWR, RD&GR, MoJS on Flood Control, Irrigation & Multipurpose Projects in its 139th meeting held on 07.01.2019 for an estimated cost of Rs. 5850 Cr. at July, 2017 Price Level. The Culturable Command Area (CCA) to be irrigated under the project was proposed as 16743 Ha. While according approval to the project, the Committee directed that "for ensuring consumptive utilization of water beyond already envisaged through Project, possibility of additional utilization should be explored at the earliest so that the water released to generate hydropower may not flow out of the country and such project should be implemented on priority".

Irrigation & Flood Control Deptt., J&K framed a modified proposal of Ujh Multipurpose project for inclusion of the additional CCA of 23973 Ha. beyond scope of the Ujh MPP already approved in the 139th Meeting of Advisory Committee. Modified DPR of the Ujh Multipurpose Project, J&K, at estimated

cost of Rs. 9167cr. (at December, 2019-PL) was accepted by Advisory Committee of DoWR, RD & GR in its 144th Meeting held on 08.05.2020.

4. Renuka Dam Project (Himachal Pradesh) has been accepted by the Advisory Committee of MoWR, RD & GR in its 132nd meeting held on 06.03.2017 at New Delhi. Revised Cost Estimate amounting to Rs.6946.99 Cr. (PL Oct, 2018) was accepted by Advisory Committee of DoWR, RD & GR in its 143rd meeting held on 09.12.2019. Proposal for Investment Clearance was examined in CWC and forwarded to DoWR, RD & GR on 11.03.2020.
5. DPR of Kishau Multipurpose Project (Himachal Pradesh & Uttarakhand) was submitted to CWC in 2010 by UJVNL for appraisal. Compliances to most of the observations of CWC/CEA are awaited since 2011. Special Purpose vehicle (SPV) as Joint Venture between Uttarakhand & Himachal Pradesh was constituted for project execution and the first meeting of SPV has been held in February, 2017. Thereafter, no progress in submission of compliances was observed. The status in the matter was reviewed at MoWR, RD & GR level and UJVNL was requested to establish Executive Committee to resolve day to day issues. UJVNL agreed to incorporate the same in agenda of board meeting of Kishau Corporation Limited.
6. Noa Dihing Project was last considered in 135th meeting of Advisory Committee held on 12.03.2018. As the ownership of the project and the source of funding were not clear and overall economic viability of the project have not been established the Advisory Committee decided that the project may be deferred and again put up to Advisory Committee once the above issues are resolved. Thereafter, Govt. of Arunachal Pradesh vide communication dated 09.01.2019 confirmed that the project ownership will be of Govt. of Arunachal Pradesh. However, the information regarding source of the funding is yet to be submitted for establishing power tariff and overall economic viability of the project.
7. DPR of Kulsi Dam Project (Assam) is under appraisal in CWC / CEA. Ownership of the project is yet to be decided. Concurrence/Agreement/MoU between Assam and Meghalaya is also required.
8. Bursar Project (J&K) is also under appraisal in CWC/CEA.
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 conceptual stage.

1.6 Modernization and Renovation works in CWC HQ

The modernization and renovation work of CWC Head Quarter Building (Sewa Bhawan, R K Puram) was started in 2010-11. The works for 9th and 8th floor were undertaken and completed by CPWD. During 2014-15, the work for modernization and renovation of remaining office space of CWC in Sewa Bhawan (2nd - 7th floors) & West Block 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 of Sewa Bhawan (2nd - 7th floors) including Training Hall, Conference Hall & Committee Room and three wings of West Block - I & II completed by March 2019. During 2019 - 20, renovation of three wings of West Block - I and other pending works in Sewa Bhawan has been completed. The work is almost complete except renovation of one hall (6th floor central) & fire alarm system in Sewa Bhawan and some minor works/ supply of furniture & Ac's etc.

In continuation to modernization / renovation work of office space at CWC (HQ), the work of modernization / renovation 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 work of 42 toilets has been completed up to March 2020 and the work of remaining 37 toilets will be completed in 2020-21.

To meet the increased electric load demand in view of the modernization/ renovation work of office space, the work for load augmentation at an estimated cost of Rs. 3.83 Crores has also been taken up through CPWD. An amount of Rs. 1,79,88,323/- has been released to BSES for electrical load augmentation and Rs. 22,23,004/- has been incurred on installation work of 1600KVA Transformer etc. by CPWD. The work will be completed in the year 2020-21.

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

The e-office was launched in CWC in Aug 2017 with inclusion of 6 Directorates. The same has been gradually implemented in other Directorate. 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 APAR period of 2017-18. Further, for the APAR period 2018-19, SPARROW has been implemented for all the officers of CWES Group 'B' Gazetted and CWES Group 'B' Non-Gazetted.

1.7. 4 APAR Management System (APARMS):

Annual Performance Appraisal Management System (APARMS) is operational in CWC to facilitate proper up-keeping and maintenance of records related to APARs 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 their latest APAR after 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:

- Implementation of e HRMS- ManavSampada Software developed by NIC Shimla Team in CWC along with its customization.
- APAR module was implemented in eHRMS for the APAR period of 2016-17. However, due to many technical issues especially in the representation process, APAR module of eHRMS was dropped and SPARROW has been implemented from the APAR period of 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) has been submitted through eHRMS (ManavSampada) software for calendar 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, SewaBhawan, 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

CWC Library is one of the most prestigious technical reference libraries on the subject of Water Resources Engineering and other allied subjects. It has collection of over 1.25 lakh books and 3.50 lakh journal/bulletins/newspapers/reports etc., and is growing with additions of books/journals and other publications every year.

The Library is regularly subscribing journals and other publications and is also receiving nearly hundred technical and non-technical journals/ bulletins /newsletters /publications from various government, non-government, educational 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.

The Map Record section is also a unit of L&IB. It has collection of approximate eighteen thousand toposheet, statemap, railmap, 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 is functioning at CWC Headquarter under the control of staff of Central Secretariat Official Language Service, Deptt. of Official Language, M/o Home Affairs working tirelessly to ensure the proper compliance of officials Language Act, 1963 and other rules and regulation related thereto. Continued measures are taken for improving progressive use of Hindi for official purpose. The Official Language Implementation Committee of the Commission under the Chairmanship of Chairman, CWC, has met regularly to review the progress on quarterly basis. Various measures required for progressive use of Hindi discussed and timely action taken on the decisions taken in the

meetings. Workshops have been organised on quarterly basis. Incentive Scheme for Hindi Noting and Drafting has been implemented. Hindi Pakhwada organised. One Seminar in hindi organised. Inspections of Field Offices and Headquarter carried out. Officers/ Official sent for Hindi Language Training under Central Hindi Traing Institute, As on March 2019, Eighty One (81) Field Offices of CWC has been notified under Rule 10(4) of Official Language Rules, 1976. Further, eleven (11) Administrative Sections of CWC have been identified 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 in the Annual Programme 2019-20 by the Deptt. of Official Language. So far, significant progress has been made in the implementation of the Official Language Act and Rules in the Commission.

'Rajbhasha Vaijayanti Puraskar' has been awarded by Deptt. of Water Resources, River Development and Ganga Rejuvenation to Central Water Commission for its excellent work and commendable achievement in implementing the Official Language Policy of the Union during the year 2018-19.

Following initiatives in regard to progressive use of Hindi were undertaken during the year 2019-20:

- i. Field offices of the Central Water Commission were inspected regularly with a view 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. During the year 30 Regional Office of CWC and 28 Section/Directorates of CWC (Hq) were inspected.
- ii. Four meetings of Official Language Implementation Committee were held during the year. Further, four Hindi workshops were also organized at Central Water Commission (Headquarter) to generate awareness about Hindi, 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 is monitored regularly through the quarterly progress report. Necessary instructions were issued to rectify the shortcomings noticed therein.
- iv. "Hindi Pakhwada" was organized from 16 to 30 September 2019 for effective implementation of the official language policy and to create awareness about Rajbhasha,. During this period, various competitions like Hindi

Noting/Drafting, Essay Writing, Technical Essay Writing, Dictation for MTS, Hindi Typing for UDC, LDC & MTS, Poem Recitation competition for Hindi and non-Hindi officials were organised 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. 2,32,720 against the allocation of Rs. 2,50,000 was spent on this occasion.

- v. Raj Bhasha Shields for the year 2018-19 were awarded to the Field Offices of Central Water Commission situated in regions, A, B and C to Yamuna Basin Organisation, New Delhi, National Water Academy, Pune and Brahmaputra & Barak Basin Organisation, Shillong respectively. Rajbhasha Shield for Directorates and Sections at Headquarters were awarded to Technical Work, Directorate of River Management and Coordination and Establishment-3 Section respectively for doing their 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. The 2nd Technical Seminar in Hindi was organised in Bhubaneshwar on 20 January, 2020 on the theme of "Flood Management in India", which was inaugurated by Honourable Member, WP&P. Officers/officials from Central Water Commission (Hq) and regional offices, Ministry of Water Resource and other attached offices participated in this.
- viii. Inspection of one Regional Office by the Committee of Parliament on Official Language was conducted successfully.

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 for 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 2019-20 are as under:

- Combined Volleyball team of CWC/CEA won Silver medal in the Inter - Ministry Tournament 2019-20.
- The CWC Chess team hold the third position in the Inter-Ministry Chess Tournament 2019-20.
- The CWC Hockey reached in Semi- Final of Inter-Ministry Hockey Tournament 2019-20.
- Shri R. Suresh, MTS, CWC Library has represented the Central Secretariat Volleyball Team in the All India Civil Services Volleyball Tournament 2019-20 held at Ranchi, Jharkhand. The team secured third place in the tournament.
- Shri Satish Kumar, DD, Monitoring (Central) Dte., CWC, New Delhi was adjudged the best player in Inter Ministry Hockey Tournament 2019-20 (Junior Division).

- CWC teams also participated in Inter Ministry Cricket, Football and Badminton tournaments 2019-20.
- CWC Cultural group won the following prizes in in Inter Ministry Music, Dance and short play Competition 2019-20
 - Best Actor in short play: 2nd Prize.
 - Best actor in supporting role: 3rd Prize.

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 1.1.2020)

Category	No. of Filled Posts	No. of SCs	No. of STs	No. of OBCs
Group A	593	105	36	86
Group B	850	139	49	130
Group C	525	109	42	99
Total	1968	353	127	315

Table 1.2

Representation of PWD (OH/VH/HH) Officials in Different Grades (As on 1.1.2020)

Category	Orthopedic Handicapped (OH)	Visually Handicapped (VH)	Hearing Handicapped (HH)	TOTAL
Group A	12	0	0	631
Group B	15	01	09	986
Group C	07	09	01	419
Total	34	10	10	2036

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>



Sh. S. Masood Husain, Chairman, CWC, Sh. U. P. Singh, Secretary, MoWR, RD&GR, Sh. A. B. Pandya, Secretary General, ICID and Dr. Srinivas Chokkakula, MoWR Research Chair, CPR during the Roundtable of States



Sh. R.K. Sinha, Member(RM), CWC and other officers of CWC-HQ, New Delhi interacting with Officers of TBO, CWC, Kolkata through Video Conferencing



Participants during Roundtable of States

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 topmost priority in water allocation and its various uses, but major utilization is for irrigation purpose. As on 2018-19, Ultimate Irrigation Potential (UIP) estimated for the country is 139.89 Mha, out of which the assessed potential through major and medium irrigation projects is 58.47 Mha. Besides this, an additional irrigation potential of about 35 Mha can be created by inter basin transfer of water from surplus to deficit basins. The Irrigation Potential Created (IPC) in the country, which stood at 12.9 Mha in 1951, has risen to 113.53 Mha by end of XI plan period. Reassessment of UIP, IPC & IPU of the country, project wise for MMI projects, and source wise i.e. Surface and Ground water, for MI projects has been taken up for updating this data and are under progress.

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

- Improving the overall water use efficiency in irrigation and drinking water supply system;

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

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

2.2 **Highlights of Water Resources Sector**

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

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

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, 399 major, 1136 medium and 265 ERM schemes were taken up during the plan period i.e., from 1951 to end of XI Plan in 2012. Out of this, 221 major, 875 medium and 139 ERM projects have been reportedly completed by end of XI Plan. Number of MMI Projects taken up and completed upto 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

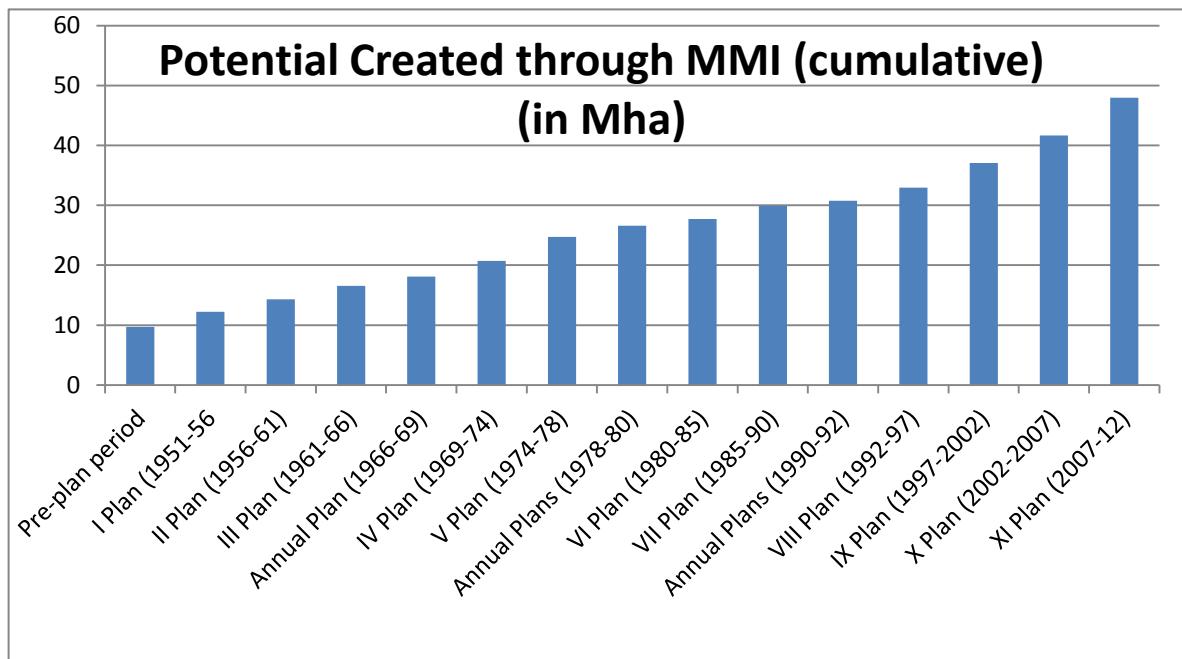


Fig 2.1 Growth of Irrigation Potential Created through Major and Medium Irrigation Project during Pre-Plan and Plan Period (Cumulative)

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

S. No.	Name of State/ UT	UIP of MMI Projects	UIP of Minor Projects	Total UIP	IPC up to XI Plan		
					MMI	MI	Total
9	Himachal Pradesh	50.00	303	353	30.45	186.217	216.667
10	Jharkhand	1276.50	1108	2384.5	530.71	534.2	1064.905
11	Jammu Kashmir	250.00	1183.5	1433.5	325.61	745.661	1071.27
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
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	399	473	74	221	295	178
Medium	143	1136	1279	143	875	1018	261
ERM	-	265	265	-	139	139	126
Total	217	1800	2017	217	1235	1452	565

Source: Erstwhile Planning Commission

Table 2.3Plan wise Outlays and Cumulative Growth in Creation of Irrigation Potential
(Major& Medium Irrigation Sector)

Period	Outlay/ Expenditure (in Crore Rs.)		Potential created (Mha)		Potential Utilized (Mha)
	During	Cumulative	During	Cumulative	
Pre-plan period	-	-	9.70	9.70	9.70
I Plan (1951-56)	376	376	2.50	12.20	12.98
II Plan (1956-61)	380	756	2.13	14.33	13.05
III Plan (1961-66)	576	1332	2.24	16.57	15.77
Annual Plan (1966-69)	430	1762	1.53	18.10	16.75
IV Plan (1969-74)	1242	3004	2.60	20.70	18.69
V Plan (1974-78)	2516	5520	4.02	24.72	21.16
Annual Plans (1978-80)	2079	7599	1.89	26.61	22.62
VI Plan (1980-85)	7369	14968	1.09	27.70	23.57
VII Plan (1985-90)	11108	26576	2.22	29.92	25.47

Period	Outlay/ Expenditure (in Crore Rs.)		Potential created (Mha)		Potential Utilized (Mha)
	During	Cumulative	During	Cumulative	
Annual Plans (1990-92)	5459	31535	0.82	30.74	26.32
VIII Plan (1992-97)	21072	52607	2.22	32.96	28.44
IX Plan (1997-2002)	48259	101896	4.09	37.05	31.03
X Plan (2002-2007)	82195	184091	5.30	41.64	33.74
XI Plan (2007-12)	164853	348944	6.34	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.

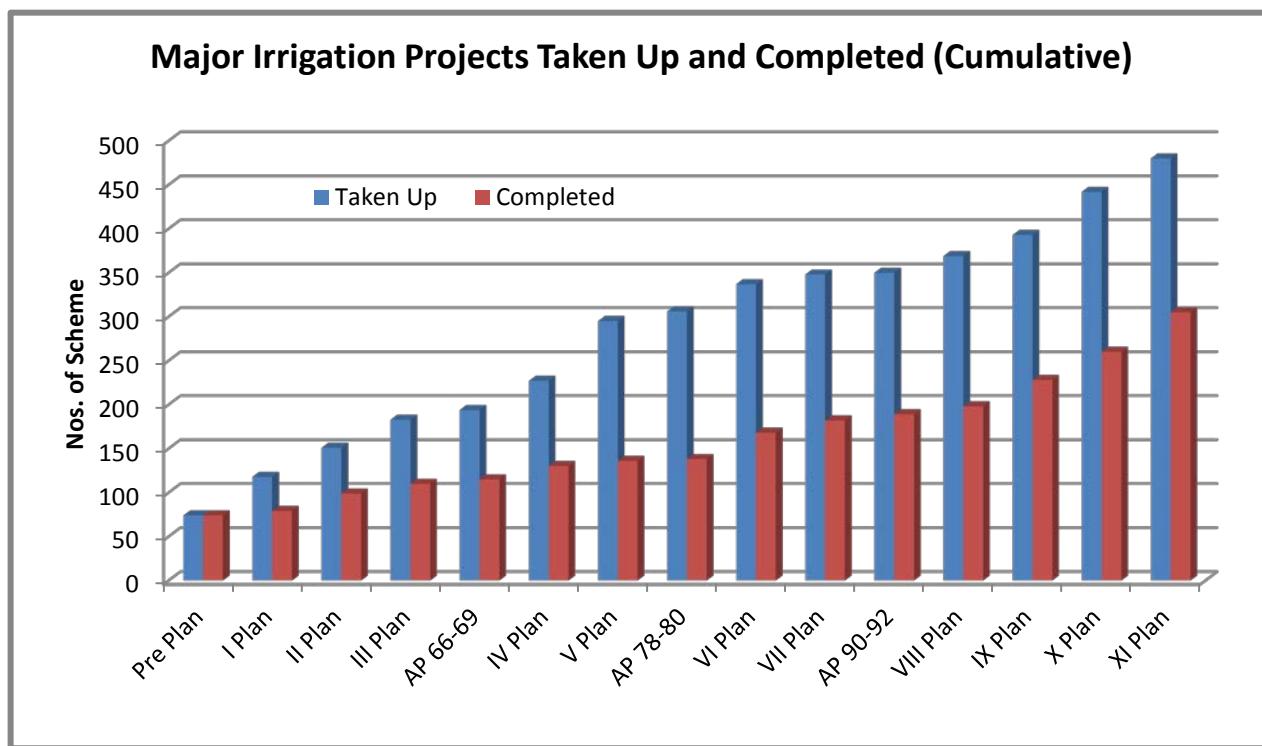


Fig 2.2 Major Irrigation projects taken up and completed (Cumulative)

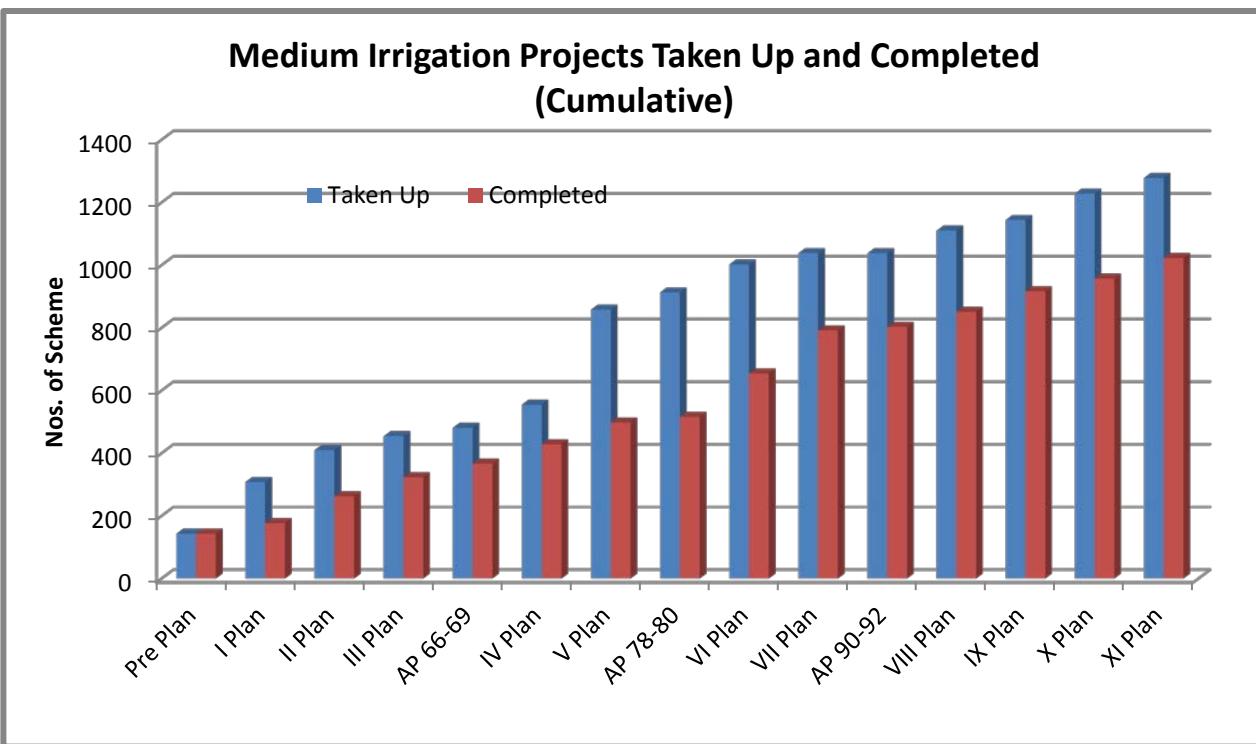


Fig 2.3 Medium Irrigation projects taken up and completed (Cumulative)

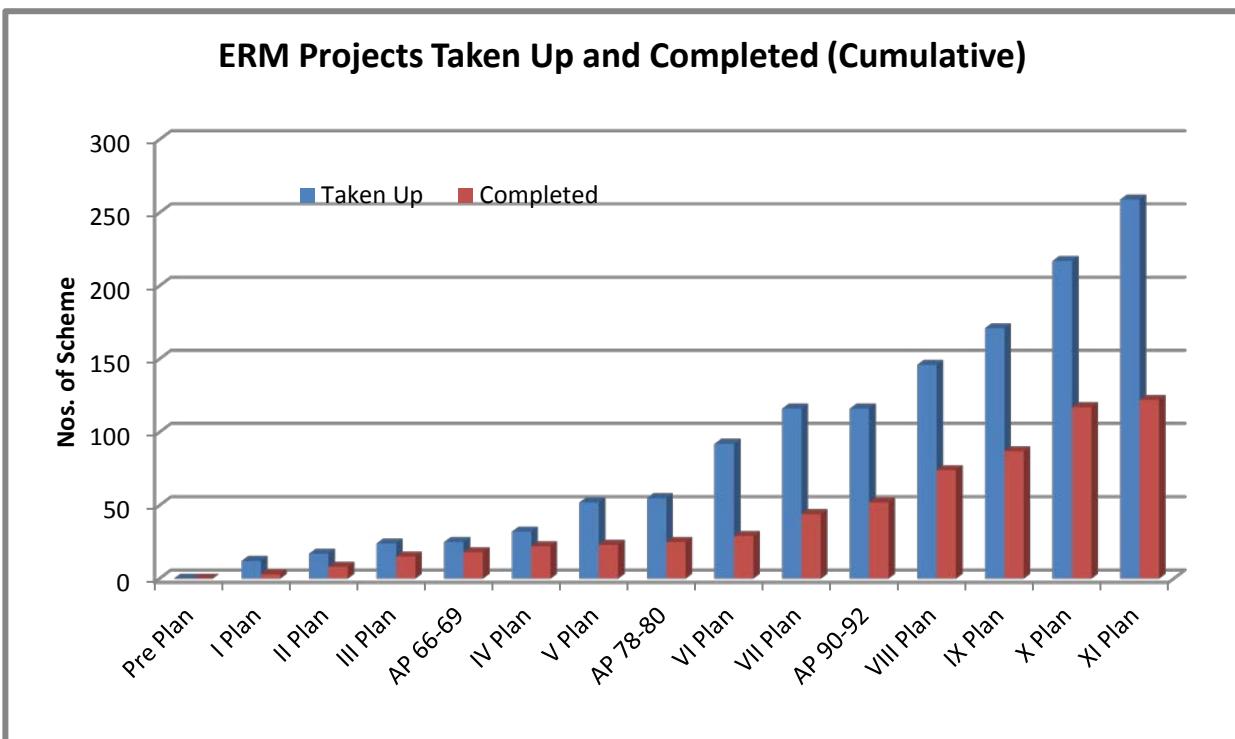
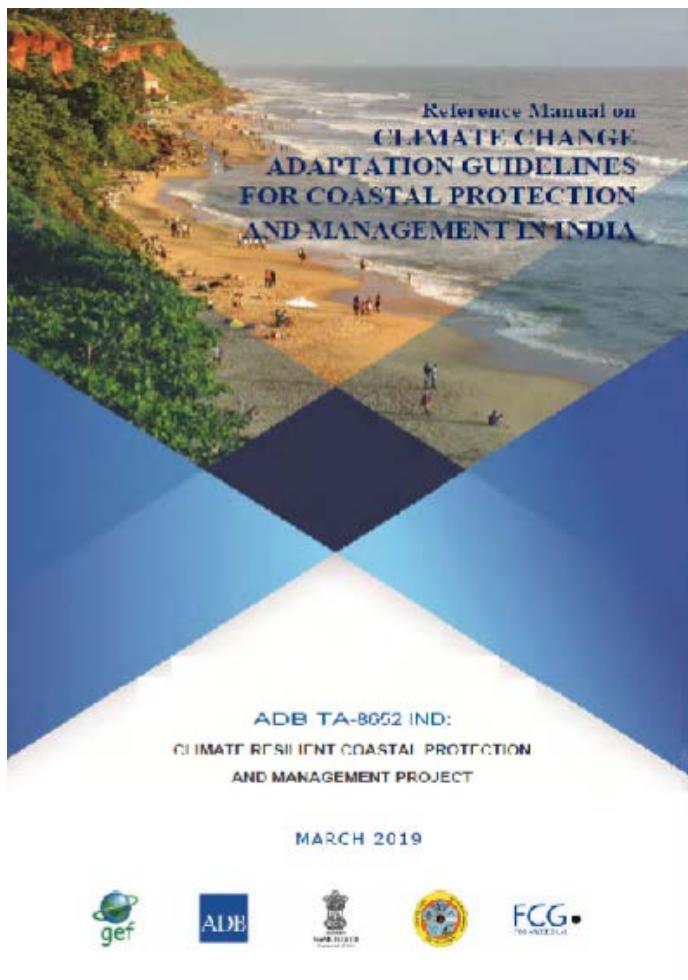


Fig 2.4 Modernization of ERM Projects taken up and Completed (Cumulative)





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 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 2020, Central Water Commission is operating a network of 1569 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 716 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 1569 HO stations is detailed below in Table 3.1.

Table 3.1
Basin-wise number of 1569 Hydrological Observation Stations

S. No.	Name of Basin	No. of Sites
1.	Brahmani-Baitarni Basin	25
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	824
6.	Godavari Basin	140
7.	Indus Basin	61
8.	Krishna Basin	72
9.	Mahanadi Basin	54

10.	Mahi Basin	17
11.	Minor rivers draining into Myanmar and Bangladesh	25
12.	Narmada Basin	71
13.	Pennar Basin	12
14.	Sabarmati Basin	13
15.	Subarnarekha Basin	15
16.	Tapi Basin	38
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

CWC also operates 76 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 634 key hydrological observation stations covering all the important river basins of India. Also, water quality samples are being collected from 33 Water Quality Sampling stations. At present the water quality network covers 67 main rivers, 161 tributaries and 73 sub-tributaries. 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 295 field water quality monitoring stations on major rivers of India where physical parameters such as temperature , colour , odour specific conductivity, total dissolved solids, 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 2020, out of 23 laboratories in CWC, 12 laboratories got accredited by National Accreditation Board for Testing and Calibration Laboratories (NABL) in accordance with Standard ISO/IEC 17025:2017 and 11 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	B&BBO, Shillong	Non Accredited
2	Middle Brahmaputra Divisional Water Quality Laboratory	II+	Guwahati	B&BBO, Shillong	Non Accredited
3	Lower Brahmaputra Divisional Water Quality Laboratory	II	Jalpaiguri	T&BDBO, Kolkata	Non Accredited
4	Upper Cauvery Water Quality Laboratory	II	Bangalore	MSO, Bengaluru	Accredited
5	Lower Cauvery Water Quality Laboratory	II+	Coimbatore	C&SRO, Coimbatore	Accredited
6	West Flowing Rivers Water Quality Laboratory	II	Kochi	C&SRO, Coimbatore	Accredited
7	East Flowing Rivers Water Quality Laboratory	II	Chennai	C&SRO, Coimbatore	Accredited
8	Upper Krishna Divisional Water	II	Pune	KGBO, Hyderabad	Accredited

S.No	Name of Laboratory	Level	Location	Organisation	NABL Accreditation Status
	Quality Laboratory				
9	Krishna & Godavari River Water Quality Laboratory	III	Hyderabad	KGBO, Hyderabad	Accredited
10	Chenab Divisional Water Quality Laboratory	II	Jammu	IBO, Chandigarh	Non Accredited
11	Middle Ganga Divisional-V 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	Non 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	Dehradun	UGBO, Lucknow	Non Accredited
21	Middle Ganga Divisional Water	II	Lucknow	UGBO, Lucknow	Non Accredited

S.No	Name of Laboratory	Level	Location	Organisation	NABL Accreditation Status
	Quality Laboratory				
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 in 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 Resources 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) implemented in participating Agencies in Hydrology Project II, and potentially in all States and UTs of India. The main objectives of development of the new software was to replace obsolete components of existing software, improve its system architecture and add some new components

The 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 with widens scope of data collection due to increase of nos. of agencies under National Hydrology Project-NHP, Internet enabled surface water information system (e-SWIS) has been upgraded to Water Information Management System (WIMS).

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 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 their 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 feed on Ground Water Module. Another feature of WIMS, Telemetry Management in WIMS and Live data from INSAT & GPRS are managing from various telemetric stations and reservoir stations in WIMS.

The benefits of WIMS software are as under:

- Based on web applications.
- Surface as well as Ground Water data is coming into WIMS.
- Telemetry Management
- 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.

3.1.3 National Hydrology Project

Hydrology Project, Phase-I (HP-I) was implemented by Government of India with an objective to establish a functional Hydrological Information System (HIS) and to improve institutional capacity of 9 States viz. Andhra Pradesh, Chhattisgarh, Gujarat, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Orissa, and Tamil Nadu and 6 Central Agencies viz. Central Water Commission, Central Ground Water Board, Indian Meteorological Department, National Institute of Hydrology, Central Water and Power Research Station and Ministry of Water Resources, River Development & Ganga Rejuvenation. In CWC, the project was implemented in the five regions in peninsular India namely C&SRO, KGBO, M&ERO, Mon(C) and NTBO besides NWA and CWC (HQ). The project was implemented during September, 1995 to December, 2003.

Under HP-I, an Integrated Hydrological Information System (HIS) providing reliable, comprehensive and timely hydrological and meteorological data relating to 56 parameters was established. A total of 916 river gauge stations, 7912 observation wells and 436 hydro meteorological stations, operated by various central and state agencies, collecting data on qualitative and quantitative aspects of both surface water and ground water were covered by the system. 380 Data Centers and 31 Data Storage Centers equipped with specialized hardware and software have also been established for data processing, storage and reliable data communication. Sufficient manpower has been trained for HIS operations and user support. In addition to current data, some of the states have also successfully computerized valuable historic data relating to rainfall and river discharge.

The Hydrology Project-II (HP-II) was a follow up on Hydrology Project-I. The overall project development objective was to extend and promote the sustained and effective use of Hydrological Information System by all potential users concerned with Water Resources Planning and Management thereby contributing to improved productivity and cost effectiveness of water related investments. Four new states viz., Himachal Pradesh, Punjab, Goa and Pondicherry and two new Central agencies viz., Central Pollution Control Board and Bhakra Beas Management Board were included in the Phase-II of the project. HP-II was implementing in five regions of CWC namely NTBO, CS&RO, KGBO, M&ERO, besides NWA and CWC (HQ). The project was started in May, 2006 and closed on May 2014.

The major components undertaken during HP-II comprises of institutional strengthening and vertical extensions of activities under HP-I. The works implemented in CWC under institutional strengthening include, development of Web Based Surface Water Information System, modernisation of Hydrological Observation Stations by installing Acoustic Doppler Current Profiler (ADCP) at fifteen Hydrological Observation Stations, upgradation of National River Water Quality Laboratory at New Delhi, installation of Real Time Water Quality Monitoring Systems on pilot basis at Moradabad on river Ramganga, Agra on river Yamuna & Lucknow on river Gomti, creation of additional infrastructure facilities at NWA, Pune, establishment of Video conferencing facilities at seven locations viz., Lucknow, Coimbatore, Bhubaneswar, NWA, Pune, Hyderabad, Gandhinagar & New Delhi. Under vertical extension, development of Hydrological Design Aids (Surface Water) was undertaken.

Based on the successful outcome of Hydrology Project, Government of India has now undertaken "National Hydrology Project (NHP) with assistance from The World Bank. Ministry of Water Resources, River Development and Ganga Rejuvenation is coordinating the implementation of NHP. There are a total of 49 implementing agencies (IAs) including 9 central agencies, 35 State-level agencies, 2 Union Territories and 3 River Basin Organizations (RBO) in NHP. Central Water Commission is one of the Implementing Agencies under NHP which has to play a crucial role as central technical coordination agency. Central Water Commission has been allocated funds totalling to about Rs. 198 Crore in NHP for carrying out the various activities. The project proposal for NHP was approved by the Government with overall cost of Rs. 3679.77 Crore on 23.6.2016 as a Central Sector Scheme. The total duration of the project is 8 years and is to be implemented in two stages.

Under NHP, the Central Water Commission will focus on following core area activities.

- **Water Resources Data Acquisition** - RTDAS for CWC & purchase of IT Equipment, Server, software, furnishing, furniture, misc. equipment etc.
- **Water Resources Information System** - Extension /upgradation of eSWIS software, procurement of satellite products and spatial data set for proposed study of IWRM, EHP, sediment & FF.
- **Water Resources Operation and Planning**- IWRM study for various basins, development of stream flow forecasting system, development of Basin-wise EHP model for medium & long term forecast, development of physical based

mathematical modeling for sediment rate estimation and sediment transport in the river basin, development of Regional Models for water availability and Aquatic life assessment in major rivers of India.

- **Institution Capacity Enhancement-** Creation of Centre of Excellence at Hyderabad, International Trainings/study tour/awareness program/conference/seminar, R&M of CPMU, Hiring of technical expert/data entry operator/ IT expert/MTS/ other expert etc.

Member (RM), CWC is the Coordinating Officer on the behalf of Central Water Commission. Chief Engineer (P&D), CWC is the Nodal Officer who would exercise overall administrative management and financial control of the project including data storage and dissemination. Director, RDC is the Project Director for implementation of CWC component of the project.

The important achievements of CWC under the National Hydrology Project during 2019-20 are as under:

Extended Hydrology Prediction in Narmada, Yamuna and Cauvery

The Expression of Interest for Extended Hydrology Prediction (Multi-Week Forecast up to 4 week) in three River Basins of India namely Narmada, Yamuna and Cauvery have been invited. Out of 11 bids received, 6 bidders were selected on the basis of selection criteria given in EoI. RFP have been issued to 6 selected bidders but only 3 Bidders have submitted RFP document. Technical and Financial bid submitted by bidder has been evaluated and negotiation meeting with the lowest bidder was held on 17th January, 2020.

Aquatic Habitat Atlas for Major Rivers of India

Terms of Reference of Aquatic Habitat Atlas for major river basins of India has been prepared and approved. It is proposed to undertake this consultancy services on single source selection basis. RFP has been prepared and sent to NPMU for review. RFP is to be issued to the selected bidders.

Physical Based Mathematical Modelling for Estimation of Sediment rate and Sediment Transport in Seven River Basin

Expression of Interest for Physical Based Mathematical Modelling for Estimation of Sediment rate and Sediment Transport in Seven River Basin namely Ramganga Basin,

Barak Basin, Narmada Basin, Cauvery Basin, Kuttiadipuzha Basin, Peechi Basin & Mangalam Basin has been prepared. Out of 11 bids received, 6 bidders were selected at EoI stage. RFP have been issued to 3 selected bidders but only 2 Bidders have submitted RFP document. Technical bid submitted by bidder is being evaluated.

Installation of Real Time Data Acquisition System (RTDAS) in Narmada Basin

In the 88th meeting of NCA held under the Chairmanship of Secretary, MoWR, RD & GR on 17.05.2017, it was decided that implementation of RTDAS may be taken up by CWC being a Central agency in an integrated manner with two master control centre to be established at Bhopal and Indore and data to be communicated to all the party States as well as NCA on real time basis in a seamless manner. Online National Competitive Bidding (NCB) for installation of RTDAS in Narmada Basin was invited by CWC on 18.10.2019.

Technical bids were opened on 27.01.2020 and total 5 no of bids were received out of which one bidder was found to be unresponsive. Financial bids of rest four of the bidders were opened on 27.03.2020 and M/s Canarys Automation Pvt Ltd, Bangluru was found to be L1 with bidding price of Rs 5,99,76,020.00 (Rs five crore ninety-nine lakh seventy-six thousand twenty only).

Installation of Real Time Data Acquisition System (RTDAS) in North Eastern States Narmada Basin

International Competitive Bidding (ICB) for installation of RTDAS on behalf of North Eastern States of Meghalaya, Tripura, Mizoram, Arunachal Pradesh, Nagaland, Manipur and Sikkim except Assam was invited by CWC on 25.10.2019. Technical bids were opened on 24.01.2020 and total 4 nos. of bids were received out of which one bidder was found to be unresponsive.

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 in India in a scientific manner made a beginning in 1958 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 325 flood forecasting stations, of which 197 are level forecasting and 128 are inflow forecasting stations on major dams/ barrages, spread over 23 States viz. Andhra Pradesh, Arunachal Pradesh, Assam, Bihar, Chhattisgarh, Gujarat, Haryana, Himachal Pradesh, Jammu & Kashmir, Jharkhand, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Orissa, Rajasthan, Sikkim, Tamil Nadu, Telangana, Tripura, Uttarakhand, Uttar Pradesh & West Bengal and one Union Territory Daman and Diu and the National Capital Territory of Delhi. It covers 20 major river systems in the country.

On an average, over 7000 forecasts are being issued every year by Central Water Commission during 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	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 four 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 2019

During the year, the flood forecasting activity began from 1st May 2019. During the flood season of 2019 (May to December), 9754 flood forecasts (6004 level forecast and 3750 inflow forecasts) were issued out of which 8451 (86.64%) forecasts were found within accuracy limit (± 0.15 m for level forecast and $\pm 20\%$ for inflow forecast). Using the web-based e-SWIS 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 <https://india-water.gov.in/ffs> 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, 1-day/ 3-day advisory forecasts are being issued by CWC. During flood season, three days flood advisories are available for all the 19 river basins online since June 2017 on the website <http://120.57.32.251>. 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 started issuing Daily Flood Situation Reports from 18th July 2018 onwards till 12th October 2018. 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 (@CWCoifficial.FF), twitter (@CWCoifficial_FF) and WhatsApp group. Reports were sent by e-mail on a daily basis from 23rd August 2018 to various beneficiaries.

3.2.2 Significant Flood Situations during 2019

During the flood season of 2019, out of 197 level forecasting stations, Extreme Flood Situation was witnessed at 4 stations. Further, 33 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
Flood Forecast Stations						
1.	Assam	Dhubri	Brahmaputra	Dhubri	17/07/2019 9 1800hrs	18/07/2019 0600 hrs
2.	Bihar	Madhubani	Kamlabalan	Jhanjharpur	14/07/2019 9 0400 hrs	14/07/2019 1300 hrs
3.	Maharashtra	Nasik	Godavari	Nasik	04/08/2019 9 1300 hrs	04/08/2019 1800 hrs
4.	Maharashtra	Satara	Krishna	Arjunwad	08/08/2019 9 1200 hrs	10/08/2019 1500 hrs

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

- 1) River Aie at Aie NH Xing in Barpeta district of Assam on 11th July 2019.
- 2) River Kosi at Birpur in Supaul district of Bihar on 13th July 2019.
- 3) River Kosi at Saharghat in West Champaran district of Bihar from 14th to 15th July 2019.
- 4) River Burhi Gandak at Kanti in Muzzafarpur district of Bihar from 17th July 2019 to 23rd July 2019.
- 5) River Krishna at Huvinahedgi in Raichur district of Karnataka on 11th August 2019.
- 6) River Dudhganga at Sadalga in Belagavi district of Karnataka from 7th to 14th August 2019.
- 7) River Ghataprabha at Gokak falls in Belagavi district of Karnataka from 6th to 12th August 2019.
- 8) River Tungabhadra at Shivamogga in Shivamogga district of Karnataka from 7th to 11th August 2019.
- 9) River Hemavathi at Sakleshpur in Hassan district of Karnataka from 8th to 11th August 2019.
- 10) River Varadha at Marol in Dharwad district of Karnataka from 9th to 10th August 2019.
- 11) River Yagachi at Thimmanahalli in Hassan district of Karnataka from 9th to 10th August 2019.
- 12) River Malaprabha at Cholachguda in Bagalkot district of Karnataka from 9th to 10th August 2019.
- 13) River Kabini at T.Narasipur in Mysuru district of Karnataka from 11th to 12th August 2019.
- 14) River Cauvery at Kollegal in Chamarajnagara district of Karnataka on 12th August 2019.
- 15) River Hemavathi at Akkihebbal in Mandya district of Karnataka from 10th to 12th August 2019.
- 16) River Agahanashini at Santeguli in Uttara Kannada district of Karnataka on 6th August 2019.
- 17) River Kabini at Muthankera in Wayanad district of Kerala from 9th to 10th August 2019.
- 18) River Valapatnam at Perumannu in Kannur district of Kerala from 7th to 11th August 2019.
- 19) River Kuttyadi at Kuttyadi in Kozhikode district of Kerala from 8th to 9th August 2019.
- 20) River Chaliyar at Kuniyil in Malappuram district of Kerala from 9th to 10th August 2019.
- 21) River Pulanthodu at Pulamanthole in Palakkad district of Kerala from 9th to 10th August 2019.

22) River Cauvery at Biligundulu in Dharmapuri district of Tamilnadu from 12th to 13th August 2019.

23) River Kalisindh at Salavad in Jhalawar district of Rajasthan from 15th to 16th August 2019.

24) River Krishna at Kurundwad in Kolhapur district of Maharashtra on 10th August 2019.

25) River Panchganga at Terwad in Kolhapur district of Maharashtra from 7th to 14th August 2019.

26) River Warna at Samdoli in Sangli district of Maharashtra from 8th to 10th August 2019.

27) River Savitri at Mahad in Raigad district of Maharashtra on 6th August 2019.

28) River Wainganga at Kumhariin Balaghat district of Madhya Pradesh on 9thSeptember 2019.

29) River Chambal at Udi in Etawah district of Uttar Pradesh on 18th September 2019.

30) River Chambal at Mandawara in Kota district of Rajasthan from 13th to 18th September 2019.

31) River Kalisindh at Salavad in Jhalawar district of Rajasthan from 14th to 15th September 2019.

32) River Ghataprabha at Mudhol in Bagalkote district of Karnataka from 21st to 25thOctober 2019.

33) River Bhavani at Odendurai in Coimbatore district of Tamil Nadu on 17th November 2019 and 2nd December to 3rd December.

Severe Flood Situation

96 FF Stations flowed in Severe Flood Situation in the States of Arunachal Pradesh, Assam, Andhra Pradesh, Bihar, Chhattisgarh, Jharkhand, Himachal Pradesh, Kerala, NCT Delhi, Odisha, Uttarakhand, Uttar Pradesh, West Bengal, Maharashtra, Madhya Pradesh and Gujarat during the period 1st May to 31st December 2019 as shown below:

Sl. No	State	District	River	Station
1	Arunachal Pradesh	East Siang	Siang	Passighat
2.	Assam	Jorhat	Brahmaputra	Neamatighat
3.		Golaghat	Dhansiri(S)	Numaligarh
4.		Sonitpur	Jia-Bharali	N T Road Crossing
5.		Sivsagar	Desang	Nanglamoraghat

6.		Sonitpur	Brahmaputra	Tezpur
7.		Sivasagar	Dikhow	Sivasagar
8.		Dibrugarh	Buridehing	Chenimari(Khowang)
9.		Lakhimpur	Subansiri	Badatighat
10		Golaghat	Dhansiri (S)	Golaghat
11		Nagaon	Kopili	Kampur
12		Morigaon	Kopili	Dharamtul
13		Kamrup	Puthimari	N H Crossing
14		Nalbari	Pagladiya	N T Rd Crossing
15		Barpeta	Beki	Beki Rd Bridge
16		Barpeta	Manas	N H Crossing
17		Kamrup	Brahmaputra	Guwahati (DC Court)
18		Goalpara	Brahmaputra	Goalpara
19		Kokrajhar	Gaurang	Kokrajhar
20		Dhubri	Sankosh	Golokganj
21		Cachar	Barak	Annapurnaghat
22		Cachar	Barak	Badarpurghat
23		Hailakhandi	Katakhal	Matizuri
24		Karimgunj	Kushiyara	Karimgunj
25	Bihar	Sitamarhi	Lakhanadi	Runisaidpur
26		Madhubani	Kamalabalan	Jainagar
27		Buri Gandak	Samastipur	Samastipur
28		Kishanganj	Mahananda	Taibpur
29		Katihar	Mahananda	Jhawa

30	Gopalganj	Gopalganj	Gandak	Dumariaghata
31		Adhwara	Sitamarhi	Sonbarsa
32		Motihari	Buri Gandak	Lalbegiaghata
33		Darbhanga	Bagmati	Hayaghat
34		Purnea	Mahananda	Dhengraghat
35		Muzzafarpur	Bagmati	Benibad
36		Darbhanga	Adhwara Group	Ekmighat
37		Supaul	Kosi	Basua
38		Darbhanga	Adhwara Group	Kamtaul
39		Sitamarhi	Bagmati	Dheng Bridge
40		Khagaria	Kosi	Baltara
41		Muzzafarpur	Buri Gandak	Sikandarpur(Muzza farpur)
42		Araria	Parwan	Araria
43		Samastipur	Buri Gandak	Rosera
44		Khagaria	Buri Gandak	Khagaria
45		Katihar	Kosi	Kursela
46		Patna	Ganga	Hatidah
47		Patna	Ganga	Patna Gandhighat
48		Munger	Ganga	Munger
49		Bhagalpur	Ganga	Kahalgaon
50		Patna	Sone	Maner
51		Siwan	Ghaghra	Darauli
52		Siwan	Ghaghra	Gangpur Siwan
53		Patna	Punpun	Sripalpur

54		Patna	Ganga	Dighaghat
55		Bhagalpur	Ganga	Bhagalpur
56		Buxar	Ganga	Buxar
57	Chhattisgarh	Bastar	Indravathi	Jagdalpur
58	Uttar Pradesh	Balrampur	Rapti	Balrampur
59		Barabanki	Ghaghra	Elginbridge
60		Ballia	Ganga	Ballia
61		Auraiya	Yamuna	Auraiya
62		Jalaun	Yamuna	Kalpi
63		Muzzafarnagar	Yamuna	Mawi
64		Badaun	Ganga	Kachlabridge
65		Faizabad	Ghaghra	Ayodhya
66		Ballia	Ghaghra	Turtipar
67		Ghazipur	Ganga	Ghazipur
68		Allahabad	Ganga	Allahabad
69		Allahabad	Ganga	Phaphamau
70		Varanasi	Ganga	Varanasi
71		Mirzapur	Ganga	Mirzapur
72		Banda	Yamuna	Chillaghat
73		Allahabad	Yamuna	Naini
74		Hamirpur	Betwa	Shahjina
75	Himachal Pradesh	Sirmaur	Yamuna	Paonta Sahib
76	NCT Delhi	North Delhi	Yamuna	Delhi Rly Bridge
77	Kerala	Palakkad	Bharathapuzha	Kumbidi

78	Karnataka	Kalaburagi	Bhima	Deongaon Bridge
79	Uttarakhand	Dehradun	Ganga	Rishikesh
80		Haridwar	Ganga	Hardwar
81	West Bengal	Coochbehar	Raidak-I	Tufanganj
82		Coochbehar	Jaldhaka	Mathabhanga
83		Jalpaiguri	Teesta	Domohani
84		Murshidabad	Ganga	Farakka
85	Jharkhand	Sahibganj	Ganga	Sahibganj
86	Odisha	Rayagada	Vamsadhara	Gunupur
87		Bhadrak	Baitarani	Akhuapada
88		Gajapati	Vamsadhara	Kashinagar
89	Andhra Pradesh	Srikakulam	Nagavali	Srikakulam
90		East Godavari	Godavari	Kunavaram
91		Kurnool	Tungabhadra	Mantralayam
92	Maharashtra	Bhandara	Wainganga	Pauni
93		Bhandara	Wainganga	Bhandara
94	Madhya Pradesh	Mandla	Narmada	Mandla
95		Hoshangabad	Narmada	Hoshangabad
96	Gujarat	Bharuch	Narmada	Bharuch

Above Normal Flood Situation:

52 FF Stations in State of Assam, West Bengal, Bihar, Maharashtra, Madhya Pradesh, Haryana, Odisha, Kerala, Telangana, Gujarat, Uttarakhand, Uttar Pradesh, Tamilnadu, Andhra Pradesh and Jammu & Kashmir flowed in Above Normal Flood Situation during the period 1st May to 31st December 2019 as shown below:

S.No.	State	District	River	Station
1	Assam	Lakhimpur	Ranganadi	Ranganadi NT Rd Crossing
2		Dibrugarh	Brahmaputra	Dibrugarh
3		Tinsukia	Lohit	Dhollabazar
4	West Bengal	Coochbehar	Torsa	Ghugumari
5		Coochbehar	Teesta	Mekhliganj
6		Hooghly	Mundeswari	Harinkhola
7		Jalpaiguri	Jaldhaka	NH-31
8	Bihar	Kushinagar	Gandak	Khadda
9		Muzzafarpur	Burhi Gandak	Ahirwalia
10		Chapra	Ghagra	Chapra
11		Vaishali	Gandak	Hazipur
12		Muzzafarpur	Gandak	Rewaghat
20	UP	Jaunpur	Gomati	Jaunpur
21		Etawah	Yamuna	Etawah
22		Banda	Ken	Banda
23		Farukkabad	Ganga	Fatehgarh
24		Ghaziabad	Ganga	Garmukheshwar
25		Jhansi	Betwa	Mohana
26		Hamirpur	Yamuna	Hamirpur
27		Mathura	Yamuna	Mathura
28		Siddartha Nagar	Rapti	Bansi
29		Rae-Bareli	Sai	Rae-Bareli
30	Jammu & Kashmir	Anantnag	Jhelum	Sangam
31		Bandipora	Jhelum	Safapora
32		Srinagar	Jhelum	Rammunshibagh
33	Odisha	Cuttack	Mahanadi	Naraj
34		Jagatsinghpur	Mahanadi	Alipingal
35		Balasore	Subarnarekha	Rajghat
36		Gabjam	Rishikulya	Purushottampur
37	Maharashtra	Bhandara	Wainganga	Bhandara
38		Ahmednagar	Godavari	Kopergaon
39	Haryana	Karnal	Yamuna	Karnal Bridge
40	Uttarakhand	PauriGarhwal	Alaknanda	Srinagar

41	Kerala	Pattanamthitta	Pamba	Malakkara
42		Ernakulam	Periyar	Neeleswaram
43	Telangana	JayashankarBhupalapally	Godavari	Eturunagaram
44		Kothagudem	Godavari	Bhadrachalam
45		Kothagudem	Godavari	Dummugudem
46	Gujarat	Valsad	Damanganga	Vapi
47		Kheda	Mahi	Wanakbori
48	Tamilnadu	Erode	Cauvery	Kodumudi
49		Tiruchirapalli	Cauvery	Musiri
50		Erode	Bhavani	Savandapur
51	Andhra Pradesh	East Godavari	Godavari	Dowlaiswaram
52		Kurnool	Tungabhadra	Kurnool Town

Reservoirs having Inflow above threshold limit:

Inflow Forecasts have been issued to 75 Reservoirs and Dams during the period 1st May to 31st December as shown below:

S.No.	State	District	River	Station
1	Karnataka	Vijayapura	Krishna	Almatti Dam
2		Kalaburagi	Krishna	Narayanpur Dam
3		Ballari	Tungabhadra	Tungabhadra Dam
4		Chikmagaluru	Bhadra	Bhadra Dam
5		Shivamogga	Tunga	Upper Tunga
6		Bagalkote	Krishna	Hippargi Dam
7		Gadag	Krishna	Singatalur
8		Hassana	Hemavathi	Hemavathi Dam
9		Mysuru	Kabini	Kabini Dam
10		Mandy	Cauvery	Krishnarajasagar Dam
11		Kodagu	Harangi	Harangi Dam
12		Belagavi	Ghataprabha	Hidkal Dam
13		Belgum	Malaprabha	Malaprabha Dam
14	Tamilnadu	Erode	Bhavani	Bhavanisagar Dam

15		Salem	Cauvery	Mettur Dam
16		Thanjavur	Cauvery	Grand Anicut
17		Theni	Vaigai	Vaigai Dam
18		Thiruvallur	Kosasthaliyar	Poondi Satyamurthy Rsvr.
19		Cuddalore	Periyar Odai	Wellington Dam
20		Tiruchirapalli	Cauvery	Upper Anicut
21	Jharkhand	Dhanbad	Barakar	Maithon Dam
22		Bokaro	Damodar	Tenughat Dam
23		Dhanbad	Damodar	Panchet Dam
24		Dumka	Mayurakshi	Massanjore Dam
25		Koderma	Barakar	Tilaiya Dam
26		Hazaribagh	Konar	Konar Dam
27	Rajasthan	Jhalawar	Kalisindh	Kalisindh Dam
28		Kota	Chambal	Kota Barrage
29		Chittorgarh	Chambal	RanaPratapSagar
30		Tonk	Banas	Bisalpur Dam
31		Udaipur	SomKamla	SomKamlaAmba Dam
32		Banswara	Mahi	Mahi BajajSagar Dam
33	Gujarat	Valsad	Damanganga	Madhuban Dam
34		Tapi	Tapi	Ukai Dam
35		Mehsana	Sabarmati	Dharoi Dam
36		Mahisagar	Mahi	Kadana Dam
37		Ahmedabad	Narmada	SardarSarovar Dam
38	Madhya Pradesh	Mandsaur	Chambal	Gandhisagar dam
39		Shahdol	Sone	Bansagar Dam
40		Lalitpur	Betwa	Rajghat Dam
41		Hoshangabad	Narmada	Tawa Dam
42		Jabalpur	Narmada	Bargi Dam
43		Raisen	Narmada	Barna Dam
44		Khandwa	Narmada	Indira Sagar Dam
45		Khandwa	Narmada	Omkareshwar Dam
46	Maharashtra	Jalgaon	Tapi	Hatnur Dam

47		Bhandara	Wainganga	Gosikhurd Dam
48		Satara	Koyna	Koyna Dam
49		Kolhapur	Varna	Warana Dam
50		Solapur	Bhima	Ujjani Dam
51		Satara	Nira	Veer Dam
52		Beed	Sindhpana	Manjlegaon
53		Parbhani	Puma	Yeldari Dam
54		Aurangabad	Godavari	Jaikwadi Dam
55	Odisha	Kalahandi	Indravathi	Upper Indravathi Project
56		Sambalpur	Mahanadi	Hirakud Dam
57	Telangana	JogulambaGadwal	Krishna	P D Jurala Project
58		Karimnagar	Godavari	SripadaYellampal ly Dam
59		Nizamabad	Godavari	Sriramasagar Dam
60	Uttarakhand	Champawat	Sharda	Banbasa Barrage
61	Kerala	Idukki	Periyar	Idukki Dam
62		Ernakulam	Idamalayar	Idamalayar Dam
63	Andhra Pradesh	Srikakulam	Vamsadhara	Gotta Barrage
64		Kurnool	Krishna	Srisailam Dam
65		Krishna	Krishna	Prakasam Barrage
66		Nellore	North Pennar	Somasila Dam
67		Guntur	Krishna	Dr KLRS Pulichintala Dam
68		Kurnool	Tungabhadra	Sunkesula Barrage
69	West Bengal	Burdwan	Damodar	Durgapur Barrage
70		Birbhum	Mayurakshi	Tilpara Barrage
71		Bankura	Kangsabati	Kangsabati Dam
72	Uttar Pradesh	Bulandshahar	Ganga	Narora Barrage (U/S)
73		Sonebhadra	Rihand	Rihand Dam
74		Lalitpur	Betwa	Matatila Dam
75	Chattisgarh	Dhamtari	Mahanadi	Ravishankar 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 2018, 245 daily bulletins (once daily), 768 Orange Bulletins for Severe Flood Situation (every 3 hours) and 113 Red Bulletins for Extreme Flood Situation (every 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 the 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/ffs> during monsoon season 2019.

3.2.6 Modernization of Flood Forecasting Services

Central Water Commission is making a constant endeavour in updating and modernizing the 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 (14), 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 23 Modelling centres have been installed in the country till the end of XII Plan. These Modelling Centres are located at Agra, Asansol, Bhubaneswar, Bhusaval, Burla, Chennai, Dehradun, Dibrugarh, Gandhinagar, Guwahati, Hyderabad (Two stations one each for Krishna and Godavari basins), Jaipur, Jalpaiguri, Kurnool, Lucknow, Maithon, New Delhi (One at headquarter and one for Yamuna basin), Patna, Shimla, Surat and Varanasi. The data reception from all the sites modernized is being monitored from Central Flood Control Room at CWC Headquarter, New Delhi.

During 2017-18, process for installation of telemetry system at 458 stations was under progress. Out of this, the installation of system at about 430 stations has been completed. The work for installation of system at remaining stations is in advanced stage and is likely to be completed before December 2020.

Establishment of five Modelling Centres (MCs) at Bengaluru, Bhopal, Gangtok, Jammu and Lucknow is planned during the period 2017-20. Out of this, establishment of Modelling Centre at four locations have been completed.

3.2.6.2 Development and use of Mathematical Model for Flood Forecasting

In order to improve the flood forecast activity in CWC, the methodology based on mathematical model using windows based Mike-11 software is progressively being used. The flood forecasting model based on the concept of rainfall-runoff module coupled with Hydrodynamic routing will use rainfall forecast for 3 days of IMD to give advance advisories followed by more reliable forecast based on actual observed hourly rainfall in the catchment. This will result in considerable increase of lead time in flood forecasting which in turn increases response time for disaster managers.

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://india-water.gov.in/ffs>.

In addition to this, CWC has partnered with Google to disseminate the flood warning through its Public Alert platform based on Common Alerting Protocol (CAP). This service was launched in November 2015 and was available to users during flood season 2016. Common Alerting Protocol (CAP) is an XML-based data format for exchanging public warnings and emergencies between various alerting technologies. CAP allows a warning message to be consistently disseminated simultaneously over many warning systems to many applications. Through this platform, level flood forecasts/ alerts were disseminated on different Google platforms such as Google Web Search, Google Now Cards in the Google Apps, Google Map and on the Google Public Alerts Homepage and can be accessed on desktop and mobile devices. Further, users can also access other information i.e., likely flood situation, current water level, forecasted water level, recommended action for affected people, website address for current water level

information etc. by clicking on the alert help. Availability of near real-time flood information helped affected people in preparing and fighting flood disasters.

3.3 Flood Management Programme

“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 and revised guidelines issued during October, 2013.

A total 522 schemes costing Rs 13238.37 Cr were approved during XI (420 projects costing Rs 7857.08 Cr) Plan and XII (102 projects costing Rs 5381.29 Cr) Plan. Out of these schemes, 235 schemes have been physically and financially completed; 168 schemes were physically completed with outstanding financial liability; 36 schemes foreclosed and shifted and 83 schemes are ongoing. A Central Assistance of Rs 4873.07 Cr was released during XI (Rs 3566.00 Cr) and XII (Rs 1307.07 Cr) Plan.

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

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 for taking up nonstructural measures such as Hydrological Observation and Flood Forecasting works on common border rivers, payment to neighboring countries (China) for supplying HO data on common rivers, investigation of WR projects in neighbouring countries, activities of GFCC and Pancheswar Development Authority (PDA) was funded through this scheme. In addition to above activities, 100% Central Assistance was also provided for taking up structural measures such as Anti Erosion/Flood Management schemes on rivers on international borders and Union Territories. The scheme with an outlay of Rs 740 Cr was also continued during XII Plan. A Central Assistance (as grant in aid) of Rs 563.61 Cr was released during XI & XII Plan (XI plan-Rs340.41 Cr and XII Plan-Rs223.2 Cr).

3.3.2 FLOOD MANAGEMENT AND BORDER AREAS PROGRAMME (FMBAP)

A comprehensive scheme titled “Flood Management and Border Areas Programme (FMBAP)” with an outlay of Rs 3342.00 Cr (FMP-Rs 2642 Cr & RMBA-Rs 700 Cr) for period 2017-2020 with merged components from the existing Flood Management

Programme (FMP) and River Management Activities & Works related to Border Areas (RMBA) schemes during XII Five Year Plan has been approved by the Union Cabinet on 07-Mar-2019 and aims at completion of the on-going projects already approved under FMP.

A Central assistance of Rs 562.67 Cr was released during year 2017-18, Rs 428.2 Cr was released during current year 2018-19 and Central assistance of Rs 546.09 Cr has been released during current year 2019-20 under FMP component of FMBAP.

A Central assistance of Rs159.25 Cr was released during year 2017-18, Rs256.48 Cr was been released during year 2018-19. A Central assistance of Rs 69.61 Cr has been released during current year 2019-20 under RMBA component of FMBAP.

3.3.3 FMP COMPONENT OF FMBAP

A total 522 schemes were approved during XI & XII Plan. Out of these schemes, 235 schemes have been physically and financially completed; 168 schemes were physically completed with outstanding financial liability; 36 schemes foreclosed and shifted, 83 schemes are on-going. A Central assistance of Rs 562.67 Cr was released during year 2017-18. Rs 428.2 Cr during year 2018-19 and Central assistance of Rs 546.09 Cr has been released during current year 2019-20. Thus, since start of XI Plan, total Central Assistance released is Rs 6410.03 Cr till 31-Mar-20. An outlay of Rs 2642 Cr has been kept for period 2017-20 under this component.

Central Water Commission coordinates the release of funds for scheme under FMP in areas other than Ganga and Brahmaputra basin. The details of fund released during 2019-20 to States for areas other than Ganga basin is given in Table 3.2.

Table 3.2

State-wise fund released under Flood Management Programme during 2019-20		
Sl No.	Name of State	Amount released (Rs. in Crore)
1	Assam	85.03
2	Bihar	0.00
3	Himachal Pradesh	176.41
4	Jammu & Kashmir	92.81
5	Uttar Pradesh	39.15

6	Uttarakhand	35.58
7	West Bengal	117.12
	Total	546.09

3.3.4 RMBA COMPONENT OF FMBAP

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)
	Total

An amount of Rs 69.61 Cr was released (as grant in Aid) under RMBA component of FMBAP during year 2019-20.

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 both by 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	Final Report Submitted
2.	IIT Delhi	Kosi, Bagmati, Yamuna	Draft Report Submitted
3.	IIT Guwahati	Bramhaputra, Subansiri, Pagladiya	Final Report Submitted
4.	IIT Madras	Krishna, Tungbhadra	Final Report Submitted
5.	IIT Kharagpur	Mahananda, Mahanadi, Hoogly	Final Report Submitted
6.	SVNIT Surat	Tapi	Final Report Submitted

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 External Assistance: Climate Resilient Coastal Protection and Management Project (CRCP&MP)

During year 2014, an agreement has been signed by the Government of India for Technical Assistance (TA) programme namely TA 8652-IND: Climate Resilient Coastal Protection and Management Project (CRCP&MP) to support mainstreaming of climate change consideration into coastal protection and management at the national level and in the two focal States (of Karnataka and Maharashtra) where the Sustainable Coastal Protection and Management Investment Programme (SCP&MIP) is already operational under external assistance from ADB.

One of the major objectives of this TA is to analyze the climate change impacts in the coastal areas and based on the same, planning & design criteria and guidelines for coastal climate change adaptation are to be prepared. A National Technical Committee (NTC) has been constituted by the Ministry to oversee and guide the implementation of the project and to endorse the project outputs. Further, a Panel of Experts (PoE) was also constituted for review of the draft Guidelines.

As a part of TA, research studies were also awarded to specialist institutes NIO, Goa, IIT Bombay & IIT Delhi. The details of the studies are given below:

Specialist Institute	Study Performed
Indian Institute of Technology (IIT), Bombay	Analysis of the downscaled Climate Change Parameters for Wind, Air Temperature and Rainfall from the CORDEX-South Asia* Domain.
National Institute of Oceanography (NIO), Goa	Sea level rise trends and Waves projections
Indian Institute of Technology (IIT), Delhi	Storm Surge Projections

(* - Indian Institute of Tropical Meteorology (IITM), Pune is one of the partner institutes in above initiative)

The Study Reports along with the data and analysis of the climate change affected parameters in the coastal areas has been hosted on web-based Water Resources Information System (INDIA-WRIS). The Coastal Climate Information System (CCIS) layer has been created in INDIA-WRIS. Coastal Climate Information System (CCIS) layer has been created in INDIA-WRIS for hosting of results of the studies and reports of various institutions. NIO Goa, IIT Bombay & IIT Delhi have submitted their Final reports on Waves, Climate Parameters and Storm Surges studies respectively. Study

Reports are available on CCIS portal on INDIA-WRIS. Two training courses and national workshops in the use of the Guidelines for the maritime States/UTs and other concerned agencies have also been organized.

A Reference Manual on "Climate Change Adaptation Guidelines for Coastal Protection and Management in India" prepared as part of Technical Assistance (TA) grant program "TA 8652-IND: Climate Resilient Coastal Protection and Management Project (CRCMP)" was released during the event held in Hotel Leela Palace, Chanakyapuri, New Delhi on 26th March 2019 by Shri U P Singh, Secretary, MoWR, RD&GR in presence of Shri N K Mathur, Member (D&R Wing), CWC, Shri B K Karjee, Chief Engineer(FMO), CWC, Mr. Arnaud Cauchois, Principal Water Resources Specialist, ADB and other dignitaries and officials from MoWR, RD&GR, CWC, New Delhi, ADB and State Govt(s). Based on the above reference manual "Guidelines for preparation of DPR for Coastal Management Projects under climate change scenario" is prepared and is under consideration of competent authority for finalization.

3.5.2 Sustainable Coastal Protection and Management Investment Program (SCPMIP)

Realizing the severity of sea-erosion problems in certain reaches of the coastline, MoWR, RD&GR initiated the process of collecting details of severely affected reaches with a view to explore the possibility of preparing a National Coastal Protection Project (NCP) for taking up the same for external assistance. As an outcome of discussions between the Government of India and ADB, a Project Preparatory Technical Assistance (PPTA) programme for preparing a Sustainable Coastal Protection and Management Project for the states of Maharashtra, Karnataka & Goa was taken up. Under PPTA an investment programme estimating to \$404.6 million USD (revised) including ADB loan of \$250 million has been envisaged. Further, the multi-tranche facility (MFF) for project was approved by ADB on 29th September, 2010 for an amount of \$250 million USD.

Further, the Government of India and ADB signed an agreement for first tranche loan (\$51.555 million loan- LN-2679-IND) under the MFF on 17/08/2011 for Sustainable Coastal Protection and Management Investment Programme (SCP&MIP) in the states of Karnataka and Maharashtra. Two projects namely Ullal Coastal Erosion & Inlet Improvement Project in Karnataka and Mirya Bay Coastal Erosion and Protection Project in Maharashtra have been completed.

The State Govt. of Karnataka has submitted Tranche-2 Projects to CWC for techno-economic appraisal. In July 2016, the Tranche-2 Projects have been accepted by

Advisory Committee of MoWR, RD and GR at an estimated cost of Rs.374.09 Crore. The project proposal under Tranche - II includes 6 sub-projects involving beach nourishment, sand by-passing, construction of offshore reefs, groynes, revetment etc and 2 community protection subprojects involving plantation works for dune stabilization.

Designs of Someshwara project under Tranche-2 is revised due to site conditions and the revised proposal of Someshwara project is submitted to CWC by the project consultant for TAC approval and the same is under examination in Cost Appraisal Directorate, CWC. The revised proposal will be considered for approval in upcoming TAC meeting to be held in FY 2019-2020. Designs of Someshwara project under Tranche-2 is revised due to site conditions and the revised proposal of Someshwara project was submitted to CWC by the project consultant for TAC approval. Approval of Advisory Committee of DoWR, RD&GR on Irrigation, Flood Control & Multipurpose Projects have been accorded the project on "implementation of Coastal protection measures at Someshwara, Mangalore"- Construction of two nos of offshore reefs and sand nourishment at an estimated cost of Rs.84.87 Crs under Sustainable Coastal Protection and Management Investment Programme (SCPMIP) of Karnataka.

3.5.3 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 member of the above Committee.

Till now, 16 meetings of CPDAC have been held. The last meeting was held on 16th July 2019 at New Delhi.

Under DoWR, RD & GR, Government of India (GoI), New Delhi, a project titled, "Shoreline Change Atlas of the Indian Coast", was initiated in 2010 by Space Applications Centre (SAC, ISRO), Ahmedabad, in collaboration with Central Water

Commission (CWC) with the major objective to prepare a digital shoreline change atlas in GIS environment on 1:25, 000 scale using satellite data (time frame 1989-91 and 2004-06) including the location of coastal protection works.

The publication of the Shoreline Change Atlas of Indian Coast was accepted by the CPDAC in its 14th Meeting and was published in May, 2014. Now atlas is being updated on time frame of 2016-17 by SAC.

New Coastline length for Maritime States/UTs as computed by National Hydrographic office (NHO), Dehradun accepted by the CPDAC and is under consideration of competent authority for publication.

Manual on "Protection and Control of Coastal Erosion in India" was accepted by the committee under publication.

Action taken report (ATR) on the minutes of 16th CPDAC meeting held at CWC (HQ), New Delhi on 16th July 2019 & Agenda points for the 17th CPDAC meeting are being collected & compiled from the committee members. 17th CPDAC meeting is going to be held in the FY 2020-2021.

3.5.4 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 the 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, 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) among CWC as project implementer, the 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 has been 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 achieved. All the remaining payments as per MoU made to IITM, Chennai.

Approval has been 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. 4,14,30,793/- for a period of one year. Accordingly, a tripartite Memorandum of Understanding (MoU) has been signed in January 2020 among CWC, IIT Madras and respective states (Kerala, Tamil Nadu and Puducherry) and an advance payment amounting to Rs 140 lakhs has been made to IIT Madras in February 2020.

B) CWPRS

CWC explored the possibility of extending CMIS to the other maritime States/UTs and held discussion 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 discussion, was held regarding the various modalities involved in the tri-partite 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.695.531 lakh 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 has been 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 has been 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.

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. 1376.60 lakh was signed among 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 has been received from DoWR, RD & GR 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. Accordingly, advance payment of Rs 412.98 lakhs has been 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.

3.5.5 Salinity Ingress Management Projects

On the intervention of Hon'ble Prime Minister's intervention, a study has been 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 Sept, 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, 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) Setting up of National Centre for Scientific Study of Salinity ingress in Delta regions, as recommended in the report.

Further, a Committee was constituted for (i) preparation of DPR (ii) preparation of newscheme for Salinity Ingress Management Projects &(iii) setting up of National Centre for Scientific Study of Salinity Ingress in Delta Regions. 1st meeting of the Committee was held at CWC, New Delhi on 24/04/2018. During the meeting, the preliminary draft guidelines for the preparation of DPR were discussed by the Committee and it was decided to submit comments/observations after a thorough review of the guidelines. Further, the work was distributed chapter-wise among the various agencies/departments/members of Committee, identified as the Lead and the Supporting agencies for the respective chapters/sub-chapters.

Second meeting of the committee was held on 14th November, 2019 for the finalization of the draft guidelines. During the meeting, the preliminary draft guidelines for the preparation of DPR were discussed by the Committee and it was decided to submit comments/observations after a thorough review of the guidelines.

Comments/Observations have been received from few directorates of CWC/agencies and the same has been incorporated in the draft guideline for preparation of DPR which will be finalized in due course.

3.5.6 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 seagoing 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 is being prepared.

3.6 River Management Activities and Works Related to Border Areas

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 for taking up nonstructural measures such as Hydrological Observation and Flood Forecasting works on common border rivers, payment to neighboring countries (China) for supplying HO data on common rivers, investigation of WR projects in neighbouring countries, activities of GFCC and Pancheswar Development Authority (PDA) was funded through this scheme. In addition to above activities, 100% Central Assistance was also provided for taking up structural measures such as Anti Erosion/Flood Management schemes on rivers on international borders and Union Territories. The scheme with an outlay of Rs 740 Cr was also continued during XII Plan. A Central Assistance (as grant in aid) of Rs 563.61 Cr was released during XI & XII Plan (XI plan-Rs340.41 Cr and XII Plan-Rs223.2 Cr).

The Government of India has been implementing the Central Sector Scheme “River Management Activities and Works related to Border Areas (RMBA)” under Central Plan for taking up following activities:

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)
	Total

3.6.1 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

The details of the ongoing proposal for bank protection /anti erosion works on common border rivers between India and neighboring countries dealt in Central Water Commission for funding under the above programme is as given below-

(Rs. in Lakh)				
Sl. No .	Particular of the scheme	Estimated cost	Fund released upto March 19	Amount released during 2019-20
	Jammu & Kashmir			
1	Construction of protection works on left side & right side of Nikki Tawi ahead of Makwal camp along international border from AMK post to Alfa Machal post, J&K.	1469.00	1058.15	269.25
2	Construction of protection works by way of constructions of Embankment spurs and Revetment to project defence posts in River Basanter & River Devak.	800.00	475.00	162.5
	Punjab			
1	Consolidated Project Proposal for flood protection work to be executed along Indo & Pak Border on River Ravi & Its Tributary Ujh, to check land erosion for the safety of village Abadies, Border Fencing and other defence Installations. Phase-I " Critical Works"	2989.00	2615.50	Nil
	Tripura			
1	Anti-erosion works along the bank or river Feni for protection of Indian Side bank at vulnerable locations from Jelai to Beltali (Segment-I), Baishpur to barunighat (Segment-II), Anandapara to Chotokhil (Segment-III), Ranibazar to Ramendra Nagar (Sector-IV) and Harbatali to	5513.00	4106.00	Nil

Sl. No .	Particular of the scheme	Estimated cost	Fund released upto March 19	Amount released during 2019-20
	Amlighat (Segment-V)			

In addition, the scheme “Flood protection work in Yanam region of UT of Puducherry” was also funded under the Plan Scheme “River Management Activities and Works related to Border Areas”. The scheme was initially included for funding under the “Flood Management Programme” and first instalment of Rs. 7.50 Crores was released during XIth plan. Subsequently, the scheme was included for funding under RMBA scheme in 2014 and as per the Court direction, the second instalment amounting to Rs. 13.2563 Crores was released. In total, an amount of Rs. 20.7563 Crore has been released to this scheme so far.

The completion of the projects got delayed due to some unforeseen reasons. Subsequently, a multi-disciplinary team was constituted by the MoWR, RD&GR to assess the ground reality and to make suitable recommendation for completion of project. The project was inspected by the team on 8th and 9th November 2016 and report was submitted on 8th December 2016. Based on the report of the team, the project was revised by the Government of UT and modified DPR costing Rs 137.28 Cr was accepted in 136th meeting of AC-MoWR, RD&GR held on 06.06.18. The investment clearance proposal is awaited from Govt. of UT, Pudducheri.



National Conference on Flood Early Warning for Disaster Risk Reduction

30-31 May 2019, Hotel GreenPark, Hyderabad, India

Jointly Organized by :National Remote Sensing Centre (NRSC), ISRO & Central Water Commission, MoWR

Under the aegis of National Hydrology Project (NHP) Ministry of Water Resources, River Development & Ganga Rejuvenation Government of India

 A photograph showing a group of people standing on a small, elevated platform or bridge in a flooded area. There are several large trees standing in the water around the platform. The water is up to the ankles of the people on the platform.





Sh. Rattan Lal Katariya, Hon'ble Minister of State, Ministry of Jal Shakti being greeted by Chairman and Member(RM), CWC



CHAPTER-IV

BASIN PLANNING

4.1 Basin Planning Studies and Related Issues

4.1.1 Reassessment of Basin-wise Water Resources Availability in the Country – Strategy identified under National Water Mission

One of the strategies (Strategy No. I.6) identified for implementation under the Comprehensive Mission Document of National Water Mission is “Reassessment of basin-wise water situation” under present scenario including water quality by using latest techniques, which inter-alia may include:

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

In June, 2010 Central Water Commission (CWC) and National Remote Sensing Centre (NRSC) jointly initiated a demonstrative pilot studies in Godavari and Brahmani-Baitarani river basins wherein remote sensing based geo-spatial inputs were used to estimate basin-level mean annual water resources. The pilot study in the Godavari and Brahmani-Baitarani Basin was completed in June, 2013. The report of pilot study was reviewed by a Working Group comprising officers from CWC, IIT and NRSC which has suggested some refinements in the methodology before replicating the same in other basins.

Later, MoWR, RD&GR decided to carry out assessment studies in all basins (including Brahmani- Baitarani and Godavari basins with refined methodology) of the country through regional offices of CWC with support from NRSC. Accordingly, MoWR, RD&GR sanctioned a proposal for conducting above study with a total estimated cost of Rs. 6.44 Crore in January 2015. The estimated cost was later revised to Rs. 10.33 Crore in March 2016 due to escalation of price of related softwares.

In this regard, four customized trainings for the studies were conducted by NRSC from 25-29 May 2015 (NRSC, Hyderabad), 5-16 Oct, 2015(NRSC, Hyderabad), 18-20 Oct 2016 (CWC, New Delhi) and 5-9 Dec 2016 (NRSC, Hyderabad) for officers of CWC involved in the study.

AnMoU was signed with NRSC in July 2016 for their technical guidance and support for the study. The study was started in Aug 2016. The study has been completed in July 2017.

The average annual water resource of the 20 basins of the country has been assessed as 1999.20 Billion Cubic Meters (BCM). Fully science based state-of-the art modelling tools and satellite data have been used in the study. The methodology for reassessment was finalised by a Committee consisting of experts from CWC, NRSC, Indian Meteorological Department (IMD) and Academia. The most distinguishing features of the study are incorporation of rainfall, land use, land cover, proper estimation of demand, evapotranspiration, soil moisture and development of basin and sub-basin wise models with the help of the software namely 'Water Resources Assessment Tool' developed by NRSC. The outcome of this study will be very useful for proper planning and development of country's water resources.

The study reports (3 volumes; Main Volume, Volume-I and Volume-II) of 'Reassessment of Water Availability in India using Space Inputs' were released by Shri. Gajendra Singh Shekhawat, Hon'ble Minister of Jal Shakti on 26.06.2019.



4.1.2 Integrated Water Resources Management (IWRM) Plan for Krishna, Godavari and Mahanadi Basins under National Hydrology Project (NHP)

The institutionalization and implementation of Integrated Water Resources Management (IWRM) in India supported by River Basin Organizations and

following the internationally acknowledged river basin planning cycle is a major target for the Government of India. The development of River Basin Management Plans for all Indian River basins takes a key role within this process. Significant steps have already been taken in the past, such as the development of specific projects for assessing water resources availability, the establishment of river basin management concepts and – most recently – the ongoing study for preparation of a Ganga River Basin Management Plan, initiation of process for enactment of Basin Management Act etc.

Ministry of Water Resources, River Development and Ganga Rejuvenation (MoWR, RD &GR) aims to develop its ability to manage basins to support optimum use of water resources. The major objectives are to: align water resources development goals in line with the National Water Policy 2012; bring all States on equal footing regarding Hydrological Information System (HIS) and its use; and, specifically, to move towards IWRM process.

To start with, IWRM of 5 river basins namely Krishna, Godavari, Mahanadi, Mahi and Subarnarekha by IITs/ IISc/ Similar Institutes under DWRIS is planned. Consultancy Evaluation-cum-Monitoring Committee (CEMC) was constituted on 30.08.2019 under the chairmanship of Dr. Naresh Kumar, CE (BPMO), CWC with the approval of Secretary, Ministry of Jal Shakti. Four meetings of the same have been conducted till now and Terms of Reference (ToR) and Bid Evaluation Criteria regarding IWRM studies of Mahi and Subernarekha basins have been finalized. The proposal for conducting IWRM studies of Mahi and Subernarekha basins is under process of approval by DoWR, RD & GR, Ministry of Jal Shakti.

4.1.3 Strategic Basin Planning of Ganga River Basin

The World Bank has engaged M/s Deltas as consultant for conducting the study titled “Strategic Basin Planning for Ganga River Basin in India”. The main objectives of the study are as under

- Significantly strengthen the capability of relevant central and state government agencies to undertake comprehensive evidence-based strategic basin planning for the Ganga River basin.
- Develop, document and disseminate a set of possible scenarios that balance significant improvement of health of the river maintaining an acceptable level of economic productivity.
- Build stronger and more accessible information and knowledge base to guide ongoing dialogue around and management of Ganga River Basin.
- Establish ongoing multi-stakeholder engagement processes in the basin to support strategic basin planning.

Keeping in view its commitment for adopting a scientific strategy for rejuvenation of river Ganga and to develop a strong evidence base to ensure that the resources are invested effectively and efficiently in the river basin, the Ministry of Water Resources, River Development and Ganga Rejuvenation is supporting the above study. Central Water Commission is actively involved in the study. Final Assessment Reports and final version of the tool developed under this project has been handed over to World Bank and concerned departments of MoWR in Dec 2019 by M/s Deltas. The State Governments have been asked to download and run the tool for possible future scenarios.

4.2 Blueprint for Water Accounting in India

Water Accounting is the systematic acquisition, analysis and communication of information relating to stocks, flows and fluxes of water (from sources to sinks) in natural, disturbed or heavily engineered environments. (FAO, 2017). Water Accounting serves as a tool to evaluate and plan Water Resources Management, to monitor changes in Water Resources and to assess the impacts of future interventions. Water Accounting (WA) integrates hydrological processes with land use, managed water flows and the services that result from water consumption in river basins.

Water accounting (now WA+) has been developed originally by Dr. David Molden from the International Water Management Institute (IWMI) and has been modified and upgraded with inputs from the Delft University of Technology. Based on global hydrological models and public domain remote sensing data sets, Water Accounting Plus (WA+) is a comprehensive depletion accounting framework that provides consistent and coherent information on water resources and the services which water provides, such as irrigation for agriculture, in a river basin or a country. Water accounting can help to create a common language to interpret and communicate water resources data for creating measures of performance such as productivity, efficiency and equity. Evidence provided by water accounting can help to manage excessive and conflicting water demands and negotiate trade-offs especially in a deficit year.

6 officers from CWC, 2 officers from NRSC, 2 officers from CGWB and 2 officers from NIH, Roorkee were imparted training in Water Accounting+. Water accounting study of Cauvery River Basin has been completed and a stakeholder workshop has been conducted at NWA, Pune on 04.09.2018. A coordination committee to look after the work of monitoring and coordination of Water Accounting studies under the Chairmanship of Member (WP&P), CWC has been

constituted. BPMO, CWC has completed WA+ study of Tapi Basin in December, 2019. Presently, study for Godavari basin has been initiated by BPMO, CWC

4.3 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 to come. The skillful and reliable forecasts of streamflows are highly valuable for providing water allocation, managing drought, planning and managing water use.

ToR for Extended Hydrological Prediction (EHP) study of 3 basins (Yamuna, Narmada, and Cauvery) under NHP has been prepared by ToR preparation Committee and sent to Project Director, NHP, CWC. 6 (six) agencies have been shortlisted for issue of RFP in the second meeting of EHP committee on 27th Feb, 2019. Out of these, only 3 bidders have submitted proposals. Technical and financial bidding process have been completed. RTI International has been selected for award of contract on LCS basis. The comprehensive proposal, along with the minutes of technical negotiating meeting and draft Contract Document has been sent to Ministry for approval of competent authority. The project is scheduled to be completed in two and half years after the award of work and signing of MoU (plus 3 years technical support and maintenance).

4.4 India-EU water Partnership

Under India-EU water Partnership (IEWP), Priority Area 1 is dedicated to the topic 'Sustainable River Basin Management and Governance'. As a key task, a pilot Tapi River Basin Management Plan (Tapi RBM Plan) is proposed to be developed using Risk Assessment Approach and Methodology provided by EU. In order to develop the Tapi RBM Plan most effectively, the Indian authorities established a formal Tapi River Basin Committee under IEWP.

It was agreed that the Tapi RBM Plan will follow the internationally acknowledged River Basin Management Cycle taking into account water quality and quantity. Indian and EU approaches will be merged to achieve meaningful results in the Tapi RBM Plan. 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
 - e.g. alterations from irrigation/abstraction; crop patterns;
- 4) Alterations of Groundwater Quality and Quantity
 - e.g. alterations from irrigation/abstraction; solar pumping; pollution
- 5) Alterations of River Structure through Sand Mining

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.

First meeting of this Committee took place on 18.06.2019 under the chairmanship of CE (BPMO) with representation from CWC, CGWB, co-basin states (Maharashtra, Gujarat, Madhya Pradesh) and officials and consultants from EU Delegation. In the meeting visions and management objectives for each KWMI were discussed and various agencies for data collection were identified.

Data required for the above study were collected/compiled from the NWIC, partner states, and submitted to GIZ/EU for further analysis at their end.

A meeting to review Risk Assessment Approach and methodology to be adopted with respect to KWMI-3 by EU Expert was held on 12.02.2020. The meeting was attended by officers from CWC, EU/GIZ and representative officials from Tapi States. The analysis work on all other KWMI is under progress.

4.5 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.

4.5.1 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, Planning Commission. The Committee has submitted its report in September, 2013. National Water Planning Directorate, CWC has been closely associated with the process of preparation of the roadmap for implementation of the policy.

Further, the Ministry of Water Resources, River Development and Ganga Rejuvenation has been impressing upon the States / Union Territories (UTs) to formulate their State Water Policies in line with the National Water Policy, 2012 and has been pursuing the same with the States/UTs. CWC is also pursuing with the States which have not formulated their water policies in accordance with National Water Policy, 2012 to either formulate policies or revise their existing policies as the case may be.

4.5.2 Revision of National Water Policy

The Ministry of Jal Shakti constituted a Drafting Committee for revision of National Water Policy on 5th November, 2019 under the chairmanship of Dr. Mihir Shah, former Member (Planning Commission). The Committee is undertaking 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. Seven meetings of the Committee have been held so far. The details are given below:

Meeting	Date	Remarks
1st Meeting	07-11-2019	Discussions were held for revision of NWP and the stakeholders to be consulted in this process.
2nd Meeting	25-11-2019	
3rd Meeting	19-12-2019	Consultation with NGOs and academic experts
4th Meeting	23-12-2019	
5th Meeting	07-01-2020 08.01.2020	Consultation with States and Water experts

6th Meeting	27.01.2020	Consultation with NGOs and academic experts
7th Meeting	25.02.2020	

80 presentations have been made in all during the meetings and in this various NGOs, organizations, experts, States/ UTs etc. have participated and presented their views. The states/UTs who participated in consultation process and presented their views were Goa, Rajasthan, Assam, Bihar, Haryana, J&K, Kerala, Meghalaya, Sikkim, Nagaland, Tamil Nadu, Uttrakhand, Uttar Pradesh, Maharashtra, Karnataka, Punjab, Odisha, Gujarat, Andhra Pradesh, Chattisgarh, Jharkhand, Puducherry and Delhi. About 49 written submissions have been received from different States/ NGOs/ Experts for inclusion in New National Water Policy.

A meeting to discuss the revision of National Water Policy (NWP) was held on 28th March, 2020 through video-conferencing under the chairmanship of Shri Rajendra Kumar Jain, Chairman, CWC. Director (NWP) attended the meeting and discussed about the progress in revision of National Water Policy.

4.6 National Water Resources Council

National Water Resources Council (NWRC) was set up in March 1983 as a National apex body with the Hon'ble Prime Minister as Chairman. The Union Minister of Water Resources is the Vice-Chairman, and Minister of State for Water Resources, concerned Union Ministers/ Ministers of State, Chief Ministers of all States & Lieutenant Governors/ Administrators of the Union Territories are its Members. Secretary, Ministry of Water Resources is the Secretary of the Council. The constitution of the NWRC is given in Figure 4.1. The council has held six meetings so far. The 6th meeting of the National Water Resources Council was held on 28th December, 2012.

4.7 National Water Board

To review the progress achieved in the implementation of the National Water Policy and to report the progress to the National Water Resources Council from time to time, the Government of India constituted a National Water Board in September 1990 under the Chairmanship of Secretary (WR). The constitution of the Board is given in the Figure 4.2. The Board has held fourteen regular and two special meetings so far. The fourteenth meeting was held on 7th June, 2012 at New Delhi.

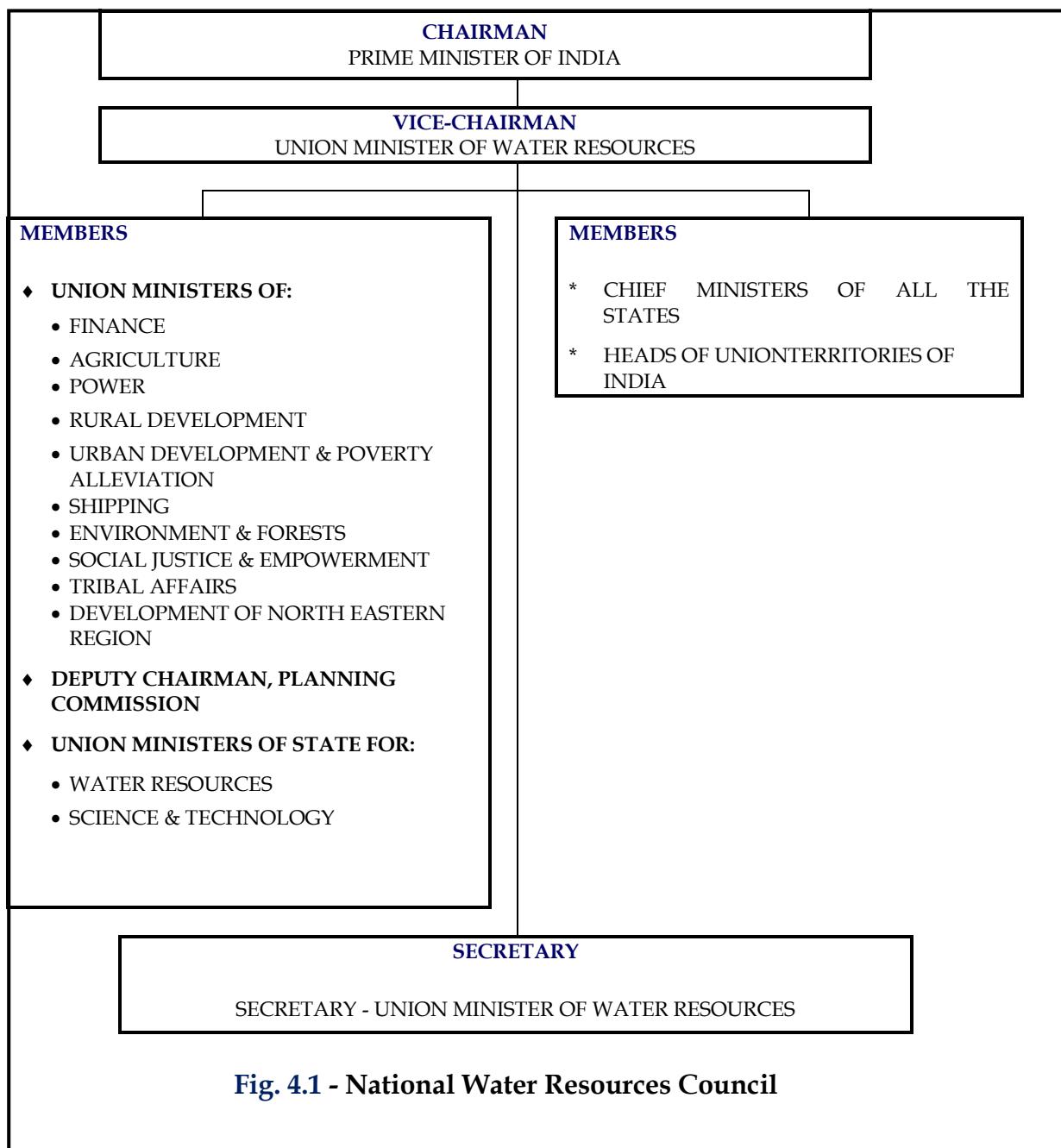
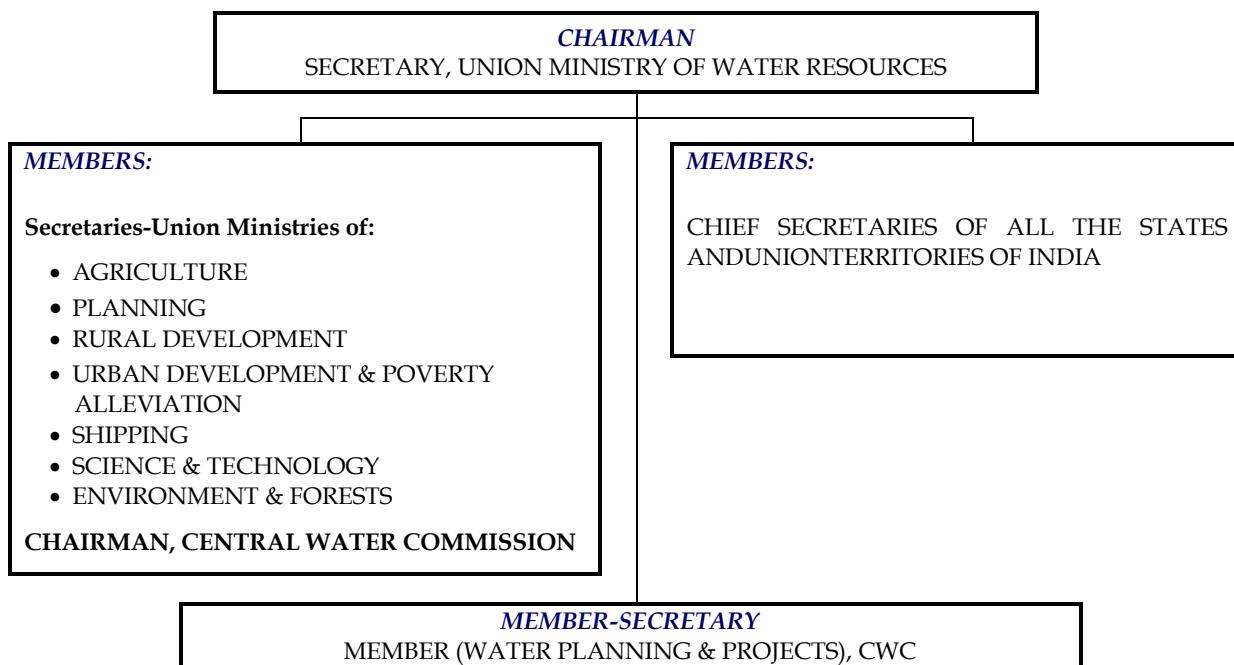


Fig. 4.1 - National Water Resources Council

**Fig. 4.2- National Water Board**

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 in July 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 in December 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 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. The Committee submitted its Final Report to the Ministry in July, 2016.

In March 2017, the Ministry 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.

Till now, comments have been received from 12 states/UTs (Rajasthan, Tamil Nadu, Madhya Pradesh, Kerala, Karnataka, Odisha, Gujarat, Uttar Pradesh, Maharashtra, Bihar, Punjab and Jharkhand. Interim response has been received from 4 states/UTs viz. Uttarakhand, Arunachal Pradesh, Delhi and Lakshadweep. Among these, Governments of Rajasthan, Madhya Pradesh, Maharashtra, Gujarat, Uttar Pradesh and Jharkhand have supported the Bill. However, Governments of Tamil Nadu, Kerala, Karnataka, Punjab, Odisha and Bihar are not in favour of the draft Bill. The bill is under examination in Uttarakhand, Arunachal Pradesh, Delhi and Lakshadweep.

4.9 River Basin Management Bill

The National Water Policy, 2012, inter-alia, recommends that there is a need for a comprehensive legislation for optimum development of inter-State rivers and river valleys to facilitate inter-State coordination ensuring scientific planning of land and water resources taking basin/sub-basin as unit with unified perspectives of water in all its forms (including precipitation, soil moisture, ground and surface water) and ensuring holistic and balanced development of both the catchment and the command areas. Such legislation needs, inter alia, to deal with and enable establishment of basin authorities, comprising the States concerned, with appropriate powers to plan, manage and regulate utilization of water resource in the basins. In pursuance, the MoWR, RD & GR had constituted a Committee 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. The Draft River Basin Management Bill, 2012 proposes establishment of separate River Basin Authorities for regulation and development of waters for twelve major inter-State river basins in the country. It proposes principles of participation, cooperation, equitable and sustainable management, conjunctive use, integrated management, public trust doctrine and demand management for governing river basin development, management and regulation.

Subsequently, a Committee under the Chairmanship of Dr.Mihir Shah was constituted 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.

Later, 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 brainstorming session on River Basin Management Bill was conducted on 3rd June, 2019 by Ministry of Jal Shakti. Response on the comments of States and public/stake holders during brain storming session has been furnished to the Department of WR, RD & GR, Ministry of Jal Shakti.

4.10 Interaction with NWDA on Inter-Basin Transfer of Water

The National Water Development Agency is engaged in carrying out water balance studies, field surveys, investigations and preparation of pre-feasibility reports /feasibility reports /DPRs of links under National Perspective Plan as well as Intra-State links proposed by the States. Chairman, Member (WP&P) and Member (D&R), CWC are members of NWDA Society and Governing Body of NWDA. So far 66 meetings of the Governing Body have been held. The 66th meeting of the Governing Body was held on 27th February, 2019.

The water balance study reports prepared by NWDA are also being examined in specialized Directorates of CWC. During the year 2018-19, four (4) Water Balance Reports were examined by CWC and comments were sent to NWDA.

4.11 Joint Operation Committee of Rihand Reservoir

Ministry of Water Resources had set up a Joint Operation Committee (JOC) for Rihand Reservoir vide their O.M. No. 54/7/92-BM/1172 dated 30th October 1992. The Committee consists of members from Uttar Pradesh JalVidut Nigam Limited (UPJVNL), Uttar Pradesh Power Corporation Limited (UPPCL), WRD-Bihar, and CEA. Member (WP&P), CWC, New Delhi is the Chairman of the Committee. So far 31 meetings of JOC have taken place. The 32nd meeting of the Joint Operation Committee (JOC) for the Rihand Reservoir was held on 18th October, 2019 under the chairmanship of Member (WP&P) at CWC Headquarters, New Delhi.

Major decisions taken during this meeting are as follows:

- i. As per the irrigation requirement of Bihar for year 2019-20 and power generation schedule of UPJVNL, release recommendations of JOC for year 2019-20 were finalized.
- ii. 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.

iii. It was found that there was variation in releases indicated by UPJVNL and WRD, Bihar. To this, the Chairman, JOC suggested that officers of both the states should jointly verify the releases and sign the data release statements. Monthly statements of the releases are issued to the members of the JOC.

4.12 Executive Committee of Bansagar Control Board and Bansagar Reservoir Regulation Committee

76th meeting of the Executive Committee of Bansagar Control Board, held on 11th June 2018 at New Delhi. Chairman, CWC New Delhi is the Chairman of the Committee. Executive Committee decided to operate the Bansagar dam as per Reservoir Regulation Manual and WRD, Govt. of Madhya Pradesh would apprise the committee regarding the outcome of the dam operation as per the operation manual in the next meeting of Executive Committee.

Bansagar Reservoir Regulation Committee constituted vide resolution letter no. 15/5/2001-MI/BM dated 15th March 2002 of BM section, then MoWR. 4th meeting of this committee held on 07th September 2018 under Chairmanship of Chairman, CWC at New Delhi. Main agenda points discussed in the meeting were as follows:-

Preparation of Regulation Manual for filling of the Bansagar Dam Reservoir and sharing of storage of Bansagar reservoir as per Bansagar agreement.

The Chairman observed that the issues related to Bansagar Reservoir Regulation Committee were being discussed in Executive Committee meeting as well and Committee may request the then MoWR, RD & GR (now M/o Jal Shakti) to merge the Reservoir Regulation Committee into Executive Committee once the Reservoir Manual is finalized.

4.13 Integrated Reservoir Operation

Integrated Reservoir Operation studies of 8 River Basins viz. Ganga, Godavari, Krishna, Mahanadi, Mahi, Subarnarekha, and Cauvery are to be taken up under DWRIS. Total estimated cost for study of 8 basins was Rs. 5.86 Crore. TOR, RFP estimate of Ganga basin was prepared initially at a cost of Rs. 1.26 crore, however, based on inputs from stakeholder meeting held on 13.05.2019 under chairmanship of Member (RM), the estimated cost got revised to Rs. 4.78 crore. The TOR, RFP, EoI and estimate of Ganga have been sent to Ministry for approval.

4.14 Climate Change Issues and National Water Mission

The “National Water Mission” was formulated by Ministry of Water Resources with main objective of “conservation of water, minimizing wastage and ensuring its more

equitable distribution both across and within States through integrated water resources development and management". The Mission, duly approved by the Government, has set five goals to achieve the above objective, which are:

1. Comprehensive water data base in public domain and assessment of the impact of climate change on water resource.
2. Promotion of citizen and state actions for water conservation, augmentation and preservation.
3. Focused attention on vulnerable areas including over-exploited areas
4. Increasing water use efficiency by 20%
5. Promotion of basin level integrated water resources management.

Climate Change cell was created in CWC in August, 2007 to deal with all the studies, works and reports on the subject regarding impact of climate change on water resources being referred to CWC. CWC provides inputs and assistance to NWM secretariat in examining the research proposals related to climate change received in NWM Secretariat.

Monitoring of Glacial lakes/Water bodies in the Himalayan Region of Indian river basin has been carried out on monthly basis from June to October. The main objective of the study is to monitor the changes in the spatial extent of the glacial lakes and water bodies greater than 50 ha area with the area of base year 2009 using satellite data received from NRSC, Hyderabad. Monthly Monitoring Reports have been sent to Central/State Govt agencies and other stakeholders.







Sh. S. Masood Husain, Chairman, CWMA & CWC chairing the 3rd Meeting of CWMA on 28.05.2019 at CWC, HQ, New Delhi



Sh. Navin Kumar, Chairman, CWRC chairing the 7th Meeting of CWRC on 23.05.2019 at CWC, HQ, New Delhi



CWC officers visiting the Arjun Feeder Canal under Madhya Ganga Canal Phase-II Project



Dam Safety Workshop on "Latest Trends in Inspection and Investigation of Dams" organized by Aqua Foundation under the aegis of the Central Water Commission in association with the World Bank, CBIP and ICID on 30th May, 2019

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.
3. Examination and vetting of manufacturers design of hydro mechanical components.
4. Review of safety aspects of existing dams and its monitoring.
5. Special analysis like Dam Break Modelling, foundation problems, rehabilitation of aged & distressed dams, etc.
6. Technical appraisal of Pre-feasibility/Detailed Project Reports of Irrigation, Hydropower and Multipurpose River Valley Projects.
7. Coordination of research, development and capacity building activities.

8. 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.
9. 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 neighbouring 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 four 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
4. Design (South East & West) Organisation

Three of the above organisations indicated at No. 1 to 3 above have specialised Directorates such as Hydel Civil Design (HCD), Concrete & Masonry Dam Design (CMDD), Embankment Design, Gates Design and Barrage & Canal Design (BCD). The fourth Organisation, which was earlier known as Narmada Basin Project Organization has specialised Directorates namely, Dam and Head Works (D&HW) Design Directorate, Power House and Canal (PH&C) Design Directorate & Hydro Mechanical Design (HMD) Directorate.

These units provide design and consultancy services during various stages of implementation of a 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 unit provide services to projects located in the States/UTs of J&K, Himachal Pradesh, Punjab, Haryana, Delhi, Uttrakhand, Uttar Pradesh, Bihar and Jharkhand in the country. It also provides services to projects located in the two neighbouring countries namely, Nepal and Afghanistan.
- (2) **Design (E&NE) Organization:** The unit provide services to projects located in the States/UTs of Sikkim, Assam, West Bengal, Meghalaya, Manipur, Mizoram, Nagaland, Tripura, Arunachal Pradesh, in the country. It also provides services to projects located in the neighbouring country namely, 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 provide services to projects located in the States/UTs of Kerala, Andhra Pradesh, Karnataka, 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 Sri Lanka.
- (4) **Design (South East & West) Unit:** The unit provide services mainly to projects of Sardar Sarovar Narmada Nigam Ltd. (SSNNL), Government of Gujarat and Narmada Valley Development Authority (NVDA), Government of Madhya Pradesh. These projects include Garudeshwar Weir Project (Gujarat), Halon Irrigation Project (M.P.), Lower Goi Project (M.P.), Bargi Diversion Project (M.P) and Arpa Barrage (Chhattisgarh). The design related support in respect of some projects for which survey and investigation is carried out by CWC is also provided by the unit. These projects include Bhadbhut Barrage Project and 20 Medium Irrigation Projects in Jharkhand.

5.2.2 Design Consultancy carried out by Design Organisations

CWC has provided design consultancy services to 94 projects during the year 2019-20. These include 85 Nos. of projects located in 22 States and 9 Nos. of projects located in neighbouring countries like Afghanistan (1), Bhutan(4), Indo-Nepal(3) and Nepal (1). The details are given below:

Sl. No.	Category	No. of Projects
1.	Projects at construction stage	29
2.	Projects at investigation and planning stage (for which detailed project reports are being prepared)	39
3.	Projects with special problems	26
	Total	94

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) Arpa Bhaisajhar Barrage Project (Arpa River), Chhattisgarh:

The Project envisages construction of a barrage across Arpa River for irrigation. CWC is providing consultancy services for vetting of design/drawings of hydro mechanical components. 3 designs & 18 drawings of Sluice Service Gates, Under-Sluice /Service Gate and HR Service Gate and Emergency Gate were approved. Comments issued for 3 design of 5T rope drum Hoist, 80T rope drum hoist and 110T rope drum hoist.



Arpa Bhaisajhar Barrage Project

2) Garudeshwar Weir Project (Gujarat):

Garudeshwar Weir, being constructed across Narmada river 12.10 KM downstream of Sardar Sarovar dam, has 389m long rockfill dam on left bank, 1137m long proposed concrete gravity type weir comprising a total of 38 blocks (29 OF blocks and 9 NOF blocks). The purpose of constructing the weir is to create reservoir pool on the downstream of Sardar Sarovar dam for enhancing power generation capacity of Sardar Sarovar Power House using turbine in pumping mode during lean power demand and generation mode during peak demand. Consultancy services were provided for construction stage design and vetting of engineering drawings of various civil and hydro-mechanical components of Weir.

Physical Achievements:

1. Revised drawings of steel liner and drawings of Reinforcement Details of Power Intake Structure of the power intake block were examined and observations/comments were sent to SSNNL.
2. Construction stage Design and Drawings of penstock emergency gate assembly, penstock service and emergency gate embedded parts have been vetted and sent to SSNNL.
3. Construction stage Design and Drawings of Bonnet cover for river sluice service and emergency gates, hydraulic hoist for river sluice service and emergency gates have been vetted and sent to SSNNL.



Garudeshwar Weir

3) Phina Sigh Medium Irrigation Project, Himachal Pradesh:

CWC is providing consultancy services for vetting of design/drawings of concrete gravity Dam and hydro-mechanical works. 12 numbers of construction drawings and comments regarding the test results for conforming to the bearing capacity of the foundation strata have been issued. Field visit was also conducted to assess the site conditions for the project.

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

Construction stage designs & drawings for some portion of the dam were issued by CWC during the year 1990. Fresh hydrology of the project was approved by Hydrology(S) Dte, CWC during the year 2013. On the basis of the fresh hydrology, a set of Specification drawings were issued by Designs (N&W) Unit, CWC during the year, 2014. Now the project authority approached to Designs (N&W) Unit, CWC for the preparation of the remaining construction stage drawings. In response to this the project authority has been asked on dated 19.12.2019, to submit the present status of all the works at project site, detailed note of the investigation studies and list of the construction stage drawings required to be issued by CWC.

5) Kharkai Barrage under Subarnarekha M.P.P. Jharkhand:

Subarnarekha MPP envisages construction of two Dams (Chandil Dam & Ichha Dam) and two Barrages (Galudih Barrage & Kharkai Barrage) apart from other appurtenant structures envisaged in the project. Design consultancy for Chandil Dam and Galudih Barrage was provided by CWC and construction of these components has been completed. The project construction thereafter remained dormant for about twenty years and only recently work on remaining pending components has started. Design consultancy for these components namely Chandil Dam and Kharkai Barrage Project is being provided by CWC. Project envisages construction of 234 m long barrage across river Kharkai a major tributary of river Subarnarekha near Village Ganjia, Jharkhand.

The work is in active stage of construction. 53 Nos. of construction stage drawings have been issued so far which include 6 Nos. of revised drawings. The construction drawings of main Barrage including Head Regulator have been issued. Four numbers construction drawing of gantry parking have been issued. The construction work of barrage is in completion.

6) Lakhwar M.P.P. Uttarakhand :**Lakhwar Dam**

The MoU for technical consultancy services for design and engineering of civil and mechanical works of Lakhwar Multipurpose Project (3x100 MW), Uttarakhand has been signed between CWC and UJVNL on 20/09/2013. Hydraulic design of Stability analysis of overflow and non-overflow sections of Spillway and Stilling basin have been completed. Revised Specification drawings are under progress.

7) Anandapur Barrage Project:

The Anandapur Barrage is located at village Anandapur in District Keonjhar (Odisha) at Longitude 86°08'E and Latitude 21°13'N. The scheme envisages construction of a barrage, having total waterway of 491.60m with 25 nos. spillway bays and 8nos. under sluice bays, across river Baitarani. It also include Left & Right Head Regulators to divert 165.00 cumecs water in Baitarani Left Bank Canal (BLBC) to irrigate 1200 ha CCA in Anandapur & Hatadihi Blocks of Keonjhar District and 10.00cumecs water in Baitarani Right Bank Canal (BRBC) to irrigate 5000 ha CCA in Ghasipura Block of Keonjhar District. The Left Bank Canal (Link Canal) carrying 165.00 cumecs water outfalls in

Salandi River at upstream of existing Bidyadharpur Barrage to provide water to the extended Salandi Left Ayacut of 53,800 Ha in Balasore District.

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 overview consultants for three projects namely; Tehri Pumped Storage Project (1000MW) Uttarakhand), Vishnugad-Pipalkoti HE Project (444MW) (Uttarakhand) and Dhukwan Small HE Project (24MW) (U.P.).

Tehri PSP comprising of four reversible pump turbine units of 250 MW each, involves construction of an Underground Machine Hall on the left bank of river Bhagirathi. Power house consists of underground cavern having 25.4m (w) X 57.3m (H) X 201m (L). There are 2 numbers upstream surge shafts of approx. 21m diameter with approx. height of 145 m.

There are 2 numbers downstream surge shaft of approx. 18m diameter with approx. height of 101 m. There are 2 numbers of Tail race tunnel (TRT-3 & TRT-4) with 9.0 m diameter of length 1081m and 1176m each respectively. The main feature of the Project is the large variation of about 90 m between the maximum and minimum head, under which the reversible units shall operate. The construction drawings are being vetted as and when submitted by project authorities.

9) Vishnugad Pipalkoti HEP (4x111 MW), Uttarakhand:

The Vishnugad Pipalkoti Hydro Electric Project (VPHEP) is located on Alaknanda River, a major tributary of river Ganga, in district Chamoli in the state of Uttarakhand. The nearest railhead is Rishikesh (225 Km) and the nearest Airport is Jolly Grant, Dehradun (240 Km). The project is approachable by an all-weather road (National Highway No. 58).

The project envisages a run of river scheme with construction of a diversion dam of 65 m height across Alaknanda River for power generation harnessing a gross head of 237 m. The reservoir will have a gross storage capacity of 3.63 Million cubic Metre (MCM), out of which 2.47 MCM shall be live storage. A diversion cum spill tunnel of 10 m dia. shall divert the discharge of 725 m³/sec during the construction period.

The water conductor system comprises of 03 numbers intake tunnels, 03 numbers Underground sedimentation chambers (390m each), a Head Race Tunnel (13.4 Km), a

Surge shaft, 02 numbers Pressure shafts bifurcating into 4 no. Penstocks. The powerhouse comprises of two separate underground caverns for installation of turbines and transformers. MoC submitted by project authorities was examined and cleared.

10) Kanhar Irrigation Project, Uttar Pradesh:

CWC is providing consultancy services for vetting of design/drawings of hydromechanical components. Comments issued on design of hydraulic hoist for operation of Spillway Radial gates and trunnion level walkway bridge of Spillway Radial gates.

11) Arjun Sahayak Pariyojana, Uttar Pradesh

This project envisages diversion of surplus water available at Lahchura Dam through feeder canal to Arjun Dam and then from Arjun Dam to Kabrai Dam and Chandrawal Dam, to augment inflows into three reservoirs Arjun, Kabrai and Chandrawal.

Design (N&W) unit is involved in providing design consultancy for Arjun Sahayak Pariyojna in respect of raising the height of existing Kabrai dam. This unit has also been engaged in construction stage drawings for Head Regulator. Total 25 Numbers of construction stage drawings have been prepared and issued to the Project authorities. The Project site in Distt Mahoba (U.P.) was also visited by concerned Directorate of Design (N&W) Dte. during February 2020. On the request from Project authorities, safe distance of Kabrai Dam from blasting sites in the hills downstream of the Kabrai Dam was calculated as per relevant IS codes and the suitable advice was communicated to the project authorities.

12) Punatsangchhu-I H.E. Project, Bhutan:

Punatsangchhu-I H.E. Project, 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 MCM and live pondage of 12.38 MCM between MDDL 1195m and FRL 1202m to enable the power station envisaged under the project, to cater to dilurnal variations in

power requirements. The project has an installed capacity of 1200 MW and construction of the project is underway.

13) Punatsangchhu-II H.E. Project, 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.



Punatsangchhu-I H.E. Project, Bhutan



Punatsangchhu-II H.E. Project, Bhutan

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

MoU was signed between CWC and Project authorities in August 2017. Arun-3 HEP (4 x 225 MW) is a run-of the river project located on Arun River a tributary of Koshi 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.

Following works have carried out during this year:

- i. The proposal for elimination of Desilting Chamber, submitted by SJVNL, was studied in detail with due consultation with CMDD(N&W) directorate, the decision to accept the proposal but with changes in spillway configuration was agreed upon.
- ii. Surge Shaft design which includes lining design, HRT multijunction design and necessity of drainage gallery around surge shaft were studied and finalized. Drawings are to issued.
- iii. Hydraulic design of intake structure and slope stability of intake back slope has been reviewed & modified drawings related to intake were prepared and conveyed to the project authorities.
- iv. 03 numbers of construction drawings regarding the Diversion Tunnel Outlet works and 05 numbers of construction drawings regarding the excavation & support details at dam axis have been vetted & issued. Comments on the layout of galleries, foundation & abutment strata and Geophysical survey on the right

bank of Arun-III HEP have been issued. The Design Note on stability analysis of U/s & D/s Coffer Dam w.r.t. Arun-III HEP has been vetted and issued. 02 numbers of the field visits were also conducted for assessing the ongoing construction works of the project.



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

15) Ganol H.E. Project, Meghalaya:

Ganol H.E. Project, Meghalaya is proposed to be located about 1.5 km downstream of the confluence of Rangram and Ganol rivers near Chilbragiri village in the West Garo Hills District of Meghalaya. This project envisages construction of 35m high Concrete 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 for generation of 22.5 MW of Power.

16) 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 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:

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

The 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 (OF) blocks (including 10 nos. of river sluice blocks), 2 nos. of non-overflow (NOF) 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 OF blocks for releasing 15 TMC of water to the downstream.

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. A Dam Design Review Panel (DDRP) has also been constituted for providing suggestions on the technical issues relating to the progress of the project.



View of Spillway of Polavaram Irrigation Project During 2019 Floods

17) Parwan Dam Project, Rajasthan

The Parwan Project is having 38m high concrete Dam on river Parwan, a tributary of river Kalisindh, a main tributary of river Chambal with catchment Area of 8242 Km². Live storage of 490 MCM and Irrigation of 138,239 ha (CCA) in 311 villages including 20 MCM for drinking water demand of 820 villages of Jhalawar, Baran & Kota districts. Design spillway capacity is 29000 cumecs.

In all, 100 drawings issued have been for dam, gates and tunnel. During excavation and mapping of spillway blocks 4 to 8, presence of a fault was reported by GSI. Dam site was visited on 20th June 2019 by the joint team of CWC, CSMRS and GSI, and it was agreed to investigate the feature of the fault to assess its nature and extent. The required investigation is being carried out jointly by GSI and WRD, Rajasthan.



18) Chheligada Dam Project, Odisha

Chheligada Dam Project is contemplated across river Badajore, a tributary of river Vansadhara, near village "Chheligada" in R-Udaygiri Block of Gajapati District from which 6.9 cumec water is proposed to be diverted to neighbouring Rushikulya basin through a tunnel connected with approach and exit channels. The proposed dam is 250 m long concrete gravity type, having Non Overflow portion of 149.50 m and Overflow (Spillway) portion of 90.5 m length with maximum height of 36.0 m above deepest foundation level with a gross storage capacity of 5021 Ha-m and live storage capacity of 4326 ha-m. As per the request of WRD, the required specification drawings have been issued and constructions drawing shall be taken up in sync with construction programme.

19) 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 their outcome, CWC has provided drawings for rehabilitation of the Dam, revising the dam section and the work is being taken up accordingly.



20) Sikasari Dam Project, Chhattisgarh

Sikasari Project is a major dam built across Pairy River of Mahanadi Basin in Chhattisgarh, during the years 1976-80. The spill channel had started eroding from confluence of the spill channel with the river and progressed in the spill channel towards spillway in its initial years, but it aggravated when flood of 1.00 lac cusecs was passed in the year 2008-09. The Project Authorities (PA) approached CWC for getting the issue resolved. The project site was visited by the CWC team and observed the extent of erosion of about 7-8 m deep and 200 m in length had taken place in the spill channel and recommended cascade type of structure to prevent further erosion and safeguard the main structure.

Subsequently, WRD, Chhattisgarh approached CWC also for providing designs & drawings for implementation of the recommendations. Considering the site conditions,

the cascade type spillway has been provided and the required drawings have been issued by CWC. The rehabilitation work is under progress.

21) Krishna Raja Sagara Dam

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. It is a multipurpose project formed by the construction of a dam. 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 EL 130.0'. There are altogether 173 sluices of different sizes at various levels to serve the intended objective of project.

An MOU has been signed between CWC & WRD Karnataka on 28.02.2020. As per the MOU, the CWC is to provide consultancy services for vetting of detailed design & drawings related to the Hydro-Mechanical work Package-II of Krishna Raja Sagara dam, which 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" to 100 years old Krishna Raja Sagara Dam.



The design has been carried out on priority and drawings issued for the Gates at EL.+106 Level on 28.03.2020.

22) Isarda Dam Project, Rajasthan

The Isarda dam is a drinking water supply project proposed to be constructed 95 km downstream of Bisalpur dam on River Banas in Tonk District of Rajasthan. The length of the proposed dam is 4958 km consisting of 591.50 m overflow portion, 2 x 23 m non-overflow portion and 3053 m & 614 m long earthen dam on left and right side of overflow portion with 2 saddles of length 324 m and 354 m on right side of dam. The maximum height of dam above deepest foundation level is 33.75 m. Design and drawings for different components of dam like spillway, stilling basin, gallery and non over flow block, intermediate and end pier for block no.4 & 5 has been completed. The General Arrangement drawing for model studies purpose was vetted and accordingly Hydraulic Model Studies was carried out.

23) Saraswati Barrage, Haryana

Construction of Adi Badri Dam, Somb Saraswati barrage on river Somb and their appurtenant works in Haryana for revival of Saraswati river and for tourism development. The main concern of the project is inflow of heavy sedimentation load. As directed by CWC, project authorities have submitted revised hydrology chapter which is under examination in hydrology directorate, CWC. Upon clearance from hydrology directorate consultancy work of project will be taken up.

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

CWC is providing design consultancy services for hydromechanical equipments of Mandal Dam North Koel Reservoir Project. Observation/ comments on design (179 pages) and drawings (47 Nos.) of Irrigation Sluice Gate, lower level Sluice Gates, intake service gate, Irrigation Emergency Sluice Gate, Hydraulic Hoist for low level sluice Gates, Hydraulic Hoist for Irrigation Sluice Gate and Hydraulic Hoist for intake service gate were sent to project authorities. A Team of experts under the leadership of Director, Gates Designs (N&W), CWC comprising officers from CWC, State Govt. (Bihar & Jharkhand) and WAPCOS visited the fabrication site at Kota, Rajasthan during 10-11 December, 2019. The team submitted the inspection report along with solution to the shortcomings observed.

25) Hirakud Dam, Additional Spillway Project:

Hirakud Dam Project is built across river Mahanadi about 15 km upstream of Sambalpur, town in the state of Odisha. It is a Multipurpose Project and is the longest Earthen Dam in Asia. 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. The 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 inflow revised design flood, 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 to discharge.

Proposed Structures for Additional Spillway on Left of Gandhi Hillock at Hirakud Dam:

MWL	192.454m
FRL	192.024m
Type of Diversion Structure:	Concrete Gravity Dam
Maximum Height (from above deepest foundation)	48.68m
Spill Channel Length	1900.00m
Spill Channel Width	120.00m
Connecting Dykes length (Combined)	1020.00m

B. Projects at DPR Stage

1) Saptakosi & Sunkosi Multipurpose Project, Indo-Nepal

As per the preliminary studies carried out, the 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. DPR stage design engineering for this project is being carried out by Central Water Commission. A joint project office has already been set up in Nepal for investigation of the project. Field investigation studies and preparation of DPR for Sapta Kosi High Dam Multipurpose project & Sun Kosi Storage cum Diversion Scheme are to be taken up jointly by Govt. of India and HMG Nepal. DPR stage design engineering for this project is being carried out by Central Water Commission. HCD (N&W) Dte. is involved in the preparation of DPR stage drawings and chapter for hydel civil designs aspect. Any kind of technical assistance on HCD aspects is provided as and when requested by project developer. Observations/comments on internal report of the Committee constituted for completion of the Survey & Investigation and preparation of DPR of Sapta Kosi - Sun- Kosi Investigation Project (Nepal) were sent to SE, Planning Circle, CWC, Faridabad on 26.03.2020

2) Pancheshwar Multipurpose Project (Indo-Nepal):

An MoU has been signed between CWC and WAPCOS(I) Ltd for providing design consultancy services for preparation/updation of Detailed Project Report (DPR) for Pancheshwar Multipurpose Project (PMP) and Rupaligad H.E. Project (Indo Nepal). The design/drawings for various hydel civil components such as intake, pressure shaft, powerhouse complex, TRT etc. is done by this office. The comments on the DPR have been issued.



Pancheshwar Project Dam site

3. Barinium Hydro Electric Project (Jammu)

The Barinium hydropower project is envisaged in river Chenab, downstream of Dugar HEP and upstream of Kirthai-I in Jammu near border of Himachal Pradesh. The Design (N&W) unit is involved in helping CWC, Chandigarh office in preparing DPR for the project. Currently, various alternatives of general project layout of the project have been studying. The different alternatives have been suggested for which inputs related to geological and topographical survey are requested from CWC, Chandigarh.

4. Sun Kosi Storage cum Diversion Scheme

DPR stage drawings and chapter pertaining to Power House will be prepared after the receipt of data from project authorities.

5. Dagmara H.E. Project (Bihar)

Project layout for modified DPR as sent by CEA vide dated 03.12.2019 has been technically examined from design angle and combined comments from Design (N&W) unit have been issued to CEA on 15.01.2020.

6. Satyar Khad Medium Irrigation Project, Himachal Pradesh

Irrigation & Public Health Department, Govt. of Himachal Pradesh approached to CWC for the design consultancy works related to the 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 studied the proposal and prepared an estimate for the works of design & drawings and has sent to the state project authority. The same has been accepted by the project authority.

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

NWDA is preparing DPR for transfer of water 202 MCM of Damanganga and Vaitarna to Godavari Basin through four storages viz. 1. Nilmati on Val 2. Met on Vagh, a tributary of Damanganga 3. Koshimshet on Pinjal river 4. Udhale on Gargai river in Vaitarnabasin to meet the industrial water requirement of 73 MCM for Delhi-Mumbai new industrial Corridor, 41.5MCM for other Industrial area, 51.93 MCM for irrigation & 22.51 MCM of drinking water for Sinnar Taluka.

For this, NWDA approached CWC to provide technical assistance as regards the planning and design of various structures. Accordingly, an MOU has been signed between CWC & NWDA. The required survey & investigations are being carried out by

NWDA, in consultation with CWC. The design of structures will be undertaken, after receipt of survey & investigation and other information/ reports.

8. The Damanganga (Ekdare) - Godavari Valley Link Project:

143 MCM waters of Damanganga to existing Waghad dam in Godavari basin, through proposed Ekdare dam. It involves 9.80 km long pipe line, 1.30 km long open channel and 1.90km long Karwa River out of 13.00 km and total lift 316 m in three stages.

9. Irrigation Projects, Jharkhand:

The Unit has also been assigned the work of preparation of design & drawings for 20 Irrigation Projects in Jharkhand. Site visit in collaboration with GSI, Kolkata to identify and finalize the dam axis of all 20 projects have been already done. The detailed design will be undertaken after the receipt of data required for preparation of design chapter for DPR.

1. Bhuswa Reservoir Scheme	2. Barkattha Reservoir Scheme
3. Dulki Reservoir Scheme	4. Phulwariya Reservoir Scheme
5. Chaura Reservoir Scheme	6. Bhelwa Reservoir Scheme
7. Khuntishot Reservoir Scheme	8. Bhur Reservoir Scheme
9. Dhanraj Reservoir Scheme	10. Sonadubi Reservoir Scheme
11. Jamunia Reservoir Scheme	12. Jamunia Reservoir Scheme
13. Khudia Reservoir Scheme	14. Kalipur Reservoir Scheme
15. Bishunpur Reservoir Scheme	16. Bhurbhuri Reservoir Scheme
17. Birmati Reservoir Scheme	18. Breto Reservoir Scheme
19. Middle Usri Reservoir Scheme	20. Bansloj Reservoir Scheme

C. Special Problems Projects

1) Bargi Diversion Project (MP)

Sleemnabad tunnel of Bargi Diversion Project is facing issues of slow progress in TBM construction. Chief Engineer, Designs (N&W) is chairman of the Committee constituted by Narmada Valley Development Department to suggest the possible measures to sort out hindrances and improve the progress of Sleemnabad Tunnel of Bargi Diversion Project. Report of the Committee was issued in June 2019.

2) Indira Sagar Project, Madhya Pradesh

The damaged slotted roller bucket type of Energy Dissipation Arrangement was re-designed with Ski-jump bucket. 3-D physical model of the spillway and Energy Dissipation Arrangement at CWPRS Pune was visited for witnessing its performance.

3) Ranganadi HEP, Arunachal Pradesh:

Suggestions for the proposal of raising FRL and MWL of Ranganadi reservoir to moderate the flood peak in the downstream of Dam has sent to CE, HP P&I, CEA on 05.06.2018. Based on the advice/suggestion of CWC, NEEPCO has carried out the flood routing to adjudge the rise in water level by restricting the maximum outflow to 950 cumec using Hec-ResSim software and submitted the revised report. The observations of CWC on the revised report were communicated vide letter dated 16.04.2019.

4) Ans-II HEP, J&K:

Ministry of Jal Shakti forwarded a report on Ans-II HEP (23 MW), J&K with a request to examine the same for its compliance with provisions of the Indus Waters Treaty, 1960. The report was examined and comments were communicated vide letter dated 03.09.2019.

5) Lower Kalnai HEP, J&K:

Ministry of Jal Shakti requested Member (D&R), CWC to prepare a Technical Memorandum on Freeboard calculations of Lower Kalnai HEP, J&K in order to share the same with Pakistan in the next Permanent Indus Commission (PIC) meeting. The Technical Memorandum was prepared and submitted to the Ministry vide letter dated 20.12.2019.

6) Pakul Dul HEP, J&K:

Ministry of Jal Shakti forwarded a Technical Memorandum on Freeboard calculations of Pakul Dul HEP, J&K prepared by NHPC Ltd. CWC was also requested to review the Technical Memorandum before the finalisation of same in order to share with Pakistan in the next Permanent Indus Commission (PIC) meeting. The Technical Memorandum was examined and forwarded to the Sr. Joint Commissioner (Indus), Ministry of Jal Shakti vide letter no. 3/172/2010-CMDD(N&W)/474 dated 20.12.2019.

7) Proposal of uprating 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 uprating 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.

8) Kholongchhu HEP (600 MW), Bhutan:

Kholongchhu HEP (600 MW), Bhutan is a joint venture of SJVNL (Satluj Jal Vidyut Nigam Ltd.) and DGPC (Druk Green Power Corporation) wherein Chief Engineer, Designs (N&W) is the member of the technical consultative committee. The project envisages the construction of 95m high concrete gravity dam with water conductor system comprising of a power intake, 2 under ground desilting chambers of 350m length, a HRT 15.77km long to convey 89 cumec discharge into an open sky surge shaft which further leads to pressure shaft and then to underground power house with 4 units. The project has a subsidiary inflow from Chaplangchhu diversion trench which join the HRT and contributes 4 cumec out of 89 cumec. The project is in pre-tender stage and CWC has conveyed its views on dam and Chaplangchhu diversion.

9) Afghan India Friendship Dam (Salma Dam) Afghanistan:

On the request of Ministry of External Affairs, Govt. of India, the works pertaining to Techno commercial proposal for Survey & Investigations for Assessment of Afghan India Friendship Dam (Salma Dam) has been taken up. The comments on the proposal were sent to WAPCOS on 27-06-2019. Earlier, Comments/suggestions related to issues associated to Embankment dam were issued vide Dated 26.06.2019. Subsequently, a letter regarding Visit of TMC (Technical Monitoring Committee) to Salma dam project site (AIFD), Chist-e-Shariff, Heart, Afghanistan was sent vide dated 10-01-2020. Recently, meetings on same were held in the chamber of Chief Engineer, Designs (N&W) on 06-03-2020 and 16-03-2020.

10) Hathnikund Barrage, River Yamuna, Haryana:

A team of experts from CWC comprising of CE, Design(N&W), Director, BCD (N&W) & Director, Gates (N&W) directorate visited project site to suggest remedial measures to check recurring damages on D/S side and Gates of Hathnikund Barrage on river Yamuna in March 2020 and submitted report on remedial measures.

11) Indira Sagar Project

The damaged slotted roller bucket type of Energy Dissipation Arrangement was re-designed with Ski-jump bucket. 3-D physical model of the spillway and Energy Dissipation Arrangement at CWPRS Pune was visited for witnessing its performance.

12) Srisailam Left Bank Hydro Electric Scheme(SLBHES)

The failure of sickle plates at bifurcations no. 2 & 4 of penstocks of Srisailam Left Bank Hydro Electric Scheme (SLBHES) was reported and CWC was approached for remedial measures. CWC advised the project authority to constitute an Expert Committee to resolve the issue. Accordingly, Expert Committee was constituted to advice on remedial /rectification measures. The issue was resolved and solution was suggested by the Committee. CWC has been significantly contributing into this whole issue since its occurrence.

In the 29th Expert committee meeting, another similar problem in 82mm thick sickle plate at bifurcation joint 1 and 3 was reported and discussed. Committee proposed to carry out FEM analysis of the problematic area, which has been carried out and also discussed in CWC on 05.02.2020with the project representatives. The report is to be discussed by the Expert Committee.

13) Upper Indravati Hydro-electric Project

Odisha Hydro Power Corporation Ltd (OHPCL) expressed the problem of vibration, air release and water leakage in the manholes and expansion joints of the penstock of Upper Indravati Hydro-Electric Project (UIHEP). The matter was discussed with OHPCL officials in meeting and views of CWC were communicated to Project Authority.

14) Rann Sarovar, Gujarat:

Development of Little Rann of Kutch (PMO Reference): Reports on proposal to harvest the water of rivers draining into Little Rann of Kutch has been reviewed and Observations of CWC have been sent to PMO, besides Chief Engineer made a presentation to Hon'ble Minister of MoJS.

15) Some other technical problems/special problems dealt by E&NE organisation are :

- Bambooflat Dam, A&N Islands

- Kadamtala New Dam, A&N Islands
- Bagjola Drainage Development Scheme, West Bengal
- Mangdechuu H.E. Project, Bhutan
- Flood Protection works in East Kameng District, Arunachal Pradesh.

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.

During 2019-20, DPRs of 80 Nos. projects submitted by the various project authorities were technically examined in CWC. Out of these, 73 Nos. DPRs of projects were received from 22 Nos. States and 7 Nos. projects were received from Afghanistan (2), Bhutan (1), Nepal (1) and Indo-Nepal (3). During the year, 19 Nos. DPRs of projects have been cleared by CWC. DPRs of other projects (61 Nos.) are under various stages of examinations/ consultation with project authorities for improvement to make it technically sound & bankable. The details are given below:

	In India	In Foreign Country	Total
Hydro-Electric Projects			
Total Nos. of projects	43	4	47
Nos. of projects cleared	13	-	13
Nos. of projects in which comment issued	25	3	28
Projects under examination	5	1	6
Irrigation Projects			
Total Nos. of projects	21	--	21
Nos. of projects cleared	06	--	06

Nos. of projects in which comment issued	12	--	12
Projects under examination	03	--	03
Multi-Purpose Projects			
Total Nos. of projects	10	02	12
Nos. of projects cleared	03	--	03
Nos. of projects in which comment issued	06	02	08
Projects under examination	01	--	01

The list of projects is as under:

Sl. No.	Name of the State	Project's Name	Status
HYDRO ELECTRIC PROJECTS			
1	Andhra Pradesh	Standalone Pumped Storage component of Pinnapuram Integrated Renewable Energy Project,(1200MW-PFR)	Comments issued
2	Arunachal Pradesh	Subansiri Upper HE Project	Comments issued
3	Assam	Lower Kopli H E Project	Comments issued
4	Meghalaya	Myntdu Leshka (Stage-II) HE Project	Cleared
5	Sikkim	Teesta (Stage-VI) HE Project	Cleared
6	Sikkim	Rangit (Stage-VI) HE Project	Cleared
7	Arunachal Pradesh	Pauk HE Project (145 MW)	Comments issued
8	Arunachal Pradesh	Oju HE Project (8x231.5+28 MW)	Comments issued
9	Bihar	Dagmara Multi HE Project	Comments Issued

10	Himachal Pradesh	Thana Plaun HE Project (191MW)	Cleared
11	Himachal Pradesh	Sunni Dam HE Project, (355/382 MW)-PFR	Comment Issued / Cleared
12	Himachal Pradesh	Jangi Thopan Powari Project,	Comments issued
13	Himachal Pradesh	Reoli Dugli HE Project Stage - I (420MW)	Cleared
14	Himachal Pradesh	Nakthan HE Project(Ist stage)	Comments Issued
15	Himachal Pradesh	Luhri Stage-II HE Project (172 MW)	Comments issued/ Under Examination
16	Himachal Pradesh	Miyar HE Project (3x40 MW)	Comments Issued
17	Leh, Ladhak	Dubrok Shyok HE Project (19 MW)	Comments Issued
18	Leh, Ladhak	Nimu Chilling H.E.Project (24 MW)	Comments Issued
19	Kargil, Ladhak	Sankoo H.E.Project 92*9.25 MW)	Cleared
20	Kargil, Ladhak	Mangdum Sangra H.E. Project (2x9.25 MW)	Cleared
21	Jammu & Kashmir	Kirthai Stage-I H.E. Project (390MW)	Cleared
22	Jammu & Kashmir	Kargil-Hunderman H.E. Project (25 MW)	Under Examination
23	Jammu & Kashmir	Ratan Nag, SHP 166 MW	Comments Issued
24	Jammu & Kashmir	Rongdoo, SHP 12 MW	Comments Issued
25	Jammu & Kashmir	Dessa, SHP 12 MW	Comments Issued
26	Jammu & Kashmir	Uphsi-II, SHP 13.5 MW	Comments Issued
27	Jammu & Kashmir	Swalkote HE Project	Cleared
28	Jammu & Kashmir	Kwar HE Project	Cleared
29	Karnataka	Sharavathy Pumped Storage Project (2000 MW)-PFR	Comments Issued
30	Karnataka	Standalone Pumped Storage component of Saundatti Integrated	Under Examination/

		Renewable Energy Project,(1260MW)	Comments Issued
31	Meghalaya	Myntdu Leshka Stage-II H.E.Project, (140 MW)	Comments issued
32	Odisha	Upper Indravati Pumped Storage Project (600 MW)-PFR	Comments issued/ Cleared
33	Odisha	Upper Kolab Pumped storage Project (UKPSP)	Under Examination/ Comments issued
34	Odisha	Balimela Pumped Storage Project (500MW).	Comments issued
35	Uttarakhand	Tiuni Plasu H.E.Project (72MW)	Comments issued
36	Uttarakhand	Sirkari Bhyol Rupsiyabagar H.E.Project (168 MW)-Ist stage	Comments Issued
37	Uttarakhand	Singoli Bhatwani H.E.Project	Comments Issued
38	Uttarakhand	Bokang Bailing H.E.Project (330MW)	Comments issued
39	Uttarakhand	Bowalanand Prayag H.E. Project (360 MW)	Comments issued
40	Uttarakhand	Vyasi H.E.Project (2x60 MW)	Cleared
41	Uttarakhand	Goriganga H.E. Project(165 MW)	Comments Issued
42	Uttarakhand	Devsari HEP(162 MW)	Comments issued/Under Examination
43	West Bengal	Teesta Low Dam Project, Stage -I & II (Combined), (81 MW)	Comments issued
44	Bhutan	Dorjilung Hydro-Power Project	Comments issued
45	Bhutan	Punatsangchhu-II	Under Examination
46	Afganistan	Shahtoot Storage Scheme	Comments issued
47	Nepal	Upper Trishuli-1 HEP (216MW)	Comments issued

IRRIGATION PROJECTS / FM PROJECTS			
Sl.N o	Name of the State	Project's Name	Status
1	Bihar & Jharkhand	North Koel Reservoir Project	Cleared- Left & right main canal, (excluding enroute structures) Hydraulically Cleared
2	Jharkhand	Burhai Reservoir Project	Comments issued
3	Jammu & Kashmir	Shahpurkandi Dam Project	Comments issued
4	Jammu & Kashmir	DPR for project including Technical and financial study in River Jhelum (NW-49)- Examination from the Indus Water Treaty angle	Comments issued
5	Jammu & Kashmir	DPR UJH Multipurpose scheme Phase-II, J&K- Irrigation scheme proposed for unirrigation areas of samba district	Comments issued
6	Jammu & Kashmir	DPR for comprehensive flood management works on river Jhelum & tributaries Phase II Part A	Cleared
7	Delhi- Allahabad	Jal Marg Project NW-110- Technical and financial study from Delhi- Allahabad stretch(total length of 1089 Km) on Yamuna river	Cleared
8	Maharashtra	Detailed Project Report of Bhandhara at Arja Phata, Near Nagpur	Cleared
9	Maharashtra	Jihe Kathapur Lift Irrigation Project	Comments issued
10	Maharashtra	Gunjawani Irrigation Project	Comments

			issued
11	Odisha	Lower Vansdhara Project Stage-I	Comments Issued
12	Odisha	DPR for construction of weir/barrages & rubber dam Navigation locks, Check dam on NW-5, weir at W1 location.	Under Examination
13	Odisha	DPR for construction of weir/barrages & rubber dam Navigation locks, Check dam on NW-5, weir at W2 location.	Under Examination
14	Odisha	DPR for construction of weir/barrages & rubber dam Navigation locks, Check dam on NW-5, weir at W-3, W-4, W-5 location.	Under Examination
15	Rajasthan	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/ Under Examination
16	Rajasthan	Eastern Rajasthan Canal Project	Comments Issued
17	Manipur	An Integrated approach to Flood Management & Control on Rivers/Streams and Drainage in Loktak Basin	Comments Issued
18	Manipur	Critical Flood Control and Anti-Erosion Works along Rivers in Manipur Basin	Comments Issued
19	Uttar Pradesh-Delhi-Haryana	Jal Vikas Marg Project, National Waterways-1, Farraka Feeder Canal	Comments Issued
20	Uttarakhand	Song Dam Drinkig Water Project	Cleared
21	Gujarat-Maharashtra	Par Tapi Narmada Link Project	Cleared

MULTI PURPOSE PROJECTS			
Sl. No.	Name of the State	Project's Name	Status
1	Bihar	Indrapuri Reservoir Scheme	Cleared /Under Examination
2	Karnataka	Mekedatu Balancing Reservoir cum Drinking Water Project (PFR)	Comments Issued
3	Madhya Pradesh	Comprehensive Report of Ken Betwa Link Project	Comments Issued
4	Odisha	Tel Integrated Multi-Purpose Project	Comments Issued
5	Odisha	Middle Kolab Multi-Purpose Project	Comments issued
6	Odisha	Tel Integrated Multipurpose Project.	Comments issued
7	Odisha	Lower Vansadhara Project	Comments issued
8	Uttarakhand	Song Dam Drinking Water Project	Cleared
9	Jammu & Kashmir	Bursur HE Project	Cleared
10	Jammu & Kashmir	Comprehensive Flood Management Works on River Jhelum Phase-II	Cleared
11	Afghanistan	Shahtoot Storage Scheme/ Shahtoot Dam Storage Project	Comments issued
12	Indo-Nepal	Pancheshwar M.P.Project	Comments Issued

5.3 Hydrological Studies

The Hydrological Studies Organization (HSO), a specialized unit under D&R Wing of Central Water Commission, carries out hydrological studies in respect of most of the irrigation, multipurpose and hydropower projects in the country. The success of the projects is largely governed by the hydrological inputs. The inputs at Detailed Project

Reports (DPR) or Pre-Feasibility Reports (PFR) or Feasibility Project Reports (FPR) stage are made available in the form of

- i. Water availability/yield studies
- ii. Design flood studies
- iii. Sedimentation studies
- iv. Diversion flood studies

The consultancy services in the field of hydrology are also offered to the State Water Resources Departments, State & Central Agencies at various stages of the project implementation. The details of works carried out by HSO are given below:

(a) Technical Examination of DPRs / Design Flood Review Studies

During the financial year 2019-20, 64 projects were under technical examination in HSO from hydrological studies point of view. Out of this, 37 projects have been cleared. Observations/comments were issued for 18 of the projects and 09 projects are under examination. In addition to above, HSO unit is also carrying out other specialized studies related to hydrology. Hydrological studies on following important International Water Resources Projects were also carried out:

- I. DPR of Upper Surma Kushiyara Project, Bangladesh
- II. Sharing of water of 7 common/ border rivers of India & Bangladesh- Water availability assessment, Bangladesh
- III. Water availability of Multipurpose Water Source Development for Mzuzu and Mizmba, Republic of Malawi
- IV. Saptakosi High Dam Multipurpose Project and Sun kosi Storage cum diversion scheme, Nepal

Advances in computing the magnitude and characteristic of extreme flood events and revision of the Indian Standards for large dams necessitates re-evaluation of spillway capacities of existing structures. State Governments have been requested to conduct Design Flood Review of all large dams in their respective States/jurisdiction and submit the reports for vetting. Under the proposed Dam Rehabilitation and Improvement Project (DRIP), the Design Flood Review Studies of 144 projects have been vetted by HSO in Financial Year 2019-20. In addition, similar studies done by States on their own for other projects are also to be examined in HSO. List of projects for which Design Flood Review carried out under DRIP is as under:

State	No. of DRIP Projects cleared
Rajasthan	47
Andhra pradesh	14
Goa	2
Telangana	22
Manipur	4
Uttar Pradesh	16
Odisha	9
Chhattisgarh	5
Meghalaya	4
Kerala	7
Gujarat	1
Jharkhand	5
Maharashtra	7
Madhya Pradesh	1
Total	144

(b) Consultancy works / special studies related to hydrological aspects

Various consultancy works / special studies related to hydrological aspects were carried out / initiated by CWC during 2019-20. The details are as under:

1. Consultancy works / special studies in progress:

- i. Design Flood Review of Indira Sagar Project
- ii. Design Flood Study of Bhadbhut Barrage Project
- iii. Bagjola Channel Pump House
- iv. Water Balance of Teesta, Torsa, Jaldhaka and Raidak river basins
- v. Water Balance Study of Upper Chambal Basin

2. Consultancy works / special studies completed:

- i. Sharing of water of 7 common/ border rivers of India & Bangladesh- Water availability assessment
- ii. Detailed analysis of Time and Cost overrun claimed by NHPC for TLDP-IV

iii. Water Availability study of Barinum Hydro Electric Project

(c) 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 2019-20 are as under:

- i. Comments on Draft Report "**Basin-Wise Reassessment of Hydroelectric Potential in the country**" on East flowing Rivers of Peninsular India sent to CEA
- ii. Technical evaluation of bids received for the Physical based mathematical modeling for estimation of Sediment rate and Sediment Transport in Seven River Basins
- iii. Finalization of ToR for the consultancy work to study the issue of floods and siltation in river Ganga due to farraka barrage
- iv. Finalization of methodology for environmental flow assessment for Indian conditions under Indo-EU co-operation
- v. Technical Assistance provided to Government of Maharashtra for Committee formed to study the "Causes of severe flooding in Bhima and Krishna basins of Maharashtra during the July and August months of year 2019".
- vi. Technical advice tendered to CEA on "Review of storage in Siang Basin"
- vii. Data on discharge and dependable flows on six trans-border rivers (Manu, Muhuri, Gumti, Khowai, Torsa&Jaldhaka) of India-Bangladesh shared with DoWR, RD &GR
- viii. 4 officers of HSO were deputed under Jal Shakti Abhiyan to provide technical expertise to their respective teams with respect to water harvesting measures in the assigned districts of Tamil Nadu, Telangana & Gujarat.
- ix. 5 officers were involved in the technical arrangements for 2 sessions of 6th India Water Week on the topic "Sustaining Climate Change Impacts-Challenges and Opportunities".

(d) Trainings/Workshop/ Seminar

The technical expertise available/developed in HSO is disseminated to other State and Central agencies associated with water resource planning through workshops and training programs where the faculty is drawn from HSO and other concerned

organisation. Necessary resource persons are also deputed to National Water Academy, Pune for organizing the workshops/training programmes.

- i. Training course on "Project Hydrology - Hydrological Aspects in Project Planning and Preparation of DPR" was conducted for CWC/State Government officers at New Delhi
- ii. Lecture on "Water Availability and E-Flow delivered to newly joined Assistant Directors of 31st ITP at National Water Academy, Pune.
- iii. Training course on "GIS, Design Flood Estimation and Hydrological Modelling for Water Resources Projects" was conducted for engineers of Water Resources Department of various States. About 350 participants benefitted from 11 training programs organized at Ahmedabad, Udaipur, Jaipur, Lucknow, Goa, Trivendrum, Hyderabad, Chennai, Raipur, Ranchi and Shillong.

(e) Paper Submitted/Presented

- i. "Inter- Relationship between timing parameters derived from Synthetic Unit Hydrograph" in the National Conference on Flood Early Warning for Disaster Risk Reduction , Hyderabad
- ii. A Case Study of Kerala Flood 2018 under the session "Flood Management- Future challenges and Mitigation Strategies" in the 6th India Water Week.
- iii. Environmental flow for the reach of River Ganga between Haridwar and Unnao under the theme "Rejuvenation of River Ganga- From Planning to action" in the 6th India Water Week
- iv. Probability based Rule levels for Kerala Reservoirs under the session "Flood Management- Future challenges and Strategies" in the 6th India Water Week.
- v. Water Resources Assessment for composite basin of Tadri to Kanyakumari under the session " River Basin Management- Modelling tools" in the 6th India Water Week, New Delhi
- vi. "Assessment of Sedimentation load for different flood conditions in the Lower reaches of River Ganga and its tributaries" in 2nd International Conference on " Sustainable Water Management", Pune

(f) Special Study

Draft Terms of Reference (ToR) for an independent study on "Study on the issue of Flood and Siltation in River Ganga due to Farakka Barrage in the state of Bihar" were finalized by committee constituted by DoWR, RD & GR, Ministry of Jal Shakti under National Hydrology Project.

(g) Review of BIS code

HSO has been involved in providing inputs for updation of BIS codes which come under the purview of WRD 01 (Hydrometry Sectional Committee) and WRD 10 (Reservoirs and Lakes Sectional 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:

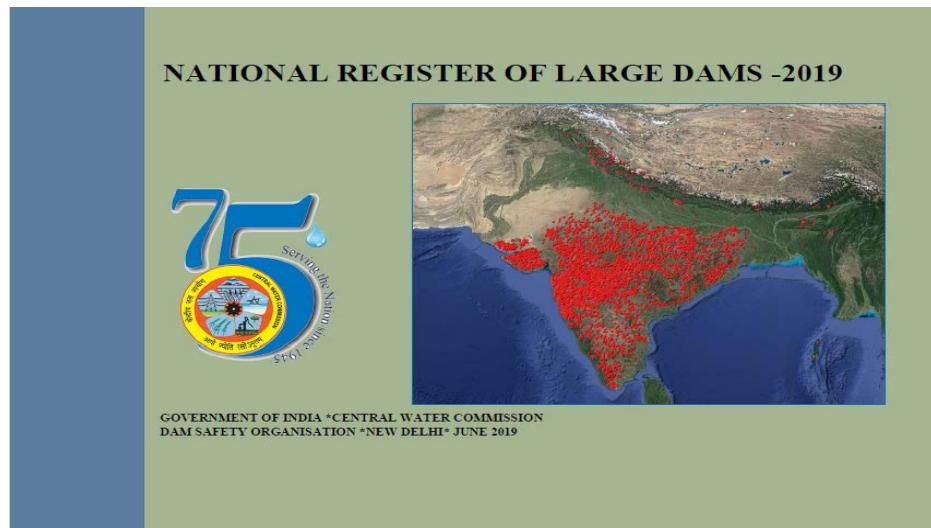
- Maintenance of National Register of Large Dams.
- Secretariat support for National Committee on Dam Safety and National Committee on Seismic Design Parameters.
- Instrumentation in Dams and Power House Caverns, besides other hydraulic structures.
- Special Analysis like Dam Break Modelling and foundation problems.
- Computer Aided Designs.
- Rehabilitation of aged & distressed dams

The Dam Safety Organisation, CWC is a ISO 9001: 2008 certified Organisation for its Quality Management Systems since 2015.

5.4.1 National Register of Large Dams

Dam Safety Organisation (DSO), CWC compiles and maintains the nation-wide register of large dams i.e. National Register of Large Dams (NRLD). The regular updation of NRLD is being carried out from time to time as per input/information received from dam owning authorities. Latest edition of NRLD i.e. NRLD-2019 was released in June, 2019 by Chairman, CWC. As per NRLD-2019, the country has 5334 constructed large dams and 411 under-construction large dams.

The database of NRLD-2019 was compiled and maintained in DHARMA and NRLD report was also generated through it. NRLD can be view/downloaded from CWC weblink: <http://cwc.gov.in/publication/nrld>.



5.4.2 National Committee of Dam Safety (NCDS)

The Government of India, Ministry of Irrigation constituted a Standing Committee in 1982 to review the existing practices and to evolve unified procedures of dam safety for all dams in India, under the Chairmanship of Chairman, Central Water Commission. Subsequently Government of India, Ministry of Water Resources reconstituted the Standing Committee in 1987 as the National Committee on Dam Safety to:

- a) Monitor the follow-up action on the report on Dam Safety Procedures both at the Centre and State level,
- b) Oversee dam safety activities in various States and suggest improvements/remedial measures to bring dam safety practices in line with state-of the art practices consistent with Indian conditions, and
- c) Act as a forum for exchange of views on techniques adopted for remedial measures to relieve distress in dams.

The Committee has been reconstituted in October, 2015 and now consists of 31 members from 18 States and 5 other organizations. The 39th meeting of NCDS was held on 12th February, 2019 at Bhubaneswar, Odisha. The minutes of meeting had been circulated in March, 2019.

5.4.3 Supervisory Committee on Mullaperiyar Dam: -

Supervisory Committee on Mullaperiyar Dam was constituted on 1st July 2014 to allay the apprehensions of Kerala about the safety of the Mullaperiyar dam and supervise the restoration of FRL in Mullaperiyar dam to the elevation of 142ft.

- Following is the composition of Supervisory Committee on Mullaperiyar Dam:

- ✓ Chief Engineer, Dam Safety Organisation (DSO), Central Water Commission (CWC), Chairman ex-officio.
- ✓ Principal Secretary, Public Works Department, State Government of Tamil Nadu, Member ex-officio.
- ✓ Additional Chief Secretary, Water Resources Department, Government of Kerala, Member ex-officio.

- Following are the meetings held during 2019-20: -

- 12th meeting held on 4th June, 2019 at Kumily, Kerala.
- 13th meeting held on 28th January, 2020 at Kumily, Kerala.

5.4.4 Dam Safety Legislation

Realising the importance of ensuring safety of dams, in 1982, the Government of India (through the erstwhile Ministry of Irrigation) constituted a Standing Committee under the Chairmanship of Chairman, Central Water Commission (CWC) to review the existing practices and to evolve unified procedures for safety of Dams. The Standing Committee submitted its report titled "Report on Dam Safety Procedures" in July, 1986. The report elaborated the then existing procedures, their evaluation and suggestions for institutional arrangements for dam safety at the levels of States and the Centre. In view of the contemporary international practice, the Committee also recommended for enactment of Dam Safety Legislation.

A comprehensive Draft Dam Safety Bill was prepared in 2002 and circulated to the State Governments for comments. The States responded well to the draft Bill. The Government of Bihar enacted the Dam Safety Act, 2006 in line with the draft Bill circulated by the Ministry. The Andhra Pradesh Legislative Assembly adopted a Resolution on 24th March 2007 that Dam Safety legislation should be regulated in the State of Andhra Pradesh by an Act of Parliament. The West Bengal Legislative

Assembly also passed a Resolution on 24th July, 2007 empowering the Parliament to pass the necessary Dam Safety Act. The initial efforts were directed towards enactment of State level dam safety legislation by the respective state Governments. The efforts for a Central Dam Safety legislation could commence only after the receipt of requests from these two state governments.

The Dam safety Bill was accordingly finalised by the then Ministry of Water Resources after inter -ministerial consultations. After the requisite inter-ministerial consultation on the draft Cabinet Note circulated by Ministry of Water Resources in October 2009, the proposal for enactment of dam safety legislation was approved by the Cabinet on 13th May, 2010. The Bill was tabled before the parliament on the 30th August, 2010, and was subsequently referred to the Parliamentary Standing Committee on Water Resources for examination.

The Parliamentary Standing Committee submitted its recommendations in its Seventh Report on Dam Safety Bill, 2010 in the Parliament, and the same were referred to Government of India by the Lok Sabha Secretariat. The Observations and recommendations of the Parliamentary Standing Committee on Water Resources were examined by the Ministry of Water Resources. Owing to significant changes or modifications entailed in the Bill while complying with the recommendations of the Parliamentary Standing Committee, the Ministry of Water resources decided to withdraw the Bill and introduced a new Bill in the Parliament.

In the meanwhile, due to certain administrative reasons due to bifurcation of erstwhile state of Andhra Pradesh in to Andhra Pradesh and Telangana the recourse suggested was to have a nationwide applicability of the Dam Safety Act and for a uniform and consistent policy across all states especially in view of the inter-State ramifications.

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. The Dam Safety Bill, 2018 was introduced in Lok Sabha on 12th, Dec. 2018. The discussion couldn't take place and hence the Bill lapsed. In line to the Dam Safety Bill 2018, Dam Safety Bill 2019 was introduced in the Lok Sabha on 29th July, 2019 and passed on 2nd August, 2019. Currently, the Bill is pending in Rajya Sabha and likely to be discussed in near future.

The Dam Safety Bill 2019, inter alia, provides for surveillance, inspection, operation and maintenance of the specified dam for prevention of dam failure related disasters and to provide for institutional mechanism to ensure their safe functioning and for matters connected therewith or incidental thereto.

5.4.5 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 2019-20, 35th meeting of NCSDP was held on 19th June, 2019, wherein the site-specific seismic study reports of 04 projects were discussed and cleared by the Committee. Site specific Study Report of Isarda Drinking Water Project and Kunnu Barrage Project, Rajasthan have been examined and observation issued.

5.4.6 Technical Examination of Projects for Seismic and Foundation Aspects

During 2019-20, Detailed Project Reports of 11 nos. of river valley projects of various states were dealt, which are as follows: -

S.No.	Name of the Project	Date of Observation /Receipt	Status
1.	SirkariBhyol-HE Project (120 MW), Uttarakhand	06.03.2020	Observation Issued
		11.11.2019	
2.	Song Dam Drinking Water Project, Uttarakhand	24.02.2020	Cleared
3.	Luhri Stage-II, 168 MW, Himachal Pradesh	02.03.2020	Under Examination
		18.10.2018	
4.	Ken-Betwa link Project, MP and UP	25.11.2019	Observation issued

5.	Standalone Pumped Storage component of Pinnapuram Integrated Renewable Energy Project, Andhra Pradesh (1200 MW)	19.03.2020	Observation issued
		15.11.2019	
6.	Devsari HEP (162MW), Uttarakhand	23.01.2020	Under Examination
7.	JangiThopanPowari HE Project, H.P.	23.10.2019	Observation issued
8.	Sunni Dam HEP, 382 MW, H.P.	14.11.2019	Cleared
9.	Standalone pumped Storage Component of Saundatti Integrated Renewable Energy Project, Karnataka, (1200MW)	28.01.2020	Observation issued
		02.12.2019	
10.	Upper Kolab Pumped Storage Project (UKPSP), Odisha(320MW)	09.03.2020	Observation issued.
		27.12.2019	
11.	Indrapuri Reservoir Scheme, Bihar (300 MW)	22.03.2019	Under Examination
		06.01.2020	

5.4.7 Special Studies

CWC undertakes special studies e.g. Dam Break Analysis, GLOF studies, 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 2019-20, Dam Break Analysis of Matatila Dam, Uttar Pradesh and Bhakra Dam have been carried out and report has also been shared with respective dam owning authorities. Dam Break Analysis for Ram Ganga Dam, Uttar Pradesh has been carried out and the report yet to be shared with the State Govt.

5.4.8 Consultancy Services on Instrumentation in Hydraulic Structures

- **Construction Stage Projects**

Kirthai-I 390 MW HEP, J&K

Kirthai HEP, Stage-I, installed capacity 390 MW, is proposed to be construct in the lower reach of the Chenab Basin. The project envisages construction of a concrete gravity dam of maximum height 147.5 m above deepest foundation with underground power house. Chenab Basin, which stores 10360 MW power potential being 85.7% of the total hydropower potential of the state, has therefore been considered in context of power shortage in the Northern region in general and in the country as whole. The project has been conceptualized as a run-of-the-river under the ambitions cascading development programme of hydropower in the Chenab basin, is an upstream development of the proposed Kirthai II HEP (930MW) and is on the downstream of the proposed Barinium HEP (240MW). Thus, Kirthai HEP, Stage-I, installed capacity of 390 MW, shall have a maximum live storage of 13.0 MCM at FRL El 1895 msl and diurnal storage of 3 MCM for the peaking purpose.

Chheligada Irrigation Project, Odisha

The Chheligada Dam Project is a multipurpose medium project being under taken across river Badjhore, a tributary of river Vansadhara near village Chheligada of Udayagiri Block in Paralakhemundi Sub-Division of Gajapati District. The Project envisages construction of masonry Dam of length 250m & height 30m across river Badjhore with central ogee spillway. The impounding water of Chheligada Reservoir will be diverted through an open cut and a tunnel to Ghodahada River of Rushikulya Basin.

- **DPR Stage Projects**

Sunni Dam H.E Project (382 MW), HP

Sunni Dam Hydro Electric Project is one of the three stages of Luhri HEP. Luhri HEP has been divided in to three stages i.e. Luhri Stage-1 (210 MW), Luhri Stage-II (172 MW) and Sunni Dam HEP (382 MW). The DPR of Luhri HEP Stage-1 has been concurred and the project is in tender stage. Luhri HEP Stage-II is in investigation stage.

In present proposal, Sunni HEP is run of the river type development proposed to harness the hydel potential of river Satluj. The project envisages construction of a concrete gravity dam of ± 83 m high above deepest foundation level across river Satluj near Khaira village and underground power house on the right bank.

Thana Plaun Hydro Electric Project (191 MW), HP

Thana Plaun HEP (191 MW) has been contemplated as storage cum run-of-the river scheme envisaging Roller Compacted Concrete (RCC) gravity dam of 85 m height above the river bed level. The project comprising 5 generating units (3X 50.33 MW=151 MW main and 2 no. Environmental Units (2X20MW=40 MW) aggregating to 191 MW installed capacity, is proposed to be located on right bank of river Beas in district Mandi, Himachal Pradesh. The Dam site is proposed to be located 40 Km downstream of Pandoh Dam in Mandi district and power house shall be located just downstream of the toe of Dam. The project is expected to generate 692.61 million units of electricity in 90% dependable year.

Ken- Betwa Link project

The Ken-Betwa link project envisages diversion of surplus waters of Ken basin to water deficit Betwa basin. To firm up the proposal further, Survey & Investigation works were carried out for preparation of Feasibility Report of Ken-Betwa link for diverting surplus waters of Ken to water short areas of Betwa basin. As per Feasibility Report prepared in 1995, it was found that the proposal is techno- economically viable. The proposal comprised of a dam across the Ken river upstream of the existing Gangau Weir and a link canal for transferring the surplus waters from Ken river to Betwa river. In order to cater to the commands of deficit areas in Upper Betwa, four storage structures were proposed. The quantity of water initially proposed to be diverted from Ken basin, after considering in-basin demands including upstream and downstream commitments at Feasibility study stage, was 1020 MCM. However, after updating of hydrological studies at DPR stage, it is now proposed to transfer 1074 MCM of Ken water through link canal, out of which 591 MCM of water will be delivered to Betwa river.

A dam is proposed on river Ken at Daudhan, 2.5 km upstream of existing Gangau weir. Daudhan dam is about 2031 m long, out of which 1233 m length will be earthen and rest 798 m length of dam will be of concrete. The concrete portion of dam along with spillway has been proposed on the left flank of the dam.

5.4.9 Dam Rehabilitation & Improvement Project (DRIP)

Ministry of Water Resources, Government of India is implementing 'Dam Rehabilitation and Improvement Project (DRIP)' with financial assistance from the World Bank. Presently, DRIP involves rehabilitation of about 198 dam projects in seven States i.e. Madhya Pradesh, Orissa, Kerala, Tamil Nadu, Karnataka, Jharkhand(DVC) and Uttarakhand (UJVNL). In addition, DRIP is involved in institutional strengthening (for dam safety) of all participating States as well as at central level in Central Water Commission. The total approved estimated cost of the project is Rs. 2100 Crore. However, cost of the project has been revised to Rs. 3466 Crore, mainly due to increase in the cost of rehabilitation of dams. The Project has become effective from 18th April 2012. Initially, the project was to be implemented over a period of six-years. Now, the project has been granted time extension of two years by the Government of India and the World Bank and officially the program will close by the end of June 2020. The main implementation agencies for DRIP are the owners of dams - i.e. Water Resources Departments and State Electricity Boards in the participating States. Overall responsibility for project oversight and coordination rests with the Central Project Management Unit (CPMU) created in Central Water Commission at New Delhi. CPMU is assisted by an Engineering and Management Consultant (M/S EGIS EAU, France).

The State-wise numbers of dams covered under DRIP and the estimate of the project cost is summarized in the table below:

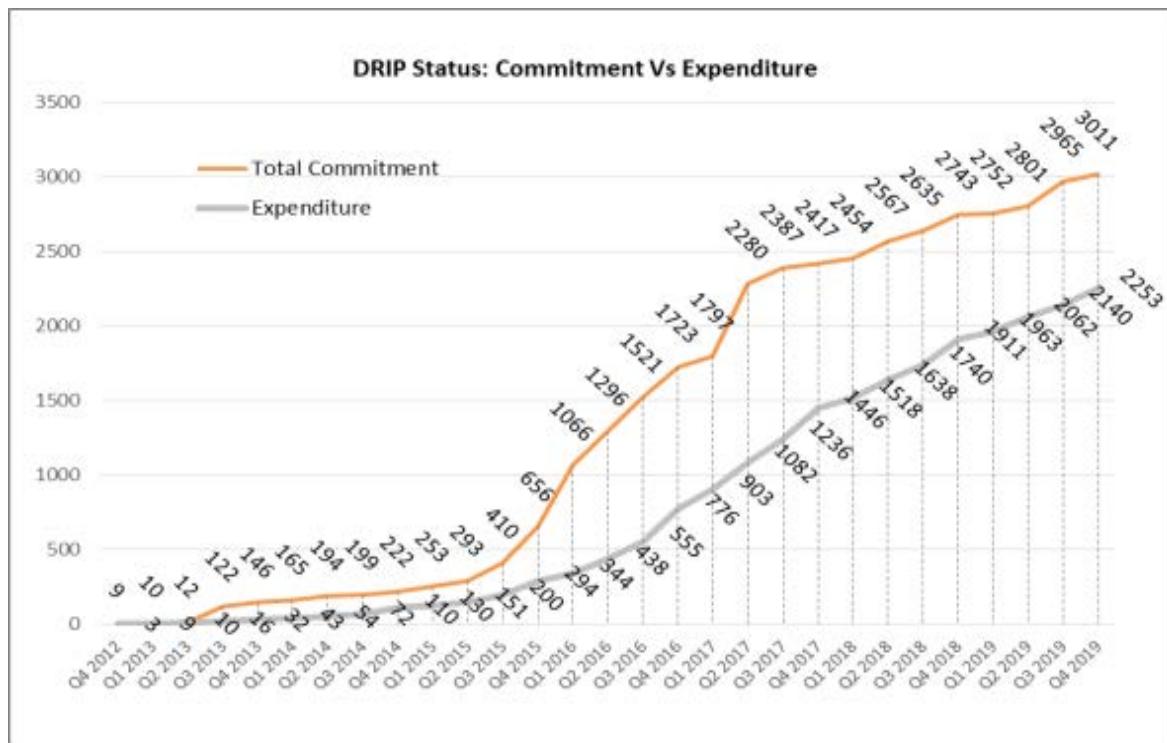
State	Total No of large dams	Revised No of DRIP Dam Projects	Total Project Cost (Rs. Crore)
Kerala	59	28	514.00
Orissa	204	26	751.00
Madhya Pradesh	906	25	169.00
Tamil Nadu	116	89	803.00
Karnataka	231	22	581.00
CWC			270.00
Jharkhand (DVC)		3	143.00
Uttarakhand (UJVNL)		5	235.00
Total		198	3466.00

The progress made under DRIP up to 31.03.2020 is highlighted as below:

- Design flood reviews of all the DRIP dams have been completed for checking the hydrological adequacy of the dams.

Main rehabilitation works in respect of 198 dam projects have been awarded and are under various stages of implementation. As per award of work till March 2020, the total committed cost for various works awarded is Rs. 3011 Crore against which a Cumulative expenditure of Rs. 2253 Crore has been made. Till March 2020, out of 223 dams rehabilitation works for 200 Dams have been completed.

In FY 2019-20, NIT issued for 74 work packages of value Rs. 215 Crore and 65 work packages of value Rs. 265 Crore are awarded. Actual expenditure was Rs. 343 Crore.

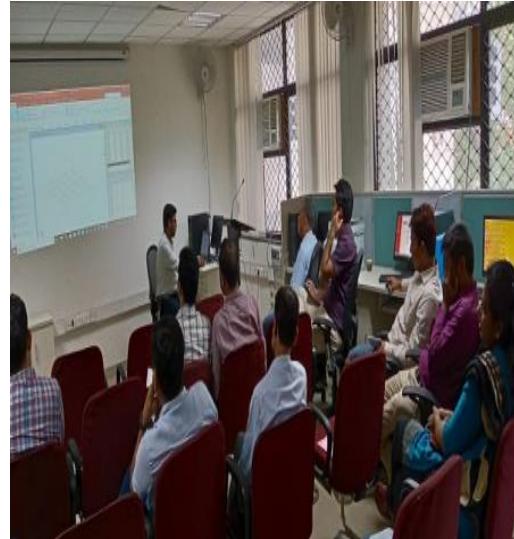


(Amount in Crore INR)

- Training programs with focus on DRIP implementation were initiated well in advance for building up in-house technical capabilities of participating states in different areas of dam safety. One Hundred and Seventy-Four (174) trainings have been conducted so far under DRIP, wherein about 5235 officials trained.



Training on Dam Safety Management and Operation & Maintenance of Dams held at Chennai on 10th to 14th Feb, 2020



Training Program on Geostudio Professional Software held at Delhi on 14th to 16th Oct, 2019

- **Dam Health and Rehabilitation Monitoring Application (DHARMA)**

CWC has developed an asset management tool named Dam Health and Rehabilitation Monitoring Application (DHARMA). It is a web-based asset management software developed to support the effective collection and management of authentic asset and health data for all large dams in India with various levels of access. DHARMA provides a platform for multilateral collaboration of all dam owning or operating and maintaining agencies to directly enter dam asset and health data and update the same on a continuing basis. Wealth of information thus generated is securely stored and made available to appropriate agencies for viewing and analyzing the data to arrive at timely review and planning of appropriate rehabilitation measures to address the safety and health concerns.

DHARMA comprises of seven modules with three static and four dynamic; first three modules deals with project features, project portfolio and engineering features, and last four modules namely asset health, asset rehabilitation,

stakeholders and document library captures the periodical data related to safety inspections, instrumentation, O&M, EAPs, rehabilitations, investigations, stakeholder etc.

DHARMA v2.0 is currently under development and is expected to be launched by December 2020. This version will include additional sub-modules to include investigation, instrumentation, O & M manual, emergency action plan and tools to generate project report, component report, risk screening report, etc.

So far, the licenses for this tool has been provided to 17 States (Andhra Pradesh, Bihar, Gujarat, Himachal Pradesh, Jharkhand, Karnataka, Kerala, Maharashtra, Meghalaya, Madhya Pradesh, Odisha, Punjab, Rajasthan, Tamil Nadu, Telangana, Uttar Pradesh, Uttarakhand) and 3 Central Agencies (DVC, NHPC, BBMB). This tool has 1009 nos. of official users with data of 1519 nos. of large dams. Also, this tool has been developed to captures the data of not only large dams, but data of other dams. The extensive training programs have been given by CWC not only to DRIP States but other States also. CPMU imparted 30 trainings on DHARMA so far, out of which, 6 trainings were conducted in 2019-20 for Tamil Nadu, Maharashtra, Rajasthan, Gujarat wherein over 200 participants were trained with data entry into DHARMA. In total over 1030 dam officials have been trained so far.



Tamil Nadu DHARMA Training on 19th Jun, 2019

- So far, Eleven guidelines and manuals on various aspects of dam safety, such as "Guidelines for Developing Emergency Action Plans for Dams", "Guidelines for

Operation and Maintenance Manual of Dams", "Guidelines for Safety Inspection of Dams", "Guidelines for Mapping Flood Risks Associated with Dams", "Guidelines for Instrumentation in large Dams", "Rehabilitaion Manual of Dams", "Guidelines for Assessing and Managing Reservoir Sedimentation", "Guidelines for Assessing and Managing Risks Associated with Dams", "Inspection Manual for Dam Field Engineers after Seismic Events, Maithon Dam, DVC, Jharkhand", "Technical Specifications of Hydro-meteorological, Geodetic, Geotechnical and Seismic Instruments", "Inspection Manual for Dam Field Engineers After Seismic Events, Ichari Dam, Uttarakhand" have been published with the guidance of specialists working in the respective fields.

In 2019-20, two additional guidelines namely *Guidelines for assessing and Managing Environmental Impacts of Dams* and *Guidelines for assessing the Hydrological Safety of Dams* have been in finalized. Further, draft versions of four balance documents have been prepared and reviewed by the respective Review Committee in January 2020. All these 6 documents shall be published by December 2020.

- MoUs have been signed with the nine premiers academic and research institutes namely, IIT Madras, IISc. Bangalore, IIT Roorkee, MNNIT Allahabad, NIT Rourkela, Anna University, NIT Calicut, CET Trivandrum and MANIT Bhopal, for their capacity building in the dam safety areas such as analysis of dams, foundation, retrofitting, flood forecasting, dam break analysis & preparation of emergency action plan, instrumentation and other related issues.

During 2019-20, in total 36 no. of trainings were conducted by the institutes. These academic institutions are also providing consultancy services to State Implementing Agencies as well as conducting training programmes in dam safety related areas. In this regard, six MoUs have been signed under the project with the leading seismic agencies such as NGRI Hyderabad, CWPRS Pune and IIT Roorkee with the Implementing Agencies for rendering all technical advice for selection of seismic instruments, finalizing their location at specific dams and processing / analysis of data of instruments. Also, two Central Agencies i.e. Central Soil and Materials Research Station (CSMRS) and Central Water and Power Research Station (CWPRS) have joined DRIP.

- DRIP has two tier monitoring and implementation supervision mechanism which consists of Technical Meeting headed by Member (D&R), CWC to provide technical

input to Implementing agencies, National Level Steering Committee (NLSC) headed by Secretary, DoWR, RD&GR to give policy directions in formulation and implementation of the project. World Bank also conducts Implementation Review Mission to review the progress of the Project.

So far twenty (24) meetings of Technical Committee, nine (9) meetings of NLSC have been held. World Bank has also completed its fourteen Review Missions, wherein road blocks as well as way forward in project implementation have been discussed.



14th WB Mission 21st Aug, 2019, in Dehradun

- Many new initiatives are being taken under the project. The details are as under:
 - **Emergency Action Plan (EAP)/Disaster Management Plan:** To handle any emergency situation for minimizing losses of life and property damages EAP is being prepared for all the dams under DRIP. Further, dissemination of Emergency Action Plan is achieved through Stakeholder Consultation Meeting exercise wherein various agencies involved in disaster management from Centre, States, local authorities including local representatives, World Bank as well as media participate. These deliberations will make ready concerned Stakeholders to be more disaster resilient in long term.
 - Till March 2020, Dam Break Analysis (DBA) and inundation mapping (IM) have been prepared for about 212 dams and Emergency Action Plans have been prepared for 165 dams. Stakeholder consultation meetings have been conducted for 42 no of DRIP dams so far.

- Seismic hazard mapping is one of the important activities under DRIP, and essential to enhance the Country's preparedness to handle seismic risk associated w.r.t. water resources and other important structures. Under this Seismic Hazard Assessment Information System (SHAISYS), a web based tool is being developed to facilitate the users to estimate seismic hazard at a particular location by giving latitude and longitude along with bare minimum other information. This tool will help planners, designers as well as disaster management authorities to evaluate seismic risk of these major structures.

The Seismic hazard mapping of South India is being prepared by Earthquake Engg Department, IIT Roorkee, and for rest of the India, by CWPRS, Pune. During the year 2019-20, two meetings of the Group of Experts (GoE) have been held in the month of December 2019 and February 2020. Majority of work has been completed by IIT Roorkee, but validation part of developed web-based tool SHAISYS is pending, whereas the progress of CWPRS, Pune is not satisfactory. The GoE have made several suggestions and critically commented on various aspects of the model being developed by CWPRS, Pune. It was advised that both Institutions examine the suggestions given by GoE on scientific basis and incorporate the maximum possible suggestions, also citing rational justification for not able to incorporate few of these in the model and share with CWC for validation.

- **Rapid Risk Screening of dams:**

CWC with the technical assistance of the Expert Group of the World Bank has developed Rapid Risk Screening Tool for screening of large dams in India. This tool provides a scientific and objective way of indexing of Indian large dams based on their distress conditions and in turn will help decide on allocation of resources for rehabilitation of dams.

In this context, three interactive workshops were organised jointly by World Bank and CWC in May 2019, October 2019 and January 2020. CWC and State Officials participated extensively in the development of the indexing tool. Based on the deliberations held in these workshops, World Bank Expert Group has finalised the Indexing tool, Guidance and Manual, Validation Report which has been circulated to State officials for suggestions.

DRIP Phase-II and Phase - III

Considering the success and usefulness of ongoing DRIP, Government of India launched the DRIP Phase-II & Phase-III in continuation with the ongoing DRIP. The new project will be implemented in 19 States (22 Implementing Agencies) and three Central Agencies for rehabilitation of around 700 dams. The total financial outlay for the project would be Rs. 10,211 Cr (US\$ 1.5 Billion) out of which the loan assistance from the World Bank would be

□ 7000 crore

an additional component besides the three components of the ongoing DRIP for incidental revenue generation at a few selected dams, for their sustainable operation and maintenance. The total duration of DRIP Phase-II & Phase-III would be 10 years with each phase having duration of 6 years with a two-year overlap between them.

A second consultation meeting under the Chairmanship of Secretary, DoWR, RD & GR was held on 12 September 2019. The meeting was attended by the policy level functionaries of the implementing agencies, World Bank, CWC and reviewed the status of implementation of the preparatory activities for commencing the DRIP Phase II and Phase III. In addition, two teams of experts from the World Bank visited various states proposed for DRIP Phase II and Phase III during the period 16 to 23 October 2019 to review the progress in the implementation of the preparatory activities and provide necessary support.



2nd Consultation and Review Meeting on DRIP Phase II & Phase III held on 12th September 2019

During the Preparation Workshop held on 25 February 2020 in New Delhi, the status of preparatory activities by different partner agencies and issues concerning the same were reviewed and fresh timelines have been agreed upon.



DRIP II Preparatory Activity Workshop held on 25 February 2020

- Project Rehabilitation Report (PRR) is an important and comprehensive document which contains complete information in respect of the rehabilitation activities done for the particular dam under the project. It contains essential information such as compliances to Dam Safety Rehabilitation Panels (DSRP)/ CWC/ World bank recommendations, pre and post rehabilitation photographs, completion certificates of all work packages etc. CPMU has been preparing PRR for all dams being rehabilitated under the Scheme and till March 2020, reports have been finalized for 136 Dams.

5.4.10 SITE VISITS

Total 1092 site visits have been conducted under DRIP, whereas during FY 2019-20, 14 site visits have been conducted.



Dam body grouting of overflow section being carried from top of dam and behind the drainage gallery at Almatti Dam of KaWRD. CPMU carried out construction site visit to Almatti dam on 11th Dec, 2020.



Inspection of Cholavarum and Wellingdon dam, TNWRD, Govt. of Tamil Nadu on July 26-27, 2019

The Central Water Commission has constituted a Group of Experts (GoE) with members from CWC, CSMRS and GSI to inspect Wellington and Cholavaram dams of Tamil Nadu Water Resources Department (TNWRD) which have had a long history of slope failures, to examine the causes of failure and suggest suitable remedial measures. The GoE undertook a visit during July 25-27, 2019 to both the dams. For Wellington dam, it was suggested to undertake the rehabilitation of the affected reach from LS 1300-1700 m on the same lines as successfully carried out earlier in the year 2011 in the reach LS 1700-2500 m after carrying out necessary Geological and Geo-Technical investigations and for Cholavaram dam, elaborate Geo-Technical investigations and soil testing were recommended.

Inspection of Rangali dam, OWRD, Govt. of Odisha on 17 April, 2019

A team consisting of Chief Engineer, DSO, CWC, Assistant Director, DSR Directorate, CWC and DRIP CPMU Officials inspected Rengali dam, OWRD, Govt. of Odisha on 16 Apr, 2019. Critical issues included cracks in the foundation gallery, heavy seepage through some of the porous concrete drains in the gallery, vertical cracks in some spillway piers below the trunnion and yoke girder, horizontal cracks in some spillway piers etc. These issues will be tackled in DRIP II. The photographs below show the d/s trunnion catwalk and a view of the foundation gallery.

Inspection of Manimuktanadi dam, TNWRD, Govt. of Tamil Nadu on 23 April, 2019

An Inspection visit to TNWRD's Manimuktanadi Dam was undertaken on 23rd April, 2019 by a team of CPMU and TNWRD, led by Pramod Narayan, Project Director, DRIP. The civil and hydro-mechanical works of additional spillway are nearing completion. Team examined the critical issues regarding design and planning aspects of the additional spillway.



Inspection visit of Rangali dam



Inspection visit of Manimuktanadi dam

Inspection of Malampuza dam, KWRD, Govt. of Kerala on 31 May, 2019

Smt. T. Rajeshwari, Additional Secretary, DoWR RD&GR, GoI with KWRD & CWC Officials visited DRIP work Site at Malampuza Dam and held meeting with concerned officials on progress of DRIP Components of the dam.

Inspection visit to Hirakud Dam by CWC Officials and CPMU Experts on 15-16 Oct, 2019

An Inspection visit was undertaken by Sh. Gulshan Raj, Chief Engineer (DSO), CWC along with other CWC & CPMU officers to Hirakud Dam on October 15 and 16, 2019 to review and assess the progress of on-going construction of Additional Spillway with Hydro Mechanical works on left of Gandhi Hillock on left bank of the Main Dam under the Dam Rehabilitation and Improvement Project (DRIP).



Inspection visit to Hirakud Dam by CWC Officials and CPMU Experts

The team members along with Project Engineers are seen inspecting the deep cutting of the hill in progress for the spill channel.

Inspection visit of Pandoh Dam, Baggi Control & Balancing Reservoir of Beas-Satluj Link Project(BSL), Himachal Pradesh 02-03 May, 2019

A team of 4 officers from CWC headed by Chief Engineer (DSO), CWC inspected Hydro-Mechanical Components of Pandoh Dam, Baggi Control & Balancing Reservoir of BSL Project, Himachal Pradesh.

Inspection visit of Sardar Sarovar Dam, Gujarat on 20-21 August, 2019

On the instructions of DoWR, MoJS, CWC constituted a multi-disciplinary committee comprising of officers from CWC, CSMRS, CWPRS to assess the safety of Sardar Sarovar Dam (SSD) and give recommendation on accelerated filling of the reservoir.



Leakage at Downstream
Face of Non-Overflow Blocks-
Sardar Sarovar Dam



Heavy Flow Through a Drain Pipe
in Intermediate Gallery at El 68.27m
- Sardar Sarovar Dam

Inspection Report for the site visit of Rana Pratap Sagar Dam, Jawahar Sagar Dam and Kota Barrage dam, on 7-8 Jan, 2020: -

On request of Chief Engineer, Water Resource Zone, Kota, 4-member team of CWC visited Rana Pratap Sagar Dam, Jawahar Sagar Dam and Kota Barrage dam for post monsoon inspection.

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 16 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 & CEDC of Bureau of Indian Standards, respectively at CWC.

During the 2019-20, 17 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.	BIS.WRD 01 (12866)	Measurement of liquid flow in closed conduits -Weighing method (ISO4185:1980)
2.	BIS.WRD 01 (12867)	Measurement of fluid flow - Procedures for the evaluation of uncertainties (ISO5168:2005)
3.	BIS.WRD 01 (12868)	Measurement of liquid flow in closed conduits -Method by collection of the liquid in a volumetric tank (ISO 8316:1987)
4.	BIS.WRD 01 (12869)	Measurement of liquid flow in closed conduits by the weighing method – Procedures for checking installations Part 1 Static Weighing systems (ISO 9368:1990)
5.	BIS.WRD 01 (12861)	Hydrometry - Open channel flow measurement using thin plate weirs (Second revision) of IS 9108
6.	BIS.WRD 01 (12862)	Amendment No 1 to IS 14869:2016 Flow measurement Structures- Rectangular, trapezoidal and U-Shaped flumes
7.	BIS.WRD 01 (12863)	Hydrometry Measurement of discharge by the ultrasonic transit time (time of flight) method (Adoption of ISO 6416: 2017)
8.	BIS.WRD 01 (12864)	Hydrometry Low cost baffle solution to aid fish passage at triangular profile weirs that conform to ISO 4360 (Adoption of ISOTR 19234: 2016)
9.	BIS.WRD 01 (12865)	Measurement of fluid flow in closed conduits – Vocabulary and symbols (ISO 4006:1991)
10.	BIS.WRD- 10 (629)	Methods for fixing the capacities of Reservoirs part 2 Dead storage (second revision) IS 5477 Par 2:1994
11.	BIS.WRD 12 (14093)	Criteria for Design of Lifting Beams IS 13591:1992 (First revision)
12.	BIS.WRD 15 (11558)	Guide for Preliminary Dimensioning and Layout of Elbow Type Draft Tubes for Surface Hydroelectric Power Stations IS 5496: 1993 [First Revision] (Amendment No. 2)
13.	BIS.WRD 15 (12602)	Hydraulic Turbines for Medium and Large Hydro-electric Power Houses -Guidelines for Selection IS 12837: 1989 (Amendment No. 1)
14.	Doc.WRD 15 (11547)	Validation of Surface Hydel power Station- code of practice (Second revision of IS 4720)
15.	Doc.WRD 08 (658)	Amendment no. 1 to IS 8414: 2014 Guideline for design of under seepage control measure for earth and rockfill dams
16.	Doc.WRD 05 (605)	Guide for core drilling operations (Second version of IS 5313)

17.	Doc.WRD 05 (680)	Core of practice for presentation of drilling information and core description in foundation
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Meetings held during 2019-20:

- Bureau of Indian Standards – WRD-15: “Hydroelectric Power House Structures” Chief Engineer, Designs (N&W) is Chairman of Sectional Committee. Director, HCD (N&W) is the principal member in this sectional committee. 17th meeting of Hydroelectric Power House Structures Sectional Committee, WRD 15 was held on 29th August under chairmanship of CE, Designs (N&W) which was attended by Director (N&W) and Deputy Director (N&W) at BIS, HQ. Draft “Guidelines for Ventilation of Underground Hydel Power Stations” and first revision of “Guidelines for Planning, Layout and Design of Cavities in Underground Hydroelectric Power Stations” were circulated for comments.
- Bureau of Indian Standards – WRD-14: “Water Conductor System”: Director, HCD (N&W) is the alternate member in the sectional committee. HCD (N&W) Dte. is extending necessary support to BIS by participating in Technical Committee and also perusing the relevant draft codes on the subject related to Hydro-civil aspects as and when received from them.
- WRD-8 titled “Foundations and Foundation Treatment” of BIS.
- WRD-16 titled “Hydraulic Structures Instrumentation” of BIS.
- Committee of “Canals and Cross drainage works, WRD-13”: Assisting Bureau of Indian Standard in preparation of codes, reviewing periodically at least once in five years, reaffirmation, amendments, finalization and offering comments on the codes. , Twentieth meeting of the committee was held on 17.09.19. Modifications were suggested for IS 6531:1994 (criteria for design of Head regulator). Final draft has been prepared by WRD and circulated to all members for comments on 20 March, 2020. Final draft has been examined and found that the draft has been prepared as per modifications suggested by BCD(N&W) directorate.
- Committee of “Canals and Cross drainage works, WRD-13”: CWC is assisting Bureau of Indian Standard in preparation of codes, reviewing periodically at least once in five years, reaffirmation, amendments, finalization and offering comments on the codes. Twentieth meeting was held on 17.09.19. Comments received from various agencies/suggestions on 20 codes of WRD 13 are under reaffirmation. Following codes have been examined and necessary modifications and sketches were provided for the codes; IS 9913:2000, IS 7714:1973, IS

6522:1972, IS 6004:1980, IS 5690:1982, IS 4701:1982, IS 9447:1980, IS 12379:1988, IS 9451:1994.

- Chief Engineer, Designs (NW&S) is Chairperson of Sectional Committee, WRD 14 - Water Conductor Systems under Water Resources Division Council & an alternate Member of CED 48 - Rock Mechanics.
- Director, HCD (NW&S) is a Principal Member of CED 54 - Concrete Reinforcement & also a Principal Member of CED 56 - Hill Area Development Engineering.
- Director, CMDD (NW&S) is Principal Member of WRD-9 "Cement and Concrete Additives Sub-Committee" and an alternate Member of - CED 2 "Cement and Concrete sectional committee"; CED 2:1 "Cement Pozzolana and Cement Additives Sub-Committee" & CED 2:2 "Panel for revision of IS 457".
- CMDD (NW&S) Directorate is Nodal Office of Civil Engineering Division Council (CEDC).
- Director, Emb (NW&S) is a Principal Member of WRD 25 - BIS Committee on Geo-synthetics & an alternate Member of BIS Committee of CED 39, Sub sectional Committee no.10 - Earthquake Resistant Design of Dams and Embankments Subcommittee.
- Director, Gates (NW&S) is a Principal Member of WRD 25-BIS Committee on Geo-synthetics & an alternative member of IS Committee CED 37 i.e on Standardization in the field of Structural Safety including Loading Standards.

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 neighbouring 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.

5.8 Technical Papers/Presentations/ Lectures/Trainings:

Sl. No.	Name of programme/course/presentation	Unit/Dte	Venue and Date
1.	Presentation on Experience in the Implementation of on-going DRIP in India	DSR Dte.	June 12-14, 2019 87th Annual Meeting of ICOLD, Canada
2.	Key Note Presentation on Experience in the Implementation of on-going DRIP in India	DSR Dte.	October 3-5, 2019 INACOLD Conference Jakarta, Indonesia
3.	Training on "Structural Dynamics" by Dr T K Datta, Retired Prof. IIT Delhi	DSR Dte.	October 21-25, 2019 at Training Hall, Sewa Bhawan, CWC
4.	Lecture on Dynamic Analysis Procedure of Dams by Dr. A. K. Chopra, Johnson Professor of Structural Engineering, Emeritus Department of Civil and Environmental Engineering, University of California, Berkeley	DSR Dte.	6-8 November 2019 at Training Hall, Sewa Bhawan, CWC
5.	Training on STAAD Pro Advanced, STAAD Foundation and Hammer Unlimited organised CWC Library Building.	DSR Dte.	02-06 September, 16-20 September 2019 And 14-16 October 2019 At Computer Lab, 2nd Floor, CWC Library Building
6.	Training on Geostudio Professional 2018 Bundled software - Basic and Advance organised at CWC Library Building	DSR Dte.	05-09 August 2019, 19-23 August 2019 At Computer Lab, 2nd Floor, CWC Library Building

8.	Training on FLAC 2D - Design and Analysis software	DSR Dte.	Feb 3-5, 2020 SMD Computer Lab, 6th Floor, CWC
9.	"A Seismic Hazard Assessment Information tool" under Theme: Water Resources System operation and Climate Change and Sub theme: Dam Safety and Management	Sh. Samir Kumar Shukla, Director FE&SA Dte. Sh. Satyam Agrawal, DD FE&SA Dte.	International Conference- "Roorkee Water Conclave", IIT Roorkee during 26-28th Feb, 2020
10.	Lecture on "Design of Gates: Hydro-Mechanical Equipment"	Shri. Aditya Mishra, DD	31 st Induction Training Program (ITP).
11	lecture on "Design of Earth & Rock fill Dam"	Sh. Kayum Mohammad, Director	For Officers of WRD of Central / State Govt. at CSMRS, New Delhi.
12	Lecture on "Quality Control and Diagnostic Investigation for concrete Hydraulic Structures"	Sh. Kayum Mohammad, Director	CSMRS, New Delhi
13	Lecture on "Application of Rock Parameters in the Design of Dams & underground Structures"	Sh. Kayum Mohammad, Director	CSMRS, New Delhi
14	A technical paper titled "Rehabilitation of Breached Earth Dam Using Geo-Composite -A Case Study"	Design (SE&W)	International Conference on Sustainable Civil Engineering practices during 19th - 20th July 2019 at Chandigarh, India.

CHAPTER-VI**WATER MANAGEMENT****6.1 Monitoring of Reservoir Storage**

Central Water Commission monitors the live storage of important reservoirs of the country. The information is 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 2019-20 (1st June, 2019 -31st May, 2020), Central Water Commission (CWC) has added 32 more reservoirs under CWC monitoring. Thus presently, CWC is monitoring 123 reservoirs having live storage capacity of 171.090 BCM which is about 66.36% of the live storage capacity of 257.812 BCM which is estimated to have been created in the country. The status is given in Table 6.1.

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

Description	Water Year (1 st June -31 st May)	
	2018-19 (1 st June -31 st May)	2019-20 (1 st June -31 st May)
Number of Reservoirs monitored (Nos)	91	123
Total Designed live storage in BCM	161.993	171.090
On June, 1 st (Start of Monsoon)	In BCM	27.384
	In % of Designed Live Storage	17
	In % of last 10 Years Avg. Live Storage	86
On September, 30 th (End of Monsoon)	In BCM	123.316
	In % of Designed live Storage	76
	In % of last 10 Years Avg. live Storage	106

Weekly bulletin on storage status of important reservoirs of country was successfully issued during the Water Year 2019-20 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 Govt. for judicious use of available water. Based on reservoir storage during Year 2019-2020, CWC has issued advisory to 13 State namely Gujarat, Maharashtra, Uttar Pradesh, Andhra Pradesh, Telangana, Tamil Nadu, Jharkhand, Karnataka, Kerala, Tripura, Uttrakhand, Chhattisgarh and West Bengal for judicious use of available water. Besides above, at the end of the monsoon, an advisory was also issued to all the States under CWC monitoring to utilize the available reservoir storage, prudently and efficiently to tide over any possible water shortage during the upcoming lean season of the Water Year.

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 123 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 programmes. 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 from 01.08.2019 for a period of 3 years. 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 there after 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 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 respect.

During Year 2019-20, capacity survey works of 8 reservoirs were targeted. RFP document in respect of these 8 reservoirs is under revision to conduct capacity survey through latest modern techniques.

Publication of Compendium on Silting of Reservoirs in India

A Compendium on silting of Reservoirs in India was published in 2015. Updation of this Compendium is under progress with data of 369 reservoirs included.

6.3.2 Capacity Survey using Remote Sensing Technique

The study "Estimation of Sedimentation in Reservoirs using Remote Sensing Technique" 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 2019-20 are as under:

1. The work of "Sedimentation Assessment Study of 40 reservoirs using Remote Sensing Technique" was awarded to MERI, Nashik. Out of 40, 23 reservoirs were found feasible for study and the work is in the draft final report preparation stage. It is expected to be completed by first half of FY 2020-21.
2. CWC also conducts in-house sedimentation studies using Remote Sensing technique. During 2019-20, Eight in-house studies were taken up. Studies of reservoir viz. Matatila, Dudhganga, Kakki, Idamalayar and Idukki have been

completed. Analysis of three more reservoirs, Maithon, Mettur & Malampuzha was completed and final reports are being prepared.

New initiative

1. Sedimentation Analysis of six reservoirs such as Kakki, Idamalayar, Idukki, Mettur, Maithon and Malampuzha were conducted using Microwave data (instead of optical data). This has been tried for the first time in CWC. The main advantage of using microwave data is that images are not affected by cloud cover. Hence images even of monsoon season can be obtained when the reservoir level is near FRL. (Imageries are cloudy in case of optical imageries during monsoon season).
2. Considering the importance of hydrographic survey of major reservoirs, it has been decided to take up the work of 191 major reservoirs of India under NHP by CWC. ToR and RFP for the same are being finalized. With this study, about 70-80% of the live storage of India will be covered for sedimentation assessment. The reservoirs are divided into 4 groups and each group is likely to take 3 years time to complete.

6.4 Project Performance Evaluation

Performance Overview and Management Improvement Organization (PO&MIO), Central Water Commission is 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.

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.

During the year 2019-20, Performance Assessment Study of 10 Irrigation Systems from 10 different States using Remote Sensing technology have been conducted with cooperation of World Bank. 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.

A one day national level meeting of 'Core Group on Benchmarking of Irrigation Projects in India' to review the progress of the States and to assess the usage of water in different activities/services/goods in general & irrigation in particular was held on 23rd January, 2020 at New Delhi.

6.4.2 Water Use Efficiency 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 been undertaking water use efficiency studies of completed major/medium irrigation projects in the country. The studies cover the following aspects of irrigation projects:

- i. Reservoir Filling Efficiencies (inflow and release pattern)
- ii. Delivery System/Conveyance Efficiency
- iii. On Farm Application efficiency
- iv. Drainage Efficiency
- v. Irrigation Potential Created and Utilized

A Technical Advisory Committee under the Chairmanship of Member (WP&P), CWC has been constituted for guiding, supervising and approving the studies.

Technical Assistance for inception report of Baseline Studies of irrigation projects was provided to NWM. For Irrigation Use Efficiency and in the field of Water resource Management, various activities have been carried out under India- EU Water Partnership (IWEP) and India- Australia Joint Working Group respectively. Feedback on the 34 Water Use Efficiency Studies has been received from State Governments and being analysed for improvement.





Signing of the minutes of the 12th ELM meeting by Sh. T.S. Mehra, Commissioner (B&B), MoJS, Gol, Group Leader, Indian Side and Sh. Yu Xingjun, Inspector, Department of International Cooperation, Science and Technology, Ministry of Water Resources, Group Leader, Chinese side



Signing of the Implementation Plan during the 12th ELM meeting by Sh. B.K. Karjee, Chief Engineer, FMO, CWC and Sh. Yang Hui, Director-General, Bureau of Hydrological and Water Resources Survey, Tibet Autonomous Region, China



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 1589 projects have been considered and accepted by the Advisory Committee of Ministry of Water Resources on Irrigation, Flood Control and Multipurpose projects till March 2020.

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 2019-20, 28 major/ multipurpose projects (21 new & 7 revised) have been appraised up to 31st March 2020. Out of that, 04 major / multipurpose projects (3 Revised Cost Estimate & 1 Coastal protection project) have been accepted by the Advisory Committee of MoWR.

7.3 Appraisal of Medium Irrigation Projects

During the year 2019-20, 13 medium projects (12 new & 1 revised) have been appraised in field units of CWC. Out of that, 3 medium projects(1revised) have been accepted by the Advisory Committee of DoWR. Necessary assistance was provided by PAO, CWC to the concerned regional offices for processing the projects for acceptance by the Advisory Committee.

7.4 Interaction with State Governments/Project Authorities

To expedite the appraisal process, Central Water Commission interacts frequently with State Govt. engineers and interstate/review meetings are convened to resolve issues having a bearing on project clearance. For that purpose, CWC hold review meetings with the officials of State Governments to discuss on project issues. During the year 2019-20, following review meetings were held and issues were resolved:

- a) Review meeting in respect of Sita Rama Lift Irrigation Project (Phase-I), Telangana was held under the Chairmanship of Chairman, CWC on 29.6.2019.
- b) Meeting to discuss the Inter State Aspect in respect of Diversion of Surplus Water of Sabarmati Basin for filling of Jawai Dam, Rajasthan was held at CWC (HQ), New Delhi on 17.06.2019.
- c) Meetings were held at CWC (HQ) on 27.08.2019 & 01.10.2019 to resolve the issues related to transfer of Rajasthan share of Yamuna Water at Tajewala Head to Jhunjhunu and Churu districts of Rajasthan by underground conveyance system and its utilisation.
- d) Review meeting in respect of ERM works in Indra Gandhi Main Canal Stage-II (Flow Area) with KSL Canal Stage-I was held at CWC (HQ) on 04.11.2019.

7.5 Meeting of the Advisory Committee

During year 2019-20, the Advisory Committee of DoWR, RD & GR, under the Chairmanship of Secretary (WR) accepted 13 projects comprising 07 Major & Medium Irrigation / Multipurpose Projects and 06 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, RD & GR is enclosed as **Annexure-7.1** and **Annexure-7.2** respectively.

The irrigation projects accepted during 2019-20 envisages annual irrigation benefits to 2.0 Lakh Ha in 4 States of the country. The Flood Control Scheme, accepted during 2019-20 envisages protection to a population of about 12,19,473 persons & area of about 7.57 lakh Ha in the 5 States of the country.

7.6 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 06 Hydro-Electric Projects has been done in CWC during the period of 2019-20. 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 the CEA. During 2019-20, CEA has accorded TEC to 1 Nos. Hydro-Electric Projects having total installed capacity of 930 MW.

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

7.7 National Projects

Government of India is implementing the scheme of National Projects since XIth 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. Later, the Ministry had issued modification in the guidelines of the same on 28.09.2012.

As per 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.
- 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.
- 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.

d) Extension, Renovation and Modernization (ERM) projects envisaging restoration of lost irrigation potential of 2.0 Lakh ha or more would be eligible for inclusion as a National Project subject to :

- i. The Command Area Development and Water Management (CAD&WM) works shall be ensured in the entire command area of the ERM project.
- ii. The 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. The WUA's may be entrusted with the responsibility for the collection of irrigation service fees and for undertaking annual repairs by retaining a part of the fee collected.
- 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.

An ERM Project of a State Government may be included in the scheme of National Projects only on completion of one ERM Project already being funded in the state under the category of 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 XIIth 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 90% of the cost.

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, 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, 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. 3400.69 crore and Rs. 86.036 crore, respectively, up to March, 2020. 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. 1884.78 Crore has been released up to March 2020. The Indirasagar Polavaram Irrigation Project started receiving funding under the scheme of National Project since 2014-15 and an amount of Rs. 8614.16 Crore has been released upto March 2020. Saryu Nahar Paryojna (Uttar Pradesh) and Gosikhurd Irrigation Project (Maharashtra) have been included under the 99 priority project under PMKSY-AIBP.

The Status of other projects are as under:

1. Lakhwar Multipurpose Project (Uttarakhand) was accepted by Advisory Committee of MoWR, RD & GR in its 116th meeting held in December 2012. The project was accorded investment clearance for an amount of Rs. 3966.51 Cr by Investment Clearance Committee (under the Chairmanship of Secretary, MoWR, RD & GR) in its meeting held on 24.02.2016. Further, RCE of Lakhwar Multipurpose Project was again submitted to CWC for appraisal. The same was accepted by Advisory Committee of MoWR, RD & GR for Irrigation, Flood Control & Multipurpose Projects in its 141st meeting held on 11.02.2019 for Rs. 5747.17 Cr (PL July, 2018).
2. Ken Betwa link Project Phase-I (Madhya Pradesh) has been accepted by the Advisory Committee of MoWR, RD & GR during the 129th meeting held on 08.07.2016. Project was accepted for investment clearance of Rs. 18,057.08 Crore (2015-16 PL) on 10.02.2017 by Investment Clearance Committee of MoWR, RD & GR. The DPR of Ken Betwa Link Project Phase-II was also submitted for appraisal in CWC/CEA. Further, as per the decision taken in the review meeting convened by Hon'ble Union Minister (WR, RD & GR) on 25th September, 2017 a draft comprehensive report on Ken Betwa Link Project prepared by NWDA has been submitted to CWC on 13.08.2019. NWDA vide letter dated 28.08.2019 informed that some changes are likely to be expected in the above mentioned Report after resolving water sharing issues related to non-monsoon season between the states of Madhya Pradesh & Uttar Pradesh. However, the Memorandum of Understanding between the States of Madhya Pradesh & Uttar Pradesh is yet to be signed.
3. The Detailed Project Report (DPR) of Ujh Multipurpose Project, J&K was initially prepared by IBO, Central Water Commission, in 2013. The DPR was

considered in the 131st meeting of Advisory Committee of MoWR, RD & GR wherein the project was agreed 'In- Principle'. Subsequently the DPR of the project was revised so as to address the concerns regarding submergence of land. The revised DPR of the project was accepted by the Advisory Committee of DoWR, RD&GR, MoJS on Flood Control, Irrigation & Multipurpose Projects in its 139th meeting held on 07.01.2019 for an estimated cost of Rs. 5850 Cr. (at July, 2017 Price Level). The Culturable Command Area (CCA) to be irrigated under the project was proposed as 16743 Ha. While according approval to the project, the Committee directed that "for ensuring consumptive utilization of water beyond already envisaged through Project, possibility of additional utilization should be explored at the earliest so that the water released to generate hydropower may not flow out of the country and such project should be implemented on priority".

Irrigation & Flood Control Deptt., J&K framed a modified proposal of Ujh Multipurpose project for inclusion of an additional CCA of 23973 Ha. beyond scope of the Ujh MPP already approved in the 139th Meeting of Advisory Committee. Modified DPR of the Ujh Multipurpose Project, J&K, at estimated cost Rs. 9167cr. (at December, 2019-PL) was accepted by Advisory Committee of DoWR, RD & GR in its 144th Meeting held on 08.05.2020.

4. Renuka Dam Project (Himachal Pradesh) has been accepted by the Advisory Committee of MoWR, RD & GR in its 132nd meeting held on 06.03.2017 at New Delhi. Revised Cost Estimate amounting to Rs.6946.99 Cr. (PL Oct, 2018) was accepted by Advisory Committee of DoWR, RD & GR in its 143rd meeting held on 09.12.2019. Proposal for Investment Clearance was examined in CWC and forwarded to DoWR, RD & GR on 11.03.2020.
5. DPR of Kishau Multipurpose Project (Himachal Pradesh & Uttarakhand) was submitted to CWC in 2010 by UJVNL for appraisal. Compliances to most of the observations of CWC/CEA are awaited since 2011. Special Purpose Vehicle (SPV) as Joint Venture between Uttarakhand & Himachal Pradesh was constituted for project execution and the first meeting of SPV has been held in February, 2017. Thereafter, no progress in submission of compliances was observed. The status in the matter was reviewed at DoWR, RD & GR level and UJVNL was requested to establish Executive Committee to resolve day to day issues. UJVNL agreed to incorporate the same in agenda of board meeting of Kishau Corporation Limited.
6. Noa Dihing Project was last considered in 135th meeting of Advisory Committee held on 12.03.2018. As the ownership of the project and the source of funding were not clear and overall economic viability of the project have not been established, the Advisory Committee decided that the project may be deferred

and again put up to Advisory Committee once the above issues are resolved. Thereafter, Govt. of Arunachal Pradesh vide communication dated 09.01.2019 confirmed that the project ownership will be of Govt. of Arunachal Pradesh. However, the information regarding source of the funding is yet to be submitted for establishing power tariff and overall economic viability of the project.

7. DPR of Kulsu Dam Project (Assam) is under appraisal in CWC / CEA. Ownership of the project is yet to be decided. Concurrence/Agreement/MoU between Assam and Meghalaya is also required.
8. Bursar Project (J&K) is also under appraisal in CWC/CEA.
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 conceptual 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.

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

7.8 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/Telengana (2364), Karnataka (1047), Odisha (324) and Tamil Nadu (5012). So far, restoration of 8054 water bodies have 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 'Har Khet ko pani' and improving water use efficiency '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 Jal Shakti, DoWR, RD & GR (erstwhile Minstry 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). PMKSY has been approved for implementation across the country with an outlay of Rs. 50,000 crore in five years. The scheme "RRR of water bodies" is now part of PMKSY (Har Khet ko pani, HKKP). Under PMKSY, the Cabinet has approved an outlay of Rs. 9050 Crore for PMKSY-HKKP component with a target to create 21.0 lakh Ha of irrigation potential including 1.5 lakh Ha from RRR of Water Bodies scheme.

The funding of projects under PMKSY-HKKP in respect of General Category States/UTs is shared between Central and State Governments in the ratio of 25(Central)

: 75(State). However, the said ratio for special areas i.e, undivided Koraput, Bolangir and Kalahandi (KBK) districts of Odisha, Bundelkhand region of UP & MP, Marathwada & Vidarbha region of Maharashtra, Naxal affected areas, DPAP areas, Tribal areas, Flood Prone Area, Desert Development Programme(DDP) area of General Category States/UTs is 60(Central) : 40(State) and that for 8 North Eastern and 3 Himalayan States is 90 (Central):10 (State).

Further, as per “Guidelines for the Scheme on Repair, Renovation and Restoration (RRR) of Water Bodies under PMKSY-HKKP” issued in June, 2017, approval of the Empowered Committee is not required after approval of proposals of RRR of Water Bodies by the State TAC & SLSC. The proposals for funding under the scheme are also to be forwarded to Ministry of Jal Shakti, DoWR, RD & GR (erstwhile Ministry of Water Resources, RD & GR), directly by the concerned Field Office of CWC. A copy of proposal is also to be sent to CWC HQ for maintaining record of overall status of schemes.

Since XII Plan, restoration works in respect of 2219 water bodies has been included for funding under the scheme of RRR of Water Bodies (as on 31.03.2020), out of which, works in respect of 1374 water bodies have been reported to be completed. So far, Central Assistance of Rs. 433.90 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 2019-20, restoration works in respect of 155(Bihar-66, Tamil Nadu - 89) water bodies were included for funding under scheme of RRR of water bodies. The details are given in Table 7.2. Total Central Assistance of Rs. 64.79 Crore was released during 2019-20

Table 7.1
Status of Water Bodies & Funds released under Scheme of RRR of Water Bodies
Since XII Plan (as on 31.03.2020)

Sl . N o.	Name of State	No. of Water Bodies	Estimat ed Cost	Commit ted Central Share (CA)	Irrigati on Potenti al to be restore d (ha)	Centra l Fund Releas ed during 2019-20	Total Centra l Fund Releas ed since XII Plan	Cumulati ve expendit ure	No. of Water Bodies Complet ed	Irrigati on Potenti al Restore d (ha)	Rs. in Crore
1	Andhra Pradesh	100	66.77	40.06	5611	-	2.70	-	-	-	-

2	Bihar	93	161.91	89.46	26090	11.82	18.08	-	-	-
3	Gujarat	61	102.91	61.74	11364	-	8.81	-	-	-
4	Madhya Pradesh	125	183.24	93.01	33305	-	37.70	149.66	121	25000
5	Manipur	4	65.44	58.90	1197	24.26	34.63	16.92	-	-
6	Meghalaya	9	11.43	10.29	1096	-	5.18	5.51	4	849
7	Odisha	863	449.03	267.94	51261	-	110.65	306.88	801	44499
8	Rajasthan	68	187.79	86.74	13197	11.96	62.18	121.61	66	13197
9	Tamil Nadu	242	127.06	76.09	6196	16.75	33.00	66.96	135	-3186
10	Telangana	575	459.18	272.02	29010	-	104.56	127.21	239	8829
11	Uttar Pradesh	74	83.41	52.99	10003	-	16.41	44.41	-8	-2354
12	Uttarakhand	5	12.49	11.24	450	-	-	1.41	-	-450
Total		2219	1910.66	1120.48	188780	64.79	433.90	840.57	1374	98364

Table 7.2

Details of projects included for funding under the scheme for RRR of Water Bodies during 2019-20

Sl. No	State	No. of Water Bodies	Estimated Cost (Rs in Crore)
1	Bihar	66	96.97
2	Tamil Nadu	89	49.31
Total		155	146.28

7.9 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, 5838 SMI schemes have been taken up under the programme (till 31.03.2020). Out of this, 2821 schemes have been reported to be completed. So far, Central Assistance amounting to Rs. 7299.40 Crore has been released

for completion of these schemes (till 31.3.2020). Out of this, an amount of Rs. 768.11 Crore was released during 2019-20 (till March 2020). The details are as given in Table 7.3.

Table 7.3
Details of Projects under implementation since XII Plan under Surface Minor Irrigation Scheme (till 31.03.2020)

Sl No.	Name of State	No of schemes included	Irrigation Potential Planned ha	Estimated Cost	Committed Central Share	CA Released during 2019-20	Cumulative CA released during XII plan & onwards	Cumulative expenditure	No of Schemes completed	Irrigation Potential Achieved ha	Rs. in Crore
1	Arunachal Pradesh	919	41928	716.316	644.684	17.49	225.97	209.421	185	18616	
2	Assam	1010	423480	4975.356	4477.82	414.06	3271.63	3122.67	546	233992	
3	Bihar	176	75908	351.620	274.071	16.14	163.71	224.065	143	65135	
4	Chhattisgarh	147	50513	722.17	433.2	-	200.37	641	102	50500	
5	Himachal Pradesh	154	25525	499.265	449.339	147.91	296.90	171.04	21	5855	
6	Jammu & Kashmir	417	112233	1277.65	1149.88	68.58	591.91	569.60	123	82218	
7	Jharkhand	82	8982	75.324	56.493	-	19.38	62.522	44	4127	
8	Karnataka	465	39104	594.9188	456.342	-	162.42	481.519	271	33811	
9	Madhya Pradesh	276	111343	1817.39	1191.58	-	987.69	1680.11	256	66130	
10	Manipur	102	12904	170.37	153.333	-	104.55	108.63	-	12200	
11	Meghalaya	260	41200	702.651	632.191	22.22	307.40	345.21	97	15321	
12	Mizoram	36	2343	42.47	38.222	11.34	21.58	13.81	-	138	
13	Nagaland	704	29398	519.701	467.731	20.46	328.10	299.286	434	22874	
14	Sikkim	381	12380	115.02	103.519	9.13	91.36	94.36	225	11374	
15	Tripura	58	11907	121.519	109.367	9.00	89.65	89.61	29	1317	
16	Uttarakhand	651	42092	520.616	468.55	31.78	436.78	434.56	345	31102	
Total		5838	1041240	13222.36	11106.32	768.11	7299.40	8547.41	2821	654710	



On 21st June, 2019, Sh. K. Chandrasekhar Rao, Chief Minister of Telangana inaugurated Kaleshwaram Project at Medigadda Barrage in the presence of Governor Sh. ESL Narasimhan, Sh. Devendra Fadnavis, CM of Maharashtra and Sh. Y.S. Jagan Mohan Reddy, CM of Andhra Pradesh. The project is having CCA of 738851 Ha in 13 districts of State and it will also stabilize irrigation in 762028 Ha of land under different projects. In addition to this, Project will also provide 40 TMC (1133 MCM) of drinking water to Hyderabad, Secunderabad and villages in enroute and 16 TMC of industrial water.



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.

As per the present arrangement in CWC, Inter-State, Externally Assisted and Centrally Aided Projects are being monitored by Monitoring Units at Headquarters and other projects by respective Field Units. During 2018-19, a total of 47(20 Major and 27 Medium) projects under general monitoring and 99 ongoing priority projects under AIBP were targeted for monitoring by CWC Field Units. Out of this, 13 Inter-State Major Projects, part of which is being monitored under AIBP by CWC field Units, will also be monitored from 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 General and AIBP monitoring is given at **Annexure-8.1 & Annexure - 8.2** respectively and that of 13 Interstate Major Projects is given at **Annexure - 8.3**.

All the projects identified for monitoring are to be visited by CWC officers. Thereafter, based on the field visit to the project and discussions with the State Government Officials, a detailed Status Report is prepared thereby highlighting various constraints impeding construction & suggestions for remedial measures, points needing attention of the State Government etc. to expedite progress for early completion of the project. The status of monitoring visits to the projects made by CWC during the year 2019-20 is as under:

S. No.	Item	Target	Achievement
1	General Monitoring by Regional Offices	47	5
2	AIBP Monitoring by Regional Offices	149	58

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.

8.2 Accelerated Irrigation Benefits Programme

Central Government launched 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. 1.4.2005 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 new 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 has been 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 has been slightly modified. As per the new guidelines, the central assistance will be in the form of central grant for new and ongoing projects which will 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 are to be arranged by the State Government from its own resources. MoU between Central and State Government has also been slightly modified with insertion of the Para for the CAD works. Central Water Commission has been assigned the responsibility to comprehensively monitor the projects receiving CLA/Grant.

So far, 297 projects from 25 States have been included for funding under AIBP. Out of 297 projects, upto 31.03.2016, 143 projects have been completed and 5 projects deferred. **Annexure - 8.4** gives State-wise list of Major & 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, DoWR, RD&GR identified 99 priority projects amongst the 149 on-going projects 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, 40 projects have been reported completed, 25 projects have been declared as foreclosed and 16 projects are scheduled for completion by March 2021. A list of 40 projects reported as complete is given at **Annexure - 8.5**

Central Grant totalling to Rs. 1330.22 Crores has been released to 34 Projects under PMKSY-AIBP during 2019-20. Since its inception, the cumulative total Central Loan Assistance / Grant provided to States under AIBP/PMKSY-AIBP is Rs. 48968.01 Crores till 31.03.2020 to 297 projects.

As reported by the State Governments, 6.10 Mha of additional irrigation potential has been created under AIBP since the start of the scheme till March, 2020.

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. Project-wise details of these 8 Major and Medium Irrigation projects indicating Central Assistance released and utilized is enclosed at **Annexure-8.6**

8.3 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 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) 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 distributaries 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 FRL of Mandal dam to 341 metre to save core area of Palamau tiger reserve. Mandal dam will now have 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 on 16th August 2017 the proposal for completion of the balance works of the North Koel Reservoir Project 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, erstwhile 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 under the Chairmanship of CEO, NITI Aayog.

Erstwhile 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 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 is still pending 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.

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.

8.4 Assessment of Irrigation Potential created under AIBP

8.4.1 Use of Satellite Technology

It has been decided to take services of Bhaskaracharya Institute for Space Application and Geo informatics (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 MIETY/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.

8.4.2 Use of Drone technology

The possibility of using drones for monitoring progress of irrigation projects is being explored in consultation with States, as the projects and its command are spread in large areas. One project of Maharashtra “Lower Dudhna” has been shortlisted for pilot study. TOR for the same is in the process of being finalised by the State Govt. in consultation with the Union Ministry of Water Resources, River Development and Ganga Rejuvenation.



Sh. S.K. Haldar, Member (WP&P), CWC and Chairman, Technical Evaluation Committee (TEC) for North Koel visited various balance components of the North Koel Project from 18th to 21st June-2019 with officers from CWC, WAPCoS, State Govt



Under India-EU Water Partnership (IEWP), the 1st meeting of Tapi River Basin Committee was organized on 18-6-19. It was chaired by CE (BPMO), CWC, with members from CGWB, states (Maharashtra, MP, and Gujarat) and EU representatives.



One-day Stakeholders Consultation Meeting on "Implementation of Emergency Action Plan" for Konar Dam of Damodar Valley Corporation under DRIP was held on 28.06.2019 which was participated by more than 150 participants



Adilabad





CHAPTER-IX

PLANT & EQUIPMENT PLANNING AND CONSTRUCTION SCHEDULING

9.1 PLANT & EQUIPMENT PLANNING& CONSTRUCTION SCHEDULING

Construction Machinery Consultancy (CMC) and Plant & Machinery (P&M) Directorate (on merger of P&M Directorate with CMC Directorate) under Central Mechanical Organization of CWC 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.

9.2 Project Appraisal

During the year, 18 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 18, 14 projects reports were considered acceptable from plant planning & other aspects with provisions worth Rs. 6214.59 Lakh. In respect of remaining 04 project reports, the observations/comments were communicated to the project authorities for compliance.

State Projects:

Sl. No.	Project Name	State	Outcome
1	Kalisindh Major Multipurpose Irrigation Project Stage -II	Rajasthan	Cleared; With provision of Rs 27.50 Lakh kept under Q. Spl. T&P were found acceptable and project was cleared from plant planning aspect, clearance conveyed to PA(C) Dte. vide letter dated 03-06-2019.
2	North Koel Project	Bihar	Cleared; After several clarifications regarding construction scheduling, planning and other aspects clearance was conveyed to PA(N),Dte. vide letter dated 06-06-2019
3	Bodwad Parisar Sinchan Yojana	Maharashtra	Cleared; With provision of Rs 41.50 Lakh kept under Q. Spl. T&P were found acceptable and project was cleared from plant planning aspect, clearance conveyed to PA(S) Dte. vide letter dated 07-06-2019.
4	Mawphu H.E. Project (Wah Umiam Stage -III) (85MW)	Meghalaya	Cleared; With provision of Rs 193.25 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 24-06-2019.
5	ERM Works of IGNP Stage -II and KSL Stage -I	Rajasthan	Cleared; After several clarifications regarding construction scheduling, planning and other aspects clearance was conveyed to PA(C),Dte. vide letter dated 30-07-2019
6	Vishnugad Pipal Koti Hydro Electric Project (444 MW)	Uttarakhand	Cleared; With provision of Rs 555.02 Lakh kept under Q. Spl. T&P were found acceptable and project was cleared from plant planning aspect, clearance conveyed to HPA Dte. vide letter dated 06-11-2019
7	Ken-Betwa Link Project	Madhya Pradesh	Cleared; With provision of Rs 1484.40 Lakh kept under Q. Spl. T&P were found acceptable and project was cleared from plant planning aspect, clearance conveyed to NP Dte. vide letter dated 11-11-2019
8	Thana Plaun Hydro Electric Project (191MW)	Himanchal Pradesh	Cleared; With provision of Rs 197 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 11-12-2019

9	Parbati Hydro Electric Project, Stage-II (800 MW)	Himanchal Pradesh	Cleared; With provision of Rs 2460.92 Lakh kept under Q. Spl. T&P were found acceptable and project was cleared from plant planning aspect, clearance conveyed to CA(HWF) Dte. vide letter dated 04-02-2020
10	Gori Ganga -III Hydro Electric Project (150 MW)	Uttarakhand	Cleared; With provision of Rs 1255.00 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 17-02-2020
11	ERM Works of Sukla Irrigation Project	Assam	Cleared; After several clarifications regarding construction scheduling, planning and other aspects clearance was conveyed to Irrigation Department, BTC Assam vide letter dated 24-02-2020
12	Rangit-IV Hydro Electric Project (120 MW)	Sikkim	Cleared; After several clarifications regarding construction scheduling, planning and other aspects clearance was conveyed to CA(HWF) Dte. vide letter dated 26-03-2020

Comments issued:

Sl. No .	Name of the Project	States	Sl. No .	Name of the Project	States
13	Sunni Dam Hydro Electric Project (382 MW)	Himachal Pradesh	15	Rajasthan Share Of Yamuna Water at Tajewala Headworks	Rajasthan
14	Kirthai-I Hydro Electric Project (390 MW)	Jammu & Kashmir	16	Balimela Pumped Storage Project (500 MW)	Odisha

International Projects:

Sl. No.	Project Name	Country	Outcome
1	Kunn Chaung Irrigation Scheme	Myanmar	Cleared; After examining the construction scheduling, planning and other aspects clearance was conveyed to PA(S),Dte. vide letter dated 19-08-2019
2	Yenwe Irrigation Scheme	Myanmar	Cleared; After examining the construction scheduling, planning and other aspects clearance was conveyed to PA(S),Dte. vide letter dated 22-08-2019

9.3 Consultancy

No consultancy work for equipment planning in Irrigation and Multipurpose project was taken up during the Year 2019-20.

9.4 Other important technical activities:

- **Clarification regarding interest on capital cost of machines:** Clarification on "admissibility of interest on capital cost of equipments for working out hourly use rate" in Punatsangchu-I Hydro Electric Project (1200 MW), Bhutan was conveyed to Managing Director, Punatsangchu-I Hydro Electric Project Authority.
- **Clarification regarding aggregate size in dam concreting:** "Review of use of 40 mm aggregate in dam concreting" in Punatsangchhu-I Hydro Electric Project (1200 MW), Bhutan was conveyed to Chief Engineer Designs (E&NE), CWC.
- Clarification regarding analysis of rates of construction of tunnel in hydro electric project using TBM was sent to Chenab Valley Power Projects Ltd Jammu & Kashmir.







Hon'ble Minister of Home Affairs had a meeting on 13th July, 2019 with MHA officials and concerned departments including CWC on the issue of developing flood situation



Telemetry system installation by CWC at Doyang reservoir -Doyang River in Nagaland was completed on 06-07-19

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 2019-20, 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 Babbali 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 Babbali Barrage issue, a three Members Supervisory Committee was constituted by MoWR, RD&GR to supervise the operation of Babbali 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 Babbali Barrage.
- ii) The Committee shall ensure that;
 - a) Maharashtra maintains Babbali Barrage storage capacity of 2.74 TMC of water out of the allocation of 60 TMC given to Maharashtra for new projects under the agreement dated 6.10.1975.
 - b) The gates of Babbali Barrage will remain lifted during the monsoon season, i.e. July 1 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 does not exceed 2.74 TMC of which only 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, 4.2.2015 and 23.6.2016. No meeting of the Committee was held during the year 2018-19. 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 2019-20.

10.1.2 Mahanadi River Water Dispute

With reference to 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 19.1.2017. 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 23.1.2018. In the final hearing, the Original Suit was disposed 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 12/3/2018. 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 14.2.2006 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 24.2.2010 and the complaint of Odisha and Andhra Pradesh were referred to the Tribunal by Central Government.

The Tribunal has submitted a report and decision under Section 5(2) of the Act on 13.9.2017. 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. The matter is under adjudication in the Tribunal.

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 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>).

10.1.5 Dispute related to TilaiyaDhadhar Diversion Scheme:

The State of Bihar filed a complaint under Section 3 of the Inter-State River Water Disputes Act, 1956 with the MoWR, RD & GR, 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. The first meeting of the Negotiation Committee was held on 13.02.2020. Officials from DoWR, RD & GR, MoJS, CWC, Damodar Valley Corporation (DVC) and the State Governments of Bihar, Jharkhand and West Bengal have participated in the meeting. During the meeting, it was suggested that proposed utilization of water under Tilaiya Dhadhar Diversion Scheme may be reviewed through efficient utilization of water by adopting micro-irrigation instead of conventional irrigation and the distribution system may be remodelled accordingly. Party States were advised to review their positions so as to resolve the dispute mutually at the level of Negotiation Committee.

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 Chair was signed earlier between MoJS(then the MoWR, RD & GR) 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 the CWC Headquarters, Sewa Bhawan to discuss the challenges of interstate river water governance in the country.

During 2019-20, the Research Chair in association with CWC organized talks on 'Interstate Water Disputes: Crisis, Consequences and Cure' by Dr. Scott Moore, Senior Fellow, University of Pennsylvania on May 28, 2019 and 'Reassessment of India's Water Resources Potential' by Rishi Srivastava, Director, CWC on August 26, 2019.

The first meeting of the Management Committee of MoJS Research Chair on 'Water Conflicts and Governance' was held on October 22, 2019 under the Chairmanship of Chairman, CWC. During the meeting various proposals regarding possible additional research activities that can be carried out by the Research Chair were discussed.

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.

10.2 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. Decision of Cabinet Committee on dependability of projects

Further, publication titled 'Legal Instruments on Rivers in India (Vol. III) - Agreements on Inter-State Rivers' was first brought out by CWC in 1995 and the same 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. Both 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 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. The details of share due/received in relation to the expenditure incurred as on 31.03.2020 of Rs. 2024.046 Crore is as under:

Status of Contribution of Fund as on 31.03.2020 (in Crore)											
Period	Total Expenditure	Share Due			Share Received			Balance Share			
		MP	UP	Bihar	MP	UP	Bihar	MP	UP	Bihar	
upto 31.03.20 18	1906.26	953.13	476.57	476.57	1070.24	409.97	426.05	117.11 (+)	66.61 (-)	50.52 (-)	
Total as on 31.03.20 19	1969.926	984.963	492.4815	492.481 5	1066.144	457.76	446.052	(+) 81.151	(-) 34.7215	(-) 46.429 5	

During 2019-20	54.12	27.06	13.53	13.53	27.06	0	27.06	0	(-) 13.53	(+) 13.53
Total as on 31.03.2019	2024.046	1012.023	506.0115	506.0115	1093.174	457.76	473.112	(+) 81.151	(-) 48.2515	(-) 32.8995

All 18 nos. spillway blocks have been completed up to crest level (RL 326.4M). Non over flow blocks on either side upto top elevation at RL 347 M have been completed. All irrigation sluices, Spillway Bridge, saddle dams, rock fill dam upto RL 347 have been completed.

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

It was decided in the 74th meeting of Executive Committee that E-in-Cs of all the co-basin States will finalise the project construction cost and get it vetted from Chairman, Executive Committee and close the account by 31.03.2014. However, in the meanwhile, MoWR, RD & GR vide it's office order No. 14/2/2015-Estt.IV/965 dated 02.06.2015 constituted a Committee 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. The Committee circulated its draft report to all concerned for their views/observation.

The views/comments of three co-basin States on the above report have been received. The views/comments on the report from all the three co-basin Stats are of divergent nature, and, as a result, the report of the Committee was not finalized.

In the 75th Executive Committee meeting, it was decided that a meeting of E-in-Cs of all of the three co-basin States may be convened by CWC under the chairmanship of the Member, WP&P, CWC by 30.01.2017 in this regard. Subsequently a meeting of Principal Secretaries of WRD of three co-basin States may be convened in MoWR, RD & GR by 15.02.2017.

In pursuance of the decision taken in 75th meeting of Executive Committee held on 9th January, 2017, a meeting was convened on 06.02.2017 under the Chairmanship of Member (WP&P), Central Water Commission. In the meeting, the draft report of CWC was discussed and some modifications were suggested in the original draft report. In the draft report, annual benefit for power has been calculated by considering all four power houses whereas in the modified proposal, power benefit was taken only from

three power houses. The Government of MP once again does not agree with the proposed cost apportionment as suggested in this meeting.

Another meeting under the chairmanship of Secretary (WR, RD & GR), was held on 21.07.2017 to discuss the conclusions/decisions emerged in the meeting held on 06.02.2017 under the chairmanship of Member (WP&P), CWC. On the basis of the discussion, a note on "Apportionment of cost of Bansagar Multipurpose Project" was finalized and circulated for concurrence/views to co-basin States. The sharable cost of dam as per rationalization of establishment cost (without cost apportionment between irrigation and power) was once again not acceptable to the WRD, Govt. of MP.

Further, to discuss the views/observation of the co-basin States on the draft Note, an another meeting was held on 09.03.2018 under the chairmanship of the Secretary, MoWR, RD&GR, in which the sharable cost of dam (without apportionment of cost and without rationalization of establishment cost) and the O&M cost (including O&M set up) were discussed. The summary record of the discussion of the meeting was circulated by MoWR, RD&GR for comments/observation. The comments/observation of the WRD, Govt. of Bihar and WRD, Government of Uttar Pradesh has been received by Ministry. In this meeting, it was decided that a committee will be constituted by DoWR, RD&GR, Ministry of Jal Shakti, comprising representatives of the party States and the Ministry to assess the realistic manpower requirement for the O&M works of Bansagar project. The Committee will review and decide the O&M cost for the next ten years from 2018-19 onwards, review the status of work charged and daily wages employees and take appropriate decision to reduce their numbers. The constitution of Committee is under progress.

10.3.2 Betwa River Board

In accordance with the inter-state agreement of 1973 between Uttar Pradesh and Madhya Pradesh, the 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 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 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 at the toe of dam on left bank. 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 2019-20 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	17.45	-	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	13.0	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

The reservoir (FRL 371.00) filled up to 371.00 M during the year 2019-2020. The three units of Power House commissioned during 1999-2000. During 2019-2020, power generation was 864.83 lakh units.

10.3.3 Ghaggar Standing Committee

The Ghaggar Standing Committee was constituted in February 1990 to examine and coordinate 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.

29th meetings of the Ghaggar Standing Committee were held on 03.09.2013 and 29.08.2019 under the Chairmanship of Member (RM). In the meeting, it was decided that:

- Immediate flood management measures in form of ring bunds to save abadi areas.
- Scope of agreed Tender for data collection work should also be shared with CWPRS, Pune for their views, if any,
- Officials from Govt of Punjab and Govt of Haryana will jointly decide the mode of payment for data collection as per accepted Tender terms & conditions and award of data collection work may be done within 10 days.
- Work for data collection should be started from 01-Oct-210 (after monsoon season) and be completed in stipulated period.

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 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 90th meeting of the Committee was held on 16.10.2019 under the Chairmanship of Member (RM), CWC. The minutes of the meeting were finalized and circulated among the Members of the Committee.



Sh.R.K. Sinha, Member (RM), CWC in panel discussion on Rajya Sabha TV on 15th July 2019 regarding Flood and River Interlinking



केंद्रीय जल आयोग के निदेशक ने किया विकास कार्यों का निरीक्षण, जानकारी ली



Jhalawar

रटलाई, बाटरवेल के उपवर्ग की जानकारी लेते केंद्र जल आयोग के अधिकारी।

रटलाई, केंद्रीय जल आयोग के निदेशक शरदचंद्र ने क्षेत्र में चल रहे विभिन्न प्रकार के विकास कार्यों का निरीक्षण किया। उन्होंने रटलाई कस्बे के बड़े तालाब पर महानरेगा के जलशक्ति अभियान के तहत करवाए जा रहे पौधरोपण और अन्य कार्यों का निरीक्षण किया। उन्होंने 2 साल पूर्व ग्राम पंचायत द्वारा सांसद कोष द्वारा स्वीकृत 12 लाख रुपए की लागत से पेयजल के लिए बनाए गए ओपनवेल का भी निरीक्षण किया।

बकानी, केंद्रीय टीम ने यहां सलालद और करलगाव में



बकानी जलशक्ति अभियान का निरीक्षण किया। ग्राम पंचायत करलगाव के मोलकाकलां में सोकता गुद्धा निर्माण सहित अन्य के बारे में जानकारी ली।





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. This organization is also initiating the process for preparation of Aquatic Habitat Atlas in major Rivers of India.

11.2 Aquatic Habitat Atlas in Major Rivers of India

Central Water Commission (CWC) is initiating preparation of Aquatic habitat Atlas for major rivers of India through ICAR- Central Inland Fisheries Research Institute (CIFRI). The purpose of the study is to ease the retrieval of ecological data with its main utility for the assessment of Environmental flows throughout the country. The study components are as under,

(A) Spatial Distribution of Biodiversity

- i. Identification of homogenous reaches/or tributaries in terms of biodiversity in all major river systems, Catalogue of the present aquatic life particularly in terms of fish, plankton and benthic invertebrates in the identified homogenous reaches
- ii. Identification of umbrella species in terms of their livelihood and conservational importance in each of the identified homogenous reaches.

(B) Requirement of Flow parameters for its healthy environment

- i. Study of the habitats of selected umbrella aquatic species for flow parameter requirements in terms of water depth, flow velocity, nutrients, physical & chemical quality, in the main stream in different seasons, viz. monsoon, non-monsoon-non-lean and lean season, and in some cases 2 seasons.
- ii. Study of the biology of the identified umbrella species particularly during reproduction/breeding stage of the species.

Study Area includes Ramsar sites of India and the following major river systems covering whole of India:

Group 1: Rivers such as Indus, Jhelum, Chenab, Rabi, Beas, Satluj and their major tributaries from Indus Basin

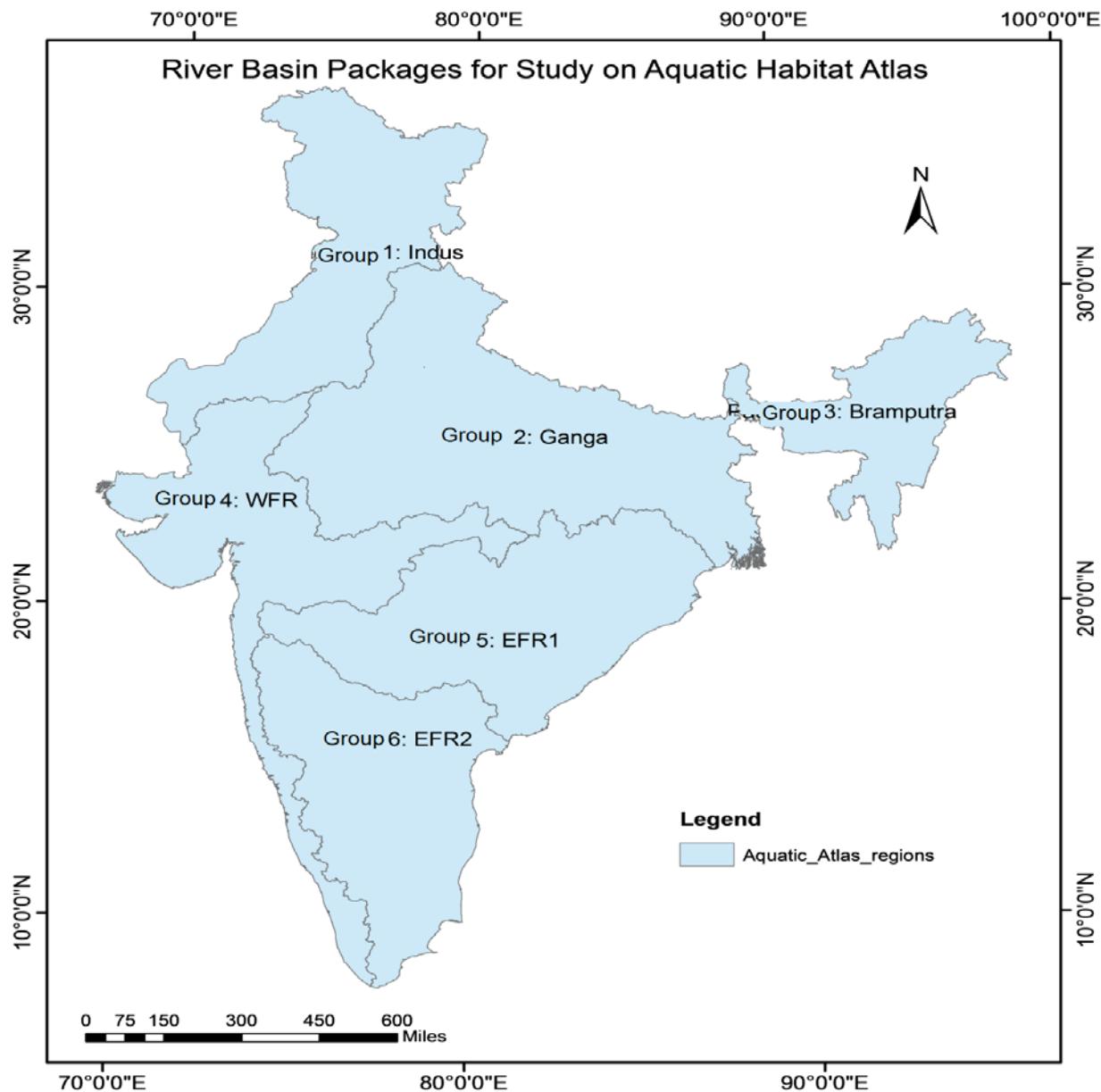
Group 2: Rivers such as Ganga, Yamuna, Sone, Kosi and their major tributaries from Ganga Basin

Group 3: Rivers such as Brahmaputra, Barak, Teesta and their major tributaries

Group 4: West Flowing Rivers (WFR's of Kutch & Saurashtra including Mahi, Sabarmati, Narmada, Tapi)

Group 5: East Flowing Rivers 1 (Subarnarekha, Bramini, Baitarni, Mahanadi, Godavari) and their major tributaries

Group 6: East Flowing Rivers 2 (Krishna, Pennar, Cauvery) and their major tributaries



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

Post Project Environmental Evaluation Study is being 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)

Inception Reports of all three projects have been submitted by the Consultants and the reports were discussed in the 4th Meeting of TAC held on 11.12.2019. The Interim Reports of all three projects are under examination.

11.4 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.

Statewise Projects Under Close Monitoring By NEMCRVP (Total :18)

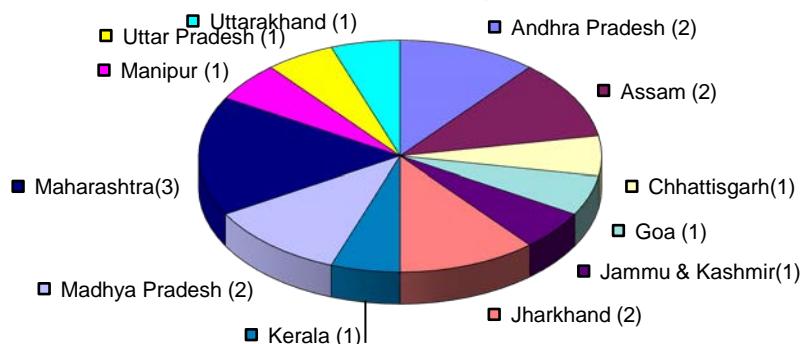


Fig.1 (Statewise Projects Under Close Monitoring By NEMCRVP)

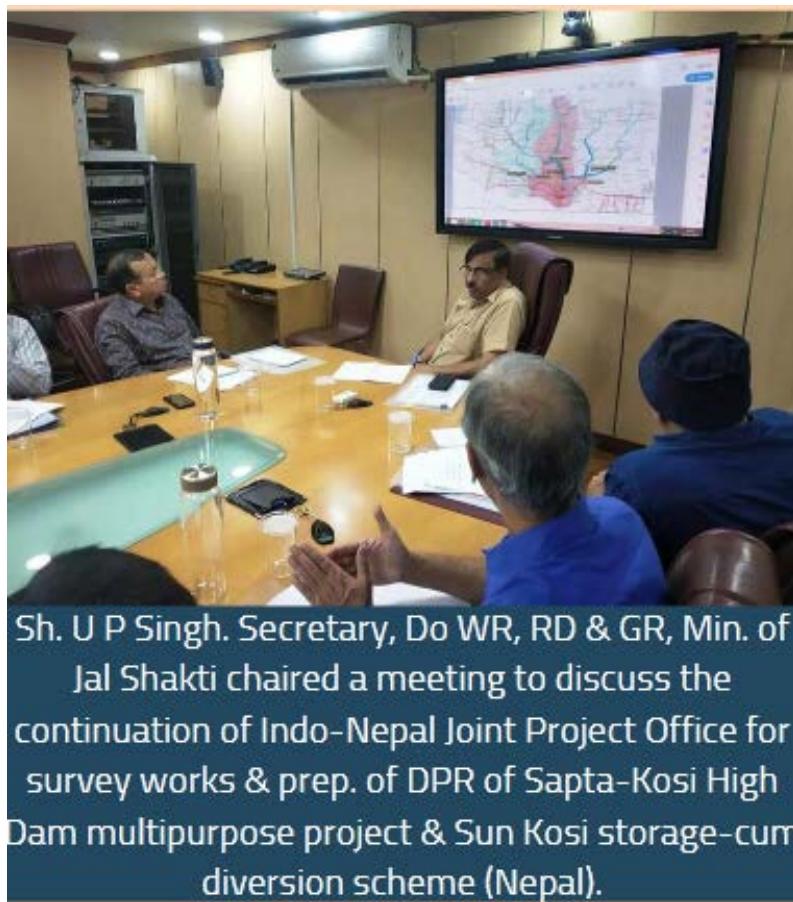
11.4.2 Functions of NEMCRVP

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) and monitors the activities of these Committees.



Chairman, CWC taking a meeting of Nodal officers for various Sessions, Panel Discussions etc. on 01.08.19 to be organized under India Water Week-2019 from 24-28th Sep 2019 at New Delhi



CHAPTER-XII

EXTERNAL ASSISTANCE

12.1 External Assistance for Development of Water Resources

External assistance flows to 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 the external assistance from different funding agencies to fill up the resources gaps, both in terms of funds and technological update for rapid development of 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

Four Concept Note & one Feasibility Study Report (FSR) of externally aided irrigation and multipurpose project have been appraised in CWC during 2019-20. The details of these 12 projects are as :

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

Sl No .	Name of Project	Status	Remarks
1.	<p>Preliminary Project Report (PPR) regarding additional financing for the ongoing World Bank supported "West Bengal Accelerated Development of Minor Irrigation Project (WBAADMIP)" – submitted by Govt. of West Bengal for World Bank Funding.</p> <p>Estimated Cost = Rs. 630 Crore</p>	<p>The revised Concept Note of the proposal has been received on 02.05.2019. The same has been examined / appraised and recommended to ministry on 20.06.2019.</p>	Recommended
2	<p>Project Proposal for "Extension Renovation and Modernization of Grand Anicut Canal System" submitted by Govt. of Tamil Nadu for AIIB external funding.</p> <p>(Estimated Cost: Rs. 2298.75 Crore)</p>	<p>A copy of Preliminary Project Proposal (PPR) in the format of DEA and the Detailed Project Report (DPR) for the proposal has been received on 02.09.2019. The same proposal (at 2014-15 PL) was earlier accepted by the Advisory Committee during its 130th meeting held on 30.09.2019. Therefore, proposal has been recommended to submit DPR through the online platform of</p>	PPR Recommended

		CWC.	
3	Project Proposal for "Jamrani Multipurpose Dam Project" submitted by Govt. of Uttarakhand for AIIB funding. (Estimated Cost: Rs. 2584.10 Crore)	The PPR of said project has been received for external funding on 13.09.2019. Since the DPR of the proposal has already been examined in CWC and accepted by the Advisory Committee of erstwhile MoWR, RD & GR during its 14th meeting held in Feb'2019, Therefore, the proposal has been recommended for external funding.	PPR Recommended
4	Project Proposal for "Water Security and Management Program in Meghalaya" submitted by the Govt. of Meghalaya for ADB funding. (Total financial of Rs. 1087 crore)	The PPR in the format of DEA has been received from DoWR RD & GR on 21.10.2019. The same has been returned due to insufficient technical information on the proposal and it has been requested to resubmit the proposal with requisite details as per DoWR, RD & GR /CWC guidelines	Returned

A2) PPR pertain to Other Line Ministry

Sl No	Name of Project	Central Line Ministry	Status	Remarks
1	Project proposal for Uttarakhand Sewerage Scheme in selected	Ministry of Housing and	The Proposal in the format of DEA has been received from	Returned

	<p>towns/Area under Environment Friendly Urban Development in Ganga States , Phase -II (Ganga Rejuvenation)</p> <p>Estimated Cost : Rs. 300 Crores.</p> <p>Financial Institution: KFW - KFW</p>	Urban Affairs	<p>Uttarakhand seeking for external assistance on 25.06.2019. The works proposed to be carried out under the proposal are mostly related to laying of Sewer Network and construction of Sewage Treatment Plan which are not pertaining to this office. Therefore, the PPR of proposal was returned on 11.07.2019.</p>	
2	<p>Project Proposal for "Borpani middle I, H.E. Project (22.5 MW" submitted by Govt. of Assam for ADB funding</p> <p>(Total Financial of Rs. 261.51 crore)</p>	Ministry of New and renewable Energy	<p>The Proposal in the format of DEA has been received through DoWR, RD & GR on 10.02.2020. The proposal is purely a Hydro-Electric Project. Therefore the same has been returned on 12.03.2020.</p>	Returned
3	<p>Project proposal for Water Security and Climate Adaptation in Rural India.</p> <p>(Estimated Cost - NIL)</p> <p>Financial Institution:</p>	Ministry of Rural Development	<p>The Proposal in the format of DEA has been received through DoWR, RD & GR on 27.05.2019. The works to be carried out in 04 nos of State namely Madhya Pradesh, Rajasthan, Tamil Naidu</p>	Returned

	GIZ-GIZ		and Uttar Pradesh under proposal does not pertain to this office. Therefore, same has been returned on 24.06.2019	
4	Providing financial support for component-C of PM-KUSUM Scheme Funding - World Bank (Estimated Amount : Rs. 7500 Crore)	Ministry of New and Renewable Energy	The Proposal in the format of DEA has been received through DoWR, RD & GR on 24.04.2020 The Proposal aims to providing reliable, affordable and adequately solar electric supply for irrigation to increase production. PPR does not have the technical details such as Hydrology, Irrigation Planning Aspect etc. Therefore, the PPR has been returned and it has been requested to resubmit the proposal with requisite details as per DoWR, RD & GR /CWC guidelines	Returned

5	Parallel carrier system to rajiv gandhi lift canal from Indira Gandhi main canal (rglc-phase- iii) Estimated Cost: RS. 1454 Crore Funding Agency: ADB	Ministry of Housing Affairs	The Proposal in the format of DEA has been received through DoWR, RD & GR on 04.03.2020. The same is under examination in concerned specialised directorate of CWC.	Under Examination
6	Soil & Water Conservation Department, Government of Meghalaya Integrated Natural Resource Conservation and Management for Livelihood Improvement Estimated Cost: RS. 600 Crore Funding Agency: JICA	Ministry of Development of North Eastern Region	The Proposal in the format of DEA has been received through DoWR, RD & GR on 29.07.2019. The same has been returned due to insufficient technical information on the proposal and it has been requested to resubmit the proposal with requisite details as per DoWR, RD & GR /CWC guidelines.	Returned
7	Project Proposal for "Improving Community Resilience and Ecosystem Management in Kopili River (Assam)" submitted by Govt. of Assam for ADB Grant (\$	Ministry of Power	PPR in the format of DEA has been received from DoWR, RD & GR on 17.10.2019. The Proposal is realted to Hydro- power Generation, river erosion and risk	Referred to B&BBO, CWC

	210 Million).		management and also has flood component. Therefore, the proposal was referred to B&BBO, CWC for appraisal on 04.12.2019.	
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B. DPR/ Feasibility Study Report

Sl No .	Name of Project	Status	Remarks
1	<p>West Bengal Major Irrigation and Flood Management Project</p> <p>Estimated Cost: Rs. 2931.67 Crore</p> <p>Cost Sharing : 35%(World Bank), 35% (AIIB), 30% (West Bengal)</p>	<p>Preliminary Project Report (PPR) of the project with changed name having an estimated cost of Rs. 2768 crore was received in CWC in February 2016. The same was examined and recommended to the erstwhile MoWR, RD & GR on 11.05.2016 subject to certain conditions/observations.</p> <p>However, Feasibility Study Report of the project proposal has been received in this office on 12.12.2019/30.12.2019. The requisite technical details given in FSR are under examination in GFCC/ specialised Directorates of CWC (HQ) as per DoWR, RD and GR guidelines.</p>	<p>Compliance to comments of CWC pending since 04.06.2020</p>





Member(RM), CWC and other officers had a meeting with Google representatives on 18-09-19. Last year CWC and Google had signed an MoU to improve the effectiveness of flood forecasting, flood management and build an online exhibition on Indian rivers.



Presentation on Efficient & Productive Water Use for Sustainable Water Resources Management in India by Sh. Chaitanya K S, Deputy Director, CWC during 3rd World Irrigation Forum (1-4 Sep, 2019) held at Bali, Indonesia



Sh. U.P. Singh, Secretary, DoWR, RD&GR, MoJS exchanging MoU for sharing of water of Feni River on 05.10.2019 with his counterpart from Govt. of Bangladesh in the presence of Hon'ble PM of both the countries



Organization of a conference on Vigilance Awareness on theme 'Integrity- A way of Life' on 30.10.2019 at CWC, HQ, New Delhi during Vigilance Awareness Week -2019





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, Kamla, Kosi and Mahananda. In order to make flood forecasting and advance warning of floods in the flood plains of the above rivers, a scheme namely, "Flood Forecasting and Warning system on rivers common to India and Nepal" which includes 42 meteorological/ hydro-meteorological sites in Nepal and 18 hydrological sites in India, has been in operation since 1989. The data collected is helpful for formulating the flood forecasts and issue of warnings in the lower catchments.

A Treaty on Integrated Development of Mahakali (Sharda) River including Sharda Barrage, Tanakpur Barrage and Pancheshwar Multipurpose Project, namely "Mahakali Treaty" was signed between Governments of India and Nepal in February 1996, and it came into force in 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 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 July 31 – August 06, 2000. The first meeting was held on 1-3 October 2000, at Kathmandu Nepal. The JCWR has met 8 times so far and last meeting was held on 11 January, 2019. 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 under taken at the institutional interactions. Joint Standing Technical Committee was constituted to coordinate all existing Committees and sub Committees under JCWR. Chairman, GFCC, Patna has been nominated as Indian Team Leader and Sr. Jt. Commissioner (Ganga), MoWR as Member Secretary from Indian side. The first meeting of JSTC was held on 8-9 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 India 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 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 in 11-17th 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) which was 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 upto August, 2019.

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.

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 Detail 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-lateral 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. Six meetings of the Governing Body (GB) of the PDA have been held so far. The last (6th) meeting was held in April, 2018 at Kathmandu, Nepal.

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 by PDA to the two Governments in December, 2016 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 32 hydro-meteorological/ meteorological stations located in Bhutan maintained by Royal Government of Bhutan (RGoB) with funding from 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. The mandate of JET is 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 34th and 35th meetings of Joint Expert Team (JET) were held during 17th - 18th May, 2018 at Aizwal, Mizoram and during 6th - 7th March 2019 at Paro, Bhutan. The 36th meeting of JGE is proposed to be held at Gangtok, Sikkim.

A Joint Group of Experts (JGE) on Flood Management headed by Commissioner, Brahmaputra & Barak Basin (B&BB), MoWR, RD & GR has been constituted 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.

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 Yaluzangbu/ 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 Yaluzangbu/Brahmaputra during flood season.

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.

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 20th- 26th, February 2019 in Ahmedabad, India.

13.5 Cooperation with Bangladesh

I. Indo-Bangladesh Joint Rivers Commission (JRC)

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. So far, 37 meetings of JRC have been held and its last meeting was held in

March, 2010. The technical level meeting of JRC is held regularly to discuss various related technical matter. Last technical level meeting of the JRC was held on 18 May 2017 at Dhaka.

II. Treaty on Sharing of Ganga/ Ganges Waters at Farakka

As per the provision of the Treaty, signed by the Prime Ministers of India and Bangladesh on 12th December 1996 for the sharing of Ganga/Ganges waters, a Joint Committee has been set up for implementing, joint inspection and monitoring of the sharing arrangements at Farakka in India and at Hardinge Bridge in Bangladesh for the dry season (Jan to May) every year. The validity of Treaty is 30 years. The Treaty is being implemented to the satisfaction of both the countries since 1997.

The Joint Committee has held 3 meetings (69th, 70th& 71st) during 2018-19 in May 2018, September 2018 and February 2019.

III. Cooperation in Flood Forecasting

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. Flood data of above sites was communicated to Bangladesh on continuous basis during the Monsoon of the year 2018. The Bangladesh side appreciated the Indian side for providing flood related data and information of various common/border rivers during 15th May to 15th October to the Flood Forecasting and Warning Centre of Bangladesh Water Development Board on a continuous basis which has helped to provide effective forecast thus saving lives and properties.

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 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 India-WRIS

CWC & ISRO had jointly undertaken the work of development of Water Resources Information System (DWRIS) during 11th plan. The first full version of website of INDIA WRIS was launched on 07 Dec, 2010 in New Delhi. Subsequently, four more versions of the website of India-WRIS have been launched. The Ver. 4.1 was launched in July, 2015 and is available in public domain at 1:250000 scale. The URL of the website is www.india-wris.nrsc.gov.in.

The information system contains 105 GIS layers grouped in five heads, namely 1) Watershed Atlas, 2) Administrative Layers, 3) Water Resources Projects, 4) Thematic Layers and 5) Environmental Data. The major GIS layer generated are basin/sub-basin/watershed, river network, canal network, water body, major and medium irrigation project (dam, barrage etc), road network, town and village extent, CWC HO network and CGWB well data. As per provision of Hydro-Meteorological Data Dissemination Policy 2013 (MoWR), all unclassified data of CWC G&D stations has been made available on India-WRIS website.

The centre for maintenance and further development of the India-WRIS portal was functioning at Central Water Commission Headquarter with support from ISRO at New Delhi since February 2015. The support from ISRO for maintenance and further development of the portal ended w.e.f. 31st Dec 2017. Later, the updation of portal has again been restarted by CWC since 1st Feb'18 through hiring of individual consultants. Refinement and updation of rivers, watershed and water bodies are under progress.

The National Water Information Centre has been setup by DoWR, RD&GR for further maintenance and development of India-WRIS.

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

14.3.1 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 scientific manner is essential for various uses 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 2020, Central Water Commission is operating a network of 1569 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 716 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.

CWC also operates 76 exclusive meteorological observations stations in various basins in the country.

14.3.2 Monitoring of Glacial Lakes/Water Bodies in Himalayan Region

Glacial lakes are common in the high elevation of Glaciated 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 are more than 50 Ha. 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 2011, 2012, 2013, 2014, 2015, 2016, 2017, 2018 and 2019. 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 2019, cloud free data of 439 GL/WBs was available during the monsoon period of 2019. Amongst these, 22 GL/WBs have shown decrease in water spread area, 350 have shown increase, 67 have not shown any significant change (+/-5%). 6 out of 22 have decreased by more than 20% and 193 out of 350 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

14.4 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)" has been approved by Ministry of Water Resources, Government of India. In this regard, it is 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 has been 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 has been 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 have been completed and intended targets achieved. All the remaining payments as per MoU has been 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. 4,14,30,793/- for a period of one year has been received from DoWR, RD&GR. Accordingly, a tripartite Memorandum of Understanding (MoU) has been signed in January 2020 among CWC, IIT Madras and respective states (Kerala, Tamil Nadu and Puducherry) and an advance payment amounting to Rs 140 lakhs has been made to IIT Madras in February 2020.

CMIS is also being implemented by National Institute of Oceanography (NIO) Goa for States of Goa and Southern Maharashtra (for three sites) and by CWPRS 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.

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 has been received from DoWR, RD & GR. Accordingly, advance payment of Rs 412.98 lakhs has been 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.

14.5 Coastal Climate Information System (CCIS):

A Technical Assistance (TA) programme namely TA 8652-IND: Climate Resilient Coastal Protection and Management Project (CRCP&MP) to support mainstreaming of climate change consideration into coastal protection and management at the national level and in the two focal States (of Karnataka and Maharashtra) where the Sustainable Coastal Protection and Management Investment Programme (SCP&MIP) is already operational under external assistance from Asian Development Bank(ADB) has been signed by Government of India. The implementation of this TA has been financed by a grant amounting to Two Million USD (\$) from Global Environment Facility (GEF) & administered by ADB. One of the major objectives of this TA is to develop a comprehensive database related to Oceanographic and meteorological data for the entire coast of India called Coastal Climate Information System (CCIS) and to upload on India WRIS web portal.

Coastal Climate Information System (CCIS) provides modelled projected scenarios related to storm surge, waves, sea level rise, and precipitation, air, temperature, humidity and wind speed for the coast of India. The interactive maps facilitate the visualization of oceanographic and meteorological data for different scenarios – present, medium and extreme climate change and for various probability of occurrence – 10, 50 and 100 years. The CCIS provides first-hand information on the coastal vulnerability to climate change which will be useful for identification of location for investment and a feasibility study of a coastal development project. The CCIS data is generated through modelling exercises by the national knowledge institutions: Storm Surge by Indian Institute of Technology, Delhi; Meteorological data by Indian Institute of Technology, Bombay using the CORDEX data of Indian Institute of Tropical Meteorology, Pune; Wave projections by National Institute of Oceanography, Goa; Sea level projections by CLIM Systems, New Zealand. The data is being generated as part of the GEF-ADB sponsored “Climate-Resilient Coastal Protection and Management Project” and implemented by the Department of Water Resources, Ganga Rejuvenation and River Management through ANZDEC, New Zealand.

The project consultant Team has uploaded all the oceanographic and meteorological data for the entire coast of India on India WRIS web portal under Coastal Climate Tab. The data is categorized in layers viz. Storm surge, Storm surge with Tide, Significant Wave Height and Sea Level Rise for each coastal site. The report on Climate Projection by IITB, Sea level trends and Wave report by NIO Goa, SLR Projections by CLIM

systems, Storm surge Projections by IITD are also available on India WRIS portal under Coastal Climate Tab.

14.6 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, 2020 (2017-2020). 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. IT department in Central Water Commission i.e. S M Dte. Has been equipped with domain as well as technological experience to deal with any upcoming challenges involving own officers and outsourced officials to cater 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 2019-20 were as under:

1. Creation and Maintenance of IT Infrastructure:

- a) Procurement of 219 nos of Desktop Computer at CWC (HQ)
- b) Procurement of 12 nos of B&W Multi-functional printer
- c) Procurement of 4 nos of Color Multi-functional printer

- d) Procurement of 2 nos of Desktop Computer for senior officers at the level of Joint Secretary equivalent and above at their residence
- e) Creation / renovation of 315 networking nodes at West Block premises of CWC (HQ).
- f) Deployment of network firewall to protect the IT infrastructure at server end against unknown network traffic intrusion
- g) Procurement of IT Items through GeM / from Local Market / open tender
- h) Management of Local Data Center at S M Dte CWC in New Delhi for hosting of customized and ready to use software for respective stakeholders

2. Design and Development of Website / Web portals / Dashboard:

- a) Development of 33 nos microsite at Chief Engineer Office level along with CMS facility & updated content
- b) Bilingual content generation of CWC main website (<http://cwc.gov.in> for English & <http://cwc.gov.in/hi> for Hindi)
- c) Development and hosting of Flood Forecasting Dashboard at CWC website in coordination with NIC (http://cwc.gov.in/ffm_dashboard_v2)
- d) Development and hosting of Reservoir Monitoring System Dashboard at CWC website in coordination with NIC (http://cwc.gov.in/wm_dashboard)
- e) Development of E-flow Monitoring Portal in coordination with UGBO, CWC
- f) Cyber security audit of newly developed web portals as GIGW guidelines

3. Implementation of e-Governance Activities:

- a) All round efforts have been made by Software Management Directorate to keep all the e-Governance portals up, active and operational so that most of the works by CWC officers could be completed while working from home in smooth manner Implementation of eOffice Software in CWC Regional Offices
- b) Implementation of SPARROW for CWES Group A Officers during reporting year 2017-18 and onward
- c) Implementation of SPARROW for Group B and Group C Officers of CWC during reporting year 2018-19 and onward
- d) Implementation CPP Portal for performing online tendering activities in Central Water Commission including all regional offices. Total 45 division offices have been mapped at CPP Portal of CWC for inviting e-tender including World Bank tenders.
- e) Build IT knowledge-base in CWC through training in the field of IT and its applications in engineering areas

4. Physical and Financial Progress during FY 2019-20:

Budgetary Sub-Head	RE 2019-20	Actual Expenditure for the month of March, 2020	Cumulative Exp during FY	% of exp up to the month against BE	Remarks (₹ in Lakhs)
Major Head -2701: Major and Medium Irrigation 80.800.11- Development of Water Resources Information System					
11.00.13 -OE	40.11	0.23	37.56	93.64 %	Purchase of IT consumables.
11.00.27 - MW	161.95	43.87	160.67	99.21 %	Maintenance of IT equipments etc.
11.00.28 Professional Services	05.00	0.00	6.24	124.8 %	Hiring of Manpower Resources for Implementation of e-Governance activities
Major Head -4701: Capital Outlay on Medium Irrigation 80.800.06- Development of Water Resources Information System					
06.00.52- Machinery & Equipment	181.46	3.60	138.95	76.57 %	Procurement of Computer and Printer could not be completed on GeM due to unavoidable reasons
Total	388.52	47.70	340.42	87.62 %	



Glacial lakes in Himalayas

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, 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 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 imparts training on almost all facets of water resources development and management covering the areas of planning, design, evaluation, construction, operation and monitoring of water resources projects and also the application of high-end technology in water sector. Initially, it was set up to provide training to primarily in-service engineers and water professionals of various Central and State agencies. However, subsequently, the programs at NWA were opened to all stakeholders of water sector including those from NGOs, Media, Private Sector Organizations, Academic Institutions, PSUs, Individuals and Foreign Nationals also.

NWA has always striven to cater to every aspect of training in Water Resources Development and Management including upcoming and advanced areas. In the recent past many new areas have been added to the NWA's portfolio like e-SWIS; e-Water; preparation of PMP Atlas; Monitoring of Irrigation Projects using Bhuvan Software; Modernization and Capacity Enhancement of Hydropower Projects 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.

NWA conducts long term as well as short-term training courses on regular basis and also holds national level seminars and workshops on the emerging technical areas in the field of water resources development and management. In addition, the academy is one of the nodal agencies for conducting training programmes under World Bank aided Hydrology Project. Induction / Orientation training to Assistant Directors recruited through UPSC (CWES-Gr A) and for newly promoted Asstt. Directors, Junior Engineers (JEs) of CWC are also conducted by National Water Academy at Pune.

15.3 Progress of Training Activities

Since its inception in the year 1988, NWA has conducted a total of 673 training programs up to March 2020 and trained a total of 17013 officers. During the year 2019-20, 29 training programs were conducted at National Water Academy, CWC, Pune. 797 officers have been trained in these programs with 2188.80 man-weeks of training.

The important activities / new sectors of training at NWA during the year 2019 -20 are as under:

- I. International Distance Learning Program in Hydrometry (17/06/2019 to 02/08/2019).
- II. Training Program for Scientific Assistant (Hydromet) during 27th May 2019 to 7th June 2019.
- III. Implementation of e-Procurement Platform in CWC during 05-06 August 2019.
- IV. Geo-membrane Sealing System for Dams during 28-29 August 2019.
- V. Young Water Professional Workshop under National Hydrology Project, on 5th November 2019.
- VI. Training cum Workshop on Transparency Audit Software developed by CIC on 14th February 2020.
- VII. Mandatory Cadre Training Program Level 1 during 17-21 Feb. 2020.
- VIII. Training Program on Water Information Management System (WIMS) during 25-27 Feb. 2020.
- IX. River Basin Planning and Management Cycle Module 2 in collaboration with NMCG and GIZ-SGR during 25-27 Feb. 2020.

X. MCTP Level 2 for STS (Deputy Directors) one week at NWA during 02-06 March 2020 and 3 weeks outside NWA during 09-20 March 2020.

The list of training courses, workshops and seminars organized / conducted/ coordinated by Training Unit of CWC and by NWA during 2019-20 are given at Annexure - 15.1 and Annexure 15.2 respectively.

15.4 Other Important Activities / Achievement of NWA

A. New Areas of Training

1. Induction Training Programs for Junior Engineers of Brahmaputra Board and Farakka Barrage were conducted.
2. Young Water Professional Workshop under National Hydrology Project was conducted.

B) Linkages

1. Study tour was conducted for Nigerian delegation for World Bank funded "Transforming Irrigation Management in Nigeria" project under Federal Ministry of Water Resources (Nigeria) on 2nd December 2019.
2. Delegates of World Meteorological Organization (WMO) visited NWA on 11th Feb. 2020. The delegates were apprised of the training activities and also infrastructure Development.

C) Faculty Development

- I. Shri Sidhartha Mitra, Director, NWA participated in the Capacity Building Program on "Applied Hydrology Project" organized by Kerala Water Resources Authority in association with RTI International under National Hydrology Project at Kerala during 25th April to 9th May 2019.

D) Mass Awareness Activities.

1. 5th International Yoga Day was celebrated at NWA, Pune on 21st June 2019 in which officers and staff of National Water Academy, Pune as well as Upper Krishna Division, CWC, Pune participated.
2. "Swachhata Hi Seva Abhiyan" was conducted by NWA during the period 19th September to 2nd October 2019 during which cleaning activities and also rally spreading the cleanliness message were organized.

E) Visit of Foreign Delegates –

Delegates of World Meteorological Organization (WMO) visited NWA on 11th Feb. 2020. Core faculty of NWA participated in the meeting organized during the visit. The delegates were apprised of the training activities and also infrastructure development.

F) Distance Learning Program

1. Seven Weeks duration International Distance Learning Program in Hydrology: Basic Hydrological Sciences in association with WMO was conducted during the period 17th June 2019 to 2nd August 2019. 56 officers (30 Indian and 26 International participants from other Asian Countries) underwent this DL program.



Hon'ble Minister, Ministry of Jal Shakti addressing the participants during inaugural function of 31st Induction Training Program at NWA.



Celebration of International Yoga Day on 21st June 2019.



Rallies for mass awareness







Middle Godavari Sub Division (MGSD) under Upper Godavari Division (UGD) of KGBO was inaugurated at Warangal on 01.05.19 by SE, Godavari Circle, KGBO, CWC, Hyderabad and SE, I&CAD Dept., Govt. of Telangana





Orientation Training Program for Newly Promoted Assistant Directors-II/Sub Divisional Engineers of CWC (Batch-II) being held from 22.4.19 to 3.5.19 at NWA Pune



School students participated in different competitions on World Water Day 2019 celebration at CWC, Coimbatore offices

CHAPTER-XVI

VIGILANCE

16.1 Disciplinary Cases

The vigilance/ disciplinary cases and complaints received against officers and staff of CWC were given proper and prompt attention. During the year 2019-20, 5 new complaints/ cases were taken up for investigation.

16.2 Observation of Vigilance Awareness Week

Vigilance Awareness Week was observed in CWC (Headquarters) along with all its field offices from 28th October to 02nd November, 2019 with the theme 'Integrity-a way of life'. During the Vigilance Awareness Week, a conference was organized in the CWC's Auditorium, Library Building, R. K. Puram, New Delhi on 30.10.2019. This conference was inaugurated by Shri U. P. Singh, Secretary, Department of Water Resources, RD&GR, Ministry of Jal Shakti and lectures were delivered on vigilance awareness by Shri Ravinder Kumar, Retired Director, Ministry of Water Resources, RD&GR, Shri Arun Gaur, Retired Joint Secretary, Union Public Service Commission and Shri Surinder Garg, Director (Vigilance), Department of Water Resources, RD & GR, Ministry of Jal Shakti.

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	Research Advisory Committee (RAC) of National Council for Cement and Building Materials.	Member (D&R)	Member
32	National Committee on Dam Safety(NCDS)	Chairman, CWC Member(D&R)	Chairman Vice Chairman
33	National Committee on Seismic Design Parameters of River Valley Projects (NCSDP)	Member (D&R)	Chairman
34	National Level Steering Committee (NLSC) for Dam Rehabilitation and Improvement Project (DRIP)	Member (D&R)	Member
35	Technical Committee (TC) for Dam Rehabilitation and Improvement Project (DRIP)	Member(D&R)	Chairman
36	Cauvery Technical Committee	Chairman, CWC	Chairman
37	Betwa River Board	Chairman, CWC	Member
38	Executive Committee of Betwa River Board	Chairman, CWC	Chairman
39	Bansagar Control Board	Chairman, CWC	Member
40	Executive Committee of Bansagar Control Board	Chairman, CWC	Chairman

Sl. No.	Name of Committees/Boards/Panel of Experts/Technical Groups etc.	Representation of CWC	
		Officer	Position in Committee
41	Governing Body of NERIWALM	Chairman, CWC	Member
42	Sahibi Standing Committee	Member(RM)	Chairman
43	Ghaggar Standing Committee	Member(RM)	Chairman
44	Yamuna Standing Committee	Member(RM)	Chairman
45	Upper Yamuna River Board	Member(WP&P)	Chairman
46	Upper Yamuna Review Committee	Member(WP&P)	Member Secretary
47	World Meteorological Organization	Member (D&R)	Principal Representative
48	Sardar Sarovar Construction Advisory Committee	Chairman, CWC	Member
49	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
50	Board of Directors of Tehri Hydro Development Corporation	Member (D&R)	Part Time Director
51	Board meeting of Punatsangchhu-I H.E. Project Authority (PHPA)	Member (D&R)	Permanent Invitee
52	Technical Coordination Committee (TCC) for Punatsangchhu - I H.E Project, Bhutan	Member (D&R)	Co-Chairman
53	Programme Advisory Committee (PAC) for Fly Ash Unit constituted by Department of Science and Technology	Member (D&R)	Member
54	Technical Advisory Committee of the Farakka Barrage Project.	Member (D&R)	Chairman
55	Farakka Barrage Project Advisory Committee (FBP-AC).	Member (D&R)	Chairman
56	Tender Committee of Farakka Barrage Project	Member (D&R)	Chairman
57	Punatsangchhu-II Hydro Electric Project Authority Meetings.	Member (D&R)	Permanent Invitee
58	Technical Co-ordination Committee (TCC) of Punatsangchhu-II Hydro Electric Project	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	Mangdechhu HE Project Authority Meetings.	Member (D&R)	Permanent Invitee
60	Technical Co-ordination Committee (TCC) Mangdechhu HE Project	Member (D&R)	Co-Chairman
61	Empowered Joint Group meetings (EJG) (for monitoring of implementation of Hydro-power projects in Bhutan).	Member (D&R)	Permanent Invitee
62	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
63	Committee of International Commission on large dams, India (INCOLD)	Member (D&R)	Member
64	National Environmental Monitoring Committee for River Valley Projects (NEMCRVP)	Member (WP&P)	Chairman
65	Programme Advisory Committee, NWA	Chairman, CWC	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, CWC as Member Secretary. There are 12 members representing MoWR/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 2019-20 following activities were undertaken:

i. Coordination of Research Schemes related to Surface Water:

- a. At present 91 research schemes are being managed by INCSW, out of which 2 Invited R&D Schemes were taken up during 2017-2020. A total amount of Rs. 2,49,19,613/- was released to these schemes during year 2019-20. 7 R&D Schemes were recommended for premature closure to R&D Division, DoWR, RD & GR during the year 2019-20.
- b. 5th & 6th Meeting of INCSW were held on 16.04.2019 and 26.06.2019 respectively under the Chairmanship of Chairman INCSW/CWC mainly to review the progress of R&D Schemes and Modification of existing R&D Guidelines.

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. Karmenu 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 IWEP 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. Chief Engineer (EMO), CWC is the Team Leader of Joint Working Group from Indian side. Initially Director (WS&RS), CWC & Member-Secretary INCSW was working as Convenor of IEWP which was later on changed to Director (RS), CWC.

IEWP is working on following 9 priority areas for which individual Nodal Officers from CWC, CGWB, NMCG etc. have been attached.

Priority Area 1: Sustainable Development of River Basins, Water Governance

Priority Area 2: Environmental Flows

Priority Area 3: Ganga Rejuvenation including Ganga Cooperation

Priority Area 4: Groundwater Use

Priority Area 5: Water Use in Irrigation

Priority Area 6: Solar pumping for Irrigation in River Basin Management Plans

Priority Area 7: Capacity building-knowledge dissemination

Priority Area 8: Treated Wastewater Re-use

Priority Area 9: Research, Innovation, Technology

During 2019-20 IEWP continued to work on all the above priorities.

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. 71 meetings of TAC of NIH have been held so far. The last meeting was held on 23.4.2018 at New Delhi.

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. 46 meeting of Working Group of NIH has been held so far. The last meeting was held during 23rd -24th October, 2018 at NIH Roorkee.

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 Chaired the Technical Advisory Committee meeting of Farakka Barrage Project. 114th meeting of TAC of FBP was held during 3rd-4th December 2017 at Farakka, West Bengal.

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. 33 meetings of STAC has been held so far. The last meeting of STAC was held on 17.8.2018 at New Delhi.

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 16 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, 6 draft standards/amendments to BIS codes have been approved by the 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 non-governmental organization with representation from more than 80 countries. India is one of the founding Members of the ICID. 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 again constituted 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:

- a. CE, IMO, CWC was nominated as Indian representative of ICID to finalise Task on Transboundary Water Management and Effect on Agriculture Water Management.
- b. Nominations for WatSave Awards of ICID and participation of Young Professionals in WIF 3.
- c. 70th Foundation Day celebration of ICID was organised jointly by ICID and INCSW on 24 June 2019.

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 6 publications (except a new initiative i.e seventh publication titled “Abstract on Water Sector”) have been constituted with the approval of Chairman, CWC. The details of publications are indicated 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-weekly
- Details of Hydrological Observations Sites, Snow Gauge and Meteorological Sites under CWC
- State/Basin-wise Details of 720 Proposed Hydrological Observations Sites as per XII Five Year Plan and subsequent years
- State-wise Ground Water Resources and Categorization of Blocks/Mandals/Talukas in India
- Abstract of Large Dams (State-wise & Decade-wise)
- State-wise Ultimate Irrigation Potential and 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
- Status of Coverage of Rural Habitations under Rural Water Supply
- Status of Hydro Electric Potential Development - Basin-wise and State-wise
- Hydro Electric Power Installed Capacity and Generation - All India (Utilities)
- Year-wise Central Assistance Released to States for Major, Medium, ERM Projects and status of 99 Priority Projects under PMKSY-AIBP
- CAD&WM Inclusion Status and State-wise Status 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 and Lift Irrigation
- Yearly and State-wise Damage due to Flood
- Flood Forecasting Information in India during Flood Season and Comparative Flood Forecasting Performance
- Extreme Flood Events in India under CWC FF & W Network during Flood Season
- Above Normal and Severe Flood Events on Various River Systems during Flood Season

The latest available edition of this publication is of October, 2019 which is available in 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 aided by World Bank
- Projects Aided by Japan International Co-operation Agency
- Projects Aided by Asian Development Bank
- Projects included under the scheme RRR of Water Bodies
- Status of Water Bodies & Funds released under the scheme RRR of Water Bodies
- Central Assistance Released under CAD&WM Programme
- Water User Associations formed and Area covered

The latest available edition of this publication is of June, 2019 which is available in the website of CWC.

iii. Hydrological Data (Unclassified) Book (Periodicity: Annual)

This annual publication provides information of Hydrological Data for non-classified basins collected from the observation sites of CWC. 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 April, 2020 which is available in 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, 2015 which is available in the website of CWC.

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 in the website of CWC.

vi. Pricing of Water in Public System in India (Periodicity 5 years):

This publication is brought out at quinquennial basis (once in 5 years) and contains information on water rates for Lift and Flow Irrigation 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
- Financial Performance of Irrigation Projects in India
- 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 in the website of CWC.

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 the said publication is under process. This publication provides a gist on the following 7 Sections:

- National Water Policy, 2012
- Water Resources at a Glance
- Land-Use Statistics
- Hydro-Electric
- Flood Management
- Financial Aspects
- International Aspects

18.2 Publication of Journals / bulletins

18.2.1 Bhagirath

Since 1954, CWC has been publishing Bhagirath (English) which one of unique publications related to Water Sector. In addition to above, Bhagirath (Hindi) is also being published since 1974. During 2019-20- following Volumes were published:

1. Bhagirath (English) Journal 1 Issue (April-September 2018)
2. Bhagirath (Hindi) Journal 1 Issue (July-September 2018)

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 Administrative News Bulletin

CWC is publishing Administrative News Bulletin on monthly basis to highlight the activities of CWC. 12 issues of CWC Administrative News Bulletin were brought out during the period of April, 2019 to March, 2020.

18.2.3 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 apprise 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 2019-20, total of twelve monthly newsletters (from April-19 to March-2020) were published. These can be accessed from URL:

<http://cwc.gov.in/Jalansh>

Hindi is the most commonly spoken language in India, so Hindi of Jalansh was also required so that more people could understand and know about the functions and work of CWC. The Hindi translation of Jalansh is also published along with its English version. During 2019-20, total 8 Hindi Jalansh were published. 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 post the same on CWC website for wider dissemination. Such compilation can be used by officers of Central and State organisations as well as general public for keeping them updated on latest happenings in the sector.

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. During the year 2019-20, CWC organized 4 numbers of School Visit for creating awareness amongst school children on water resources management and conservation of resources. Also, CWC participated in 9 events/exhibitions organised in different part of India to create awareness in general people, media, villagers & formers and other stake holders associated with water sector in the country.

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 has opened 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>

18.6 Mass Awareness Activities:

The CWC participated in following events during the period from 1st April, 2019 to 31st March, 2020:

- 5th Smart Cities India 2019 Expo" at Pragati Maidan, New Delhi during 22 to 24 May, 2019.'
- "Innovative Water Solutions " at Le-Meridien, New Delhi on 28 June 2019
- 23rd National Exhibition at Amarabati Maidan, Sodepur, Kolkata during 28 to 31 August 2019.

- “Vision Rajasthan 2019” at Udaipur, Rajasthan, during 17-19 September 2019
- “India Water Week” at New Delhi during 24-28th September 2019
- “20th GeoSmart India” at HICC Hyderabad during 03 to 05 December 2019.
- 24th Sundarban Kristi Mela-o-LokoSansriti Utsab” at South 24 Parganas, West Bengal during 20 to 29 December 2019.



CWC on behalf of Dept. of Water Resources, River Development and Ganga Rejuvenation, Ministry of Jal Shakti participating in 23rd National ExhibitionKolkata during 28th-31st August, 2019



Hon'ble Ministers at CWC stall during 6th India Water Week held during Sep, 2019

18.7 Publication of Water Resources at a Glance - 2020:

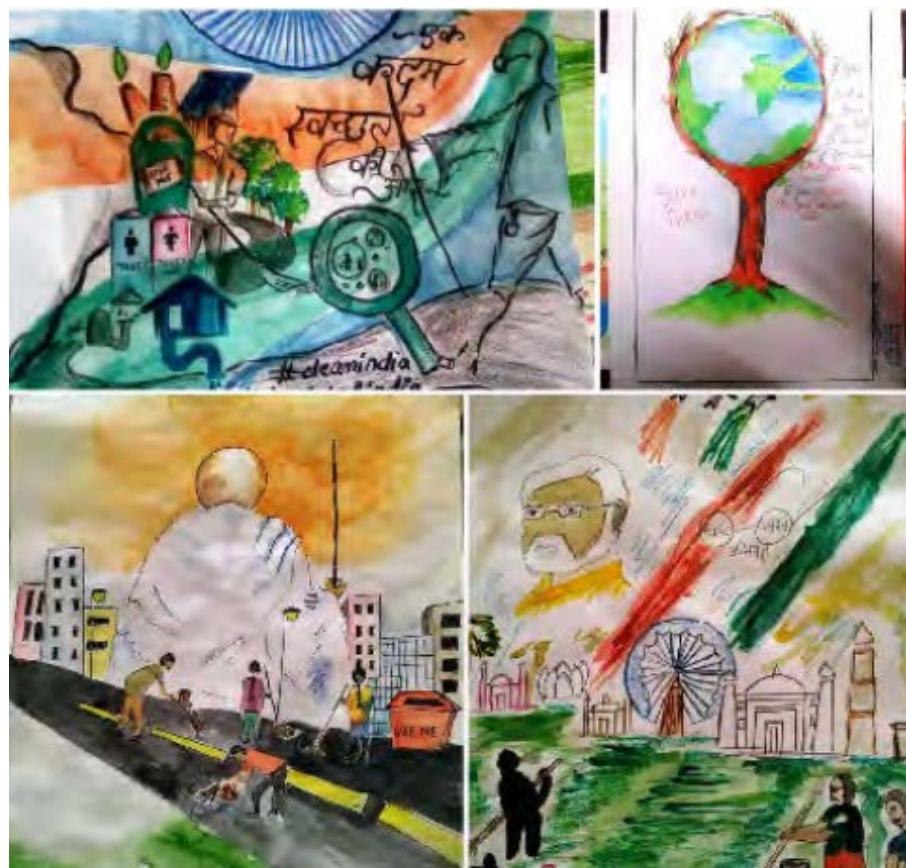
CWC is bringing this annual compilation to cover the details of various information like Land and Water Resources of India, Water Resource Potential of River basins in India, Storage capacities of reservoirs across India, information about large dams, status of irrigation potential created and utilized, 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.

18.8 Civil List of Central Water Engineering Service Group A officers-2020:

Central Water Commission, through this annual publication covers the details of all CWES Group-A officers posted at various levels in different organizations under DoWR, RD & GR and other Ministries of Government of India.

18.9 Publication Registration System:

A Publication Registration System is evolved in CWC for various publications of CWC for their tracking, retention and version control. It is implemented from year 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 8 Publications were registered during Jan to March 2020.



Colours Portraying "Clean India" by School Children



Hon'ble Minister at Ujh Project Site











Annexure - 5.1**List of Consultancy Projects in D&R Wing during the Year 2019-20**

Sl. No.	Name of Project
Construction Stage Projects	
Andhra Pradesh	
1	Polavaram Irrigation Project
Chhattisgarh	
2	Sikasar Project
3	ArpaBhaisajhar Barrage Project (Arpa river)
Gujarat	
4	Garudeshwar Weir Project
Himachal Pradesh	
5	Phina Sigh Medium Irrigation Project
Jharkhand	
6	Kharkai Barrage under Subarnarekha M.P. Project
7	North Koel Reservoir Project (Mandal Dam)
8.	Ichha Dam Under Subarnarekha M.P. Project
Karnataka	
9	Krishna Raja Sagar
Madhya Pradesh	
10	Pench Diversion Project
11	Halon Irrigation Project
Manipur	
12	Dholaithabi barrage Project
Meghalaya	
13	Ganol H.E. Project
Odisha	
14	Anandpur Barrage Project
15	Chheligada Irrigation Project
16	Hirakund H.E Project Additional Spillway
Rajasthan	

Sl. No.	Name of Project
17	Parwan Project
18	Isarda Major Dam Project in Tonk District
19	Rehabilitation of Garada Earth dam
20	Khetri Tailings Dam
Uttar Pradesh	
21	Arjun Sahayak Pariyojna
22	Kanhar Irrigation Project
Uttarakhand	
23	Tehri Pump Storage Project
24	Lakhwar Multi-Purpose Project
25	Vishnu gad Pipalkoti HEP
26	Dhukwan SHP
Bhutan	
27	Punatsangchu Stage-I H.E. Project
28	Punatsangchu Stage-II H.E. Project
Nepal	
29	Arun-3 HEP
DPR Stage Projects	
Gujarat	
1	Bhadbhut Barrage Project Phase-1
Himachal Pradesh	
2	Satyar Khad Project
Jammu & Kashmir	
3	Barinium Hydroelectric Project
Jharkhand	
4	Bhuswa Reservoir Scheme
5	Barkattha Reservoir Scheme
6	Dulki Reservoir Scheme
7	Phulwariya Reservoir Scheme
8	Chaura Reservoir Scheme

Sl. No.	Name of Project
9	Bhelwa Reservoir Scheme
10	Khuntishot Reservoir Scheme
11	Bhur Reservoir Scheme
12	Dhanraj Reservoir Scheme
13	Sonadubi Reservoir Scheme
14	Jamunia Reservoir Scheme -I
15	Jamunia Reservoir Scheme-II
16	Khudia Reservoir Scheme
17	Kalipur Reservoir Scheme
18	Bishunpur Reservoir Scheme
19	Bhurbhuri Reservoir Scheme
20	Birmati Reservoir Scheme
21	Breto Reservoir Scheme
22	Middle Usri Reservoir Scheme
23	Bansloj Reservoir Scheme
24	Pahantoli Reservoir across West Deo Nala
25	Palemura Reservoir across Dongajhor Nala
26	Kharsoti Dam site across Kharsoti Nala
27	Jagannathpur Reservoir across Deo nala
Maharashtra	
28	Intra State Link Projects. Daman Ganga (Val/Vagh)-Vaitarna -Godavari link. Nilamati Dam
29	Intra State Link Projects. Daman Ganga (Val/Vagh)-Vaitarna - Godavari link. Ghatakarpada Dam
30	Intra State Link Projects. Daman Ganga (Val/Vagh)-Vaitarna - Godavari link. Pulachiwadi Dam
31	Intra State Link Projects. Daman Ganga (Val/Vagh)-Vaitarna - Godavari link. Budukpuda Dam
32	Intra State Link Projects. Daman Ganga (Val/Vagh)-Vaitarna - Godavari link. Udhale Dam
33	Intra State Link Projects. Daman Ganga, Ekdare-Godavari link
Orissa	
34	Vetting of Designs & Drawings of proposed Weirs/Barrages on National Waterways-5.
Sikkim	

Sl. No.	Name of Project
35	Kalezhkola H.E. Project
West Bengal	
36	Design of pass/fish ladder in proposed navigation lock at Farakka
Indo- Nepal	
37	Sapta KosiMulti-Purpose Project
38	Sun Kosi Multi-Purpose Project
39	Pancheshwar Multipurpose Project
Sp. Problem Projects	
Arunachal Pradesh	
1	Ranganadi H.E.Project (405 MW)
Gujarat	
2	Sardar Sarovar Dam
3	Rann Sarovar – Development of Little Rann of Kutch (PMO Reference)
Haryana	
4	Hansi Bhutana link channel
5	Hathnikund Barrage Project
Himachal Pradesh	
6	Shongtong Karcham H.E.Project(450 MW) H.P
7	Karcham Wangtoo HEP(1000 MW)
Jammu & Kashmir	
8	Lower Kalnai H.E.Project
Madhya Pradesh	
9	Sleemnabad Tunnel of Bargi, Madhya Pradesh.
10	Bargi Diversion Project
Rajasthan	
11	Rana Pratap Sagar Dam
12	Jawahar Sagar Dam
13	Kota Barrage
Sikkim	
14	Teesta (Stage-IV) H.E.Project
Telengana	

Sl. No.	Name of Project
15	Srisailam left bank Hydro Electric Scheme
16	Nagarjuna Sagar Project left main canal
Tripura	
17	NoaCherra Barrage
Uttarakhand	
18	Devsari H.E.Project (252 MW)
Uttar Pradesh	
19	Saryu Nahar Pariyojana
West Bengal	
20	Dauk Barrage Project
21	Mahananda Barrage Project
22	Farakka Barrage Project
23	National Waterways-1, Bank Protection works in Farakka Feeder Canal
Bhutan	
24	Tala H.E.Project
25	Chukha H.E.Project
Afghanistan	
26	Salma Dam Project

Annexure-7.1**List of the Irrigation / Multipurpose Projects Accepted by the Advisory Committee of DoWR, RD&GR during 2019-20**

Sl. No.	Project Name	State	Major/ Medium	Est. Cost (Rs. in Crore)	Irrigation Benefits (in Ha)
1	7th Revised Cost Estimate of North Koel Reservoir Project	Jharkhand & Bihar	Major Irrigation	Rs. 3042.16 crore (PL-2019)	CCA- RMC-123000, LMC-2500 AI-RMC-111521, LMC-2500
2	2nd RCE of Poorna Barrage-2 (Ner Dhamana) Medium Irrigation Project	Maharastra	Medium Irrigation	Rs. 888.43 crore (PL-2016-17)	CCA- 6954 AI-7024
3	Renukaji Dam Project	Himachal Pradesh	Multipurpose (National Project)	6946.99 Cr(PL-October, 2018)	Drinking water project
4	Seven Pneumatically Operated Gated Weirs in Series on Girna River	Maharashtra	Medium Irrigation	781.32 Cr (PL-2017-18)	5540 ha
5	Shelgaon Barrage Medium Irrigation Project, Revised Cost Estimate (RCE)	Maharashtra	Medium Irrigation(REC)	961.11 Cr (PL-2017-18)	9589 ha
6	Revised Cost Estimate of Bodwad Parisar Sinchan Yojana	Maharashtra	Major Irrigation	Rs. 3763.60 Crores (PL-2017-18)	CCA - 53025 ha
Coastal Protection works					
1*	Implementation of coastal protection measures at Someswara, Mangalore taluk, Dakshina Kannada Distt, Karnataka.	Karnataka	84.87 Cr (PL-2016-17)	Length of protection- 3 km	-

*coastal Protection Measures

Annexure - 7.2

**List of the Flood Control Schemes Accepted by the Advisory Committee of
DoWR, RD&GR during 2019-20**

Sl. No.	Project Name	State	Est. Cost (Rs. in Crore)	Flood Protection
1	Anti Erosion works on Left bank of river Ghaghara from confluence of river Rapti and Ghaghara up to village Kurah Parasia in District Deoria.	Uttar Pradesh	RS. 58.83 crore(PL-2018)	Benefitted area-960 ha Benefitted population-26415
2	Providing flood protection/stabilization work to Naker Khad and its tributaries from Rainta (RD 0) to Sour Kalan Bridge (RD 30000) .	Himachal Pradesh	231.02 Cr (PL-Dec. 2018)	Benefitted area-274 ha Benefitted population-3678
3	"Providing Flood Protection Works/Anti erosion measures for Sakrain, Malthod, Thothu, Dol and Samour Khad in Dharampur Constituency, Distt Mandi (HP)	Himachal Pradesh	145.73 Cr (PL-June, 2019)	Benefitted area-300 ha Benefitted population-3289
4	Revised DPR for protection work of left edge of River Ganga from Kewala village to Baghmara village in the length of 5200m.	Bihar	105.60 Cr (PL-2017)	Benefitted area-55000 ha Benefitted population-60000
5	Anti Erosion works before flood 2019 in between 0.00 km to 35.00 km of PP Embankment and at GH embankment	Bihar	44.53 Cr (PL-2017)	Benefitted area-4,20,000 ha Benefitted population-2,20,000
6	Comprehensive Plan for Flood Management works on River Jhelum and its tributaries short term measures phase-II, part-A	J&K	1623.43 Cr. (PL- Sep-2019)	Benefitted area-280000 ha Benefitted population-906091

Annexure - 7.3**The list of H.E Project accepted by TEC during 2019-20**

Sl No.	Project Name	State	Capacity (MW)
1.	Kirthai-II	Jammu & Kashmir	930
Total			930

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) 3 MW 3) 0.93 MAF	2008-09= 450.00 2009-10= 720.00 2010-11= 1412.94 2012-13= 405.00 2017-18= 166.59 2018-19= 195.81 <u>2019-20=50.34</u> Total= 3400.69	Project is under execution.
2.	Shahpurkandi, Punjab	1) 0.37 lakh 2) 168 MW 3) 0.012 MAF	2009-10= 10.80 2010-11= 15.236 <u>2019-20=60.000</u> Total= 86.036	Project is under execution..
3.	Teesta Barrage, West Bengal	1) 9.23 lakh 2) 1000 MW 3) Barrage	2010-11= 81.00 <u>2011-12= 97.20</u> Total= 178.20	Project is at standstill since 2014-15 due to land acquisition issues.
4.	Renukaji, HP	1) Drinking water 2) 40 MW 3) 0.404 MAF	-	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.
5.	Lakhwar Vyasi, Uttarakhand	1) 0.34 lakh 2) 420 MW 3) 0.325 MAF	-	RCE of the project amounting to Rs. 5747.17 at PL 07/2018 was accepted during 141 st Advisory Committee meeting held on 11.02.2019. National Green Tribunal on 10.01.2019 directed Expert Appraisal Committee (EAC) of MoEF& CC to appraise the project afresh in terms of EIA notification 2006.

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
6.	Kishau, HP/ Uttarakhand	1) 0.97 Lakh 2) 600 MW 3) 1.04 MAF	-	Revised DPR under preparation by Project Authority.
7.	Ken Betwa, Madhya Pradesh	1) 6.35 lakh 2) 78 MW 3) 2.18 MAF	-	DPR of Ph-II is under appraisal in CWC. As per the decision taken in the review meeting convened by Hon'ble Union Minister (WR, RD & GR) on 25th September, 2017 a draft comprehensive report on Ken Betwa Link Project prepared by NWDA was forwarded to State Govt. of MP / UP and CWC. Final report is yet to be received.
8.	Bursar, J&K	1) 1.74 lakh (indirect) 2) 800 MW 3) 0.5 MAF	-	Under appraisal in CWC/CEA.
9.	Gyspa Project, HP	1) 0.50 lakh ha 2) 300 MW 3) 0.74 MAF	-	The work of DPR under preparation is held up due to agitation by local people.
10.	2nd Ravi Vyas Link, Punjab	Harness water flowing across border of about .58 MAF in non-monsoon period	-	Under PFR stage
11.	Ujh Multipurpose Project, J&K	1) 0.76 lakh 2) 196 MW 3) 0.82 MAF	-	Estimated cost of Rs. 9167cr. (at December, 2019-PL) was accepted by Advisory Committee of DoWR, RD & GR in its 144th Meeting held on 08.05.2020

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 CroresRs.)	Status
12.	Kulsi Dam Project, Assam	1) 22,000 ha. 2) 55 MW 3) 0.28 MAF	-	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) 3605 ha. 2) 71 MW 3) 0.26 MAF	-	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.	SaryuNaharPari yojana, 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 2017-18=0.00 2018-19=305.00 <u>2019-20=358.20</u> Total = 1884.80	Project is under execution.
16.	IndirasagarPolavaram, 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= 2514.70 2017-18= 2000.00 2018-19=1400.00 <u>2019-20=1850.00</u> Total= 8614.16	Project is under execution. Central Assistance of Rs. 562.47Cr also provided under AIBP prior to declaration of National Project.

Annexure - 8.1

State-Wise and Project-Wise List of Projects under General Monitoring - Target & Achievements of Monitoring Visits during 2019-20

Sl. No	State/Project Name	Major/ Medium/ ERM	Date of Visit	Status of Report
ANDHRA PRADESH/ TELANGANA				
1	Peddagedda Reservoir Project- AP	Medium	--	--
2	Godavari Lift Irrigation Scheme-TS	Major	-	--
3	KLRS Pulichintala Project &Krishna Delta Modernization Scheme including Pulichintala Dam Project (New)-AP	Major	--	--
4	Pulivendula Branch Canal-AP	Major	--	--
5	Tungabhadra high level canal stage -II-AP	Major	--	--
	TOTAL- 05			
BIHAR				
6	North Koel Reservoir-IS	Major	-	-
7	Bateswar Asthan Ganga Pump Canal Phase-I -IS	Major	--	--
	TOTAL- 02			
GUJARAT				
8	Und-II	Medium	--	--
	Total-01			
HIMACHAL PRADESH				
9	Phina Singh Irrigation Project	Medium	05-06.04.2019	Submitted
			11.11.2019	Submitted
10	Nadaun Area Medium Irrigation Project	Medium	07-08.04.2019	Submitted
			12.11.2019	Submitted

Sl. No	State/Project Name	Major/ Medium/ ERM	Date of Visit	Status of Report
	TOTAL-02			
JHARKHAND				
11	Ajoy BarrageProject	Major	--	--
12	Dhansinghtoli Res. Project	Medium	--	--
13	Katri Res.Project	Medium	--	--
14	Nakti Res. Project	Medium	--	--
15	PunasiRes.Project	Medium	--	--
16	Kans Reservoir	Medium	--	--
	TOTAL-06			
KARANATAKA				
17	Hirehalla	Medium	--	--
18	Amarja	Medium	--	--
19	Bennathora	Major	--	--
20	Lower Mullamari	Medium	--	--
21	Sri Rameshwara Lift Irrigation	Major	--	--
	TOTAL-05			
KERALA				
22	Idamalayar Irri. Project	Major	-	-
	TOTAL-01			
MAHARASHTRA				
23	Wakod Irrigation Project	Medium	--	--
24	Kirmiri Darur Lift Irrigation Scheme	Medium	--	--
25	Sonapur Tomta Lift Irrigation Scheme	Medium	--	--
26	Chilhewadi Irrigation Project	Medium	--	--
27	Haranghat Lift Irrigation Scheme	Medium	--	--
28	Kamani Tanda Medium Irrigation Project	Medium	--	--

Sl. No	State/Project Name	Major/ Medium/ ERM	Date of Visit	Status of Report
29	Ghungshi Barrage Medium Irrigation Project	Medium	--	--
30	Shelgaon Barrage project	Medium	--	--
31	Urmodi Irrigation Project	Major	--	--
32	Tembhu Lift Irrigation Project	Major	--	--
33	Bodwad ParisarSinchanYojna	Major	26.07.2019	-
34	Maharashtra Water sector Improvement Project (MWSIP) (World Bank Aided)-ERM	Major	--	--
35	Purna Barrage (NerDhamana) Irrigation Project.	Medium	--	--
36	Upper Pravara	Major	--	-
	TOTAL-14			
MEGHALAYA				
37	Rongoi Valley	Medium	--	--
	Total-01			
NAGALAND				
38	D'zuza irrigation scheme	Medium	--	--
	TOTAL_01			
RAJASTHAN				
39	Takli Irrigation Cum Drinking Water Project	Medium	--	--
40	Gagrin Irrigation Project	Medium	--	--
41	Piplad Irrigation Project	Medium	--	--
42	Lhasi Irrigation Project	Medium	--	--
	TOTAL-04			
UTTAR PRADESH				
43	Bhupali Pump Canal	Major	--	--
44	Kanhar Irrigation Project	Major	--	--
45	Restoring capacity of Western Gandak Canal system - ERM	Major	--	--

Sl. No	State/Project Name	Major/ Medium/ ERM	Date of Visit	Status of Report
	TOTAL-03			
WEST BENGAL				
46	Beko Irrigation scheme	Major	--	--
47	Khairabera Irrigation Scheme	Major	--	--
	Total-02			
	Monitoring Target	47	5	

Annexure - 8.2**State-Wise and Project-Wise List of Projects under AIBP - Target & Achievements of Monitoring Visits during 2019-20**

Sl. No	State/Project Name	Major/ Medium/ ERM	Date of Visit	Status of Report
	ANDHRA PRADESH			
1	Yerrakalva Res.	Med.	26.11.2019	(Interim 26/11/2019) 06/01/2020
2	Tadipudi LIS	Maj.	22.05.2019	(Interim 06/06/2019) 03/09/2019
3	Pushkara LIS	Maj.	21.11.2019	(Interim 17/12/2019) 17/01/2020
4	Gundlakamma	Maj.	06.09.2019	(Interim 18/09/2019) 22/10/2019
5	Thotapally Barrage	Maj.	20.05.2019	(Interim 06/06/2019) 03/09/2019
6	Tarakarama thirtha Sagaram	Med.	21.05.2019	(Interim 6/6/2019) 19/09/2019
7	Musurumilli	Med.	20.11.2019	(Interim 12/12/2019) 14/01/2020
8	Indira Sagar (Polavaram)	Maj.		
8A	Maddigedda Res. Project			
	TOTAL=08			
	ASSAM			
9	Dhansiri	Maj.	05.02.2020 01.04.2020	22.12.2019 03.02.2020
10	Champamati	Maj.	22.12.2019	03.02.2020
11	Borolia	Med.	18.07.2019 22.12.2019	19.07.2019 03.02.2020

Sl. No	State/Project Name	Major/ Medium/ ERM	Date of Visit	Status of Report
12	Burhi Dihing lift	Med.		
	TOTAL=04			
	BIHAR			
13	Western Kosi	Maj.		
14	Durgawati	Maj.	10-11.06.2019 5-6.12.2019	17.06.2019 30.12.2019
	Bansagar			
15	Batane	Med.		
16	Punpun	Maj.	12.06.2019	17.06.2019
	Eastern Kosi Canal System- ERM			
	TOTAL=04			
	CHHATISGARH			
17	Kelo Project	Maj.	03-04.06.2019	16.07.2019
18	Kharung	ERM	--	--
19	Sutiapat	Med.	--	--
20	Maniyari Tank (ERM)	Maj	16.09.2019	16.10.2019
	TOTAL=04			
	GOA			
21	Tillari	Maj.	04.06.2019	25.06.2019
	TOTAL=01			
	GUJARAT			
22	Sardar Sarovar	Maj.	4-6.09. 2019 7-10 .01. 2020	25.04.2020 To be issued
	TOTAL=01			
	HIMACHAL PRADESH			
23	Shahnehar Irr. Project	Maj.	--	--
24	Sidhata	Med.	--	--

Sl. No	State/Project Name	Major/ Medium/ ERM	Date of Visit	Status of Report
25	BalhVally (Left Bank)	Med.	--	--
	TOTAL=03			
	JAMMU & KASHMIR			
26	Mod. of Ranbir Canal*	ERM	--	--
27	Mod. of New Pratap Canal*	ERM	--	--
28	Rajpora Lift	Med.	--	--
29	Tral Lift	Med.	08.05.2019	23.05.2019
30	Mod. Of Dadi Canal	ERM	--	--
31	Mod. Kandi Canal	Med	--	--
32	PrakashikKhows Canal	Med.	14.10.2019	31.10.2019
33	Mod. Of Ahji Canal	ERM	--	--
34	Restoration & Mod. Of Main Ravi Canal	ERM	27.03.2019	(preliminary – 29.03.2019), Main – 27.06.2019
	TOTAL=09			
	JHARKHAND			
35	Gumani	Med.	--	--
36	Sonua	Med.	--	--
37	Surangi	Med.	--	--
38	Upper Sankh	Med.	--	--
39	Panchkhero	Med.	--	--
40	Subernarekha Multipurpose	Maj	21-23.08.2019 18-20.12.2019	04.09.2019 11.02.2020
	TOTAL=06			
	KARNATAKA			
41	Upper Krishna St.I	Maj.	18-20.11.2019	28.01.2020
42	Malaprabha	Maj.	--	--
43	Karanja	Maj.	22-23.05.2019	24.06.2020
44	Upper Krishna St.II	Maj.	--	--
45	Varahi	Maj.	--	--
46	Dudhganga	Maj.	--	--
47	Mod. Canal System of Bhadra Reservoir Canal System (ERM)	ERM	--	--
48	Hipparagi LIS	Maj.	--	--

S1. No	State/Project Name	Major/ Medium/ ERM	Date of Visit	Status of Report
49	Restoration Bhimasamundra Tank	ERM	--	--
50	Bhima LIS	Maj.	05.03.2020	24.04.2020
51	GuddadaMalapura Lift	Med	--	--
52	Upper Tunga Irrigation Project	Major		
53	Sri Rameswar Irrigation	Major	13-14.02.2020	11.03.2020
54	NLBC System Project(New ERM)	ERM	04-05.12.2019 29.02.2020	26.02.2020 24.04.2020
	TOTAL=14			
	KERALA			
55	Muvattupuzha	Maj.	07.06.2019	19.11.2019
56	Karapuzha	Med.	--	--
57	Kanhirapuzha	ERM	--	--
58	Chitturpuzha	ERM	--	--
	TOTAL=04			
	MADHYA PRADESH			
59	Indira Sagar Unit II (Ph I &II)	Maj.	11-14.12.2019	20.03.2020
	Indira Sagar Canal Ph. III	Maj.	11-14.12.2019	20.03.2020
	Indira Sagar Unit IV	Maj.	19.06.2019	14.08.2019
	Indira Sagar Unit V	Maj.	11-14.12.2019	20.03.2020
	Bansagar Unit-II	Maj.	--	--
60	Sindh Phase II	Maj.	--	--
61	Mahi	Maj.	22.07.2019	01.08.2019
62	Bariarpur LBC	Maj.	--	--
63	Bawanthadi	Maj.	--	--
64	Mahan	Maj.	03-07.09.2019	13.11.2019
65	OmkareshwarPh - I	Maj.	--	--
	Omkareshwar, Ph.-II	Maj.	20.06.2019	08.07.2019
	Omkareshwar, Ph.-III	Maj.	12.02.2020	02.03.2020
	Omkareshwar, Ph.-IV	Maj.	13.02.2020	02.03.2020
66	Bargi Diversion Ph - I	Maj.	--	--
	Bargi Diversion Ph -I I	Maj.	--	--
	Bargi Diversion Ph -I II	Maj.	--	--
	Bargi Diversion Ph-IV	Maj.	--	--

Sl. No	State/Project Name	Major/ Medium/ ERM	Date of Visit	Status of Report
67	PenchDiv-I	Maj.	13-15.06.2019	23.08.2019
68	Upper Beda	Maj.	--	--
69	Punasa lift	Maj.	--	--
70	Lower Goi	Maj.	--	--
71	Jobat	Med	--	--
72	Sagar(Sagad)	Med.	--	--
73	Singhpur	Med.	--	--
74	Sanjay Sagar (Bah)	Med.	--	--
75	Mahuar	Med.	10.07.2019	16.07.2019
	TOTAL=17			
	MAHARASHTRA			
76	Gosikhurd [NP]	Maj.	21-22.01.2020	20.04.2020
77	Waghur	Maj.	25.07.2019 22.01.2020	28.11.2019 To be issued
78	Upper Manar	Med.	--	--
79	Upper Pen Ganga	Maj.	06-07.01.2020	20.03.2020
	Bawanthadi [IS]		--	--
80	Lower Dudhna	Maj.	--	--
	Tillari		16.11.2019 21-22.01.2020	16.03.2020 20.04.2020
81	Warna	Maj.	--	--
82	Punad	Maj.	-	--
83	Lower Wardha	Maj.	20.09.2019	08.11.2019
84	Khadakpurna	Maj.	--	--
85	Dongargaon	Med.	25.07.2019	Submitted
86	Gul	Med.	--	--
87	Bembla	Maj.	19.09.2019	08.11.2019
88	Uttermand	Med.	--	--
89	Sangola Branch Canal	Maj.	06-07.09.2019	06.02.2020
90	Tarali	Maj.	8.11.2019	22.04.2020

Sl. No	State/Project Name	Major/ Medium/ ERM	Date of Visit	Status of Report
91	DhomBalakwadi	Maj.	7.11.2019	--
92	Morna (Gureghar)	Med.	28.05.2019	18.09.2019
93	Arjuna	Med.	30.05.2019	08.08.2020
94	Lower Pedhi	Maj.	11.11.2019	17.02.2020
95	Upper Kundalika	Med	--	--
96	Wang Project	Med	10.11.2019	07.02.2020
97	Lower Panzara	Med	28.06.2019 05.03.2019	18.11.2019 To be issued
98	Aruna	Med	14.11.2019	03.03.2020
99	Krishna Koyana Lift	Maj.	08-09.09.2019	24.02.2020
100	Naradave (Mahammadwadi)	Med	15.11.2019 22-23.01.2020	20.03.2020 20.04.2020
101	Gadnadi	Med	09.11.2019	21.04.2020
102	Kudali	Med	28.05.2019	18.09.2019
	NandurMadhmeshwarPh-II		26-27.06.2019 07.03.2020	08.01.2020 To be issued
	TOTAL=27			
	MANIPUR			
103	Khuga	Maj.	--	--
104	Thoubal	Maj.	14.01.2020 16.01.2020	01.04.2020 01.04.2020
105	Dolaithabi Barrage	Med.	14.01.2020 15.01.2020	01.04.2020 01.04.2020
	TOTAL=03			
	ORISSA			

Sl. No	State/Project Name	Major/ Medium/ ERM	Date of Visit	Status of Report
106	Upper Indravati(KBK)	Maj.	27.11.2019	17.01.2020
107	Subernarekha	Maj.	13.06.2019	14.08.2019
108	Rengali	Maj.	--	--
109	Anandpur Barr./ Integrated Anandpur Barr.	ERM	06.08.2019 13.03.2020	13.09.2019 24.04.2020
110	Lower Indra(KBK)	Maj.	26.02.2020	24.04.2020
111	Lower Suktel(KBK)	Maj.	--	--
112	Telengiri(KBK)	Maj.	26.11.2019	13.01.2020
113	RET Irrigation(KBK)	Med.	27.11.2019	20.12.2019
114	Kanupur	Maj.	07.08.2019	19.09.2019
115	Chheligada Dam	Med.	--	--
116	Rukura-Tribal	Med	16.08.2019	30.09.2019
	TOTAL=11			
	PUNJAB			
117	ShahpurKandi dam (N.P)	Maj.	--	--
118	Kandi Canal Extension (Ph.II)	ERM	--	--
119	Rehabilitation of Ist Patiala Feeder and Kotla Branch Project	ERM	--	--
120	Relining of Rajasthan Feeder Cannal&Sirhind Feeder	ERM	--	--
	TOTAL=04			
	RAJASTHAN			
121	IGNP Stage-II	Maj.	--	--
122	Narmada Canal	Maj.	--	--
123	Mod. of Gang Canal	ERM	--	--
	TOTAL=03			
	TELANGANA			

Sl. No	State/Project Name	Major/ Medium/ ERM	Date of Visit	Status of Report
124	Indiramma FFC of SRSP	ERM	07.06.2019	05.11.2019
125	SRSP St.II	ERM	16.12.2019	11.03.2020
126	Ralivagu	Med.	20.05.2019	20.08.2019
127	Gollavagu	Med.	20.05.2019	07.08.2019
128	Mathadivagu	Med.	05.09.2019	14.11.2019
129	Peddavagu at Jagannathpur	Med.	21.05.2019 16.03.2020	30.08.2019 To be issued
130	J. ChokkaRao LIS	Maj	24.05.2019 01.10.2019	01.10.2019 07.04.2020
131	Neelwai (Peddavagu)	Med.	20.05.2019	23.08.2019
132	Sri KomaramBheem	Med.	21.05.2019	09.09.2019
133	Palemvagu	Med.	26.07.2019	25.09.2019
134	Rajiv Bhima LIS	Maj	03.06.2019 12.03.2020	09.09.2019 To be issued
TOTAL=11				
TRIPURA				
135	Manu	Med.	--	--
136	Gumti	Med.	--	--
137	Khowai	Med.	--	--
TOTAL=03				
UTTAR PRADESH				
138	SaryuNahar NP	Maj	16-18.10.2019 18-20.02.2020	31.12.2019 01.04.2020
139	Bansagar Canal	Maj.	--	--
140	Mod. of Lachhura Dam	ERM	--	--
141	Improving Irr. Intensity of Hardoi Branch System	ERM	--	--

Sl. No	State/Project Name	Major/ Medium/ ERM	Date of Visit	Status of Report
142	Madhya Ganga Canal Ph-II	Maj.	11-13.06.2019 18-20.03.2019	01.08.2019 31.03.2020
143	Kachnoda Dam	Maj.	--	--
144	ArjunShyak	Maj.	21-23.05.2019 03-04.03.2020	01.08.2019 31.03.2020
145	Restoring Cap of SardaSahayak [NP]	ERM	--	--
	TOTAL=08			
	WEST BENGAL			
146	Teesta Barrage [N.P]	Maj.	--	--
147	Tatko	Med.	--	--
148	Patloi	Med.	--	--
149	Subernrekha Barrage ++	Maj.	--	--
	TOTAL=04			
	Grand Total	149	107	101

Annexure - 8.3

**State-Wise and Project-Wise List of Inter-State Projects to be Monitored by CWC
(HQ) during 2019-20**

S. No.	Name of Project	Major/ Medium/ ERM	States
1.			
2.	Subernarekha multipurpose Irrigation project	Major	JHARKHAND (ORISSA,W.B)
3.	Western Kosi Canal	Major	BIHAR (JHARKHAND)
4.	Batane Irrigation Project	Medium	BIHAR (JHARKHAND)
	Total - 3		
5.	Bansagar Canal (UP)	Major	UTTAR PRADESH (M.P)
	Total - 1		
6.	Indira sagarPolavaram	Major	ANDHRA PRADESH (ORISSA)
7.	Dudhganga project	Major	KARNATAKA (MAHARASTRA)
8.	Subernarekha irrigation project	Major	ORISSA (JHARKHAND)
	Total - 3		
9.	Rajasthan Feeder Canal	Major	RAJASTHAN (PUNJAB)
10.	SardarSarovar (Narmada)	Major	GUJARAT (RAJASTHAN)
11.	Narmada Project	Major	RAJASTHAN (GUJARAT)
	Total - 3		
12.	Bawanthadi (IS)	Major	MAHARASHTRA (M.P)
13.	Tillari #	Major	GOA (MAHARASHTRA)
14.	Bansagar Canal (MP)	Major	M.P (UTTAR PRADESH)
	Total - 3		
15.	Grand Total - 13		

Annexure - 8.4**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 - 8.5**Details of Projects Reported to be completed under PMKSY-AIBP as on 31.3.2020**

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
	JAMMU & KASHMIR		
5	Rajpora Lift	2000-01	2018-19
	KARNATAKA		
6	Sri Rameswar Irrigation	2014-15	2017-18
7	Bhima LIS	2009-10	2018-19
	MADHYA PRADESH		
8	Sagar(Sagad)	2011-12	2017-18
9	Singhpur	2011-12	2017-18
10	Mahuar	2013-14	2017-18
11	Sindh Phase II	1998-99	2018-19
12	Bariarpur LBC	2000-2001	2018-19
13	Bansagar Unit-II	2003-04	2018-19
14	Sanjay Sagar (Bah)	2011-12	2018-19
15	Indira Sagar Unit II (Ph I & II)	1996-97	2018-19
16	Indira Sagar Unit V	2014-15	2018-19
17	Omkareshwar, Ph.-IV	2014-15	2018-19
18	Bargi Diversion Ph - I	2001-02	2018-19

	MAHARASHTRA		
19	Bawanthadi [IS]	2004-05	2017-18
20	Lower Panzara	2009-10	2017-18
21	Dongargaon	2005-06	2017-18
22	Warna	2005-06	2017-18
23	NandurMadhmeshwar	2006-07	2018-19
24	Upper Kundalika	2008-09	2018-19
25	Lower Dudhna	2005-06	2019-20
26	Dhom Balaakwadi	2007-08	2019-20
27	Khadakpurna	2006-07	2019-20
	ORISSA		
28	Upper Indravati(KBK)	1996-97	2017-18
29	Rukura-Tribal	2009-10	2017-18
30	RET Irrigation(KBK)	2003-04	2018-19
31	Upper Indravati Extn (KBK)	1996-97	2019-20
32	Telengiri	2003-04	2019-20
	PUNJAB		
33	Kandi Canal Extension (Ph.II)	2002-03	2017-18
34	Rehabilitation of Ist Patiala Feeder and Kotla Branch Project	2007-08	2017-18
	RAJASTHAN		
35	Narmada Canal	1998-99	2018-19
36	Mod. of Gang Canal	2000-2001	2018-19
	TELANGANA		
37	Gollavagu	2006-07	2017-18
38	Ralivagu	2006-07	2017-18
39	Mathadivagu	2006-07	2017-18
	UTTAR PRADESH		

40	Bansagar Canal	1997-98	2018-19
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Annexure - 8.6**List of CA for MMI Projects included under the Special Package for Maharashtra**

S. No	Project Name	Districts Benefitted	Total CA released				Ultimate Irrigation Potential in Ha	Potential created in Ha as on 31.03.2018
			For CA proposal of 2017-18	For CA proposal of 2018- 19	For CA proposal of 2019- 20	Total CA released		
1	Tembhu LIS Dist. Satara	Satara, Sangli, Solapur	25	65.025	4.7643	94.7893	111856	15537
2	Warkhed Londhe Dist. Jalgaon	Jalgaon	10.41	19.345	0	29.755	7919	0
3	Sulwade Jamphal Kanoli L.I. Scheme Dist. Dhule	Dhule	0.23	0	0	0.23	52720	0
4	Shelgaon Barrage Medium Project, Dist.Jalgaon	Jalgaon	15.22	13.985	0	29.205	11318	0
5	Ghungshi Barrage LIS Akola	Akola (V)	3.27	2.5525	0	5.8225	6660	0

6	Purna Barrage No.2 (Nerdhamana) Dist.Akola		0	0	0	0	6954	0
7	Jigaon Dist. Buldhana	Buldhana, Akola (V)	138.69	140.3475	0	279.0375	101088	0
8	Urmodi Dist. Satara	Satara	13.27	10.625	0	23.895	32000	7628
	Total MMI		206.09	251.88	4.7643	462.7343	330515	23165

Annexure - 15.1**Training Activities Organised / Coordinated by Training Directorate during 2019-20****Training / Workshops within Country****In House training at CWC (HQ) New Delhi**

S. No.	Name of Program	Period	Venue	Participants
1.	Training Course on "Space Based Water Level, Discharge, Estimation and Water Quality Studies with Emphasis on Hydrological and Hydrodynamic Modelling of Brahmaputra River Basin" organized by CWC through IIRS, Dehradun	10-21 June, 2019	Dehradun	15 CWC Officers
2.	"Basic Computer Training Including M.S. Office, Excel & Power Points etc. Including advance tools in MS Office & Excel" at CWC Library Building, New Delhi	30-31 July, 2019	CWC(Hq), New Delhi	27 CWC Officials
3.	"Implementation of e-procurement Software (CPP Portal)"	01-02 August, 2019	CWC(Hq), New Delhi	18 CWC Officers
4.	"Implementation of e-procurement Software (CPP Portal)"	20-21 August ,2019	CWC(Hq), New Delhi	11 CWC Officers
5.	Workshop on "National Water Museum" at Library Building, CWC New Delhi,	19-20 September, 2019	CWC(Hq), New Delhi	40 CWC Officers
6.	Training Course on "Geodesy" at IISM, conducted by CWC	30 September -05 October ,2019	Hyderabad	30 CWC Officers

	through IISM			
7.	Training Program on "Telemetry-Automatic Data Collection &Transmission System".	10-12 December, 2019	CWC(Hq), New Delhi	36 CWC Officers
8.	Training Program on "e-Office" for the officials of CWC(Hq), New Delhi	10 December, 2019	CWC(Hq), New Delhi	26 participants
9.	Training Program on "Bhavishya" for the officials of CWC(Hq), New Delhi	11 December, 2019	CWC(Hq), New Delhi	13 participants
10.	Training Program on "GeM" for the officials of CWC(Hq), New Delhi	12 December, 2019	CWC(Hq), New Delhi	15 participants
11.	Training Program on "e Procurement" for the officials of CWC(Hq), New Delhi	13 December, 2019	CWC(Hq), New Delhi	13 participants
12.	Basic Computer Training Including M.S. Office, Excel & Power Points etc. Including advance tools in MS Office & Excel".	06-10 January 2020	CWC(Hq), New Delhi	21 participants of CWC
13.	Training program on "Project Hydrology-Hydrological Aspects in Planning and Design of WR Projects"	29-31, January, 2020	CWC(Hq), New Delhi	17 CWC Officers & 10 State engineers
14.	Hindi Workshop organized at CWC Headquarter, New Delhi	06 March, 2020	CWC(Hq), New Delhi	48 CWC Officers

In-House Training Program in Field Office

S. No.	Name of Training	Period	Venue	Participants
1.	"Implementation of e-Procurement Software (CPP Portal)"	22-23 August,2019	Middle Brahmaputra Division, Guwahati	20 CWC Officers
2.	"Implementation of e-Procurement Software (CPP Portal)"	29-30 August,2019	UGBO, CWC, Lucknow	20 CWC Officers
3.	Hindi Workshop	17 September,2019	MTBO,CWC, Gandhinagar	50 CWC Officers
4.	Training Program on "Use of Arc GIS in Water Resources including Watershed delineation, Hydrological Analysis etc".	14-16 October ,2019	UGBO, CWC, Lucknow	15 officials of UGBO, CWC, Lucknow.
5.	Training Program on "HO, WQ, Telemetry System & e Swiss for the officials of MTBO, CWC, Gandhinagar	13-16 November,2019	MTBO,CWC, Gandhinagar	25 CWC Officials of MTBO, Gandhinagar.
6.	Training Program on "e-office, Bhavishya, GeM, E-procurement for the officials of MTBO,CWC, Gandhinagar	19-22 November,2019	MTBO,CWC, Gandhinagar	25 CWC Officials of MTBO, Gandhinagar.
7.	Training Program on "Vigilance, Conduct Rules, Pension and LIMBS for the officials of MTBO, Gandhinagar.	02-04 December,2019	MTBO, CWC, Gandhinagar	20 participants of MTBO, CWC, Gandhinagar.
8.	Basic Computer Training Including M.S. Office, Excel & Power Points etc. Including advance tools in MS Office & Excel" for the	19-20 December,2019	MSO, CWC, Bengaluru	19 participants

	officials of Monitoring (S), CWC, Bengaluru.			
9.	Training Program on "e-office/e-HRMS/ Bhavishya /PFMS/Financial Management/ GeM / e-Procurement"	30-31 December,2019	MSO, CWC, Bengaluru	20 participants of MSO, CWC, Bengaluru.
10.	Basic Computer Training Including M.S. Office, Excel & Power Points etc. Including advance tools in MS Office & Excel" for the officials of B&BBO.	20-21 January 2020	B&BBO, CWC, Guwahati	23 participants of CWC
11.	Hindi Workshop	23 January 2020	MTBO, CWC, Gandhinagar	48 participants
12.	Training Program on "HO,WQ, Telemetry System & e Swiss for the officials of MSO,,CWC, Bengaluru	10-12 February,2020	MSO, CWC, Bengaluru	19 CWC Officials of MTBO, Bengaluru.
13.	Training Program on "HO,WQ, Telemetry System & e Swiss for the officials of KGBO,CWC ,Hyderabad	11-14 February,2020	KGBO, CWC, Hyderabad	30 CWC Officials of KGBO, Hyderabad.
14.	Workshop on the subject "Flood Plain Zoning" to celebrate 75th years of CWC in UGBO, Lucknow.	17 February,2020	UGBO, CWC, Luclnow	111 officers from different Govt. Deptt., PSUs, Academic & Resarch Instt., Agriculture University.
15.	Training Program on "HO,WQ, Telemetry System & e Swiss for the officials of YBO,CWC,NEW Delhi	17-20 February,2020	YBO, CWC, New Delhi	25 Officials of YBO, New Delhi.
16.	Training programme on "Application of	24 - 28 February, 2020	B&BBO, CWC, Guwahati	25 Officers of CWC,

	Total Station & Rtkgps for HO Work & Topographical Survey" and "Latest Survey and Investigation Techniques" Organized by Brahmaputra & Barak Basin Organisation, CWC, Guwahati.			Guwahati.
17.	Training Programs on "e-tools" (Arc GIS, Bhavishya, e-office, e-HRMS, PFMS, GEM and e-Procurement) Organized for the officials of KGBO, CWC, Hyderabad	25 - 29 February, 2020	KGBO, CWC, Hyderabad	27 Officers of CWC, Hyderabad.
18.	Training Programs on "Disciplinary Proceedings and Preventive Vigilance" Organized for the officials of KGBO, CWC, Hyderabad	02-03 March, 2020	KGBO, CWC, Hyderabad	29 Officers of CWC, Hyderabad.
19.	Hindi Workshop	20 March, 2020	MTBO, CWC, Gandhinagar	28 participants

Training conducted by other organization 2019-2020

S. No.	Name of Training	Period	Venue	Participants
1.	Participation in "Capacity Building on Gem Procurement-Training to Procurement Officers" as by MoWR, RD & GR.	15 May 2019	CSMRS, New Delhi	22 CWC officers
2.	Training Program on " Hydrological ,Geo technical and Geological Investigations for Dams" Organized by CPMU of	22-26 July 2019	MNNIT, Prayagraj, U.P	6 CWC Officers

	DRIP in association with MNIT			
3.	Training programmes on "Geotechnical and Seismic Considerations in Dams" organized by Central Project management Unit (CPMU) of DRIP association with IIT Roorkee	17-18 June 2019	IIT Roorkee	5 CWC Officers
4.	Training programmes on "Seismic Safety of Earth and Rock-fill Dams" organized by Central Project management Unit (CPMU) of DRIP association with IIT Roorkee	19-21 June, 2019	IIT Roorkee	5 CWC Officers
5.	Training Programme on "Morphological Study of Mahananda, Mahanadi and Hooghly River using Remote Sensing Technique" organized by IIT, Kharagpur in association with CWC	19 June 2019	IIT Kharagpur	17 CWC Officers
6.	Training Course on "MIKE FLOOD" organized by DHI (India) Water & Environment Pvt. Ltd	07-09 August, 2019	New Delhi	4 CWC Officers
7.	Training Programme on "Seismic Studies for Dam" organized by CPMU of DRIP in association with IISc, Bangalore	19-20 August, 2019	IISc, Bangalore	3 CWC Officers
8.	Training Programme on "Watershed Modelling" organized by CPMU of DRIP in association with Anna University, Kotturpuram, Chennai.	19-21 August, 2019	Anna University, Kotturpuram, Chennai,	3 CWC Officers
9.	Training programme on	19-30	NRSC,	4 CWC Officers

	"RS and GIS Application to Water Resources" organized by Survey of India Under National Hydrology Project,	August,2019	Balanagar, Hyderabad	
10.	Participation in Training course on " Concrete construction material for River valley project & its importance " organized by CSMRS	22-23 August,2019	New Delhi	2 CWC Officers
11.	Training Programme on "Seismic Design and Safety Evaluation of Concrete Gravity Dams"	11-13 September,2019	IIT, Roorkee	4 CWC Officers
12.	Participation in training course on "Geotechnical Instrumentation and Numerical Modelling for Hydroelectric Projects" organized by CSMRS, New Delhi	26 -27 September,2019	New Delhi	2 CWC Officers
13.	Training Programme on " Geotechnical Aspects Related to Dam Safety" organized by CPMU & MANIT, Bhopal	30 September - 01 October ,2019	Bhopal	1 Officer
14.	Participation in two days training course on " Investigation ,Construction, Methodology and Quality Control Aspect for Earth and Rock fill Dam " organized by CSMRS, New Delhi	28-29 September 2019	New Delhi	5 CWC Officers
15.	Participation I training program on "River Basin Planning and Management Cycle" organised by NMCG, DoWR, RD&GR, MoJS.	03-04 December,2019	Dehradun	2 Officers

16.	Participation I training program on "River Basin Planning and Management Cycle" organised by NMCG, DoWR, RD&GR, MoJS.	06-07 December,2019	Lucknow	1 Officer
17.	Participation in Two days Training Course on "Geotechnical Investigations for River Valley Projects" organized by CSMRS	12-13 December,2019	New Delhi	3 CWC Officers
18.	Participation in training program on "Arc GIS" organized by ESRI India Technologies Ltd.	13-17 January,2020	ESRI India, Noida	20 CWC Officers
19.	Participation in training program on " GIS Remote Sensing in Water Resources" organized by WRD, Rajasthan Govt. under NHP	13-24 January, 2020	IIRS, Dehradun	2 Officers
20.	Participation/presentation in training Corse on "River Training Work" Organized by Inland Waterways Authority of India	28-29 January,2020	Patna	2 CWC Officers
21.	Participation in training course on "Quality Control and Diagnostic Investigation for Concrete Hydraulic Structures" organized by CSMRS.	30-31 January, 2020	CSMRS, New Delhi	2 CWC Officers
22.	Training Program on "Hydrometry Techniques using non-contact measurement" organized by IIT Roorkee under NHP, Govt. of India.	18-21 February, 2020	IIT, Roorkee	5 CWC Officers

23.	Training program in "Remote Sensing & GIS Applications in Irrigated Command Area Inventory and Performance evaluation" under National Hydrology Project Govt. of India.	24 February-06 March, 2020	NRSC, Balangar, Hyderabad	2 CWC Officers
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Conference / Workshops /Seminar organised during 2019-20

S. No.	Name of Training	Period	Venue	Participants
1.	Participation in "Basin Futures Training Workshop" Organized by ICID, New Delhi.	08-12 April, 2019	New Delhi	2 Officers of CWC.
2.	4th Asia -Pacific Forum on Urban Resilience and Adaptation -Resilient Cities Asia Congress-2019 [RCAP] organized by ICLEI-Local Government for Sustainability Offices in the Asia Pacific.	15-17 April, 2019	Eros Hotel, New Delhi	2 Officers of CWC.
3.	Participation in Pre-Cyclone Exercise on "Cyclone Monitoring and Warning System" Organized by IMD, New Delhi.	18 April, 2019	New Delhi	2 Officers of CWC
4.	Participation in National Workshop on "Development Comprehensive & Scientific Mechanism/Model for forecasting of Hydrology for hydro Electric Project" organized by SJVN Ltd. in corporation with CBIP.	25 April, 2019	India Habitat Centre, New Delhi	5 CWC officers
5.	Participation in one day	29 April, 2019	CWC Auditorium,	25 CWC

	seminar on "Use of Technical Textiles(TT) in Water Resources Works" organized by MoWR, RD & GR.		New Delhi	officers
6.	Participation in Water Digest Conclave on "Restoring Water Restoring Nature-II" organized by Advance Water Digest Pvt. Ltd. New Delhi.	03 May, 2019	India Habitat Centre, New Delhi	10 CWC officers
7.	Participation in one day dissemination workshop on "Morphological Studies of River Brahmaputra, Subansiri & Pagladia using Remote Sensing Technique" organized by IIT Guwahati in association with CWC.	03 May, 2019	IIT, Guwahati	22 CWC officers
8.	Participation in "Annual Conference of Relief Commissioner/ Secretaries of Departments of Disaster Management of States/UTs-2019 to Review the state of preparedness for South-West monsoon" organized by Ministry of Home Affairs Disaster Management Division, New Delhi.	7-8 May, 2019	Vigyan Bhawan, New Delhi	3 CWC officers
9.	Workshop on " Zen of good writing" organized by National Productivity Council	14 May, 2019	New Delhi	3 CWC officers
10.	"5th Smart Cities India 2019 Expo " organised by Indian Trade Promotion	22 May ,2019	New Delhi	1 Officer

	Organization			
11.	Workshop on "Developing a Roadmap for Sustainable Agriscapes in Ganga basin " organized by NMCG.	22 May, 2019	New Delhi	2 Officers
12.	"Jalasamgamam -Kerala Water Summit 2019" organized by Govt. of Kerala	29 -31 May, 2019	Thiruvanthapuram	3 Officers
13.	Workshop on " Latest Inspection & Investigations of Dams " organised by Aqua Foundation with World Bank ,ICID,CWC and CBIP	30 -31 May, 2019	New Delhi	6 CWC Officers
14.	"Inception cum Brainstorming Workshop for Preparation of Guidelines for the Management of Glacial Hazards and Risks including Glacial Lake Outburst Floods (GLoFs)" organized by NDMA.	3-4 July,2019	New Delhi	2 Officers
15.	Workshop on "Major Bridge in Bihar - Innovations & Challenges" Organized by ING-IABSE.	26-27 July,2019	Patna	1 Officer
16.	Participation in Capacity Building Programme on "Water Budgeting tool for river basins using Google earth engine application" Under National Hydrology Project.	19-23 August,2019	NIH Roorkee	4 Officers
17.	Conference on "ESRI India User Conference 2019" organized by ESRI India	28-29 August,2019	Gurugram	17 CWC Officers

18.	Workshop on "Automation & Emerging Skill requirement for efficient Water Resource Management" organized by Instrumentation Automation surveillance & Communication sector skill council (IASC-SSC)	29 August,2019	New Delhi	10 CWC Officers
19.	Workshop on "Sediment Management for Ensuring the Sustainability of Reservoir and Run-of - River Projects" organized by INCOLD & CBIP.	25-26 September, 2019	New Delhi	5 CWC Officers
20.	Participation in 12th National Conference on "Earthing System" conducted by CBIP, New Delhi.	10-11 October, 2019	New Delhi	3 CWC officers
21.	Participation in "25th edition of Technical Summit" organized by Ministry of Science & Technology, New Delhi.	15-16 October, 2019	New Delhi	4 CWC Officers
22.	All India Seminar on "Sustainable Water Management and Conservation" organized by the Institution of Engineers.	2-3 November, 2019	Lucknow	2 CWC Officers
23.	Participation in 2nd International Conference on "Sustainable Water Management" organized under NHP, DoWR, RD&GR.	6-8 November, 2019	Pune	53 CWC Officers
24.	Participation in one day "Consultation workshop with States on Concept Note on National Water Conservation Scheme"	15 November ,2019	Shram Bhawan, New Delhi	3 CWC Officers

	organized by DoWR, RD & GR , Ministry of Jal Shakti.			
25.	Brain Workshop on "River -research to Evolve sustainable -projects for people with Eco-friendly Climate -resilient technology (RESPECT) organized by IIT Guwahati.	15 November ,2019	IIT, Guwahati	1 Officer
26.	Workshop on "Increasing Water use efficiency in Agriculture" organized by NWM, DoWR, RD&GR, MoJS.	26-27 November, 2019	New Delhi	10 CWC Officers
27.	12th National Conference on "Earthing System" organized by CBIP.	10-11 November, 2019	New Delhi	3 CWC Officers
28.	Participation in "Water EX World Conference 2019" organized by M/s Jasubhai Media Pvt. Ltd., Mumbai.	05 December,2019	Hyderabad	30 CWC Officers
29.	Participation in "4th India Water Impact Summit" Organized by IIT, Roorkee.	05-07th December, 2019	Vigyan Bhawan, New Delhi	3 CWC officers
30.	Participation in Workshop on "Modellers Meet at New Delhi " Organised by NPMU, DoWR, RD&GR, MoJS.	07 December,2019	The Claridge Hotel, New Delhi	10 CWC Officers
31.	Participation in Second National Workshop on "Developing Comprehensive and Scientific Mechanism /Model for Forecasting in Hydrology for Hydro Electric Projects" organized by CBIP.	07 December,2019	Hotel Shivalik View, Chandigarh	4 CWC Officers

32.	Participation in Workshop on "Improving our understanding of the aquifer system in the Sundarbans" Organized by NIH, Roorkee.	08-09 December, 2019	Hotel Senses Kolkata	3 CWC Officers
33.	Participation in International Conference on 3 rd edition of "American Water Works Association India Conference and Exhibition" Conducted by American Water Works Association India, Mumbai.	13-14 December, 2019	Mumbai	1 CWC Officer
34.	Participation in "HYDRO 2019 International Conference organized by Osmania University, Hyderabad.	18-20 December, 2019	Hyderabad	5 CWC Officers
35.	Participation in Conference on "Irrigation in India" organized by India Infrastructure Publishing Private Limited, New Delhi	19-20 December, 2019	Hyderabad	6 CWC Officers
36.	Participation/presentation in National Conference on "Policies & Strategies for Flood Management: Kerala Scenario organized by Water Resources Department, Govt. Of Kerala	23-24 January, 2020	Thiruvananthapuram	3 CWC Officers
37.	Participation/presentation in International Conference on "Roorkee Water Conclave" Organized by IIT, Roorkee.	26-28 February, 2020.	IIT, Roorkee	17 CWC Officers
38.	Participation in Workshop	05 March, 2020	New Delhi	5 Officers

	on " Increase in Water Use efficiency in Industries" Organized by National Water Mission, DoWR, RD &GR, MoJS at Scope Complex, Lodi Road, New Delhi			
39.	Participation in " Smart Water Distribution Session" Organized by India Smart Grid Form,	06 March, 2020	New Delhi	10 Officers
40.	Participation in Seminar on " Coastal Zone Water Management" organized by WRD of BIS, New Delhi	13 March, 2020	Goa	1 Officer
41.	Participation in Flag-in of the Ganga Aamantran, kayaking & Rafting Expedition from Devprayag (Uttarakhand) to Fazergunj (West Bengal organized by the National Mission for Clean Ganga, MoJS, DoWR, RD & GR	13 March, 2020	The Ashok Hotel, Chanakyapuri, New Delhi	15 CWC Officers
42.	Participation in Half Day Workshop on "Water Security and Sustainable Development Hub" organized by IIT Delhi	13 March, 2020	IIT Delhi	01 CWC Officer
43.	Participation in Workshop on "Rain Water Harvesting and Artificial Recharge Structures for Water Conservation" organized by National Mission for Clean Ganga, MoJS, DoWR, RD & GR	13 March, 2020	Lodhi Road, New Delhi	50 CWC Officers

Annexure - 15.2**Details of Training Programs undertaken by National Water Academy, Pune during 2019-20**

<i>Sr. No.</i>	<i>Name of Training Program</i>	<i>Duration (Weeks)</i>	<i>Start Date</i>	<i>No. of Officers</i>	<i>Man Weeks</i>
1	Orientation Program for AD-II (Batch II)	2	22 April 2019	49	98
2	Training Program for Scientific Assistant (Hydromet)	2	27 May 2019	16	32
3	International Distance Learning Program in Hydrology : Basic Hydrological Sciences in association with World Meteorological Organizations	7	17 June 2019	56	392
4	Financial Accounting System and e-Procurement	1	10 June 2019	18	18
5	ePAMS (2 days)	0.4	13 June 2019	25	10
6	Orientation Training Program for Newly Promoted AD	2	17 June 2019	38	76
7	Coastal Erosion and Protection	1	01 July 2019	19	19
8	Training Program on World Bank Procurement & Contract Management and Arbitration	1	15 July 2019	45	45
9	Training-cum-Workshop on Water Resources Sector of India	0.2	31 July 2019	56	11.2
10	Overview of Water Resources Sector of India	1	29 July 2019	22	22
11	Implementation of e-Procurement Platform in CWC	0.4	05 August 2019	23	9.2

12	31st Induction Training Program (ITP) (22 Weeks + two weeks Bharat Darshan)	24	19 August 2019	44	1056
13	Geomembrane Sealing System for Dams	0.4	28 August 2019	27	10.8
14	Induction Training for Junior Engineers of Brahmaputra Board	2	02 September 2019	30	60
15	Induction Training for Junior Engineers of Farrakka Barrage	2	14 October 2019	15	30
16	Cost Estimation and Economic Evaluation of Water Resources Projects	0.8	05 November 2019	12	9.6
17	Young Water Professional Workshop under NHP	0.2	05 November 2019	44	8.8
18	Overview of Water Resources Sector of India	1	11 November 2019	10	10
19	Induction Training for Junionr Engineers of Brahmaputra Board	2	18 November 2019	30	60
20	Integrated Pipe Irrigation Network and Micro Irrigation	1	02 December 2019	20	20
21	River Morphology and Sedeiment Management	1	09 December 2019	30	30
22	Training-cum-Workshop on Water Resources Sector of India	0.2	18 December 2019	24	4.8
23	Flood Forecasting including Modelling (MIKE 11)	1	06 January 2020	25	25
24	Water Governance / Water Laws	0.6	10 February 2020	31	18.6
25	Training-Workshop on Transparency Audit Software developed by CIC	0.2	14 February 2020	10	2
26	MCTP Level 4	1	17 February 2020	10	10
27	Training Program on Water Information Management System (WIIMS)	0.6	25 February 2020	27	16.2

28	River Basin Planning and Management Cycle – Module 2 in collaboration with NMCG and GIZ-SGR	0.6	25 February 2020	16	9.6
29	MCTP - Level 2* for STS (Deputy Director) (one Week at NWA + 2 Weeks Outside NWA) (*)	3	02 March 2020	25	75
Total		59.6		797	2188.8
