सत्यमेव जयते

ANNUAL REPORT 2017-18

CENTRAL WATER COMMISSION

Government of India

Ministry of Water Resources, River Development & Ganga Rejuvenation

INDIA - LAND AND WATER RESOURCES: FACTS

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

WATER RESOURCES

•	Average Annual Rainfall	4000 BCM
•	Annual Rainfall (2016)	3560 BCM
•	Mean Annual Natural Run-Off	1869 BCM
•	Estimated Utilisable Surface Water Potential	690 BCM
•	Total Replenishable Ground Water Resources	433 BCM
•	Ground Water Resources Available for Irrigation	369 BCM
•	Ground Water Potential Available for Domestic, Industrial And Other Purposes	71 BCM (approx.)
•	Ultimate Irrigation Potential	140 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 M 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

Contents

From Chairman's Desk

It is our pleasure to bring out this Annual Report of the Central Water Commission (CWC) for the year 2017-18. The report gives an insight into the organisation structure, functions and activities of CWC highlighting the contribution made in the developement and management of water resources in the country.

CWC continued to forge ahead in providing the necessary leadership and guidance for the development of the water sector and provided necessary support to the Ministry of Water Resources, River Development and Ganga Rejuvenation on all technical and policy matters during the year 2017-18. Officers of CWC represented in several committees and contributed substantially on various issues. CWC provided technical assistance to the Ministry on various issues related to inter-state matters, sharing of waters with neighbouring countries, bilateral treaties and MoUs etc. Regular activities of 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 were successfully carried out during the year.

During 2017-18, CWC has provided design consultancy for DPR preparation and project construction in respect of 64 water resources development projects in India and neighbouring countries namely Bhutan and Nepal. We have undertaken techno-economic appraisal of water resources development projects leading to acceptance of 13 projects comprising of 8 major & medium irrigation projects and 5 flood control projects by the Advisory Committee of MoWR, RD & GR. In view of goal of providing "Har Khet Ko Pani", CWC has undertaken rigorous monitoring of irrigation projects as well as scrutiny of fund release proposals which resulted in disbursement of funds to 52 Major and Medium Irrigation Projects to the tune of Rs. 3596 Crore under PMKSY-AIBP programme.

CWC has been monitoring storage position of 91 reservoirs in the country which has helped the states in planning of water utilisation during non-monsoon period. We have started Flood Forecasting service at 27 new stations during 2017-18. The timely issue of 6297 flood forecasts (with 93.71 % accuracy) during the monsoon period of 2017 has helped concerned authorities / society at large in effective flood management.

CWC has always worked for providing quality service to the nation in the field of water resources development and management. The Water Quality Laboratories at Hyderabad, Varanasi and Coimbatore have been accredited by National Accreditation Board for Testing and Calibration Laboratories (NABL) for chemical testing during the year.

I am sure the report will be useful in understanding the role, functions and achievements of CWC during the year.

(S. Masood Husain)
Chairman, CWC

Highlights of the Year 2017 -18

❖ DESIGNS

- CWC provided design consultancy to States / Project Authorities for 64 water resources development projects involving detailed designs and preparation of drawings of various types of hydraulic structures.

❖ RIVER MANAGEMENT

- Carried out hydrological observations, including snow and meteorological observation, at 954 sites in different basins spread over the entire country.
- The River Water Quality Laboratory of CWC at Coimbatore, Hyderabad and Varanasi were accredited by National Accreditation Board for Testing and Calibration Laboratories (NABL) in the disciple of chemical testing.
- Provided Flood Forecasting Service at 226 flood forecasting stations (including 60 inflow forecasting stations) spread over 19 major river basins. During the flood season 2017, 6297 flood forecasts (5085 level forecast and 1212 inflow forecasts) were issued, out of which 5901 (93.71%) 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.

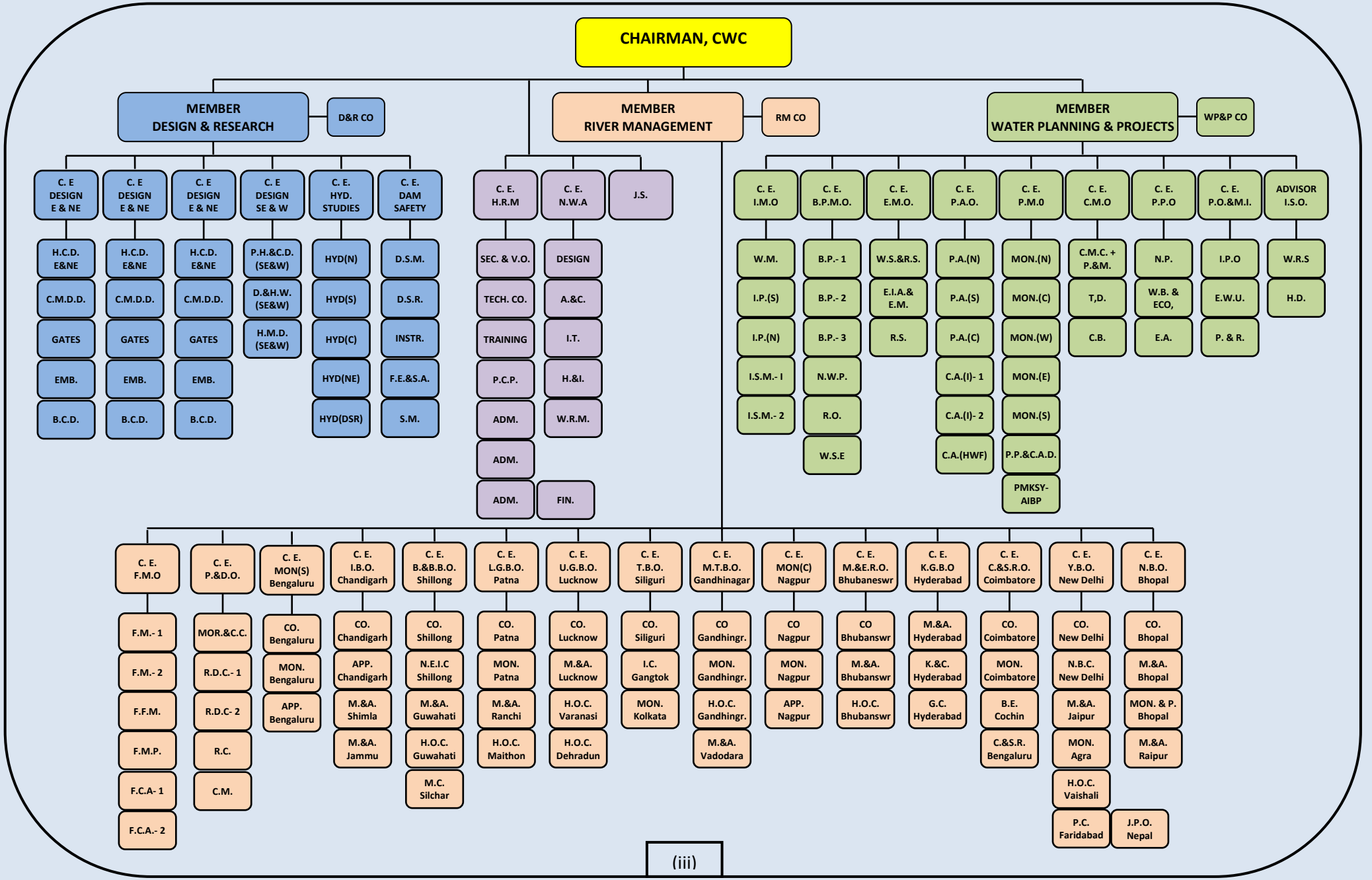
❖ WATER PLANNING

- During the year 2017-18, 45 major / medium irrigation projects were under appraisal in CWC. 13 projects comprising 8 major / medium irrigation projects and 5 flood control projects were accepted by the Advisory Committee.
- Monitored 47 Irrigation projects under General Category and 149 Irrigation projects (including Extension/Renovation/Modernization (ERM) projects) receiving grants under AIBP.
- Storage positions of 91 important reservoirs, with total live storage of about 157.8 BCM, were monitored on weekly basis.
- Processing of proposals for release of Rs. 3596.61 crore of Central Grant under PMKSY-AIBP programme to 52 Major and Medium Irrigation Projects were undertaken.

❖ TRAINING & CAPACITY BUILDING

- National Water Academy, CWC, Pune conducted 42 training programmes during 2017-18 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 1812.

Organogram of Central Water Commission



CHAPTER-I

AN OVERVIEW

1.1 INTRODUCTION

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 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. In the discharge of these responsibilities, officers of the rank of Chief Engineer, Director/ Superintending Engineer, Deputy Director/Executive Engineer, Assistant Director/Assistant Executive Engineer; other Engineering and Non-Engineering officers and supporting staff working in

various regional and headquarter organizations, assist the Members. 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.

Shri S. Masood Husain, Chairman, CWC receiving CBIP Recognition Award for Excellence in Health & Safety of Dam from Shri Satya Pal Singh, Hon'ble Minister (WR,RD&GR) on 3rd January 2018 at New Delhi for coordinating Dam Rehabilitation and Improvement Project in the country

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, issues related to construction machinery of projects, application of remote sensing technologies in water resources, etc.

Table 1.1

Details of incumbents to the posts of Chairman and Members of Central Water Commission during the year 2017-18

1.	Chairman, CWC	Sh. Narendra Kumar (01-04-2017 to 31-10-2017) Sh. S. Masood Husain (18-12-2017 to 31-03-2018)
2.	Member (D&R)	Sh. N. K. Mathur (01.04.2017 to 31.03.2018)
3.	Member (RM)	Sh. Pradeep Kumar (01.04.2017 to 31.03.2018)
4.	Member (WP&P)	Sh. S. Masood Husain (01-04-2017 to 31-03-2018)

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 Command Area Development, etc.

The details of incumbents to the posts of Chairman and Members of Central Water Commission during the year 2017-18 are given in Table 1.1

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 so 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, when so requested, to the State Governments concerned/project authorities.
- 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, when so required, the State Governments (Commissions, Corporations or Boards that are set up) 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 irrigation;
- 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 regarding the progress and achievements made by the country in the water resources development, use and conservation.

1.3 Headquarters

There are eighteen organizations, each headed by a Chief Engineer at CWC headquarters, New Delhi. Out of which, 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.

1.4 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 Siliguri.

Visit of Shri Arjun Ram Meghwal, Hon'ble Minister of State(WR,RD&GR) to Regional Office of CWC at Silliguri

1.5 Important Schemes and Programmes

PMKSY - Accelerated Irrigation Benefits Programme

The PMKSY-Accelerated Irrigation Benefits Programme (AIBP) is being implemented by MoWR,RD&GR. Central Water Commission has been assigned with the responsibility to comprehensively monitor the projects receiving Central Assistance. Presently, there are 149 ongoing projects under AIBP which are 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. The Accelerated Irrigation Benefits Programmes (AIBP) have been subsumed in Pradhan Mantri Krishi Sinchayee Yojana (PMKSY).

Head works of Peddavagu, Jagannathpur Project

In order to overcome the bottlenecks faced in completion of project under PMKSY-AIBP, during 2016-17, MoWR,RD&GR has identified 99 priority projects amongst the 149 ongoing projects under AIBP for early completion. Out of these 99 priority projects, 18 projects have been reported completed by June 2017 apart from some peripheral works. 28 projects are

scheduled for completion by June 2018 and remaining projects are targeted to be completed by December 2019.

Central Grant totalling to Rs. 3596.61 Crores has been released to 52 Projects under PMKSY-AIBP during 2017-18. Since its inception, the cumulative total Central Loan Assistance / Grant provided to States under AIBP/PMKSY-AIBP is Rs. 62507.25 Crores till 31.03.2018 to 297 projects.

Flood Management Programme

Since XI Plan, the Government of India is implementing "Flood Management Programme (FMP)", a State Sector Scheme under Central Plan, to provide central assistance to the State Governments for taking up works related to river management, flood control, anti erosion drainage development, flood proofing, restoration of damaged flood management works, anti sea erosion and catchment treatment etc. During the XI Plan period (2007-12), 420 Nos. of schemes of various State Governments with a total estimated cost of Rs. 7857.08 Crore were included for funding under FMP. Further during the XII Plan period (2012-17), 102 Nos. of schemes of various State Governments with a total estimated cost of Rs. 5381.29 Crore were included for funding under FMP. The activities under the scheme are continuing during the period 2017-18. As per advice of the Ministry of Finance, the activities are proposed to be included under the scheme "Flood Management and Border Area Programme (FMBAP)". The EFC for the scheme with an outlay of Rs. 5285 Cr for 2017-20 period including provision of Rs. 4585 Cr for spill over works of XI and XII Plan is under consideration.

The total amount released under FMP during XI and XII Plan period is Rs. 3566.00 Crore and Rs. 1307.07 Crore respectively. Central Water Commission coordinates the release of funds for scheme under FMP in areas other than Ganga and Brahmaputra basin. An amount of Rs. 206.95 Crore has been released to the schemes in such areas during 2017-18.

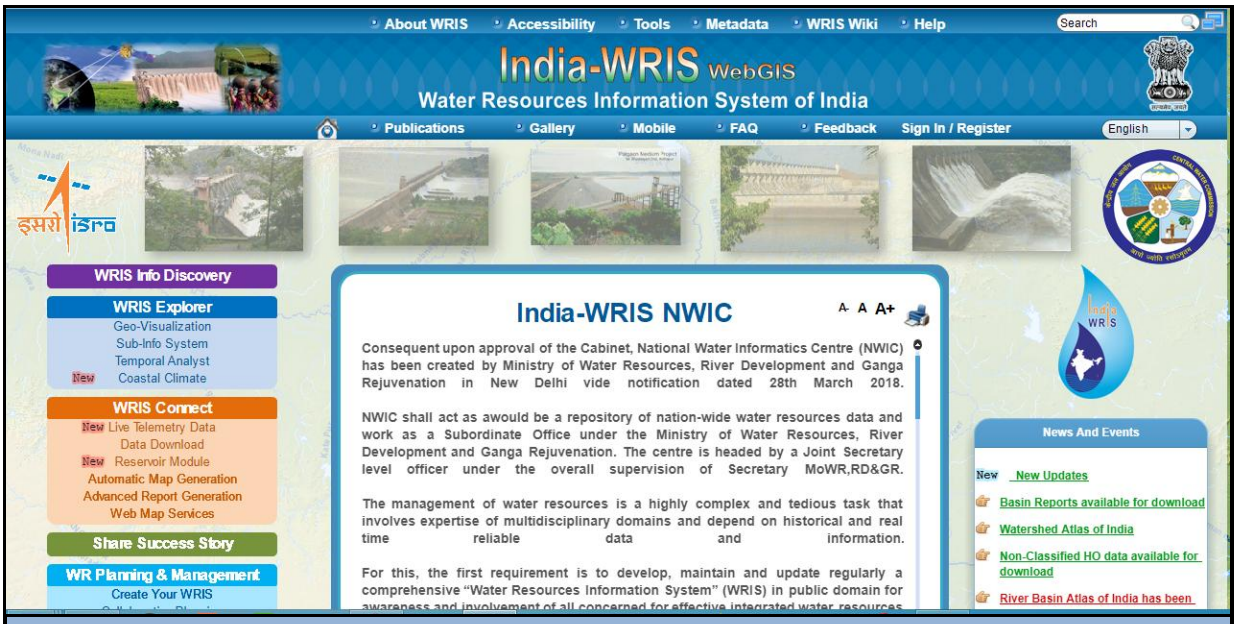
Development of Water Resources Information System (DWRIS)

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 five major components:

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

CWC & ISRO has jointly undertaken the work of development of Water Resources Information System (DWRIS) during 11th plan. The estimated cost of the project was Rs. 78.3164 Crores. The MoU was signed between CWC and ISRO during the month of December 2008 and the project was to be completed in 4 yrs time period i.e. upto December 2012. The project comprises of 30 major GIS layers (viz. River network, basins, canal network, water bodies, hydro meteorological network, administrative layers etc.) of the country at a scale of 1: 50000. The first full version of website of INDIA WRIS has been launched on 07 Dec, 2010 in New Delhi by Hon'ble Minister Water Resources. Five versions of website of India-WRIS have been launched so far. The version 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 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 December 2017. Later, the updation of portal has



Home Page of India-WRIS WebGIS Portal

again been restarted by CWC since 1st February 2018 through hiring of individual consultants. During the year 2017-18, The MIS for obtaining data from States for preparation of compilation of MMI projects by Project Monitoring Organisation has been completed and hosted on CWC website. Refinement and updation layers in respect of rivers, watershed and water bodies are under progress.

In order to maintain and update such a large volume of water resources data at national level, it has been planned to establish a new setup "National Water Information Centre (NWIC)" under the Ministry. Proposal for creation of NWIC is under process in MoWR, RD & GR

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. As per XII Plan guidelines, financial assistance of 75% and 90% of cost of balance works of irrigation and drinking water component of the projects is provided as Central Grant to projects in Non-Special Category States and Special Category States respectively. Central Government has declared 16 water resources projects as National Project so far.

Construction of Lining of Left Main Canal of Polavaram Project

The National Projects has now been included as a component under the Pradhan Mantri Krishi Sinchai Yojna (PMKSY). Accordingly, funding pattern for schemes has also been revised. Now, Central Grant is provided as 60% of cost of balance works of irrigation and drinking water component of the projects to general category States. The projects in Sikkim, seven North Eastern States and three Himalayan States (Jammu &Kashmir, Himachal Pradesh and Uttarakhand) continue to receive grant at the rate of 90%.

1.6 Modernization and Renovation works in CWC HQ

The modernization and renovation works of CWC Head Quarter Building (Sewa Bhawan, R K Puram) was started in 2010-11 through CPWD. The works for 9th and 8th floor were completed. During 2015-16, the work for

modernization and renovation of remaining floors was awarded to National Projects Construction Corporation Ltd (NPCC) and work for 7th Floor (South Wing) was completed by March 2017. During the year 2017-18, the work for 6th Floor (South Wing), 5th Floor (South Wing) and 4th Floor (South Wing) were completed. The works for 2nd Floor (South Wing), Training Hall and Conference Hall were under progress as on March 2018.

1.7 CWC Personal Information System

A Personal Information System is operational in CWC for up-keeping and maintenance of personal records of employees working in CWC. Different modules under this system include APAR Management System (APARMS), GPF Information System and CWES Bio-data Information System. The details of the system 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 Implementation 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 has been included under e-office. The process for implementing e-office in Regional Office is under progress.

1.7.3 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. 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.

1.7.4 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.

1.8 Aadhaar Enabled Biometric Attendance System (AEBAS):

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

1.9 Central Water Commission Library

CWC Library is one of the most prestigious technical reference library 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 complementary 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 are

two fully air-conditioned reading rooms with latest journals / magazines and news papers. The library is being progressively modernized and automated, in order to serve the users in a better, fast and accurate way by providing latest available information from across the globe.

The Map Record Section is also a unit of L&IB. It has collection of approximante eighteen thousand toposheet, state map, rail map, political map etc.

An auditorium, which is a part of library building, has been made operational since January 2014. Other facilites in the permisses includes conference hall for organizing training, seminar, meeting etc.

1.10 Progressive Use of Hindi in Official Work

The official language policy is being implemented in all the offices under the administrative control of the Central Water Commission. To ensure the proper compliance of officials Language Act, 1963 and other rules ad regulation related thereto, a Hindi Section is functioning at CWC Headquarter. Continued measures are taken for improving progressive use of Hindi for official purpose. The Official Language Implementation Committee of the

Inspection by Second Sub Committee of Standing Parliamentary Commuittee on Official Language on 19 May 2017

Commission meets regularly under the Chairmanship of the Chairman, Central Water Commission. Various measures required for progressive use of Hindi are discussed and timely action is being taken on the decisions taken in the meetings. Sufficient progress has been made in the implementation of the Official Language Act and Rules in the Commission. As on March 2018, Sixty Three (63) Field Offices of CWC has been notified under Rule 10(4) of OL Rules, 1976 . Further, eleven (11) Administrative Sections of CWC are identified to work only in Hindi.

Following initiatives in regard to progressive use of Hindi were undertaken during the year 2017-18:

1. 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 are taken for rectifying short- comings noticed during the inspection. During the year 25 Regional Office and 19 Directorates were inspected.
2. 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.
3. 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.
4. "Hindi Pakhwara" was organized from 01 to 14 September 2017 for effective implementation of the official language policy and to create awareness about Raj-bhasha,. 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.

5. Raj Bhasha Shields for the year 2017-18 were awarded to the Field Offices of Central Water Commission situated in regions, A, B and C to Middle Ganga Division - III, Varanasi, Monitoring(C) Organisation, Nagpur & Middle Brahmaputra Division, Dibrugarh respectively. Raj Bhasha Shield for Directorates and Sections at HQs were awarded to Flood Forecasting Monitoring Dte. & Establishment-I Section respectively for doing their maximum work in Hindi during the year.
6. Apart from translation of documents falling under section 3(3) of the Official Language Act, the Annual Report of the Central Water Commission and other urgent translation material received from MoWR,RD&GR were translated into Hindi.
7. Hindi books were purchased for the Central Water Commission Library as per the targets fixed in the Annual Programme of the Department of Official Language.
8. As per Annual Programme of Department of Official Language, Unicode font (Mangal) has been installed in all computers in CWC(HQ) during the year.

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 installments.

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. 1,50,000/- and emergency loan of Rs. 15,000/-, recoverable in 60 and 10 monthly installments 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 2017-18 are as under:

- Shri Ashwani Kumar, ASO(E-IV), CWC has won the Bronze Medal in 100 m Race (Vet.) in the Inter-Ministry Athletics Meet 2017-18
- The CWC Athletics Team under the Captainship of Shri Satish Kumar, AD, Mon(N) Dte. has won the March Past Trophy in the Inter-Ministry Athletics Meet 2017-18
- Shri Ashwani Kumar, ASO(E-IV), CWC and Smt. Savitri Chaubey, Sr.D'man(E-X), CWC has won the Bronze Medal in Mixed Doubles (Vet.) in the Inter-Ministry Badminton Tournament 2017-18.
- Shri Ashwani Kumar, ASO(E-IV), CWC and Shri Sunil Kumar, JSA, A/Cs (Works) Section, CWC has represented as Coach and Manager of the Central Secretariat Badminton Team in the All India Civil Services Badminton Tournament 2017-18 held at Raipur, Chhattisgarh.. The team won Silver Medal.
- Shri Ashish Yadav, Sr. D'man, BCD(E&NE) Dte., CWC has won the Bronze Medal in the Inter-Ministry Chess Tournament 2017-18.
- The CWC Hockey Team under the captainship of Shri I. J. Sharma, SPA, Publication Division has won the Bronze

Medal in the Inter-Ministry Hockey Tournament 2017-18.

- Shri Ravi, MTS, Mon(S) Dte. has won the Bronze Medal in the 100 m Freestyle Event in the Inter-Ministry Swimming Tournament 2017-18.
- Shri Parvinder, MTS, O/o US(CM&V) has won the Silver Medal in the Best Physique Event in the Inter-Ministry WL/PL/BP Tournament 2017-18.

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 1.2 and Table 1.3

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

Table 1.2

Representation of OBC, SC & ST Officials in Different Grades (As on 1.1.2018)

Category	No. of Filled Posts	No. of SCs	No. of STs	No. of OBCs
Group A	526	78	28	66
Group B	888	138	49	144
Group C	695	162	37	163
Total	**2109**	**378**	**114**	**373**

Table 1.3

Representation of PWD (OH/VH/HH) Officials in Different Grades (As on 1.1.2018)

Category	Orthopedic Handicapped (OH)	Visually Handicapped (VH)	Hearing Handicapped (HH)	TOTAL
Group A	5	-	-	5
Group B	11	1	6	18
Group C	6	7	3	16
Total	**22**	**8**	**9**	**39**

Charter for CWC. The Citizen's Charter was finalized with the concurrence of MoWR 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

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Meeting taken by Shri Nitin Gadkari Hon'ble Minister(WR,RD&GR) to review the activities of CWC on 13.03.2018 at Sewa Bhawan, New Delhi

Visit of Malawi delegation to CWC HQ for discussion on technical collaboration

Visit of Shri Nitin Gadkari Hon'ble Minister(WR,RD&GR) at CWC Stall during India Water Week

CHAPTER-II

WATER RESOURCE DEVELOPMENT

2.1 Water Resources in India

Central Water Commission (CWC) has been making periodic assessment of the country's water resources. The water resources potential of the country, which occurs as a natural runoff in the rivers is about 1869 Billion Cubic Meters (BCM). It constitutes a little over 4% of the total river flows of the world. However, due to various constraints of topography and uneven distribution over space and time, only about 1137 BCM of the total annual water potential can be put to beneficial use. This can be achieved through 690 BCM of utilizable surface water and 447 BCM through ground water.

While water for drinking purpose has been accorded top most priority in water use, irrigation is the major consumer of water. Ultimate Irrigation Potential which can be created through 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 by the end of XI Plan.

Besides this, an additional irrigation potential of about 35 Mha can be created by taking up long distance inter basin transfer of water from surplus to deficit basins.

In order to appropriately address the present and future water demand and food grain requirements of the society, the following thrust/priority areas for water resources related issues have been identified by the Government.

- Improving water utilization efficiency;
- Command area development and participatory irrigation management;
- Flood management and erosion control;
- Protection from coastal erosion;
- Dam safety and rehabilitation;
- Revival and restoration of existing water bodies;
- Appropriate regulation and management of ground water;
- Ground water recharge;
- Inter-linking of rivers;
- Rural drinking water supply and sanitation;

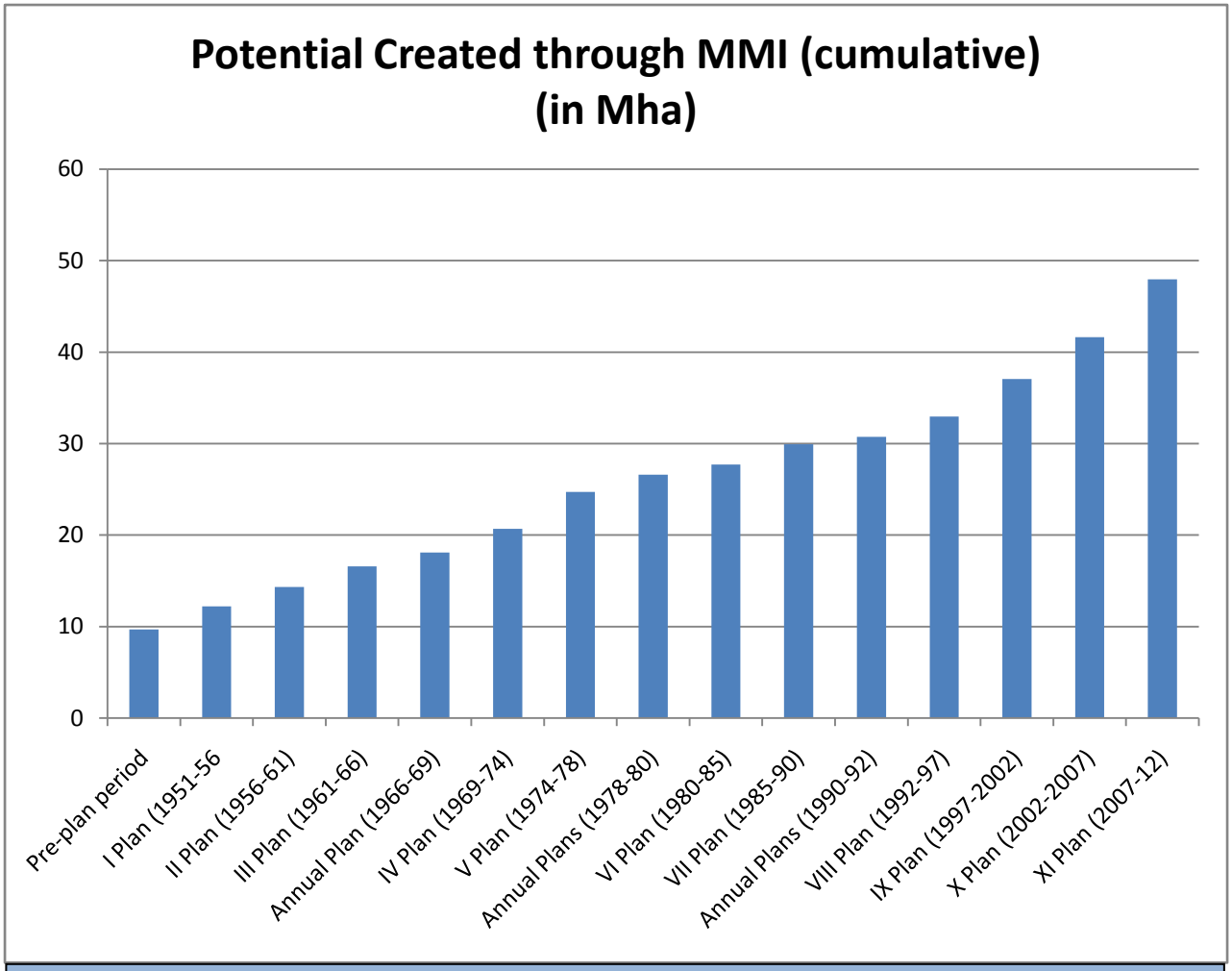

Fig 2.1 Growth of Irrigation Potential Created through Major and Medium Irrigation Project during Pre-Plan and Plan Period (Cumulative)

Central Water Commission is directly and indirectly contributing in achieving the objectives of these thrust/priority areas.

2.2 Highlights of Water Resources Sector

As the variability of rainfall over the country is well known, the development of water resources for irrigated agriculture received high priority in the different Plan periods. Expansion of irrigation facilities, along with consolidation of the existing systems, has been the main strategy for increasing production of food grains.

Irrigation support is provided through major, medium and minor irrigation projects and command area development.

Table 2.1

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

(Thousand ha.)

Sl No	Name of State/ UT	Ultimate Irrigation Potential	Potential Creation				
			Upto IX Plan	During X plan	Upto end of X Plan	During XI Plan (Ant.)	Upto end of XI Plan (Ant.)
1	Andhra Pradesh	5000.00	3303.22	439.44	3600.21	1203.52	4803.73
2	Arunachal Pradesh	0.00	0.00	1.20	1.20	0.00	1.20
3	Assam	970.00	243.92	68.98	302.69	153.27	455.96
4	Bihar	5223.50	2680.00	279.00	2879.00	175.46	3054.46
5	Chhattisgarh	1146.93	922.50	888.18	1137.00	132.32	1269.32
6	Goa	62.00	21.17	16.48	33.75	21.80	55.55
7	Gujarat	3000.00	1430.37	788.13	2230.50	1448.59	3679.09
8	Haryana	3000.00	2099.49	91.87	2193.70	12.59	2206.29
9	Himachal Pradesh	50.00	13.35	2.10	15.45	15.00	30.45
10	Jharkhand	1276.50	354.47	23.61	397.77	132.94	530.71
11	Jammu Kashmir	250.00	179.69	249.50	187.30	138.31	325.61
12	Karnataka	2500.00	2121.12	6.63	2637.71	328.12	2965.83
13	Kerala	1000.00	609.49	480.98	669.49	46.20	715.69
14	Madhya Pradesh	4853.07	1386.90	65.00	1931.90	574.53	2506.43
15	Maharashtra	4100.00	3239.00	255.15	3494.15	634.56	4128.71
16	Manipur	135.00	91.15	11.90	106.55	51.95	158.50
17	Meghayala	20.00	0.00	0.00	-	-	-
18	Mizoram	0.00	0.00	0.00	-	-	-
19	Nagaland	10.00	0.00	1.00	-	-	-
20	Orissa	3600.00	1826.56	163.41	1974.36	173.00	2147.36

Sl No	Name of State/ UT	Ultimate Irrigation Potential	Potential Creation				
			Upto IX Plan	During X plan	Upto X Plan	During XI Plan (Ant.)	Upto XI Plan (Ant.)
21	Punjab	3000.00	2542.48	62.19	2574.67	109.72	2684.39
22	Rajasthan	2750.00	2482.15	408.20	2861.58	305.55	3167.13
23	Sikkim	20.00	0.00	0.00	-	-	-
24	Tamil Nadu	1500.00	1549.31	11.75	1562.56	15.71	1578.27
25	Tripura	100.00	4.90	13.80	14.05	15.20	29.25
26	Uttar Pradesh	12154.00	7910.09	871.26	8781.97	506.12	9288.09
27	Uttarakhand	346.00	280.30	9.35	288.98	0.00	288.98
28	West Bengal	2300.00	1683.29	86.52	1754.81	146.60	1901.41
29	Union Territories	98.00	6.51	0.00	0.00	0.00	0.00
	Total	58465.00	36981.43	5295.63	41637.86	6341.06	47972.41
Source: Erstwhile Planning Commission							

2.2.1 Irrigation Potential: Major & Medium Irrigation Sector

The Ultimate Irrigation Potential of the country is estimated as 139.9 Mha, out of which Irrigation Potential 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 and State-wise cumulative potential created through major and medium projects up to end of IX Plan, during & cumulative up to X Plan and anticipated potential creations during XI Plan are given in Table 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

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	Upto XI Plan	Total	Pre-plan	Upto 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

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 up to XI Plan are given in Table 2.2.

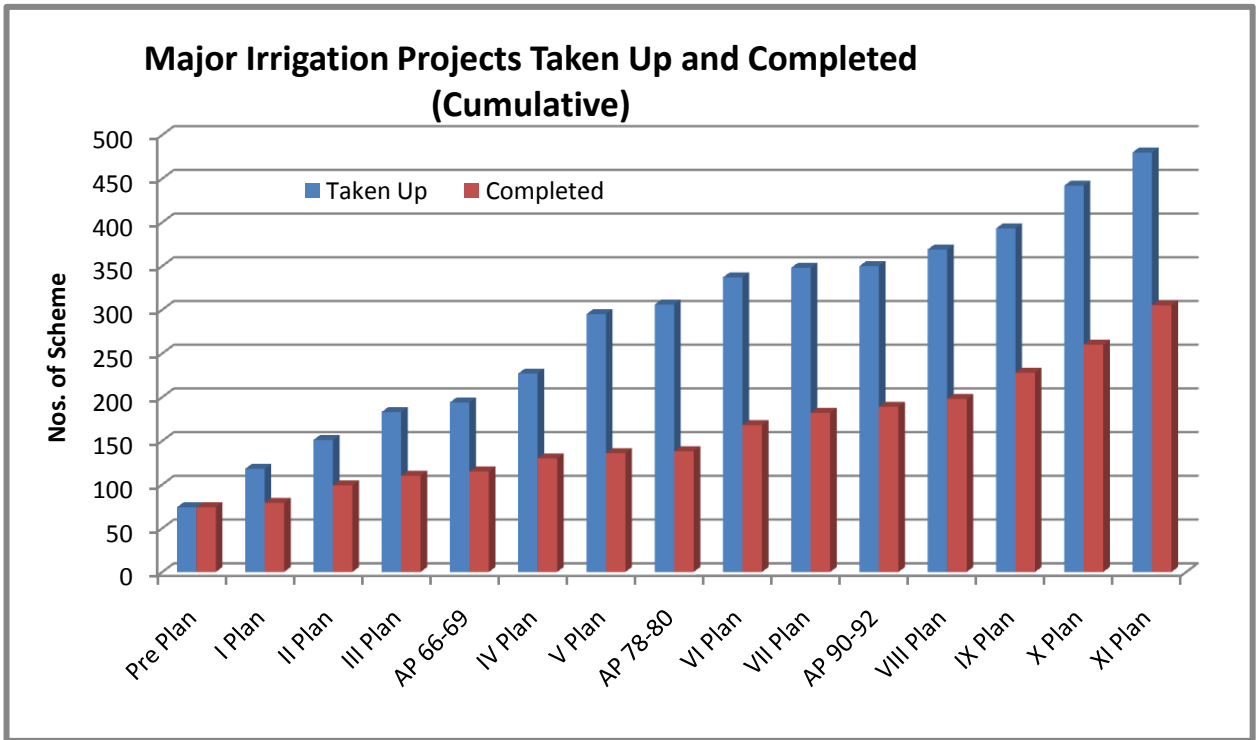

Fig 2.2 Major Irrigation projects taken up and completed (Cumulative)

Table 2.3

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

The cumulative irrigation potential created till the end of XI Plan is 47.97 Mha. Working Group on MMI & CAD for XII Plan has recommended target for additional potential creation of 7.79 Mha during the XII Plan. 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

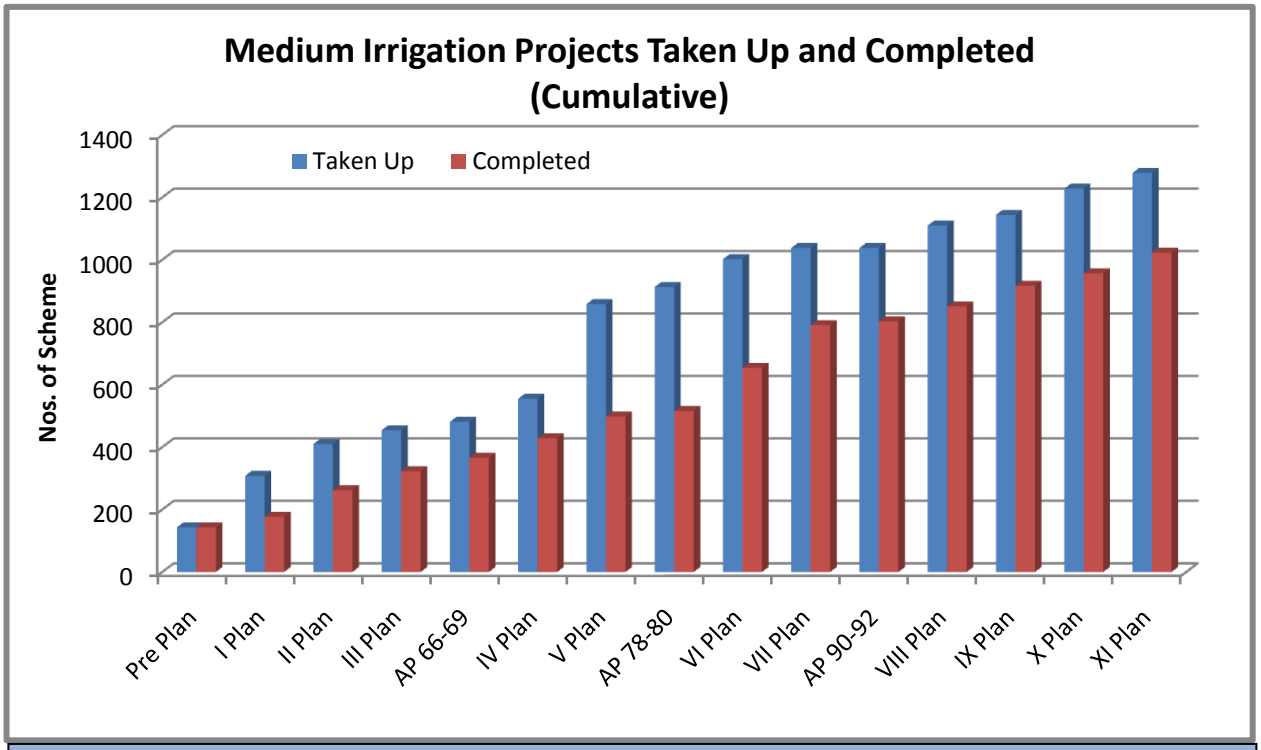

Fig 2.3 Medium Irrigation projects taken up and completed (Cumulative)

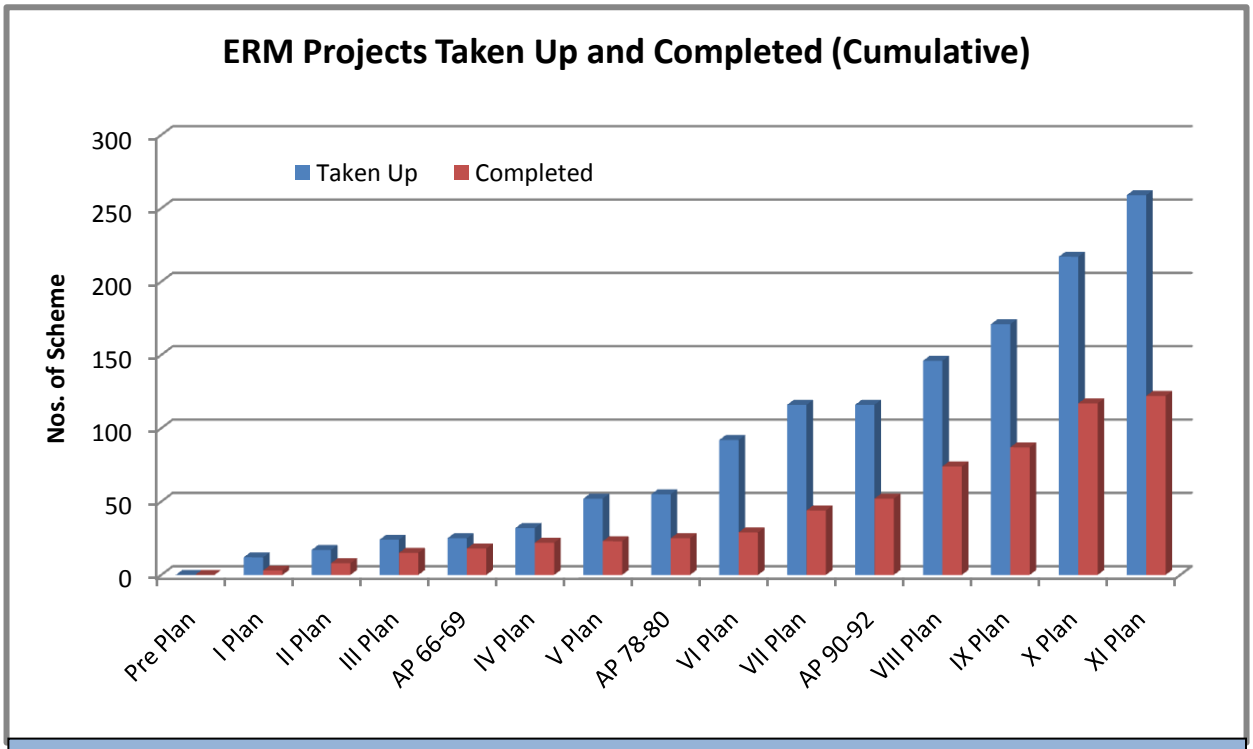

Fig 2.4 Modernization of ERM Projects taken up and Completed (Cumulative)

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.

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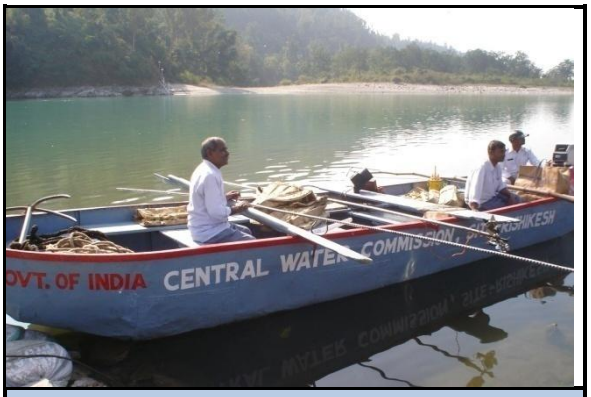
CHAPTER-III

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. India from river basin point of view 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 activities etc.

Central Water Commission is operating a network of 878 Hydrological Observation (HO) stations in different river basins of the country to collect (i) water level, (ii) discharge, (iii) water quality, (iv) silt and (v) selected meteorological parameters including snow observations at key stations. The basin-wise distribution of HO stations is given in Table 3.1.



Discharge observation in progress

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

In addition to this, Central Water Commission has opened 722 new sites. However, measurement of few parameters with reduced frequency is being done at these sites due to paucity of required manpower. This will help in addressing the data requirement of the country more precisely and in better scientific manner.

Table 3.1

Basin-wise number of Hydrological Observation Stations

S. No.	Name of Basin	No. of Sites
1.	Brahmani-Baitarni Basin	15
2.	Cauvery Basin	34
3.	East Flowing rivers between Mahanadi and Pennar	13
4.	East Flowing rivers between Pennar and Kanyakumari	17
5.	Ganga/Brahmaputra/Meghna/Barak Basin/ Teesta Basin	445
6.	Godavari Basin	77
7.	Indus Basin	26
8.	Krishna Basin	53
9.	Mahanadi Basin	39
10.	Mahi Basin	12
11.	Narmada Basin	26
12.	Pennar Basin	8
13.	Sabarmati Basin	13
14.	Subernarekha Basin	12
15.	Tapi Basin	18
16.	Teesta Basin	05
17.	West Flowing Rivers from Tadri to Kanyakumari	29
18.	West flowing rivers from Tapi to Tadri	22
19.	West flowing rivers of Kutchh and Saurashtra including Luni	14

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.

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Planning & Development Organization at CWC headquarter at Delhi maintains hydrological data pertaining to all rivers of India. The data is provided to the bonafide users on request following a set procedure and 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 at 406 key locations covering all the major river basins of India. At present the water quality network covers 67 main rivers, 138 tributaries and 64 sub-tributaries.

CWC is maintaining a three tier laboratory system for analysis of the physic-chemical parameters of the water. The Level-I laboratories are located at 403 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 analyse 25 nos. of physico-chemical characteristics and bacteriological parameters of water. 5 Level-III/II+ laboratories are functioning at Varanasi, Delhi, Hyderabad, Coimbatore and Guwahati where 41 parameters including heavy metals / toxic parameters and pesticides are analysed.

CWC Water Quality Lab

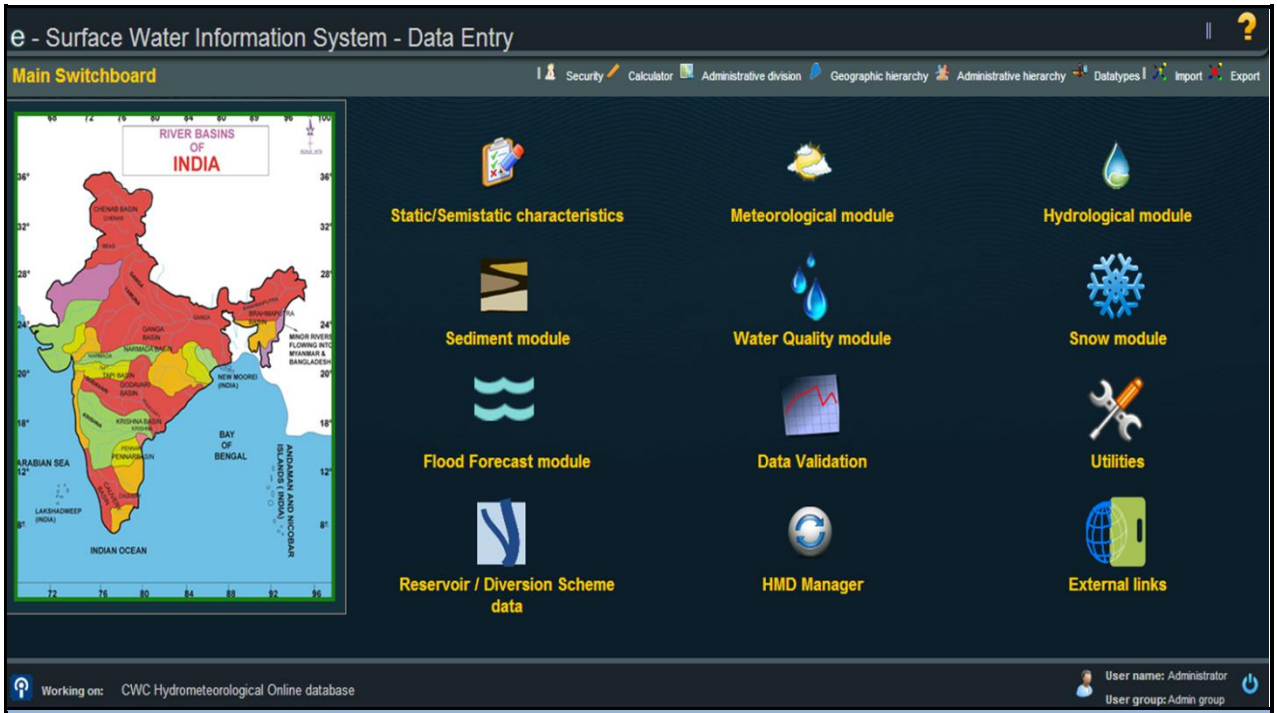
As on March 2017, the National River Water Quality Laboratory, CWC, New Delhi was accredited by National Accreditation Board for Testing and Calibration Laboratories (NABL) in accordance with Standard ISO/IEC 17025_2005 in the disciple of Chemical as well as biological testing. During the year 2017-18, the Krishna and Godavari River Water Quality Laboratory, Hyderabad; Upper and Middle Ganga Water Quality Laboratory, Varanasi and Lower Cauvery Water Quality

Laboratory, Coimbatore have also been accredited by NABL under Chemical Discipline.

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 Online Surface Water Information System (eSWIS):

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.



User Interface for Online Surface Water Information System (eSWIS)

To overcome the above drawbacks which were encountered during the running of above software, Central Water Commission has developed an Online Surface Water Information System (eSWIS) software during the Hydrology Project-II (HP-II). The main objectives of development of the new software were to replace obsolete components of existing software, improving its system architecture and adding some new components. The development of eSWIS was focused on using open source software, replacing the underlying database system used for central storage of hydro-meteorological data, replacing the existing system for validation and data processing, moving data entry from stand-alone systems to a web environment and providing web services required for data dissemination and to include the facility of Flood Warning functions currently hosted by the WISDOM web site. The benefits of eSWIS software are as under:

- Based on web and desktop applications both.
- Data and functionality will be integrated.
- 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
- Time from data-entering to data-dissemination will be largely decreased.
- Data can be entered offline and it will be sent when online connection is available.
- Data Integration is automatic and there is no need to physically send the data for central depository.

The e–SWIS software is operational in Central Water Commission and many HP-II States since 2014-15. It is basically having three primary module viz. eSWDES for entry & processing of hydro-meteorological data, e-FF for dissemination of flood forecast and e-SV for secondary validation. Central Water Commission is using its e-FF module extensively since 2014 while other modules are being used since the beginning of 2015. All the historical data of CWC has already been transferred to eSWIS software. A number of training program on eSWIS has been conducted in CWC during and after HP-II project period. The necessary guidelines for operation of eSWIS have been circulated to all field offices. Further, It is again proposed to upgrade e-SWIS as per latest requirements of CWC and other IAs.

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 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 47 implementing agencies (IAs) including 8 central agencies, 37 State-level agencies and two River Basin Organizations (RBO) in NHP. Central Water Commission is one of the implementing agencies under NHP which has to play a crucial role of central technical coordination agency. Central Water Commission has been allocated funds totalling to about Rs. 275 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 which will improve the overall efficiency.

- **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 2017-18 are as under:

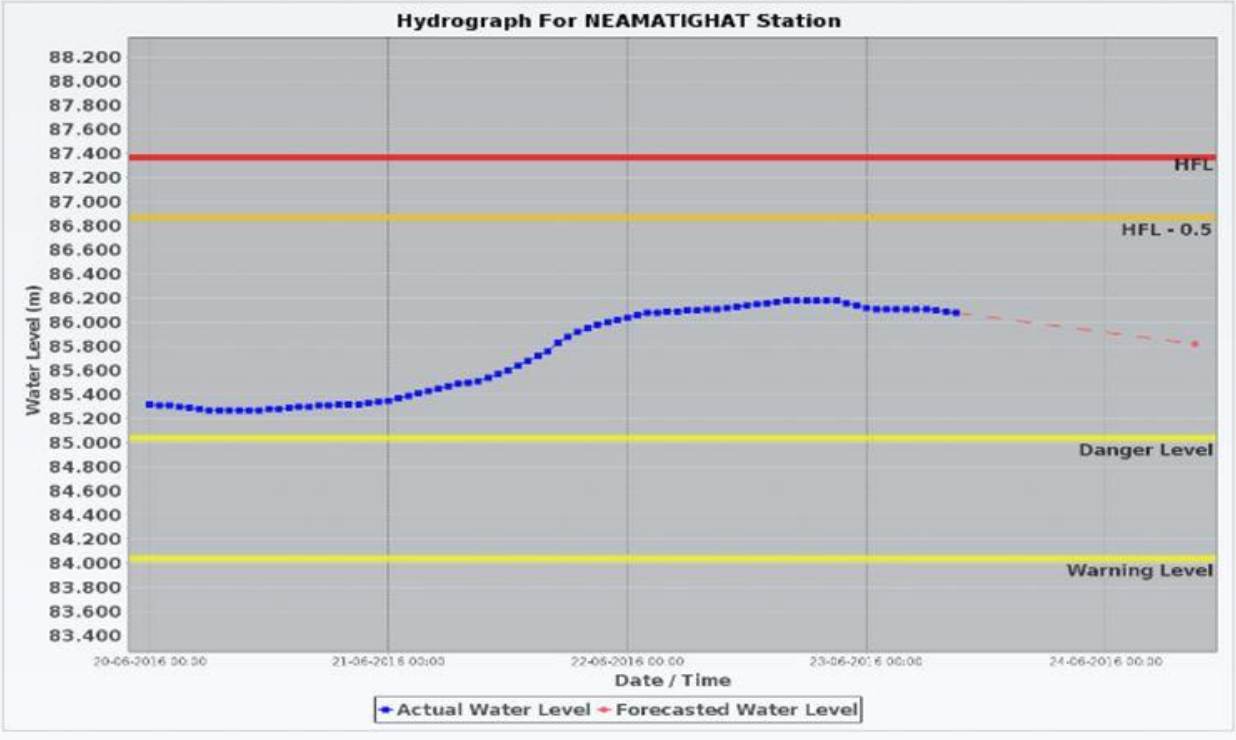
- The empanelment of Hydro-Meteorological and Water Quality Equipment's under Framework Agreement under National Hydrology Project was completed.
- The Expression of Interest (EoI) received for IWRM Studies of three Indian River Basins (Krishna, Godavari and Mahanadi) was examined and Bid Evaluation Report and RFP Document for the same were prepared.
- The hydro-meteorological network proposed to set up by various State Implementing Agencies under NHP was finalized.
- The Centre for Excellence for Water Resources, River Development and River Rejuvenation is proposed to be created under NHP at Hyderabad. A Concept Note for the same has been prepared and sent to Ministry for further deliberation and finalization.

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 226 flood forecasting stations, of which 166 are level forecasting and 60 are inflow forecasting stations on major dams/ barrages, spread over 20 States viz. Andhra Pradesh, Arunachal Pradesh, Assam, Bihar, Chhattisgarh, Gujarat, Haryana, Jammu & Kashmir, Jharkhand, Karnataka, Madhya Pradesh, Maharashtra, Orissa, Rajasthan, Tamil Nadu, Telangana, Tripura, Uttarakhand, Uttar Pradesh & West Bengal and one Union Territory Dadra & Nagar Haveli and the National Capital Territory of Delhi. It covers 19 major river systems in the country.

On an average, over 6000 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.



Near real time information on water level available on website https://india-water.gov.in/ffs

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.

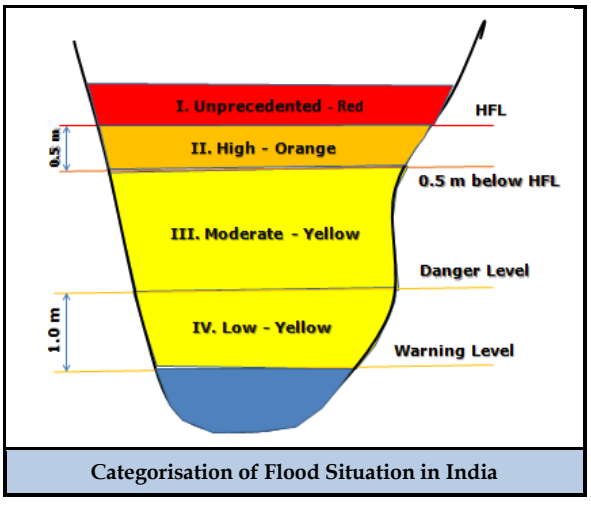
The flood forecasting services is provided by CWC during a designated flood period in a year in order to cover pre monsoon and post monsoon incidents. The designated flood period was last reviewed in 2013 and accordingly the designated flood period for various basins as given below:

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

Depending upon the water level of the river, Central Water Commission has categorized the flood situations at a station into four different categories namely, low, moderate, high & unprecedented flood situation. The details are as under , depending upon with reference to warning level, danger level, and highest flood level.

Low Flood Situation: The river is said to be flowing in "Low Flood Situation" 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.

Moderate Flood Situation: The river is said to be flowing in "Moderate Flood Situation" at any station when the water level of the river touches or crosses the Danger Level, but remains 0.50 m or more below the Highest Flood Level (HFL) of the station.



Categorisation of Flood Situation in India

High Flood Situation: The river is said to be flowing in "High Flood Situation" at any station when the water level of the river at the station is 0.50 m or less below the HFL of the station. In "High Flood Situation" a special "Orange

Bulletin" is being issued by the Central Water Commission to the users agencies which contains the details related to the flood situation.

Unprecedented Flood Situation: The river is said to be flowing in "Unprecedented 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 2017

During the year, the flood forecasting activity began from 3rd April 2017. Due to continuous rain in Jhelum basin, River Jhelum crossed Warning Level on 5th April 2017 and flowed in moderate flood situation for next two days i.e. 6th and 7th and fell below warning level on 8th April 2017. The river Dhansiri(S) at Numaligarh, river Kopili at Kampur, river Barak at Badarpurghat, river Kushiyara at Karimganj flowed above Warning Level from 3rd April to 8th April 2017. The river Brahmaputra at Dibrugarh and Neamatighat and River Jia-Bharali at N T Road Crossing flowed in low flood situation from 27th to 30th April 2017.

During the regular flood season 2017 (May to December), 6297 flood forecasts (5085 level forecast and 1212 inflow forecasts) were issued out of which 5901 (93.71%) forecasts were found within accuracy limit (± 0.15 m for level forecast and ± 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 on 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 was 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. During the year, such advisories were issued on 9 occasions with details as under:

1. On 9th July 2017 for North Eastern Region
2. On 13th July 2017 for Western India
3. On 18th July 2017 for Odisha, Andhra Pradesh, Chhattisgarh, Telangana, Maharashtra and Karnataka
4. On 21st July 2017 for Gujarat
5. On 27th July 2017 for Jharkhand, Madhya Pradesh, Gujarat and Rajasthan
6. On 29th July 2017 for Himachal Pradesh and Uttarakhand
7. On 10th August 2017 for Assam, Arunachal Pradesh, North Bihar and Eastern Uttar Pradesh
8. On 29th August 2017 for Gujarat, Maharashtra, Chhattisgarh, Telangana, Karnataka and Tamil Nadu
9. On 1st December 2017 for Tamil Nadu, Kerala and Southern Andhra Pradesh

3.2.2 Significant Flood Situations during 2017

Unprecedented Flood Situation

During the flood season of 2017, out of 166 level forecasting stations, Unprecedented Flood Situation was witnessed at 8 stations. Further, 12 more stations, where water level is being monitored by CWC, witnessed Unprecedented Flood Situation during the period. The details of such stations are given in Table - 3.2.

High Flood Situation

During the year, High Flood Situation was witnessed at 22 Level Forecasting stations. Further, 12 more stations, where water level is being monitored by CWC, witnessed High Flood Situation during the period. The details of such stations are given in Table - 3.3.

Moderate Flood Situation

During the year, Moderate Flood Situation was witnessed at 42 Level Forecasting stations. The details of such stations are given in Table - 3.3.

Low Flood Situation

During the year, Low Flood Situation was witnessed at 25 Level Forecasting stations. The details are as under:

Table 3.2
Details of stations which witnessed Unprecedented Flood Situation during the flood season of 2017

Sl. No.	State	District	River	Station	Period	
					From	To
Level Forecasting Stations						
1.	West Bengal	Hooghly	Mundeswari	Harinkhola	28/07/2017	28/07/2017
2.		Coochbehar	Raidak-I	Tufanganj	12/08/2017	13/08/2017
3.	Bihar	Supaul	Kosi	Basua	13/08/2017	13/08/2017
4.		Purnia	Mahananda	Dhengraghat	14/08/2017	14/08/2017
5.		Katihar		Jhawa	14/08/2017	14/08/2017
6.		Gopalganj	Gandak	Dumariaghat	15/08/2017	15/08/2017
					16/08/2017	18/08/2017
7.	Uttar Pradesh	Balrampur	Rapti	Balrampur	15/08/2017	16/08/2017
8.		Siddhartha Nagar		Bansi	20/08/2017	23/08/2017
Other Monitoring Stations						
1	West Bengal	Alipurduar	Sankosh	Sankosh LRP	09/07/2017	13/08/2017
2	Gujarat	Ahmedabad	Sabarmati	Vautha	27/07/2017	28/07/2017
3	Arunachal Pradesh	Anjaw	Lohit	Kibithu	10/08/2017	12/08/2017
4	Bihar	Araria	Mahananda	Araria	13/08/2017	14/08/2017
5		Sitamarhi	Bagmati	Dheng Bridge	13/08/2017	13/08/2017
6				Runisaidpur	13/08/2017	13/08/2017
7		Kishanganj	Mahananda	Chargharia	13/08/2017	13/08/2017
8	Uttar Pradesh	Maharajganj	Rohin	Trimohinighat	15/08/2017	15/08/2017
9		Gorakhpur		Maniram	18/08/2017	18/08/2017
10	Karnataka	Bengaluru Rural	Arkavathy	T. Bekuppe	10/09/2017	11/09/2017
11	Tamil Nadu	Kanyakumari	Tamraparini	Kuzhithurai	01/12/2017	01/12/2017
12		Kanyakumari	Pazhayar	Ashramam	01/12/2017	01/12/2017

Table 3.3
Details of stations which witnessed High Flood Situation during the flood season of 2017

Sl. No.	State	District	River	Station	Period	
					From	To
Level Forecasting Stations						
1.	Assam	Hailakhandi	Katakhal	Matizuri	14/06/2017	14/06/2017
					15/06/2017	15/06/2017
2.		Karimganj	Kushiyara	Karimganj	28/06/2017	28/06/2017
3.		Sonitpur	Jia –Bharali	N T Road Crossing	02/07/2017	02/07/2017
					03/07/2017	03/07/2017
					04/07/2017	04/07/2017
					05/07/2017	05/07/2017
					09/07/2017	10/07/2017
4.		Dhubri	Sankosh	Golokganj	10/07/2017	10/07/2017
					12/08/2017	14/08/2017
5.		Barpeta	Beki	Road Bridge	11/07/2017	12/07/2017
					10/08/2017	11/08/2017
					12/08/2017	12/08/2017
6.		Dibrugarh	Brahmaputra	Dibrugarh	09/07/2017	10/07/2017
					10/08/2017	12/08/2017
7.		Jorhat		Neamatighat	11/08/2017	13/08/2017
8.		Sonitpur		Tezpur	12/08/2017	14/08/2017
9.		Sibsagar	Dikhow	Sibsagar	10/07/2017	12/07/2017
10.		Kokrajhar	Gaurang	Kokrajhar	11/08/2017	12/08/2017
11.		Dhubri	Brahmaputra	Dhubri	15/08/2017	16/08/2017
12.		Goalpara	Brahmaputra	Goalpara	14/08/2017	16/8/2017
13.	West Bengal	Coochbehar	Torsa	Ghugumari	12/08/2017	13/08/2017
14.		Jalpaiguri	Tista	Mekhliganj	13/08/2017	13/08/2017
15.	Bihar	Muzzafarpur	Bagmati	Benibad	14/08/2017	15/08/2017
16.		Khagaria	Kosi	Baltara	15/08/2017	18/08/2017
17.		Madhubani	Kamlabalan	Jhanjarpur	13/08/2017	14/08/2017
18.		Siwan	Ghagra	Gangpur Siswan	20/08/2017	23/08/2017

Sl. No.	State	District	River	Station	Period	
					From	To
19.	Uttar Pradesh	Badaun	Ganga	Kachhla Bridge	16/07/2017	16/07/2017
					03/08/2017	16/08/2017
					04/09/2017	06/09/2017
20.		Faizabad	Ghagra	Ayodhya	16/08/2017	20/08/2017
21.		Barabanki	Ghagra	Elgin Bridge	15/08/2017	18/08/2017
22.		Gorakhpur	Rapti	Birdghat	19/08/2017	23/08/2017
Other Monitoring Stations						
1	Assam	Sonitpur	Brahmaputra	Bhomraguri	12/08/2017	15/08/2017
2	Assam	Barpeta	Aie	N H Crossing	10/08/2017	13/08/2017
3	Assam	Bongaigao	Champamat	Bahalpur	11/08/2017	12/08/2017
4	Bihar	Supaul	Kosi	Birpur	12/08/2017	12/08/2017
5	Bihar	Kishanganj	Mahananda	Taibpur	12/08/2017	13/08/2017
6	UP	Shrawasthi	Rapti	Bhinga	12/08/2017	15/08/2017
7	UP	Bahraich	Rapti	Kakardhari	12/08/2017	12/08/2017
8	UP	Kheri	Sharda	Paliakalan	11/08/2017	12/08/2017
9	Bihar	Muzzafarpur	Burhi Gandak	Kanti	20/08/2017	21/08/2017
10	Gujarat	Banaskanta	Banas	Kamalpur	25/07/2017	25/07/2017
11	Odisha	Kendrapara	Brahmani-Baitarni	Indupur	30/07/2017	30/07/2017
12	Tamil Nadu	Nilgiri	Moyar	Thengumarhada	06/09/2017	06/09/2017

Table 3.4
Details of stations which witnessed Moderate Flood Situation during the flood season of 2017

Sl. No.	State	District	River	Station
1	Assam	Kamrup	Brahmaputra	Guwahati
2		Lohit	Tinsukia	Dholabazar
3		Dibrugarh	Buridehing	Chenimari (Khowang)
4		Lakhimpur	Subansiri	Badatighat
5		Sibsagar	Desang	Nanglamoraghat

Sl. No.	State	District	River	Station
6		Lakhimpur	Ranganadi	N T Road Crossing
7		Nagaon	Kopili	Kampur
8		Golaghat	Dhansiri (S)	Golaghat
9		Golaghat	Dhansiri (S)	Numaligarh
10		Kamrup	Puthimari	N H Crossing
11		Nalbari	Pagladiya	N T Road Crossing
12		Barpeta	Manas	N H Crossing
13		Karimganj	Barak	Badarpurghat
14		Cachar	Barak	Annapurnaghat
15		Morigaon	Kopili	Dharamtul
16	Arunachal Pradesh	East Siang	Siang	Passighat
17	West Bengal	Jalpaiguri	Tista	Domohani Road Bridge
18		Coochbehar	Jaldhaka	Mathabanga
19		Murshidabad	Ganga	Farakka Barrage
20	Bihar	Patna	Punpun	Sripalpur
21		Darbhanga	Adhwara Group	Kamtaul
22		Darbhanga	Adhwara Group	Ekmighat
23		Darbhanga	Bagmati	Hayaghat
24		Siwan	Ghaghra	Darauli
25		Purba Champaran	Burhi Gandak	Ahirwalia
26		Purba Champaran	Burhi Gandak	Lalbeghiaghat
27		Khagaria	Burhi Gandak	Khagaria
28		Samastipur	Burhi Gandak	Rosera
29		Samastipur	Burhi Gandak	Samastipur
30		Muzzafarpur	Burhi Gandak	Sikandarpur (Muzzafarpur)
31		Katihar	Kosi	Kursela
32	Uttar Pradesh	Ballia	Ghaghra	Turtipar
33		Kushinagar	Gandak	Khadda
34	Uttarakhand	Haridwar	Ganga	Haridwar
35	Jharkhand	Sahibganj	Ganga	Sahibganj
36		Purba Singhbhum	Subarnarekha	Jamshedpur
37	Odisha	Gajapati	Vamsadhara	Kashinagar
38		Bhadrak	Baitarni	Akhuapada

Sl. No.	State	District	River	Station
39		Keonjar	Baitarni	Anandpur
40		Balasore	Subarnarekha	Rajghat
41	Chhattisgarh	Bastar	Indravathi	Jagdalpur
42	Andhra Pradesh	Srikakulam	Nagavali	Srikakulam

Table 3.5
Details of stations which witnessed Low Flood Situation during the flood season of 2017

Sl. No.	State	District	River	Station
1	Tripura	North Tripura	Manu	Kailashahar
2	West Bengal	Jalpaiguri	Jaldhaka	N H 31
3	Bihar	Muzzafarpur	Gandak	Rewaghat
4		Patna	Ganga	Gandhighat
5		Patna	Ganga	Hathidah
6		Patna	Ganga	Dighaghat
7		Bhagalpur	Ganga	Kahalgaon
8		Bhagalpur	Ganga	Bhagalpur
9		Motihari	Gandak	Chatia
10	Uttar Pradesh	Muzzafarnagar	Yamuna	Mawi
11		Mathura	Yamuna	Mathura
12		Kannauj	Ganga	Kannauj
13		Kanpur	Ganga	Ankinghat
14		Kanpur	Ganga	Kanpur
15		Farukkabad	Ganga	Fathegarh
16		Ghaziabad	Ganga	Garhmuktheswar
17		Moradabad	Ramganga	Moradabad
18	Uttarakhand	Dehradun	Ganga	Rishikesh
19	NCT Delhi	Delhi North	Yamuna	Delhi Railway Bridge
20	Odisha	Jajpur	Brahmani	Jenapur
21		Rayagada	Vamsadhara	Gunupur
22	Gujarat	Ahmedabad	Sabarmati	Subash Bridge
23	Maharashtra	Ahmednagar	Godavari	Kopergaon
24	Karnataka	Kalaburagi	Bhima	Deongaon Bridge
25	Andhra Pradesh	Kurnool	Tungabhadra	Mantralayam

3.2.3 Inflow Forecast for Reservoirs

CWC provides Inflow Forecasts for 60 dams/reservoirs/barrages in various river basins in the country. The forecasts are issued for a dam/reservoir/barrage whenever the inflow to reservoir is more than a threshold inflow value, which is decided by the project authorities considering various factors such as safety of the dam, status of reservoir, downstream channel/ canal requirements. During the year 2017-18, 40 dams/reservoirs/barrages received inflow beyond the threshold inflow value. The list of such dams/ reservoirs/ barrages is given in Table 3.6

Table 3.6
List of dams/ reservoirs/ barrages for which inflow forecast was issued during the flood season of 2017

Sl. No.	State	District	River	Dams/ Reservoir/ Barrage
1	Karnataka	Kodagu	Harangi	Harangi Dam
2		Hassan	Hemavati	Hemavathy Dam
3		Mysuru	Kabini	Kabini Dam
4		Mandya	Cauvery	Krishnarajasagar Reservoir
5		Ballari	Tungabhadra	T B Dam
6		Shivamogga	Tunga	Upper Tunga Project
7		Chikmagaluru	Bhadra	Bhadra Dam
8		Vijayapura	Krishna	Almatti Dam
9		Kalaburagi	Krishna	Narayanpur Dam
10	Jharkhand	Bokaro	Damodar	Tenughat Dam
11		Santhal Parganas	Mayurakshi	Massanjore Dam
12		Dhanbad	Damodar	Panchet Dam
13		Dhanbad	Barakar	Maithon Dam
14		Purbi Singhbum	Subarnarekha	Chandil Dam
15	West Bengal	Bardhamman	Damodar	Durgapur Barrage
16		Birbhum	Mayurakshi	Tilpara Mihirlal Barrage
17		Medhinipur	Kangsabati	Kangsabati Dam
18	Odisha	Sambalpur	Mahanadi	Hirakud Dam

Sl. No.	State	District	River	Dams/ Reservoir/ Barrage
19	Uttarakhand	Champawat	Sharda	Banbasa Barrage
20	UP	Bulandshahar	Ganga	Narora Barrage
21		Chandauli	Rihand	Rihand Dam
22	MP	Shahdol	Sone	Bansagar Dam
23		Mandsaur	Chambal	Gandhisagar Dam
24	Gujarat	Valsad	Damanganga	Madhuban Dam
25		Banaskanta	Banas	Dantiwada Dam
26		Mehsana	Sabarmati	Dharoi Dam
27	Maharashtra	Jalgaon	Tapi	Hathnur Dam
28		Aurangabad	Godavari	Jaikwadi Dam
29	Andhra Pradesh	Srikakulam	Vamsadhara	Gotta Barrage
30		Kurnool	Tungabhadra	Sunkesula Barrage
31		Kurnool	Krishna	Srisailam Dam
32		Nellore	Pennar	Somasila Dam
33	Telangana	Gadwal	Krishna	P D Jurala Project
34	Tamilnadu	Salem	Cauvery	Mettur Dam
35		Erode	Bhavani	Bhavanisagar Dam
36		Tiruchirapalli	Cauvery	Upper Anicut
37		Thanjavur	Cauvery	Grand Anicut
38		Theni	Vaigai	Vaigai Dam
39		Thiruvallur	Kosasthaliyar	Poondi Satyamurthy Reservoir
40		Thiruvannamalai	Ponnaiyar	Sathanur 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 2017, 245 daily bulletins (once daily), 81 Orange Bulletins for High Flood Situation (Twice daily) and 58 Red Bulletins for Unprecedented Flood Situation (every 3 hours) were issued by CWC as per Standard Operating Procedure (SOP).

Apart from regular bulletins, CWC also prepared various status notes on

occurrence of severe flood events for discussions in NDMA, MoWR, National Crisis Management Committee (NCMC), National Executive Council (NEC) meetings.

3.2.5 Communication System of CWC used for flood forecasting purposes

Various modes of communication namely, wireless (VHF & HF), satellite, VSAT, Telephone, Mobile, Fax and Internet were used by CWC for flood forecasting purposes. Since beginning, Central Water Commission has been operating wireless stations covering almost all river basins to transmit and receive 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 High and Unprecedented 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 were 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 2017.

3.2.6 Modernization of Flood Forecasting Services

The 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.

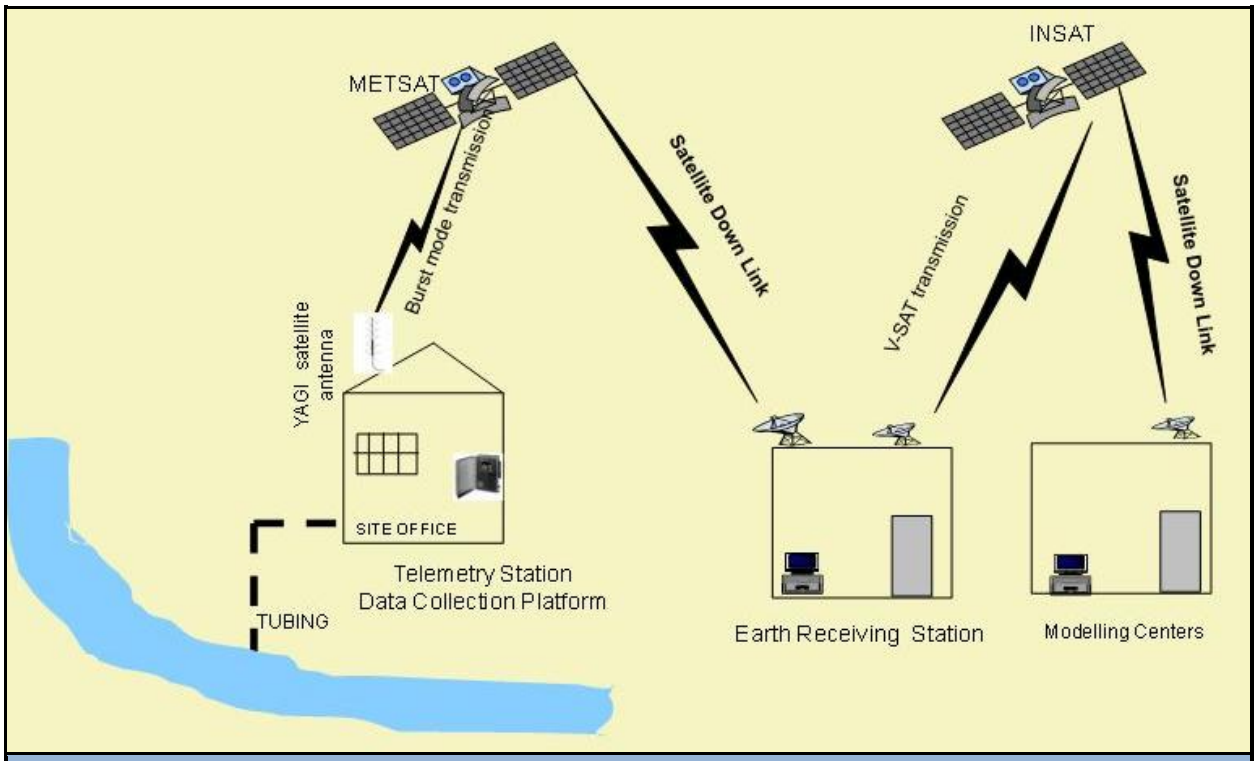
- Installation of telemetry system for automatic sensor based data collection and satellite based data communication.
- Development of mathematical model for forecast formulation

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 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 65 stations in six river basins namely, Brahmaputra(35), Yamuna (5), Godavari(7), Pennar(5), Krishna(8) and Eastern Rivers(5).



A Conceptual Model of Modernised Flood Forecasting System in India

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 period. 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 were under progress. Out of this, the installation of system at about 180 stations have been completed. The work for installation of system at remaining stations is in advanced stage and is likely to be completed during monsoon 2018.

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 is in progress.

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.

Up to March 2018, mathematical modelling for flood forecasting has been completed for the major river basins namely Brahmaputra, Barak, Cauvery,

Godavari, Krishna, Mahanadi, Narmada and Tapi. The development of mathematical models for remaining river basins is under progress.

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

The "Flood Management Programme (FMP)" was initiated by the Government of India in XI Plan for providing Central Assistance to the State Governments for undertaking the works related to river management, flood control, anti-erosion, drainage development, flood proofing including flood prone area development programme, restoration of damaged flood management works and anti-sea erosion works. During the plan period (2007-12), 420 Nos. of schemes of various State Governments with a total estimated cost of Rs. 7857.08 Crore were included for funding under FMP and Central Assistance totaling to Rs. 3566 Crore was released. By the end of XI Plan, 252 works were physically completed The completed works have restored 17.01 lakh hectare of old flood

prone area and provided reasonable protection to 2.59 lakh hectare of new flood prone area.

During XII plan period (2012-17), 102 Nos. of schemes of various State Governments with a total estimated cost of Rs. 5381.29 Crore were included for funding under FMP. During the period, an amount of Rs. 1307.07 Crore has been released.

The activities under the scheme are continuing during the period 2017-18. As per advice of the Ministry of Finance, the activities are proposed to be included under the scheme "Flood Management and Border Area Programme (FMBAP)". The EFC for the scheme with an outlay of Rs. 5285 Cr for 2017-20 period including provision of Rs. 4585 Cr for spill over works of XI and XII Plan is under consideration.

Ministry of Finance has also advised that the spillover works of XI and XII Plan under Flood Management Programme (FMP) needs to be completed first before taking up new works. Accordingly, a Committee has been formed under the chairmanship of Chairman, CWC. The Committee will review all XI and XII Plan spillover works under FMP to assess the status of their completion and the pending liabilities against the outstanding works.

Central Water Commission coordinates the release of funds for scheme under FMP in the area other than Ganga and Brahmaputra basin areas. The details of fund released during 2017-18 to States for areas other than Ganga basin is given in Table 3.7.

Table 3.7
State-wise fund released under Flood Management Programme during 2017-18

Sl No.	Name of State	Amount released (Rs. in Crore)
1	Himachal Pradesh	87.50
2	Jammu & Kashmir	110.40
3	Kerala	19.05
Total		206.95

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 Studies of three rivers namely, Ghaghra, Satluj and Gandak rivers were completed during 10th Plan period.

Under the Plan Scheme "R&D Programme in Water Sector", the morphological studies of 15 rivers (namely, Ganga, Sharda, Rapti, Kosi, Bagmati, Yamuna, Bramhaputra, Subansiri, Pagladiya, Krishna, Tungbhadra, Mahananda, Mahanadi, Hoogli, & Tapti) by using Remote Sensing Technology were awarded to various IITs /NITs on consultancy basis during the 12th Plan. Out of these, the Morphological Study of river Tapi has been completed by SVNIT Surat and the final report was submitted. The studies in respect of other 14 rivers are under progress in various IITs. The final reports are expected to be submitted by March, 2019. The institute-wise status of these studies is given in Table 3.8.

Table 3.8
Status of morphological studies of 14 rivers under progress in various IITs

Sl. No.	Institute	Name of Rivers	Status
1.	IIT Roorkee	Ganga, Sharda, Rapti	Draft Report Submitted
2.	IIT Delhi	Kosi, Bagmati, Yamuna	Draft Report Submitted
3.	IIT Guwahati	Bramhaputra, Subansiri, Pagladiya	Draft Report Submitted
4.	IIT Madras	Krishna, Tungbhadra	Draft Report Submitted
5.	IIT Kharagpur	Mahananda, Mahanadi, Hoogly	Interim Report Submitted

3.5 Coastal Erosion

The Indian coastline is 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.

This TA will be financed by grant amounting to two million USD ($) from Global Environment Facility (GEF) & administered by Asian Development Bank (ADB). The Ministry of Water Resources, River Development and Ganga Rejuvenation (MoWR, RD&GR) is the Executing Agency and Flood Management Organization (FMO) in Central Water Commission (CWC) under MoWR,RD&GR is designated as Nodal Office for the same. The three implementing agencies for CRCP&MP are Central Water and Power Research Station (CWPRS) Pune and the State Governments of Karnataka and Maharashtra. The implementation of this TA is scheduled to be completed by September, 2017.

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.

The draft Climate Change Adaption Guideline for Coastal Protection and Management in India was reviewed during the two Workshops held for the Panel of Experts. The Guidelines is under finalisation. The Final Guidelines will be considered by National

Technical Committee (NTC) headed by Member (RM), CWC. Two training courses in the use of the Guidelines for the maritime States/UTs and other concerned agencies have also been organized.

As a part of TA, research studies were also awarded to specialist institutes NIO, Goa, IIT Bombay & IIT Delhi. These institutes have submitted their Final Reports to ADB for consideration. 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 alongwith 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 for this purpose.

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 (NCPP) 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.

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. CPDAC provides a common platform to all maritime States/UTs to discuss and solve their coastal erosion problems. Till now, 15 meetings of CPDAC have been held. The last meeting was held on 17th August 2017 at New Delhi.

As per decision taken by CPDAC, CWC has compiled and published a Status Report on Coastal Protection and Development in India in December, 2016. The document is available on CPDAC Website (http://cwc.gov.in/CPDAC-Website/index.html)

As per decision taken in 13th CPDAC meeting, a Sub-committee of CPDAC on Coastal Data Collection, Compilation and Publication was constituted. The Report of the Sub-Committee was accepted by CPDAC in its 15th meeting and was published by CWC in December 2017. The document is available on CPDAC Website (http://cwc.gov.in/CPDAC-Website/index.html)

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.

As per recommendation of maritime State/UT Governments and Expert Institutes/Agencies during the "One day Brainstorming Workshop on Implementation & Creation of CMIS" held on 13th May, 2014 at New Delhi, CWC has associated with the maritime State/UT Governments and Institutes/Agencies for development of CMIS. In this regard, 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 over a period of 2 years. The total cost of above work is Rs 896.05 Lakh. The work is to be completed by March 2019.

Matter is also pursued with National Institute of Oceanography (NIO) Goa for implementation of CMIS in States of Goa and Southern Maharashtra (for three sites) and with CWPRS for implementation of CMIS in States of Gujarat and Maharashtra (for two sites).

3.6 River Management Activities and Works Related to Border Areas

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)

The activities under the scheme are continuing during the period 2017-18. As per advice of the Ministry of Finance, the activities are proposed to be included under the scheme "Flood Management and Border Area Programme (FMBAP)". The EFC for the scheme with an outlay of Rs. 5285 Cr for

2017-20 period including provision of Rs. 700 Cr for above activities is under consideration.

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 Bangladesh dealt in Central Water Commission for funding under the above programme is given in Table - 3.9.

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 Crores has been released to this scheme so far.

Table 3.9

Details of the ongoing proposal for bank protection /anti erosion works on common border rivers between India and Bangladesh dealt in Central Water Commission for funding under the scheme "River Management Activities and Works Related to Border Areas"

(Rs. in Lakh)

Sl. No.	Particular of the scheme	Estimated cost	Fund released upto March 17	Amount released during 2017-18	Status
	Tripura				
1	Jenai to Beltali(Segment-I)	1161.57	871.18	Nil	No proposal for release of funds have been received in CWC during 2017-18
2	Baishnpur to Barunighat (Segment-II)	833.89	625.42	Nil	
3	Anandapara to Chotokhil (Segment-III)	1374.53	1004.26	Nil	
4	Ranirbazar to Ramendra Nager (Segment-IV)	1234.25	923.19	Nil	
5	Harbatali to Amlighat (Segment-V)	909.11	681.83	Nil	
	Total	**5513.35**	**4105.88**	**Nil**	

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 report was revised by the State Government and submitted to CWC for appraisal. The revised proposal has been examined and it has been decided that the same may be submitted for TAC clearance of MoWR in forth coming meeting.

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Inspection of Discharge Observation Activity by Senior Officers

Gauge and Discharge observation through cable bridge in hilly region.

CHAPTER-IV

BASIN PLANNING

4.1 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.

4.2 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 the 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.

4.3 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.

4.4 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.

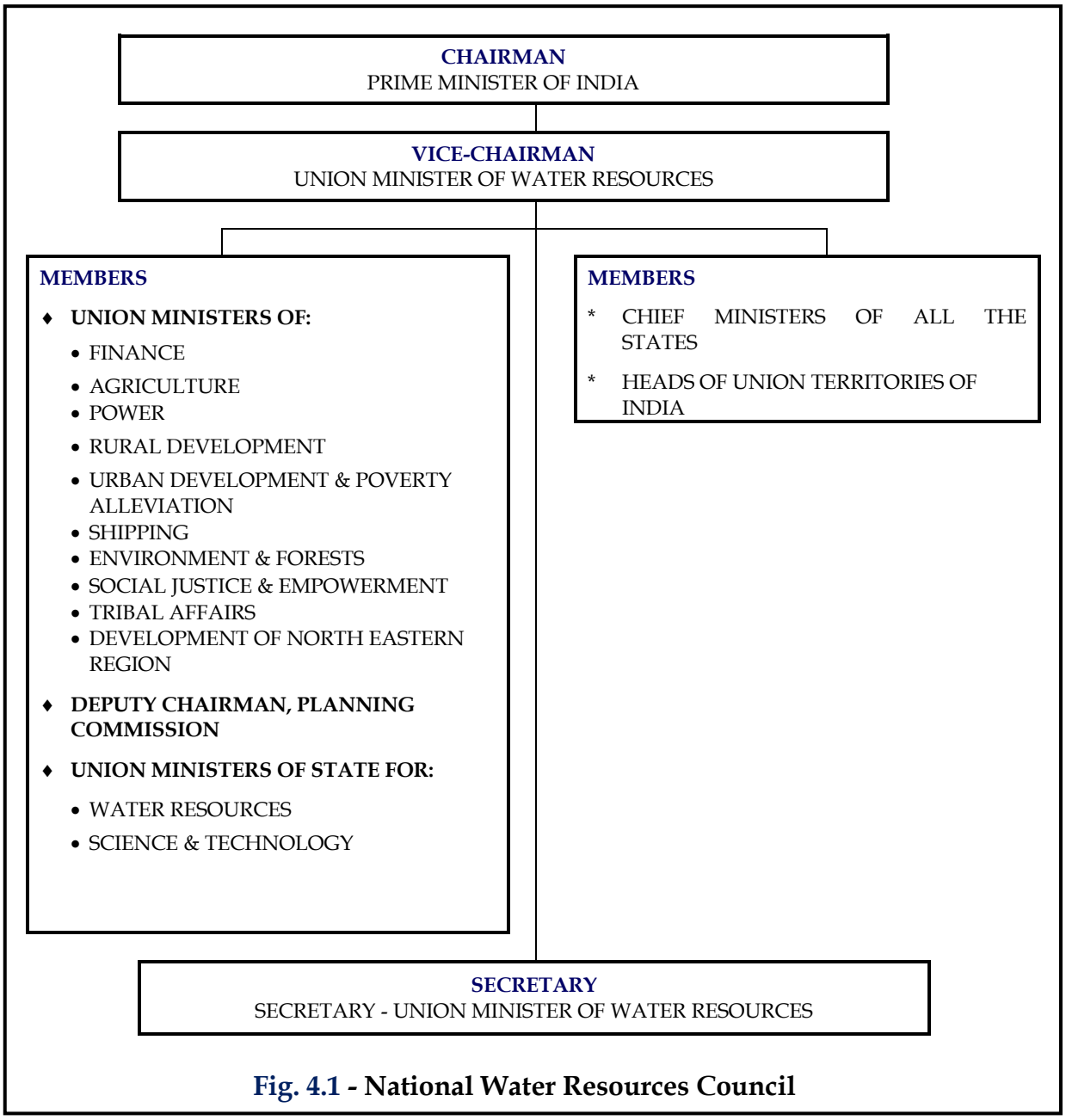


Fig. 4.1 - National Water Resources Council

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.

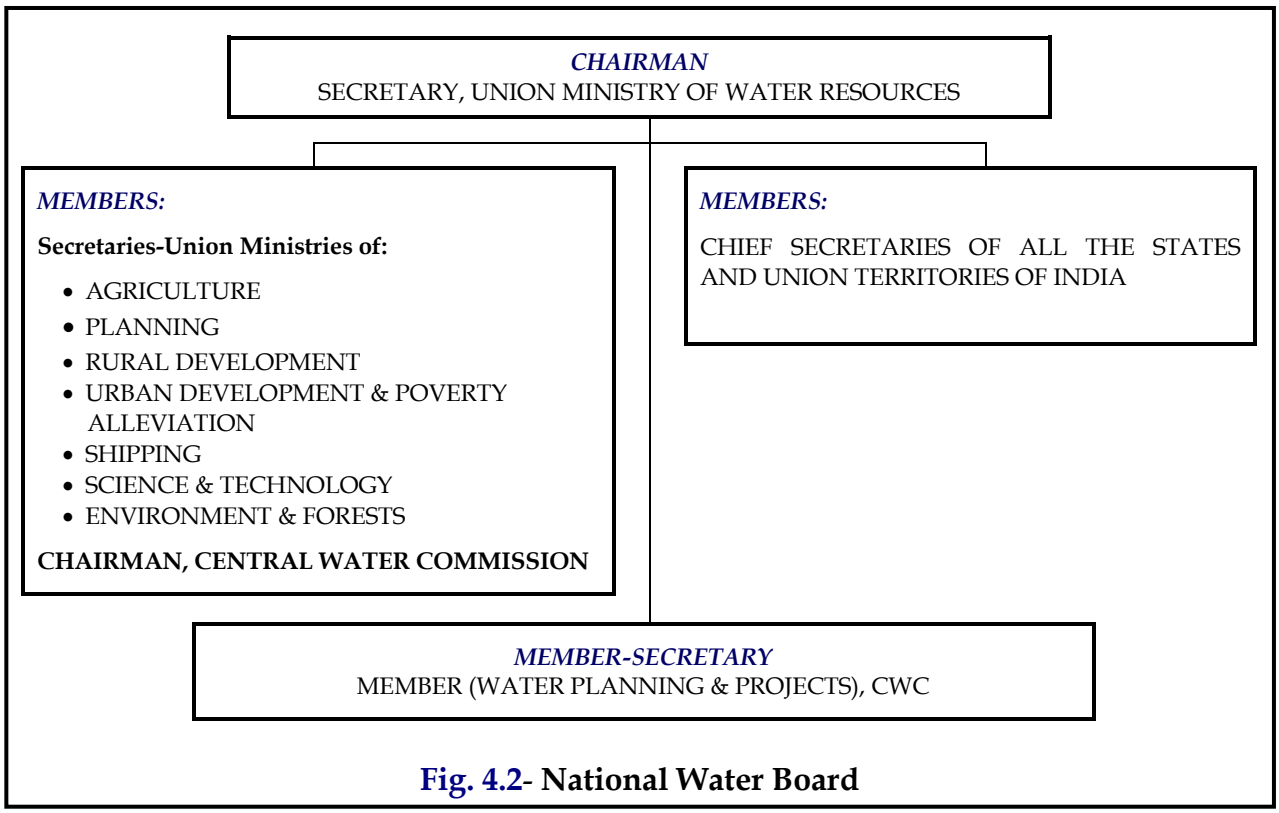


Fig. 4.2- National Water Board

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.

4.4.1 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.

4.4.2. 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.

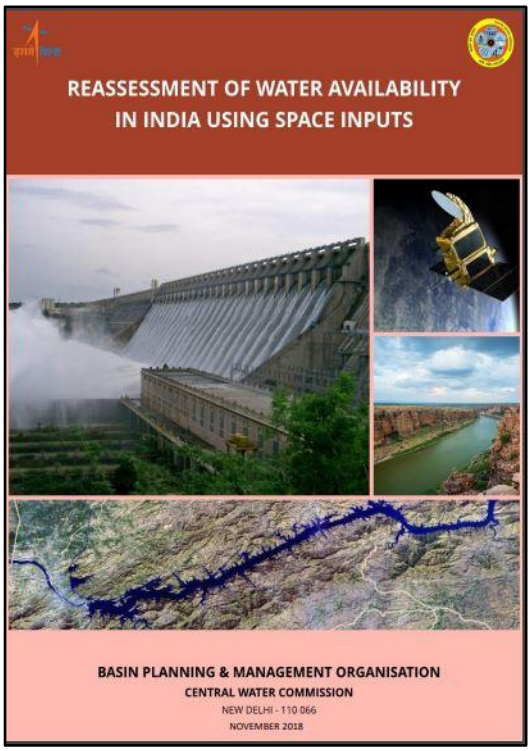
4.5 Basin Planning Studies and Related Issues

4.5.1 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 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.

An MoU 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 Draft Reports of the study have been uploaded on CWC website for comments/ views in Nov 2017.

4.5.2 Strategic Basin Planning of Ganga River Basin

The World Bank has engaged M/s Deltares 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. The Central Water Commission is actively involved in the study. The study was started in June 2015 and is under progress. The same is likely to completed soon.

4.5.3 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 studies are planned to be conducted in three basins namely, Krishna, Mahanadi and Godavari under the National Hydrology Project. The process for awarding the study through global tendering is under progress. The Technical Evaluation of tenders has been completed. The study is expected to be awarded soon.

4.6 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 65 meetings of the Governing Body have been held.

The water balance study reports prepared by NWDA are also being examined in specialized Directorates of CWC. During the year 2017-18, six (6) Water Balance Reports were examined by CWC and comments were sent to NWDA.

4.7 Climate Change Issues and National Water Mission

Realizing the importance of climate change and to address the related issues, National Action Plan on Climate Change (NAPCC) has been prepared by the Government of India. The Action Plan has laid down principles and identified the approach to be adopted to meet the challenges of impact of climate change through eight Missions in climate sensitive sectors. National Water Mission (NWM) is one of them, for which

Ministry of Water Resources (MoWR), Government of India is the Nodal Ministry.

The "National Water Mission" has been 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 document was approved by Hon'ble Prime Minister's Council on 30th August 2010 and by the Union Cabinet on 6th April 2011.

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

Mission Secretariat for operationalizing the National Water Mission for coordinated actions for addressing the impact of climate change on water resources has been established by Ministry of Water Resources. Climate Change Cell has also been set up in Central Water Commission in August 2007 for taking stock of the current development in respect of climate change studies and other related issues. The Morphology and Climate Change Directorate CWC is supporting NWM for coordinating various activities being implemented by CWC as well as in examining the research proposals related to climate change received in NWM Secretariat.

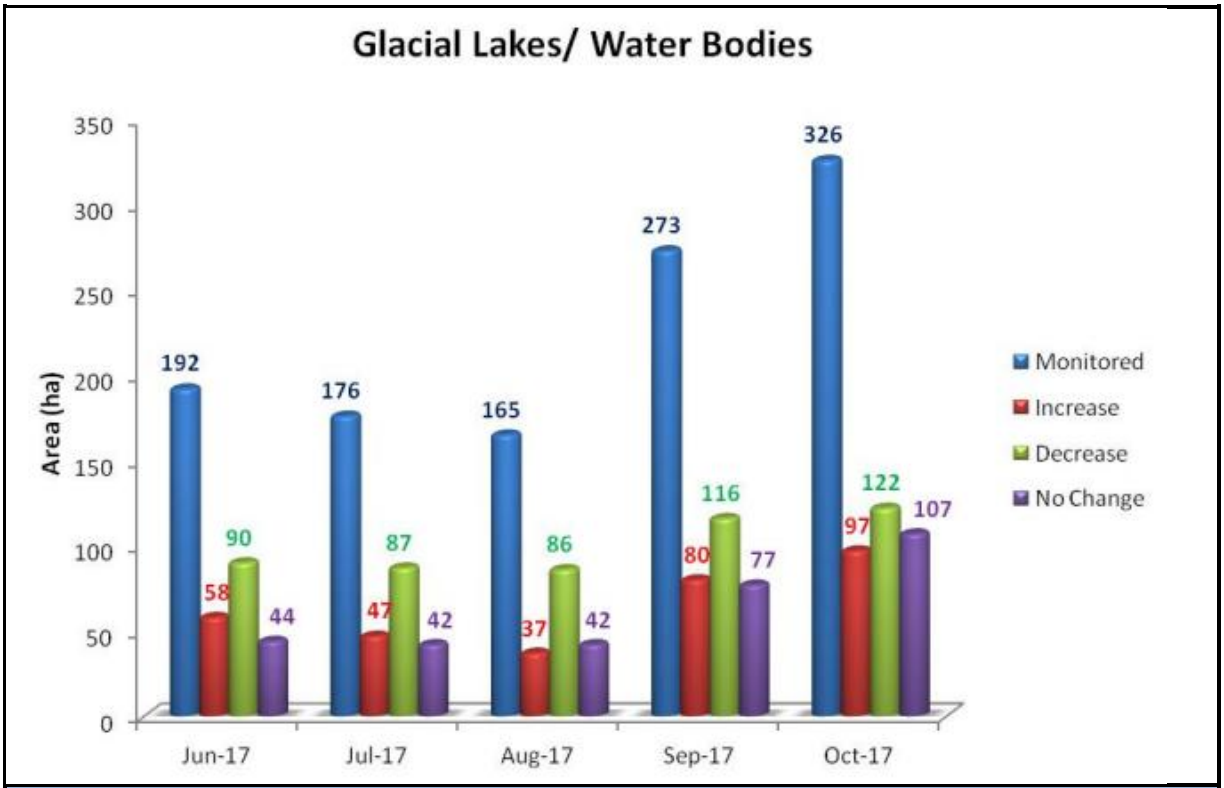
CWC has prepared an "Inventory of Glacial Lakes/Water Bodies in the Himalayan Region of Indian River Basins" through National Remote Sensing Centre, Hyderabad (NRSC) in 2009. From 2011 onwards, CWC is monitoring the Glacial Lake and Water Bodies (GL/WBs) of spatial extent more than 50 Ha on monthly basis during monsoon season (June to October). The report of such monitoring are circulated to all concerned for appropriate actions.

As per the Monitoring Report of October, 2017, 326 GL/WBs for which cloud free data was available, were monitored. Amongst these, 122 GL/WBs have shown decrease, 97 have shown increase and 107 have not shown any significant change (+/-5%) in spatial extent. 20 out of 122 have shown decrease in spatial extent by more than 20% and 38 out of 97 have shown an increase in spatial extent by more than 20%. The Monitoring

Report is available on CWC website (http://cwc.gov.in/main/downloads/Monitoring_Glacial_Lake_Water_Bodies_Himalayan_Region_Annual_Report_2017.pdf).

Another work of "Snowmelt runoff forecasting in Himalayan River Basin" has been taken up by CWC and the model development part has been entrusted to NRSC, Hyderabad by CWC. The model has since been developed and installed in CWC at Shimla. During 2017-18, CWC Shimla issued Seasonal and Short Term Snowmelt Runoff forecast in Himalayan river basins namely, Satluj, Beas, Chenab, Yamuna and Ganga. The forecast is issued to Irrigation Departments of all concern States and Hydro-Power Development agencies.

MoWR,RD&GR has established six Chairs in Academic institutes, namely, IIT Kanpur, IIT Kharagpur, IIT Guwahati, IIT Roorkee, NIT Patna and NIT Srinagar with the objective of carrying out studies and research on "Impact of climate change on Water Resources". A Management Committee under the chairmanship of Additional Secretary and Mission Director, National Water Mission reviews the progress and co-ordinates activities/functioning of Chairs.



Glacial Lakes/ Water Bodies Monitored during the year 2017

4.9 Joint Operation Committee of Rihand Reservoir

Ministry of Water Resources set up a Joint Operation Committee (JOC) for Rihand Reservoir vide their O.M. No.

54/7/92-BM/1172 dated 30.10.1992. The Committee consists of members from Uttar Pradesh Jal Vidyut Nigam Limited (UPJVNL), Uttar Pradesh Power Corporation Limited (UPPCL), WRD-Bihar, and CEA. Member (WP&P), CWC, New Delhi is the Chairman of the Committee. So far 30 meetings of JOC have taken place. The last meeting (30th meeting) was held in New Delhi on 5th October. 2017 in which the actual releases made from Rihand reservoir during 2016-17 were discussed and the operation plan for 2017-18 was finalized.

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Final Project Workshop for "Strategic Planning for the Ganga River Basin in India" held in New Delhi in March 2018

CHAPTER-V

DESIGN AND CONSULTANCY

5.1 General

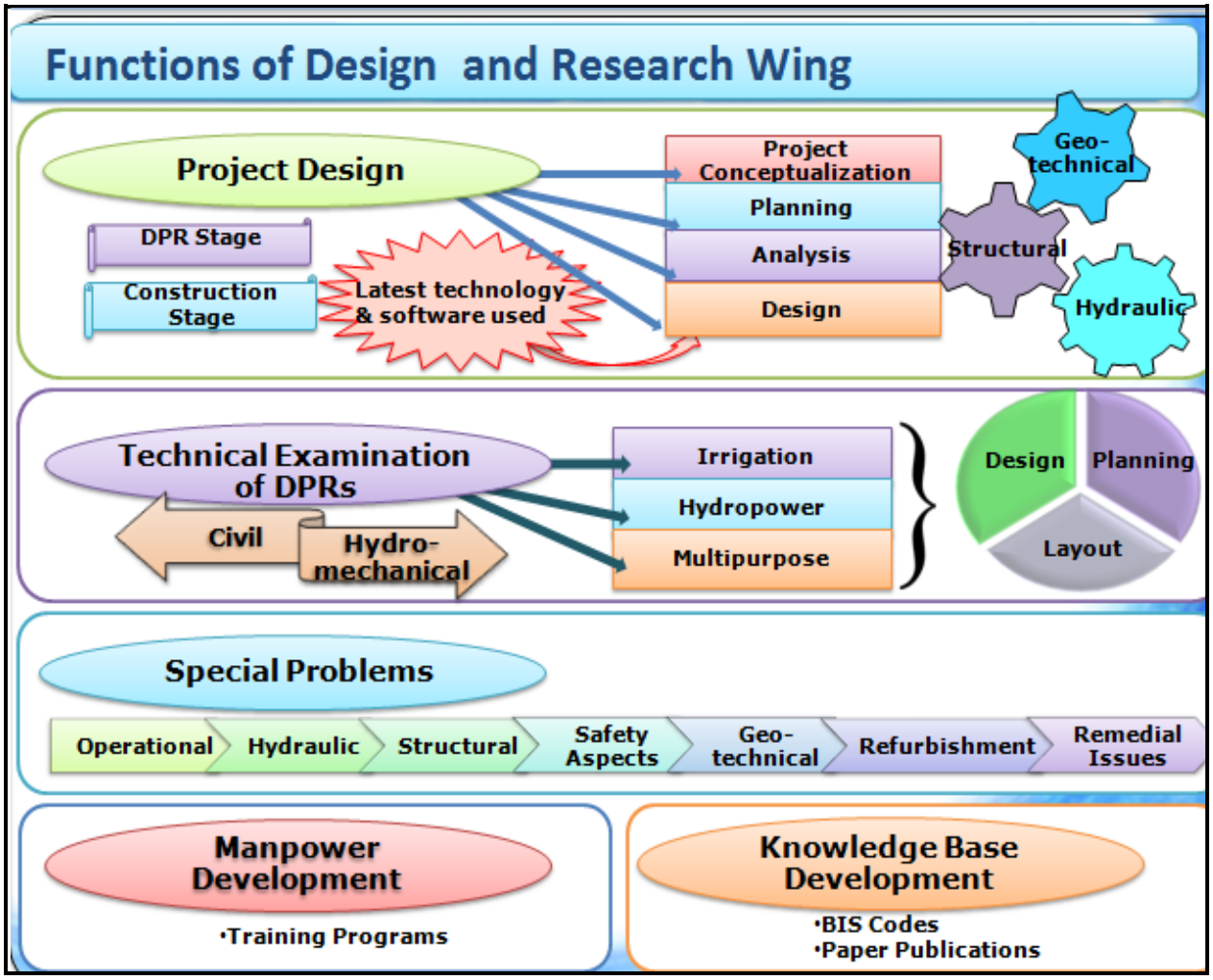
Design and Research Wing of Central Water Commission plays a pivotal role in the field of design and consultancy for water resources projects. Various units of the wing are actively associated with design consultancy, technical studies and research & development activities in the water resources sector. 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. D&R Wing is a 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 Modeling, 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.
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 MoWR,RD&GR in various design issues involved in international and trans-boundary projects, specially 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) Unit

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) during PFR & DPR preparation for project; (ii) during construction of project; (iii) for addressing specific problem during construction and operation of project; and (iv) for 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, and 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) **Designs(NW&S) Organization**: The unit provide services to projects located in the States/UTs of Kerala, Andra Pradesh, Tamil Nadu, Mahrashtra, Madhya Pradesh, Odisha, Chhattisgarh, Gujarat, Rajasthan, Goa, and Andaman and Nicobar Islands in the country.

(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 project include Kalez Khola HE Project (Sikkim) and 20 Medium Irrigation Projects in Jharkhand.

5.2.2 Design Consultancy carried out by Design Organisations

CWC has provided design consultancy services to 64 projects during the year 2017-18. These include 55 Nos. of projects located in 22 States and 9 Nos. of projects located in neighbouring countries like Bhutan(4), Indo-Nepal(4) 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)	13
3.	Projects with special problems	22
	Total	**64**

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), Chhatisgarh:

Project envisages construction of a barrage across Arpa river for irrigation. Consultancy services for scrutiny of

manufacturers design and drawings of Sluice Service Stoplog Gate, Sluice service Gate, Head Regulator service and Emergency Gate were provided during the year.

2) Garudeshwar Weir Project (Gujarat):

Garudeshwar Weir, is 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 drawings of various civil and hydro-mechanical components of the Weir.

Garudeshwar Weir

3) Phina Sigh Medium Irrigation Project, Himachal Pradesh:

CWC is providing consultancy services for vetting of design / drawings of concrete gravity Dam. Project authorities submitted general layout and excavation drawings related to dam complex. Observation/ Comments were issued to project authorities regarding layout and excavation plans.

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

On the request from State Government, the consultancy works for Icha Dam under Subarnarekha Multipurpose Project (Jharkhand) have been taken up by CWC. CWC is providing consultancy for the construction of this composite dam project. Dam is partly constructed. Specification drawings have been issued and works of preparation of construction drawings will be taken up as per the requirement of the project authority.

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

Subarnarekha MPP envisages construction of two Dams (Chandil Dam & Icha 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 earlier provided by CWC and construction these components have since 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.

The work is in active stage of construction. Construction stage drawings were issued to the project authority to facilitate the construction of the project.. The construction drawings of Barrage main including Head Regulator have been issued, the construction work of barrage is in full swing. Design & drawings of rope drum hoist and monorail of HR Service Gate and Stoplog Gate. Design & Drawing work related to Afflux bunds of Kharkai Barrage Project is preparedwhich are now being revised to address some site specific new issues Construction drawings pertaining to left abutment and right abutment, plan elevation & Bridge Plan reinforcement details have been issued during the

period. Scrutiny of 74 Nos. construction stage drawings of Hydro-mechanical equipments was carried out for project authorities.

6) Halon Irrigation Project (M.P.):

The project envisages construction of an earthen dam of 751.68m long and 31.0 m height with central Spillway. The headwork is designed as a storage reservoir in the left bank main canal taking off from the reservoir through a sluice located in a saddle between Karanjiya and Jamuntola villages. The 81.50 km long Irrigation canal on left Bank will irrigate an area of 11736 ha with an Irrigation intensity of 143%. Scrutiny of construction stage drawings. of Hydro-mechanical equipments were carried out for project authorities.

7) Lower Goi Project (M.P.):

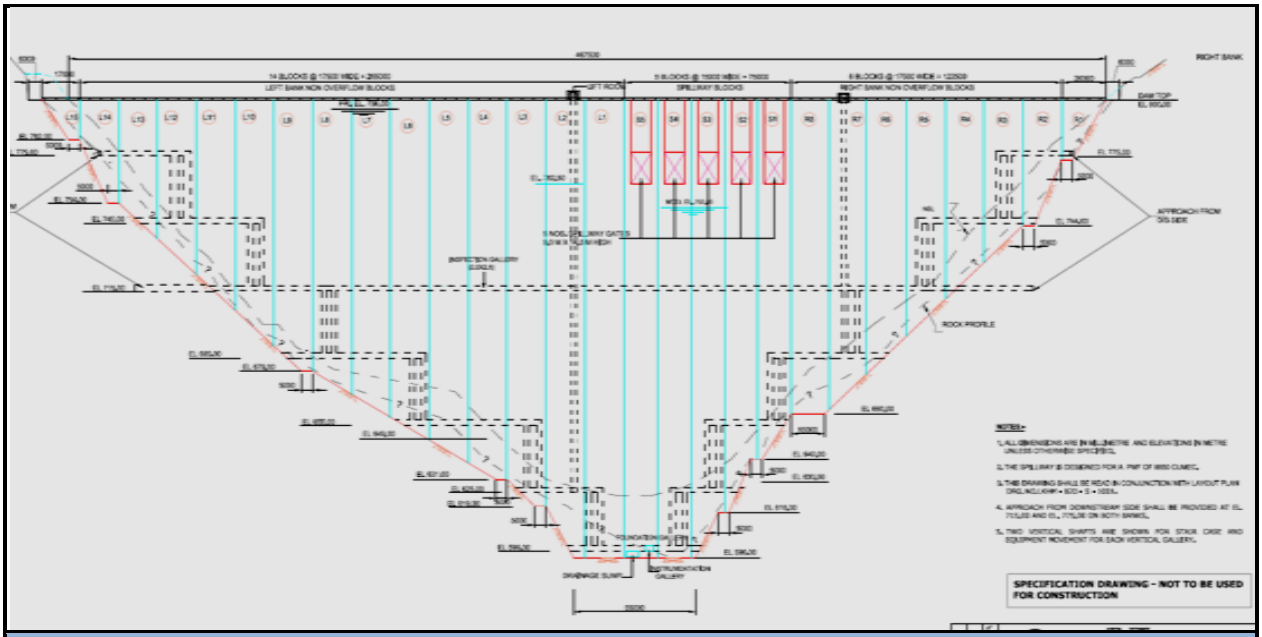
The project is proposed on the river Goi, which is a tributary of the river Narmada. Dam site is situated in Lower Narmada Zone in District Barwani. The site is located at a distance of 21 Km. from Barwani District Head Quarter.

Halon Irrigation Project

The project envisages construction of 2226.50 m long earth dam having maximum height of 43.80 m and side spillway 203.50 m long with 10 nos. gates of size 13.5 m x 12 m located in the river bed. Gross storage capacity of the project is 143.18 Mcum whereas the river capacity is 112.24 Mcum. Irrigation is proposed through a tunnel of 2.60 m diameter and 5.7 km long on the right bank. Net cultivable command area proposed for irrigation is 13760 ha and an annual irrigation @ 130% intensity i.e 17888 ha. Scrutiny of construction stage drawings. of Hydro-mechanical equipments were carried out as per the requirement of project authorities.

8) Lakhwar M.P.P. Uttarakhand :

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. After receipt of data/drawings Layout project, surge chamber, addition surge chamber electro-mechanical drawings etc. 6 Nos of study drawings on the basis electro-mechanical drawings received from project authority. 57 Nos. of Specification drawings have been issued to project authority.



Lakhwar M.P.P. Uttarakhand

9) Tapovan Vishnugad Project – NTPC Uttarakhand :

The Tapovan Vishnugad project is a 520 MW ROR hydroelectric project being constructed on Dhauliganga River in Chamoli District of Uttarakhand. Design (N&W) Unit is providing design consultancy to NTPC for the project. All the construction drawings of the project were issued and work of issuing construction drawing is complete.

10) Tehri Pumped Storage Plant (1000 MW), Uttarakhand:

MoU between CWC & THDC for providing design consultancy services for the three projects as Overview Design Consultant i.e. Tehri PSP (1000MW), VPHEP (444MW) and Dhukwan SHEP (24MW) signed on July 2017.

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). The type of machine is variable speed vertical Francis type reversible turbine with design head of 188m. There are 2 nos. upstream surge shafts of approx. 21m diameter with approx. height of 145m. There are 2 nos. downstream surge shaft of approx. 18m diameter with approx. height of 101m. There are 2 nos. of Tail race tunnel (TRT-3 & TRT-4) with 9.0m 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 when the Project authority requests to do so.

11) Vishnu gad 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 cum, out of which 2.47 Million cum 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 nos. Intake tunnels, 03 nos. Underground sedimentation chambers (390m each), a Head Race Tunnel (13.4 Km), a Surge shaft, 02 nos. Pressure shafts bifurcating into 4no. Penstocks. The powerhouse comprises of two separate underground caverns for installation of turbines and transformers.

The construction drawings are being vetted when the Project authority requested to do so. So far, Construction drawings in respect of Power House and Surge chamber as referred have been vetted by CWC.

12) Kanhar Irrigation Project, Uttar Pradesh:

Consultancy services for scrutiny of manufacturers design and drawings of Stoplog Gate, Spillway Radial Gate, Spillway river Sluice service Gate and Emergency Gate were provided during the year.

13) Arjun Sahayak Pariyojana, Uttar Pradesh

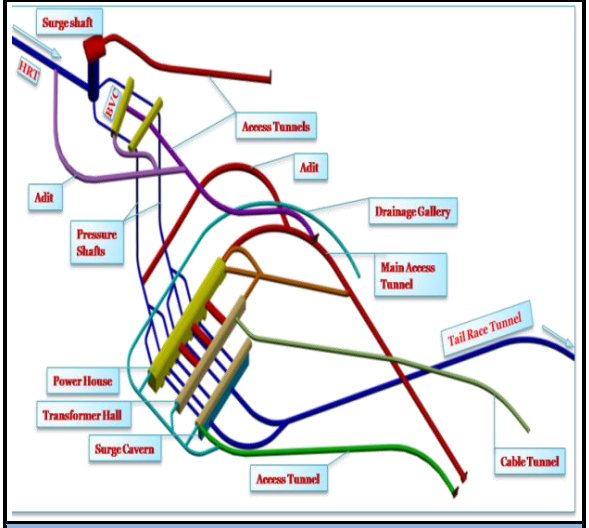
This project envisages diversion of surplus water available at Lahchura Dam through feeder canal to Arjun Dam and then from Arjun Dam to Kabrai Dam and Chandrawal Dam, to augment inflows into three reservoirs Arjun, Kabrai and Chandrawal.

CWC is providing design consultancy for Arjun Sahayak Pariyojna in respect of raising the height of Kabrai Dam. Design and drawing work related to right extension of Kabrai dam along revised alignment is under progress. The work envisages construction of irrigation outlet structure. 8 Nos. construction stage drawing for the Entrance block, Trash rack have been issued. Director, Embankment (N&W) visited dam site to avoid the necessary acquisition of agriculture land. Work on remaining drawings could not be undertaken due to unavailability of geotechnical investigation data, which was to be provided by project authority.

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

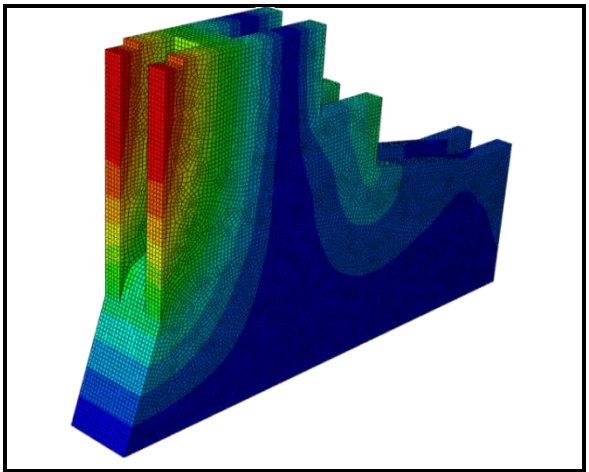
Punatsangchhu-I H.E. Project which intercepting total catchment area of 6390 sq. km. envisages construction of a concrete gravity type dam, 130m high above the deepest foundation and 240.0 m long at the top. The overall length of the spillway section of the dam is 120.0 m comprising of seven nos. of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



Layout of Punatsangchhu-I H.E. Project

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.

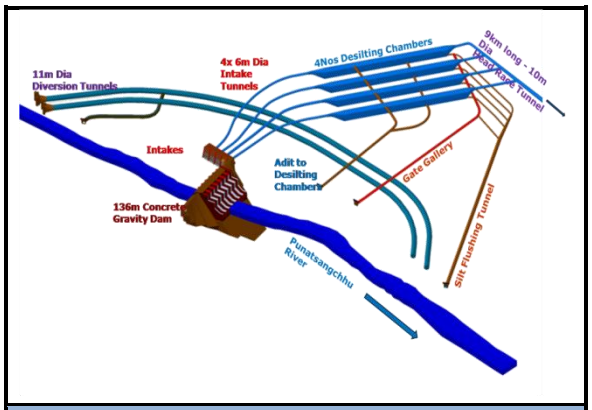


FEM Study of Punatsangchhu-I H.E.P.

The project has an installed capacity of 1200 MW and construction of the project is underway. Design E&NE Unit is providing construction stage design consultancy for civil and hydro-mechanical works of the project.

15) Punatsangchhu-II H.E. Project, Bhutan:

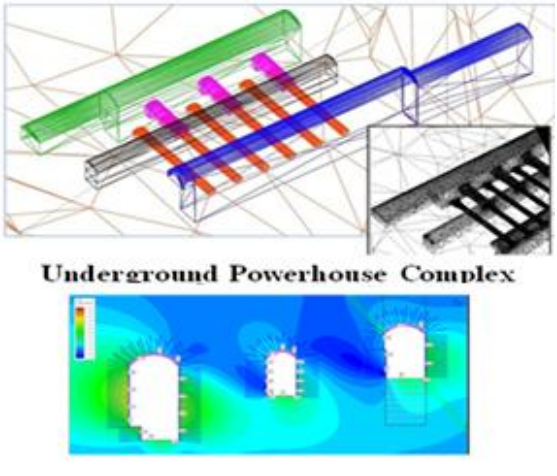
The Punatsangchhu-II H.E. Project envisages construction of 86m high concrete gravity dam with an installed capacity of 1020 MW. The dam is located 29km downstream of the Wangdue Bridge and 3 km downstream of TRT outfall of PHEP-I on WangdueTshirang National Highway.



Layout of Punatsangchhu-II H.E. Project

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. Design E&NE Unit is providing construction stage design consultancy for civil and hydro-mechanical works of the project.



FEM Study of Punatsangchhu-II H.E.P.

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

MoU between CWC & SJVNL for providing design consultancy services for 900 MW Arun-3 HEP in Nepal as Retainer Consultant signed on 10th Aug 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 use 344.68 cumecs of design discharge and will generate about 3924.03 GWh energy per annum at 90% dependable year. The project comprising of 70 m high diversion dam, intake structure with four bell mouth opening leading to four no. of intake tunnels of 6m diameter, restricted orifice type Surge Shaft of 24m diameter, two vertical steel lined underground pressure shafts each of 5.5m dia. with bifurcation into four of diameter 3.2m to feed the four 225 MW capacity Francis turbines placed in underground Power House of size 179.49m (L) x 22.5m (W) x 49.5m (H). Water after generation has been proposed to be discharged into the river through 10m modified horse-shoe shaped concrete lined TRT tunnel.

Transient analysis of water conductor system of Arun 3 HEP has been carried out in CWC and the comments/observations of the same were communicated to SJVNL. The proposal for the removal of Desilting Chamber has been submitted by SJVNL and same has been broadly examined and comments/observations were communicated to project authority.

17) Polavaram Irrigation Project

Polavaram Irrigation Project is a multipurpose project located on Godavari River near Ramayyapeta, in West Godavari District, Andhra Pradesh, 42 Km upstream of existing Sir

Arthur Cotton Barrage. Water from the project shall be utilized to meet the demands of irrigation, drinking water and power generation. The project is envisaging irrigation benefits to 4 lakh acres in East Godavari, Visakhapatnam Districts under Left Main Canal and to 3.2 lakh acres in West Godavari, Krishna Districts under Right Main Canal.

In addition to irrigation benefits, generation of Hydro Electric power with installed capacity of 960 MW and water supply for industries in Visakhapatnam besides drinking water supply to villages and towns enroute are also envisaged under the project. It is proposed to divert 80 TMC of water to Krishna River through Right Main Canal. The Left Main Canal runs for a length of 181.50 km and the Right Main Canal runs for a length of 174.00 km.

Project Design Flood is estimated as 5.0 million cusecs, which is required to be passed through spillway comprising of 48 spans of size 16 m(W) x 20 m(H) with hydraulic hoist arrangement for lifting Radial Gates. The FRL of reservoir is at El. 45.72 m and Gross Storage Capacity at FRL is 194 TMC with a Live Storage Capacity of 75.20 TMC. A power house with an installed capacity of 960 MW with 12 Kaplan turbines each of 80 MW capacity is planned on left bank.

The major components of the project consists of an Earth cum Rockfill dam in Gap I (of 564 m length) on left bank of river, an Earth cum Rockfill dam in Gap II (of 1750 m length) located in main flow channel of Godavari River, a concrete dam in Gap III (of 140 m length) located on right bank and a spillway located on right bank along with connecting approach channel and spill channel. The concrete dam is 1054 m long comprising 49 nos. of overflow (OF) blocks, 2 nos. non-overflow (NOF) blocks and 2 nos. key blocks. There is provision of 10 nos. of river sluices of size 2.1 m(W) x 3 m(H) in Blocks No. 5 to 14 for releasing 15 TMC water in the downstream. Other structures include approach channel, spill channel, training walls etc.

B. Projects at DPR Stage

1) Par-Tapi-Narmada Link Project (consists 6 nos. proposed dams), Gujarat / Maharashtra

The project is located in the state of Gujarat & Maharashtra. The proposed Par-Tapi-Narmada link envisages transfer of surplus water from west flowing rivers between Par and Tapi to water deficit areas in the north Gujarat. There are 7 dams with total catchments are of 2573 sq. Km., 3 weirs, 6 powerhouses & about 400 km. Long conveyance system including two tunnels of total length of about 5.5 km.

Design (N&W) unit is involved in the preparation of design chapter and drawings for the hydel civil designs aspects of 6 power houses and two tunnel. 59 Nos drawings of 6 power house and one tunnel along with design chapter have been completed and submitted to NWDA. Unit will continue to provide consultancy service for revisions in the DPR as per the suggestion of the project authority due to any modification in the design parameters.

2) Ujh Multipurpose Dam Project (3x62=186MW+1x2+1x24), J&K:

Ujh Multipurpose Dam Project proposes a 119m. High concrete faced rockfill dam (CFRD), 2.5 Km long head race tunnel (HRT), Diversion tunnel and a surface power house. As per the power potential studies, finalized by CEA, the installed capacity is 186MW through 3 units of 62 MW each. DPR drawings and design chapter were prepared by Design unit and some have been incorporated in the DPR prepared by IBO, CWC, Chandigarh. Drawings and design chapters related to Ujh Multipurpose Project of 26 MW have also been completed by the design unit & submitted to IBO, CWC.

3) Kalez Khola HE Project (Sikkim):

Kalez Khola Hydroelectric Project, a run off the river scheme is located on the Kalej Khola, a major tributary of the Rangit River. It will engross the construction of a 41 m high dam at Kalej Khola, around 6 Km long and 3.8 m diameter head race tunnel (HRT), an underground with open top surge shaft and a surface powerhouse on right bank of Rangit River to generate about 52 MW(2X26MW).

The proposed surface power house site lies about 2km upstream of Rishi village and about 750 m upstream of Tatopani hot spring at west Sikkim.

The DPR stage design and drawings of various components of the project were prepared by NBP/Design (SE&W) unit and were submitted to TBO, CWC for incorporation in the DPR.

4) Saptakosi & Sunkosi Multipurpose Project, Indo-Nepal

The Sapta Kosi High Dam Multipurpose Project, as per the preliminary studies carried out, envisages construction of a 269 m high dam to divert river waters through a dam toe power house with an installed capacity of 3000 MW (at 50% load factor) and irrigation of 15.22 lakh ha. Gross command area through construction of a barrage 1 km downstream of the dam. 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. Design (N&W) is involved in the preparation of DPR stage designs & drawings. The preparation of DPR stage drawings and chapter is being carried out in this unit. Drawings of layout plan and L-Section have been completed and further design and drawings works would be prepared after receipt of the data from project authority.

5) Pancheshwar Multipurpose Project (Indo-Nepal):

A MoU has been signed by CWC and WAPCOS (I) Ltd. For Pancheshwar Multipurpose Project and Rupaligad HE Project (Indo-Nepal) to providing consultancy services for preparation/updating of detailed project report (DPR).

About 96 Nos. of drawings are to be prepared on time bound manner and out of this about 20 nos. of drawings (study) have been submitted to WAPCOS Ltd. Based on the tentative data received. After received of data from project authority /WAPCOS Ltd. 44 nos. of DPR drawings and 8 Nos. of design have been prepared and issued to WAPCOS Ltd. in June 2016. Detailed preliminary comments on the draft DPR have been issued in December 2016.

C. Special Problems Projects

1) Kohira Dam Project, Bihar

Special problem related to leakages from Spillway bay of Kohira Dam, Kaimoor, Bihar was studied for providing solution of the problem.

2) Sikasar Project, Chhattisgarh

Proposal from project authority received for construction of 18 m Ogee fall at RD.345 m of spill channel due to subsequent erosion at site and the proposal is under consideration.

3) Giri HE Project, Himachal Pradesh

On the request of the project authority, asite inspection of the Intake gate, HRT (including Marar Adit) Disc valve chamber, surge Shaft and Power House was undertaken and detailed discussion with the Project authorities regarding the repair of Disc valve seal of the project was done for the resolution of the problem.

North Koel Project, Jharkhand

4) North Koel Project, Jharkhand

A detailed study North Koel Project was carried out for deriving the maximum advantage from the created infrastructure. As per PMO's decision further follow up action by concerned states of Jharkhand Bihar is being monitored.

5) Indira Sagar Project, Madhya Pradesh

CWC is providing design consultancy for the rehabilitation of slotted roller bucket. Rehabilitation of damaged slotted roller bucket is under progress based on drawings issued by CWC. Indira Sagar Project, Madhya Pradesh: The damaged slotted roller bucket type of Energy Dissipation Arrangement was re-designed with Ski-jump bucket. One drawing issued for Ski-jump reinforcements. 3-D physical model of the spillway and Energy Dissipation Arrangement at CWPRS Pune was visited for witnessing its performance.

Indira Sagar Project, Madhya Pradesh

6) Ken Betwa Link Project, Phase-1, Madhya Pradesh

Project Authority requested advice on certain issues pertaining to modification of hoisting arrangement of Intake service gate of Dam Toe Power House-1.

7) Temghar Project, Maharashtra

An expert committee has been appointed to study the causes of leakage in the Dam and to suggest the leakage control measures by grouting from upstream and downstream face, grouting from top and inspection gallery. Leakages in the Dam are observed from the time of construction. The discharge of leakage increases as the reservoir storage level increases. CWC is providing its expert technical assistance.

8) Kanupur Irrigation Project, Odisha

Gravel Layers below the constructed earth dam has been noticed. CWC expert opinion for the solution of the problem has been sought. Report on foundation treatment of existing pebble layers in Kanpur Irrigation Project sent to project authority.

9) Additional Spillways for Hirakud Dam, Odisha

For increasing the design flood, additional spillway is proposed to be provided for the safety of Dam. For the safety of the dam, design consultancy

for the provision of additional spillway has been sought from CWC.

10) Deo Irrigation Project, Odisha

A Major Shear Zone has been encountered in the foundation of the Dam. Water Resource Department, Govt. of Odisha requested to CMDD (NW&S) Dte, CWC to provide the treatment for this Shear Zone(Deo Irrigation Project, Odisha: Shear zone treatment of foundation at Non Overflow section of concrete dam between RD 24 m to RD 78 m). The proposal is under study.

11) Subarnarekha Irrigation Project, Odisha

Design and preparation of Drawings of Slope Protection work including Lining of Subarnarekha Main Canal Odisha from RD 7950m to 8840m (890m) under Subarnarekha Irrigation Project, Odisha. The proposal is under study.

12) Rehabilitation of Garada Dam, Rajasthan

The Garada Dam, an earth fill dam was completed in March 2010 and subsequently breached on 15.08.2010 during initial filling of the reservoir. State Government of Rajasthan requested to suggest rehabilitation/ restorations measures of Garada Earth Embankment Dam, Bundi (Rajasthan). CWC has provided drawings for rehabilitation of the Dam and the work is going on.

Garada Dam, Rajasthan

13) Vishnugad Pipalkoti HE Project, Uttarakhand

Project authorities submitted memorandum of changes in the design chapter of approved DPR which has been examined and clearance was issued to CEA.

14) Rihand Dam, Uttar Pradesh

The Design (N&W) unit regularly attends the meeting of Joint team of engineers for comprehensive safety review of the Rihand Dam.

15) Farakka Barrage Project, West Bengal

The Farakka barrage on river Ganga was completed in the year 1975. Due to international importance of the project in sharing of waters between India and Bangladesh through Indo-Bangladesh treaty, the upkeep and maintenance of various components is being done by the Farakka Barrage Project Authorities under the MOWR. A Technical Advisory Committee (TAC-FBP) under the Chairmanship of Member (D&R) takes decisions about the various works to be taken up for safety and efficient working of the project. The TAC-FBP held it 113th meeting during 21-22 December, 2017 at Farakka. A Gate Regulation Committee and the Canal Study Group is also formed to advice regarding the operation of the gates, regulate various flood discharges and suggest solutions to various problems arising in the feeder canal. Since the project was designed by CWC, various technical problems and special studies are referred to it.

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 2017-18, DPRs of 77 Nos. projects submitted by the project authorities were technically examined in CWC. Out of this 70 Nos. DPRs of projects were received from 20 Nos. States and 7 Nos. projects were received from Afghanistan (2), Bhutan (1), Nepal (1) and Indo-Nepal (3). 23 Nos. DPRs

of Projects have been cleared. DPRs of other projects are under various stages of examinations and consultation with Project Authorities for improvement to make it technically sound & bankable.

The list of Hydro-Electric, Irrigation and projects received for technical examination is given in Table 5.1, 5.2 and 5.3 respectively.

Table 5.1
List of Hydro-Electric Projects (30) received for technical examination in CWC

Sl. No.	Name of the State	Project's Name
1	Arunachal Pradesh	RCE of Subansiri Lower H.E.Project (MOC)
2	Arunachal Pradesh	Subansiri Upper H.E.Project
3	Arunachal Pradesh	Magochu H.E.Project
4	Arunachal Pradesh	Pauk H.E.Project
5	Arunachal Pradesh	Oju H.E.Project
6	Bihar	Dagmara H.E.Project
7	Bihar & Jharkhand	North Koel Reservoir Project
8	Himachal Pradesh	Thana Plaun H.E. Project (191MW)
9	Himachal Pradesh	Nakthan H.E.Project (460MW)
10	Himachal Pradesh	Sunni Dam H.E.Project, 355 MW-PFR
11	Himachal Pradesh	Reoli Dugli H.E.Project Stage – I (420MW)
12	Himachal Pradesh	RCE of Parbati Stage-II H.E.Project
13	Himachal Pradesh	Luhri H.E.Project (210 MW) Stage-I
14	Himachal Pradesh	Miyar H.E.Project (3x40 MW)
15	Jammu & Kashmir	Kirthai Stage-I H.E. Project (390MW)
16	Jammu & Kashmir	Sawalkote H.E.Project (1856MW)
17	Jammu & Kashmir	Kirthai Stage-II H.E. Project (990MW)
18	Karnataka	Sharavanthy Pumped Storage Project(2000MW)
19	Meghalaya	Mawphu (Stage-II) H.E.Project, 81MW

Sl. No.	Name of the State	Project's Name
20	Meghalaya	Myntdu Leshka Stage-II H.E.Project, 140 MW
21	Meghalaya	Umangot H.E.Project
22	Odisha	Upper Indravati Pumped Storage Project(600 MW)
23	Uttarakhand	Goriganga IIIA H.E.Project (165MW)
24	Uttarakhand	Tiuni Plasu H.E.Project(72MW)
25	Uttarakhand	Sirkari Bhyol Rupsiyabagar H.E.Project (168 MW)
26	Uttarakhand	Proposal for longitudinal connectivity of Jelum-Tamak H.E.Project(108 MW)
27	Uttarakhand	Bokang Bailing H.E.Project (330MW)
28	West Bengal	Teesta Low Dam Project, Stage –I & II (Combined), 81 MW
29	Afghanistan	Shahtoot Storage Scheme/ Shahtoot Dam Storage Project
30	Bhutan	Dorjilung Hydro-Power Project

Table 5.2
List of Irrigation Projects (36) received for technical examination in CWC

Sl. No.	Name of the State	Project's Name
1	Andhra Pradesh	Remodelling of TBP RBLCC Main Canal, Tunga Bhadra Board.
2	Andhra Pradesh	Modernisation of D.R (Dagadarthi-Racharlapada) & D.M (Dagadarthi-Mungamuru) channels in Dagadarthi, Alluru, Kodavauru, Bogole & Kavali mandals in SPSR, Nellore District
3	Andhra Pradesh	Chinkalapudi Lift Irrigation Scheme
4	Andhra Pradesh	Narayanpuram Anicut Project
5	Assam	Protection of Majuli Island
6	Assam	Amjur Drainage Development Scheme

Sl. No.	Name of the State	Project's Name
7	Assam	Demow Drainage Development Scheme
8	Assam	Amreng Irrigation Project
9	Assam	Flood Management of River Subansiri along with river training works on both bank embankment
10	Chhattisgarh	DPR of Arpa Bhaisajhar Barrage Project on Arpa river
11	Gujarat	Sauni Yojna Phase-II Project
12	Gujarat & Maharashtra	Par-Tapi Narmada Link Project
13	Jharkhand	Burhai Reservoir Project
14	Jammu & Kashmir	Akhnoor Steel Bridge
15	Karnataka	Modernization of Vijanagar Channels in Tungabhadra Project
16	Karnataka	Singatalur Lift Irrigation Project
17	Madhya Pradesh	Ken-Betwa Link Phase-II (Lower ORR Project), NWDA
18	Madhya Pradesh	Kotha Barrage Major Project
19	Madhya Pradesh	Dudhi Irrigation Project
20	Maharashtra	Jihe Kathapur Lift Irrigation Scheme
21	Maharashtra	Gunjawani Irrigation Project
22	Odisha	Nabarangapur Irrigation Project
23	Odisha	Feasibility Report of Khadaga Barrage Project
24	Punjab	Raising the height of old Dhussi Bundh along the Ravi River
25	Puducherry	Flood Protection Works in Yanam Puducherry
26	Rajasthan	Feasibility Report on Eastern Rajasthan Canal Project
27	Rajasthan	DPR of Eastern Rajasthan Canal Project
28	Rajasthan	Transfer Rajasthan'"s share in Yamuna water from Tajewala head Haryana to to Rajasthan and its Utilization inJhunjhunu and Churu
29	Tamil Nadu	Report on opening of Raidoruvu mouth of Pulicat Lake, NIOT

Sl. No.	Name of the State	Project's Name
30	Telangana	Kaleshwaram Project
31	Telangana	Sita Ram Lift Irrigation Project Phase-I
32	Uttar Pradesh	Badaun Lift Canal Irrigation Project
33	Uttar Pradesh	Bhitaura Pump Canal
34	Indo-Nepal	Indo-Nepal Link Canal 1.25 KM, Tanakpur Barrage-NHPC
35	Nepal	Rehabilitation work of Koshi Pump Canal distribution system (Under Indian Grant).
36	Nepal	Mahakali Irrigation Project –IIIrd Phase Mahendranagar, Kanchanpur

Table 5.3

List of Multi-Purpose Projects (11) received for technical examination in CWC

Sl. No.	Name of the State	Project's Name
1	Arunachal Pradesh	Dibang M.P.Project (2880MW)
2	Arunachal Pradesh	Noa-Dehing M.P.Project
3	Assam	Kulsi M.P.Project
4	Jammu & Kashmir	Ujh Multipurpose Project
5	Jammu & Kashmir	Bursar Multipurpose Project
6	Madhya Pradesh	Shakkar Multi Purpose Project
7	Odisha	Tel Integrated Multi Purpose Project
8	Odisha	Middle Kolab Multi Purpose Project
9	Rajasthan	Revised DPR of Parwan Major Project (Abstract of Cost) submitted after introducing pressurized distribution and water application method (initially designed as open gravity based canal system).

Sl. No.	Name of the State	Project's Name
10	Afghanistan	Shatoot Reservoir project
11	Indo-Nepal	Pancheshwar M.P.Project

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 2017-18, 80 projects were under technical examination in HSO from hydrological studies point of view. Out of this, 46 projects have been cleared. The remaining projects were either under examination or the observations thereon were communicated to the concerned project authority.

Advances in computing the magnitude and characteristic of extreme flood events and revision of the Indian standards for large dams require re-evaluation of spillway capacities of many existing structures. CWC conducts design flood review of project on consultation basis as per request received from States. CWC also vets the studies carried out by states on their own. Design Flood Review Studies of the following 9 projects were carried out by CWC during the year 2017-18.

1. Asan Dam Project, Uttarakhand
2. Virbhadra Barrage, Uttarakhand
3. Dakpather Barrage, Uttarakhand
4. Maithon Dam, Jharkhand

5. Panchet Dam, Jharkhand
6. Mala Prabha Dam Project, Karnataka
7. Bennithora Dam, Karnataka
8. Bhadra Dam, Karnataka
9. Mettur Dam, Tamilnadu

(b) Development of flood estimation model for un-gauged catchments

To compute the design flood in un-gauged catchments, country has been divided into 7 zones and further into 26 hydro-meteorologically homogeneous sub-zones and flood estimation models have been developed for each subzone. So far flood estimation reports covering 24 sub-zones have been published. The periodic revisions/updating of earlier reports are carried out whenever additional data are received.

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

Various consultancy works / special studies related to hydrological aspects were carried out / initiated by CWC during 2017-18. The details are as under:

1. Preparation of Chapter on Hydrological Studies for Sapta-Kosi, Sun-Kosi and Kamala Dams Projects, Nepal.
2. Hydrological Studies for Karnali Multipurpose Project
3. Finalisation of Hydrological studies of Araniar Reservoir and its canal system under Andhra Pradesh Irrigation and Livelihood Improvement Project Phase-II (APLIP-II).
4. Consultancy for undertaking Hydrological Studies for 31 irrigation projects in the State of Jharkhand initiated.
5. Hydrological Study for Design Flood for Kuri-Gongri HE Project of Bhutan was carried out.
6. Vetting of Design Flood Study for Hasdeo river for construction of a bridge downstream of Hasdeo-Bango Dam, Korba, Chattisgarh.
7. Design Storm and Design Flood Studied for Kadana Dam in Gujarat carried out.
8. Design Flood Study for Phinasingh Medium Irrigation Project, Himachal Pradesh was carried out.
9. Design Flood Study of Garada Dam Project was carried out.
10. Design Flood Study of Banas river at crossing with Narmada Main Canal, Gujarat was initiated.

11. Water Availability Study of Upper Mahananda Irrigation Project was carried out.

12. Preparation of Water Availability Study Chapter for DPR of Taramchu HE Project (Tripura).

13. Review of 6 Water Balance Study Reports and Technical Feasibility Report in respect of Godavari-Cauvery link prepared by NWDA carried out.

14. Preparation of Water Availability Report for Vamsadhara river.

15. In order to study the problem of salination of land along the coast in a scientific manner and to suggest remedial measures, a technical committee was constituted under the Chairmanship of the Chairman, CWC with members from specialized organizations of State Government & Government of India in the related field. The report of the Committee is under finalisation.

16. The MoWR,RD&GR constituted an Expert Committee on Erosion and Siltation in Rivers (ECESR) under the chairmanship of Director, CWPRS to study the problems of erosion, siltation and requirement of desiltation/ dredging of rivers, particularly, Ganga and Brahmaputra rivers and suggest remedial measures. Chief Engineer(FM) was Member and Chief Engineer(HSO) was Member-Secretary of the Committee. The report of the Committee is under finalisation.

(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.

During the year, two training programs were conducted on the topic "Project Hydrology - Hydrological Aspects in Project Planning and Preparation of DPR" and "Project Hydrology – Use of Statistics in Hydrology" for practicing Engineers/ Officers of Central and State Government..

5.4 Dam Safety Assurance Activities

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.

The various activities carried out by the Dam Safety organisation are as under:

5.4.1 National Register of Large Dams

The National Register of Large Dams (NRLD) is maintained by CWC. As per the latest information compiled during January, 2018 there are 5701 large dams in the country, out of which 5264 are completed and 437 are under construction.

The regular updation of NRLD is carried out from time to time as per information received from the States/ Dam owners. NRLD is now available at CWC Website. The compilation of NRLD is expected to prove useful/handy to all engineers, planners and policy makers associated with water resources sectors.

A new web based "Dam Health and Rehabilitation Monitoring Application" (DHARMA) has been developed. All States/ PSUs/ dam owners are requested to start using the different modules of the application. Training are also being conducted for working on DHARMA as per request of the State Government.

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 at the 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 38th meeting of NCDS was held on 22nd January 2018 at Thiruvananthapuram, Kerala. During the meeting matter related to pre & post monsoon inspection of dams; preparation of emergency action plan (EAP) and reservoir operation manual; proposed Dam Safety Bill; instrumentation in dams; Dam Rehabilitation and Improvement Project were mainly discussed.

5.4.3 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 also involves 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, a proposal for revision of the cost of the project to Rs. 3466 Crore, mainly due to increase in the cost of rehabilitation of dams is under consideration.

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 progress made under DRIP up to 31.03.2018 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 197 dam projects have been awarded and are under various stages of implementation. As per award of work till March 2018, the total committed cost for various works awarded is Rs. 2056.00 Crore. So far, Rehabilitation works for 87 dams have been completed.
- Training programs with focus on DRIP implementation were initiated well in advance for building up in-house technical capabilities of participating states. Ninety Six (96) trainings conducted by the CPMU, wherein about 3198 officials trained on different aspects of DRIP implementation. Four international training programs benefiting 78 officials were also organized in 2016 and 2017 in collaboration with Worlds two leading and renowned organizations namely, Bureau of Reclamation, USA and Deltares, Netherlands. With the assistance from The World Bank and in cooperation with Japan Water Agency, knowledge sharing six (6) exposure visits have been organized to Japan. Fifty (50) participants from Central as well as State agencies have been provided exposure on seismic, desiltation, instrumentation and other dam safety related issues during these visits. One exposure visit to Australia has also been organized in 2018 on dam safety issues for the senior level officers of the States and Central Government.

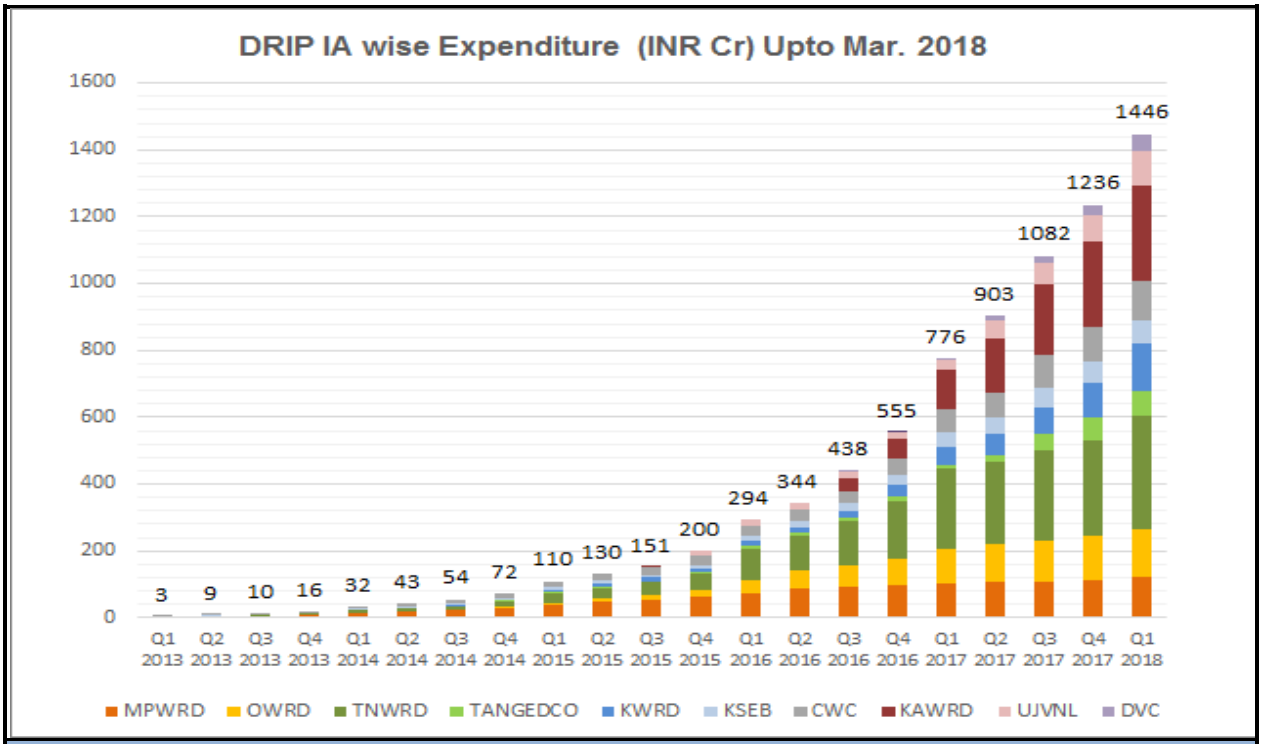
Training Programmes organised for Implementation Agencies under DRIP

Training and Capacity Building Program on Dam Safety and Reservoir Management by M/s Deltares at Delft, Netherlands

- A web-based asset management software tool "Dam Health and Rehabilitation Monitoring Application (DHARMA)" has been developed and launched. DHARMA program will enable collection and compilation of basic as well as engineering information for all dams and allow the systematic presentation and interpretation of data for effective monitoring of the health of dams.
- So far, six guidelines 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" and "Rehabilitaion Manual of Dams" have been prepared with the guidance of specialists working in the respective fields and published. Work on six more guidelines is under progress.
- Three National Dam Safety Conferences, first at IIT Madras (24-25th Mar, 2015), second at IISc, Bangalore (12-13th Jan, 2016) and third at Roorkee (18-19th Feb, 2017) and a International Dam Safety Conferences at Thiruvanantpuram (2018) have been organized under the project so far. These conferences received overwhelming response from the dam safety professionals, researchers, academicians, industries from the country as well as overseas.
- MoUs have been signed with the seven premier academic and research institutes namely, IIT Madras, IISc, Bangalore, IIT Roorkee, MNNIT Allahabad, NIT Rourkela, Anna University and

NIT Calicut 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.. These academic institutions will be 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.

- So far twenty (20) meetings of Technical Committee for DRIP have been held so far. Seven meetings of National Level Steering Committee for DRIP have also been held so far. World Bank has also completed twelve of its Review Missions, wherein road blocks as well as way forward in project implementation have been discussed.



Quarterly Expenditure Under DRIP

- Many new initiatives are being taken under the project. The details are as under:
    - Emergency Action Plan/Disaster Management Plan to handle any emergency situation for minimizing losses of life and property damages is being prepared for all the dams under DRIP. In this regard, Dam Break Analysis and inundation mapping have been prepared for about 125 no. of DRIP dams so far.
    - Studies of Seismic Hazard Mapping for Peninsular India are being prepared by the IIT Roorkee. CWC has also signed MoU with CWPRS to take up the study for Seismic Hazard Mapping for rest part of the country.
    - Study of unusual dam behavior and distress of Idukki Arch Dam has been completed. FEM Studies for Crack analysis of Konar Dam of DVC is completed.

As on March, 2018, the total fund utilization under DRIP is Rs. 1427.00 Crore.

5.4.3.1 1st International Dam Safety Conference

The 1st International Dam Safety Conference was organized during 23rd & 24th January 2018 at, Thiruvananthapuram. The Conference was jointly organized by CWC, Kerala Water Resources Department, Kerala State Electricity Board, National Institute of Technology, Calicut, and College of Engineering, Trivandrum under the aegis of ongoing DRIP.

About 560 participants from 20 different countries attended the Conference. The eminent international experts attended the meeting include Dr Anton J Schleiss, President, International Commission on Large Dams, Dr Nicholos Schofield, Chief Executive, Australian Water Partnership, Mr Satoru Ueda, World Bank, Dr Martin Wieland, Seismic Expert, Switzerland, Dr Ignacio Escuder Bueno, President, Spanish Commission on Large Dams, Dr Desmond Harfort, BC Hydro Canada, Mr Angus Swindon, National Director, Entura, Hydro Tasmania, Australia.

The themes for various technical sessions cover all important aspects of dam safety, namely: Sustainable Dam Safety Initiatives; Uncertainties and Risk Management in Dams; Operation, Maintenance, Rehabilitation and Upgrading of existing dams; Dam Safety Management Practices; and Integrated Flood Management for existing dams.

International Dam Safety Conference organized at Thiruvananthapuram during 23rd & 24th Jan 2018

Seven dam safety guidelines and manuals developed under DRIP were released during the Conference. A software tool, Dam Health and Rehabilitation Monitoring Application (DHARMA) was also launched for all dam owners to enhance their asset management ability. About 30 national and international organizations also participated in the Conference Exhibition showcasing various products used in dam safety activities including

various contemporary advancements on technological fronts, construction rehabilitant materials, surveillance and monitoring.

5.4.3.2 Dam Safety Inspection Visit

Dam Safety inspection is an important and integral part for sustained safety of the important structures. Team of officials of CWC have been visiting various Dams as per request of Ministry / State Government. During the 2017-18, more than 475 site visits were conducted by CWC to various dams located in various part of the country.

5.4.3.3 Next Phase of DRIP

The DRIP has been successful in bringing greater awareness on dam safety issues and addressing the serious problems by introducing novel solutions and technologies. Keeping in view that the project at present covers only 5% of large dams in India, Phase 2 of the DRIP is being contemplated to address the safety concerns at other dams. Process has been initiated for formulation of scheme for DRIP 2 with larger financial outlay to cover more dams and having three components of DRIP namely (i) Rehabilitation and Improvement of dams and associated appurtenances, (ii) Dam Safety Institutional Strengthening in participating States and CWC, and (iii) Project Management. Proposal is this regard has been invited from all the State Governments clearly identifying their needs.

Non destructive testing at Bhaskel Dam, OWRD

Inspection of gate hoists at Maithon and Panchet Dams

5.4.4 Consultancy Services on Instrumentation in Hydraulic Structures

Detailed Project Report / Compliance Report of sixteen river valley projects from various states in the country namely Arunachal Pradesh, Assam, Himachal Pradesh, Jammu & Kashmir, Meghalaya, Madhya Pradesh, Maharashtra, Odisha and Uttarakhand as well as from neighbouring country namely Afghanistan have been examined. Out of this eleven projects have been cleared with respect to instrumentation aspect. Observations of CWC on remaining five projects have been communicated to the project authorities.

In addition to above, following consultancy services were undertaken towards planning and preparation of instrumentation specification/ construction drawings/vetting of drawings/preparation of instrumentation chapter for DPR purpose.

(i) Preparation of Instrumentation Drawings for projects:

- Four instrumentation drawings of Ganol HE Project, Meghalaya have been prepared and submitted to project authorities.
- Five revised instrumentation drawings and one new instrumentation drawing of Punatsangchhu-II HE Project, Bhutan have been prepared.
- One Revised Instrumentation Construction drawing of Longitudinal Section at dam axis of Punatsangchhu-II Project, Bhutan has been prepared. .

(ii) Vetting of Proposal:

- Proposal of additional instruments in Dam, Punatsangchhu-II HEP as submitted by M/s NIRM examined and comments issued.

5.4.5 Technical Examination of Projects for Seismic and Foundation Aspects

Detailed Project Reports of 19 nos. of river valley projects from various States namely, Meghalaya, Madhya Pradesh, Himachal Pradesh, Uttarakhand, Gujarat, Maharashtra, Odisha, Arunachal Pradesh, West Bengal and Karnataka and from neighbouring country namely,Afghanistan were examined with respect to geological investigations related to foundation engineering and Seismic aspects. Out of this, nine nos. of DPRs have been cleared. Observations of CWC on remaining projects have been communicated to the project authorities, compliance of which is awaited.

5.4.6 National Committee on Seismic Design Parameters

The National Committee on Seismic Design Parameters (NCSDP) was constituted through MoWR Order dated 21st October, 1991 with the objective to recommend the Seismic Design Parameters for the proposals received from the dam owners. The 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 the NCSDP.

During 2017-18, 32nd meeting of NCSDP was held on 12th July, 2017, wherein the site specific seismic study reports of 13 projects were discussed and cleared by the Committee.

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. The dam break analysis is being carried out in CWC on consultancy basis. 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. The glacial lakes are formed by accumulation of glacier melt behind the moraine dams formed by landslides or some other natural phenomenon.

Both these studies help to ensure better safety of the dam and to plan out better safeguard for the lives of people & property downstream.

During the year, the GLOF study report of Goriganga IIIA HEP, Uttarakhand has been examined and cleared.

5.4.8 Dam Safety Legislation

Owing to India's sizeable number of dams – of which substantial proportions are ageing – legislation on the dam safety has been desired by various forums to ensure the safety of the dams in the country. The need of legislation was first underlined by the Standing Committee constituted in 1982 to review the then existing practices and to evolve unified procedures on dam safety in India (CWC, 1986). The need has also been repeatedly emphasized by the National Committee on Dam Safety.

The States of Andhra Pradesh and West Bengal have adopted resolutions in their respective Assemblies for enactment of dam safety legislation for regulation in their States by an Act of Parliament. In pursuance of the above, Ministry of Water Resources formulated a (Draft) Dam Safety Bill 2010, which was introduced in the Parliament on 30th August 2010. The Bill was referred to the Parliamentary Standing Committee on Water Resources for the examination of the Bill, which had submitted its recommendations in June 2011. The observation and recommendations of the Parliamentary Standing Committee on Water Resources were examined by Ministry of Water Resources for necessary compliance. However, with the dissolution of the 15th Lok Sabha, Dam Safety Bill (2010) lapsed.

Seeing the limitation of the Dam Safety Bill (2010) in terms of its initial applicability to the two states of Andhra Pradesh and West Bengal and the Union Territories only, CWC in June 2014 had submitted a new draft of the Dam Safety Bill to the Ministry seeking national level applicability of the Bill. Accordingly, Dam Safety Bill 2017 has been prepared with all India applicability under Entry 56 and 97 of list I on the basis of opinion obtained from Solicitor General of India. Draft Dam Safety Bill 2017 was also shared with the concerned line Ministries /Departments. The comments have been received from Ministries. As per suggestions of NITI Aayog, the draft Bill was circulated to State Governments in August 2016. Comments were received from 19 States and 4 dam owning organizations. The comments of the States were deliberated in the meeting of National Committee on Dam Safety (NCDS) held under the Chairmanship of Secretary (WR, RD & GR) for finalization of draft Bill. States except a few have largely supported the bill. The National Dam Safety Bill 2017 has been put up for approval of the Cabinet.

The proposed legislation on dam safety is intended to provide for proper surveillance, inspection, operation and maintenance of all large dams to ensure their safe functioning, and thereby protect persons and property against risks associated with dam failures. The legislation seeks to enjoin responsibility on Central Government, State Governments and owners of specified dams to set up an institutional mechanism for ensuring safety of such dams and reporting the action taken. It defines the duties and functions of these institutions in relation to perpetual surveillance, routine inspections, operation and maintenance, maintenance of log books, instructions, funds for maintenance and repairs, technical documentation, reporting, qualifications and trainings of

concerned manpower etc. Provisions have been made concerning the necessities of periodical inspections, instrumentations and establishment of hydrological and seismological stations. The Bill addresses the issues of emergency action plan and disaster management, and also enlists the requirements of comprehensive dam safety evaluation.

5.5 Design Consultancy in 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 important activities in this regard 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. Most part of the Counter Memorial and Counter Rejoinder are prepared by CWC as and when such issues arrises.
- Technical assistance to government for Cooperation with China, Bangladesh, Nepal, Bhutan and Afghanistan and technical evaluation of impacts of the projects in/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 water sharing related disputes. It provides its services for impartial/unbiased assessment of Water Availability Studies and Backwater Assessment to give fair picture for submergence concerns. Site inspections and preparation of reports for Government on critical issues related to Inter-State Projects

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

D&R Wing is assisting BIS in formulation/amendment of codes for WRD Projects. Research is essentially integrated in working of D&R Wing asit 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 codes through the WRD Committee meetings which results in modification 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 its contribution towards disaster management is in assessing hazard potential of landslide dams, providing mitigation measures for Landslides, Land subsidence.

D&R wing is also imparting training to Water Resources Professionals of the country for planning, design & development of Water Resources Projects by organising training programme in CWC and at NWA Pune. Officers of D&R Wing are regular faculty in training programmes of NWA.

A list of technical papers submitted and presentations/ lectures conducted by Officers of D&R Wing is given in Table 5.4.

Table 5.4
List of technical papers submitted or presentations/ lectures conducted by Officers of D&R Wing

Sl No.	Name of programme/ course/ presentation	Name of Officer & Unit/Dte	Venue and Date
1.	Presentation on basic features & appraisal issues on "Par-Tapi-Narmada Link Project" Gujarat & Maharashtra	DSO Unit	12-07-2017 at CWC, New Delhi
2.	Presentation on Floods of Bhramaputra	Shr N.N. Rai, Director, Hyd(NE)	20-07-2017 at CWC, New Delhi
3.	Lecuture on Pile foundation	Shri P.Devendra Rao, Director, Emb (NW&S) dte	03-07-2017 at HIRMI Kurukshetra

Sl No.	Name of programme/ course/ presentation	Name of Officer & Unit/Dte	Venue and Date
4.	Lecture on well foundation for practising engineers of Haryana Iriigation department	Shri P.Devendra Rao, Director, Emb (NW&S) dte	03-07-2017 at HIRMI Haryana
5.	Lecture on design of gate and gearing with hand on practical sessions	Shri Vaseem Ashraf, Director, GD (N&W)	07-07-2017 at HIRMI, Haryana
6.	Design of dams and bridges	Shri. Kayum Mohammad, Director, CMDD(NW&S)	26.10.2017 to 28.10.2017 Human Resources Development Institute Bapatle, A.P(APHRDI)
7.	Training program on "Project Hydrology-Hydrological Aspects in planning and Preparation of DPR"	Hyd (DSR)	06-11-2017 to 10-11-2017 at New Delhi
8.	A technical paper on Slope Stability Analysis of Earth Dam of Middle Kolab Multipurpose Project, Odisha	Emb (NW &S)	Journal of Water Resources Planning, Design & Research Oct- Dec 2017, Volume-2, Issue-1
9.	Training programme on "Project Hydrology-"Use of Statistics in Hydrology"	Hyd (DSR)	06-12-2017 to 08-12-2017 at New Delhi
10.	Lecture on Project Hydrology-Use of statistics in Hydrology	Sh. M. Raghuram, Director, Hyd(N) Dte.	07-12-2017 at CWC, New Delhi
11.	Lecture on "AR and ARMA models"	Sh. S.K.Sinha, Director, Hyd(C) Dte.	08-12-2017 at CWC, New Delhi

Sl No.	Name of programme/ course/ presentation	Name of Officer & Unit/Dte	Venue and Date
12.	Lecture on "Hydro-Meteorological Data Processing and various Data check techniques" and on "Hypothesis testing, Confidence interval and Goodness of Fit tests "	Sh. N.N. Rai, Director, Hyd(S) Dte.	06-12-2017 to 08-12-2017 at CWC, New Delhi
13.	Lecture on Integrated Water Resource Management	Shri N.K. Mathur, Member (D&R)	11.01.2018 at IIT Roorke
14.	Lecture on Sedimentation.	Sh. M. Raghuram, Director, Hyd(N) Dte.	30-01-2018 at NWA, Pune

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19th meeting of Technical Committee of DRIP held at Durgapur on 20.12.2017

CHAPTER-VI

WATER MANAGEMENT

6.1 Monitoring of Reservoir Storage

Central Water Commission monitors live storages of important reservoirs of the country. The information is used by the Crop Weather Watch Group constituted by Ministry of Agriculture for reviewing the crop planning strategy based on the availability of water in the reservoirs.

During the Water year 2017-18, Central Water Commission have monitored the live storage of 91 important reservoirs of the country having total live storage capacity at FRL of 157.799 BCM which is about 62 % of the live storage capacity created in the country as per the assessment carried out in 2010. The status is given in Table 6.1.

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

Description			Water Year	
			2016-17	2017-18
Number of Reservoirs			91	91
Total Designed live storage in BCM			157.799	157.799
ACTUAL STORAGE	On June, 1st (Start of Monsoon)	In BCM	29.160	33.407
		In % of Designed Live Storage	18	21
		In % of last 10 Years Average Live Storage	91	105
	On September, 30th (End of Monsoon)	In BCM	117.111	104.099
		In % of Designed live Storage	74	66
		In % of last 10 Years Avg. live Storage	97	87

A bulletin on the status of reservoir storages monitored by CWC is being issued every week. 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.

In order to expeditiously collect the data required for preparation of reservoir bulletin, automation of storage data collection for reservoirs being monitored by CWC is proposed through existing telemetry installed by concerned authorities of reservoirs or by installing new telemetry system. It is also proposed increase the no. of reservoir under monitoring from 91 to 120.

6.2 Interaction with Ministry of Agriculture

Central Water Commission is represented in the Crop Weather Watch Group meetings of Ministry of Agriculture in which the water storage status of 91 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 water use for irrigation and suggest measures for maximizing the return from investment on Irrigation in areas covered under major, medium, minor and other irrigation programme. 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 optimizing 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 on 02.08.2016. The 1st meeting of reconstituted ICAR-CWC Joint Panel was held under the chairmanship of Secretary, DARE & Director General, ICAR and co-chairmanship of Member(WP&P), CWC on 2nd June 2017.

6.3 Reservoir Sedimentation-Capacity Survey of Reservoirs

6.3.1 Hydrographic Survey/ Capacity Survey

Capacity Survey of reservoirs has been a continuing scheme, known as hydrographic survey of major reservoirs, initiated during the VIII plan and continued in subsequent Plans. Up to the end of XII plan, the capacity survey

work of 36 reservoirs has been completed by CWC.

During 2017-20, the capacity survey work of 15 reservoirs has been targeted. Process for awarding work for capacity survey of 8 reservoirs is under progress.

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 progress of studies during 2017-18 is as under:

i.) CWC conducts in house Sedimentation Assessment Study of reservoirs using Remote Sensing Technique. During the period 2017-20, the study in respect of 10 reservoirs is proposed. In this regard, Sedimentation Assessment Study of Tandula Reservoir (Chhattisgarh) has been undertaken and is in progress.

ii.) It is proposed to carry out Sedimentation Assessment Study in respect of 40 reservoirs using Remote Sensing Technique during 2017-20 through consultancy. The RFP for awarding the consultancy work for Sedimentation Assessment study of these reservoirs is under preparation.

6.4 Project Performance Evaluation

Performance Overview and Management Improvement Organization (PO & MIO), Central Water Commission is undertaking Post Project Performance Evaluation studies of completed major/medium irrigation projects in the country. It is also involved in benchmarking of completed irrigation projects and promotion of Water Audit and Water Conservations in all the three sectors viz. domestic, industrial and irrigation in the states.

The Post Project Performance Evaluation study of Completed Irrigation Projects includes i) Evaluation of system performance, ii) Agro-economic, iii) Socio-Economic and iv) 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 2017-18, the Post Project Performance Evaluation study of "Giri Medium Irrigation Project, Himachal Pradesh" is ongoing.

6.5 Other important works

Study Report on Water Requirement for maintaining Son Gharial Sanctuary

In O.A. No 146 of 2014 - Nityanand Mishra Vs State of Madhya Pradesh & Ors., NGT Bhopal directed CWC to conduct a study for determining minimum acceptable flow in Son Gharial Sanctuary, downstream of Bansagar Dam. The study report was prepared and submitted in November, 2016. A report in this regard was also submitted by Madhya Pradesh Government.

The NGT further directed CWC to reconcile the two reports and make its recommendations. 1st meeting of the Committee to study the report submitted by Madhya Pradesh Government was convened on 23.01.2017 wherein it was decided to constitute a new Committee to reconcile the two reports. Accordingly, a new Committee was constituted involving representatives from State Governments of UP, MP & Bihar and also MoEF&CC. A meeting of the new Committee was convened on 16.02.2018. Representatives of all the 3 State Governments attended the meeting. In the meeting, it was decided that the HSO Unit of CWC will carry out this analysis to find out the quantity of water to be released from Bansagar Reservoir after taking into account the 95% dependable flows in the d/s tributaries of Son River. The study is in progress.

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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). After establishment of techno-economic viability of the project, the Advisory Committee of MoWR,RD&GR on Irrigation, Flood Control and Multipurpose Projects headed by Secretary, MoWR, RD & GR considers projects for acceptance and thereafter recommends the same for investment clearance. Since 1976, about 1509 projects have been considered and accepted by the Advisory Committee till March 2018.

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 by State Governments.

7.2 Appraisal of Major / Multipurpose Irrigation Projects

During the year 2017-18, 45 major/ multipurpose projects (42 new & 3 revised) have been appraised up to 31st March 2018. Out of that, 8 major / multipurpose projects have been accepted by the Advisory Committee of MoWR. A Pie Chart showing state-wise distribution of major irrigation / multipurpose projects under appraisal during 2017-18 is shown at **Fig-7.1**

7.3 Appraisal of Medium Irrigation Projects

During the year 2017-18, 6 medium projects (3 new & 3 revised) have been appraised in field units of CWC. Out of that, 1 medium projects (new) have been accepted by the Advisory Committee of MoWR. Necessary assistance was provided by PAO, CWC to the concerned regional offices for processing the projects for acceptance by the Advisory Committee.

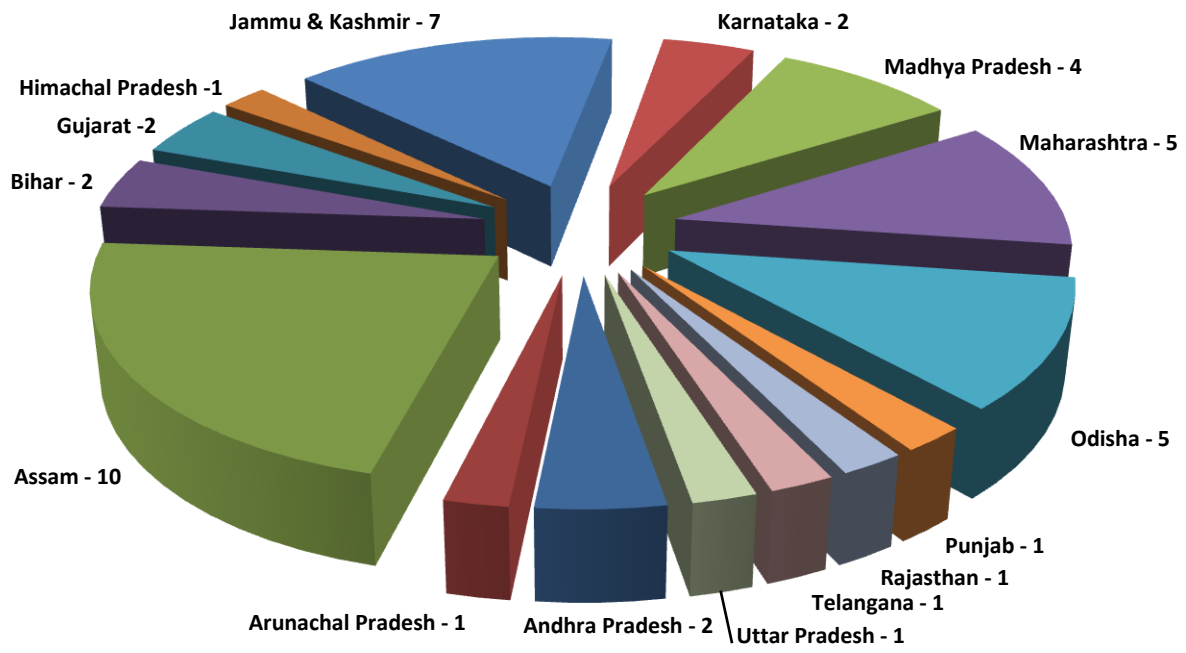

Fig. 7.1 State-wise distribution of major irrigation / multipurpose projects under appraisal during 2017-18

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 calls upon review meetings and collectively many State Governments are invited to discuss on project issues. During the year 2017-18, following review meetings were held and issues were resolved:

a Inter-State meetings in respect of Kanhar Barrage Project (Jharkhand) was held at CWC-HQ, New Delhi on 06.06.2017 and

25.07.2017, wherein it was concluded that there is no Inter-State issue involved between Bihar and Jharkhand regarding the proposed utilization of 0.283 MAF of water from the Kanhar Barrage Project by the State of Jharkhand.

b. Inter-State meeting in respect of Baksoti Barrage Project (Bihar) was held at CWC-HQ, New Delhi on 06/06/2017.

7.5 Meeting of the Advisory Committee

During year 2017-18, the Advisory Committee of MoWR,RD&GR, under the Chairmanship of Secretary (WR) accepted 13 projects comprising 8 Major & Medium Irrigation / Multipurpose projects and 5 Flood Control schemes in 3 meeting. The list of major & medium irrigation / multipurpose projects and flood control schemes accepted by the Advisory Committee of MoWR is enclosed as **Annexure-7.1** and **Annexure-7.2** respectively.

The irrigation projects accepted during 2017-18 envisages annual irrigation benefits to 14,65,353 hectare in the 7 States of the country. The Flood Control Scheme, accepted during 2017-18 envisages protection to the population of about 4,53,894 persons & area of about 1,48,331 hectares in the states of Bihar and Uttar Pradesh. Pie Chart showing State-wise distribution of 8 Nos. major & medium irrigation / multipurpose projects accepted by the Advisory Committee during the current year is enclosed as **Fig. 7.2**

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 11 Hydro-Electric Projects has been done in CWC during 2017-18. 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 2017-18, CEA has accorded TEC to 3 Nos. Hydro-Electric Projects having total installed capacity of 5531 MW.

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

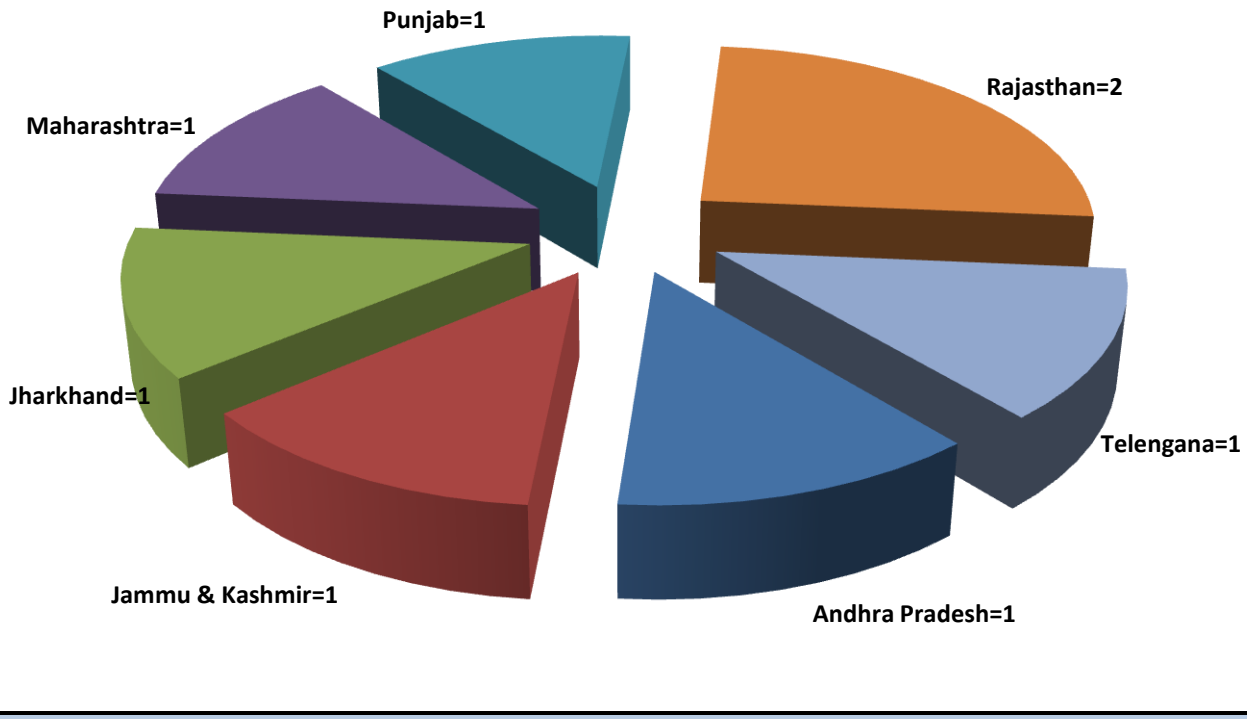

Fig. 7.2: State-wise Distribution of Major/ Medium/ Multipurpose Projects Accepted by the Advisory Committee of MoWR,RD&GR during the Year 2017-18

7.7 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. 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, Ministry of Water Resources had issued modification in the guidelines 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, 00, 000 hectare (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 2,00,000 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 of 90% 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 reduced 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, 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 fund under the scheme of National Projects.

Indirasagar Polavaram Irrigation Project

Goshikhurd and Shahpur Kandi projects have been provided grant amounting to Rs. 3154.53 crore and Rs. 26.04 crore, respectively, up to March, 2018. 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 2018. Saryu Nahar Pariyojana started receiving funding under the scheme of National Project during 2012-13 and an amount of Rs.

1221.58 Crore has been released upto March 2018. The Indirasagar Polavaram Irrigation Project started receiving funding under the scheme of National Project during 2014-15 and an amount of Rs. 5364.70 Crore has been released upto March 2018. Saryu Nahar Paryojna (Uttar Pradesh) and Gosikhurd Irrigation Project (Maharashtra) have been included under the 99 priority project under PMKSY-AIBP.

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.

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 is under appraisal in CWC/CEA.

Ujh Multi-Purpose Project (J&K) was agreed "In Principal" by the Advisory Committee of MoWR, RD & GR in its 131st meeting held on 17.11.2016 at New Delhi with a condition that a team consisting of concerned officers from CWC and other experts shall visit the project site/area and explore the alternate options with reduced submergence/displacement alongwith minimum loss of power and irrigation benefits, so that the potential of east flowing river may be fully utilised, as envisaged in Indus Water Treaty. Accordingly, the optimized proposal the project, ensuring utilisation of full potential of east flowing river as per Indus Water Treaty, prepared as per suggestion of the above team was to be re-submitted to Advisory Committee of MoWR, RD & GR after Environment and Forest Clearance. The team has visited the project in March, 2017. The Team submitted its report in May, 2017 with suggestion for reduction in Full Reservoir Level of Dam by 6m. The DPR is being modified as per the report of the team.

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.

Four projects, viz Kishau MPP (HP and UK), Noa-Dihing Dam Project (Arunachal Pradesh), Kulsi Dam Project

(Assam) and Bursar Project (J&K) are under appraisal in CWC/CEA.

Two projects, viz. Upper Siang Project and Gyspa Project (Himachal Pradesh) are at DPR preparation stage. Remaining one project, viz. 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 the Secretary (WR) as Chairman and Chief Engineer (PPO), CWC as 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.

Ten meetings of High Powered Steering Committee for implementation of National Projects have been held so far. The last meeting was held on 3rd March, 2017.

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

Government of India has approved two schemes on Repair, Renovation and Restoration of water bodies (i) with external assistance with an outlay of Rs. 1500 Crore and (ii) with domestic support with an outlay of Rs. 1,250 Crore for implementation during XI Plan Period.

Under the scheme with domestic support, a total of 3341 water bodies were taken up for restoration in 12 States. A total central grant amounting to Rs. 917.259 Crore has been released till date to the States for the completion of works on these water bodies.

Under the scheme with External Assistance, 10887 water bodies were taken up for restoration in the States of AndhraPradesh (3000), Karnataka (1224), Odisha (900) and Tamil Nadu (5763).

The scheme for continuation of RRR of Water Bodies for XII Plan envisages to provide Central Assistance for the restoration of about 10,000 water bodies with an earmarked central share outlay of Rs. 6235 crore which includes Rs 250 Crore for the spill over works in respect of water bodies taken up during XI Plan. Out of 10,000 water bodies, 9000 water bodies in rural areas and balance 1000

water bodies in urban areas were to be covered. The proposal of water bodies where the Integrated Water Management Programme (IWMP) is implemented/propose to be implemented were to be considered for inclusion under the XII Plan scheme of RRR of water bodies.

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. The PMKSY-Har Khet Ko Pani (HKKP) is one of the components of PMKSY. The scheme of RRR of Water Bodies has now become a part of PMKSY-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, naxal affected areas, DPAP areas, Tribal areas, 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 revised "Guidelines for the Scheme on Repair, Renovation and Restoration (RRR) of Water Bodies under PMKSY-HKKP" issued in January 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 is also to be forwarded to MoWR,RD&GR directly by the concerned Field Office of CWC. A copy of proposal is also to be sent to CWC HQ for maintaining overall status of scheme.

Since XII Plan, restoration works in respect of 1827 water bodies has been included for funding under the scheme of RRR of Water Bodies (as on 31.03.2018). Out of which works in respect of 1065 water bodies have been reported to be completed. So far, Central Assistance of Rs. 344.32 Crore has been released to the States for completion of works of these water bodies. The details are given in Table 7.1. During the FY 2017-18, restoration works in respect of 532 (Odisha 103, Rajasthan 36 and Telangana 393) water bodies were included for funding under scheme for

RRR of water bodies. The details are as given Table 7.2. Total Central Assistance of Rs. 79.65 Crore was released during 2017-18.

Table 7.1
Status of Water Bodies & Funds released under Scheme for RRR of Water Bodies Since XII Plan (as on 31.03.2018)

Rs. in Crore

Sl. No.	Name of State	No. of Water Bodies	Estimated Cost	Irrigation Potential to be restored (ha)	Central Fund Released during 2017-18	Total Central Fund Released since XII Plan	No. of Water Bodies Completed	Irrigation Potential Restored (ha)
1	Odisha	863	449.03	51261	3.00	110.65	724	44252
2	Madhya Pradesh	125	183.24	33305	-	37.70	121	25000
3	Meghalaya	9	11.43	1096	2.67	5.18	4	849
4	Manipur	4	65.44	1197	-	10.37	-	-
5	Rajasthan	68	187.80	13197	14.30	50.23	31	7340
6	Tamil Nadu	104	54.32	2448	-	9.22	104	NR
7	Telangana	575	459.18	29010	59.68	104.56	81	1250
8	Uttar Pradesh	74	83.41	10003	-	16.41	-	-
9	Uttarakhand	5	12.49	450	-	-	-	-
Total		1827	1506.36	141967	79.65	344.32	1065	78691

Table 7.2
Details of Projects included for funding under the scheme for RRR of water bodies during 2017-18

Sl. No	State	No. of Water Bodies	Estimated Cost (Rs in Crore)
1	Odisha	103	87.51
2	Rajasthan	36	98.13
3	Telangana	393	333.73
Total		532	519.37

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, 4893 SMI schemes have been taken up under the programme (till 31.03.2018). Out of this, 2667 schemes have been reported to be completed. So far, Central Assistance amounting to Rs. 5873.65 Crore has been released for completion of these schemes (till 31.3.2018). Out of this, an amount of Rs. 665.36 Crore was released during 2017-18 (till March 2018). 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 31.03.2018)

Rs. in Crore

Sl No.	Name of State	No of schemes included	Irrigation Potential Planned ha	Estimated Cost	Committed Central Share	CA Released during 2017-18	Cumulative CA released during XII plan & onwards	No of Schemes comple-ted	Irrigation Potential Achieved ha
1	Arunachal Pradesh	315	19162	230.723	207.651	10.259	186.23	185	18104
2	Assam	1046	434774	5120.30	4608.267	375.77	2559.68	582	221510
3	Bihar	176	73295	351.620	274.071		115.29	117	52331
4	Chhattisgarh	147	50513	722.17	541.59		200.37	102	50500
5	Himachal Pradesh	150	21991	411.9201	370.728	49.275	82.8	21	3806
6	Jammu & Kashmir	419	115082	1317.431	1185.688	104.483	491.63	121	68747
7	Jharkhand	82	8982	75.324	56.493		19.38	44	4127
8	Karnataka	465	39104	594.9188	456.342		162.42	271	33811
9	Madhya Pradesh	276	111343	1817.39	1370.096		987.69	256	66130
10	Manipur	102	12904	170.37	153.333	22.23	104.55		12200
11	Meghalaya	192	31748	495.745	445.976	44.44	253.68	89	14823
12	Mizoram	36	2343	42.47	38.222	8.25	10.24		
13	Nagaland	434	20854	312.848	281.564	9.25	272.315	434	20854

Sl No.	Name of State	No of schemes included	Irrigation Potential Planned ha	Estimated Cost	Committed Central Share	CA Released during 2017-18	Cumulative CA released during XII plan & onwards	No of Schemes comple-ted	Irrigation Potential Achieved ha
14	Sikkim	381	12380	115.02	103.519	9	65.63	225	11131
15	Tripura	21	3890	47.323	42.591		17.75	12	438
16	Uttarakhand	651	42092	541.4094	487.268	32.4	343.995	208	29140
Total		**4893**	**1000457**	**12366.98**	**10623.4**	**665.36**	**5873.65**	**2667**	**607652**

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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 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 2017-18, a total of 47 (20 Major and 27 Medium) projects under general monitoring and 149 (80 Major, 48 Medium and 21 ERM) ongoing projects under AIBP were targeted for monitoring by CWC Field Units. Out of this, 13 Inter-State Major Projects, part of which are being monitored under AIBP by CWC field Units, will also be monitored from CWC(HQ). The 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**. State-wise summary of monitoring visits to projects under AIBP is given at **Annexure - 8.4**.

Tarakarama Thirtha Sagaram Barrage

All the projects identified for monitoring are to be visited by CWC officers once a year. Thereafter, based

on the field visit to the project and discussions with the State Government Officials, a detailed Status Report is to be prepared 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 2017-18 is given in Table 8.1.

Cross Drainage Structure & Head Regulator on Srikakulam Branch Canal of Thotapally Project

Table 8.1
Status of Monitoring Visits by CWC during the Year 2017-18

S. No.	Item	Target	Achieve-ment
1	General Monitoring by Regional Offices	47	7
2	AIBP Monitoring by Regional Offices	149	141

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, during 1996-97, launched an Accelerated Irrigation Benefits Programme (AIBP) 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 can also be 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, non-special category states could also include 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. 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.

Ongoing lining work on Canals of Gundlakamma Project

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, the 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 potential utilization. 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. 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. Could be enhanced upto 50% for new projects subject to condition that the States actually carry out water sector reforms

The balance funds to be arranged by the State Government from its own resources. During a financial year, the sanctioned grant will be released in two instalments.

(i) For projects receiving 25% CA :- 90% (as Ist Instalment) after release of at least of 50% of State Share. And balance 10% (IInd Instalment) after obtaining the UC of minimum of 50% of CA released earlier and

(ii) For projects receiving higher than 50 % CA: - 50% (Ist Instalment) after the State releases its full Share and balance 50% (IInd Instalment) after obtaining the UC of minimum of 50% of CA released earlier.

MoU between Central and State Government has also been slightly modified with insertion of the Para for the CAD works.

Ujh Canal of Main Ravi Canal

Central Water Commission has been assigned the responsibility to comprehensively monitor the projects receiving CLA/Grant. Presently, there are 149 ongoing projects under AIBP which are getting grant and are being monitored by CWC. The projects under AIBP are monitored once a year by CWC officers and thereafter the Status Reports are prepared and issued to all concerned.

So far, 297 projects from 25 States have been included for funding under AIBP. Out of 297 projects, 143 projects have been completed and 5 projects were deferred up to 31.03.2016. **Annexure - 8.5** gives State-wise list of Major & Medium projects completed under AIBP.

CAD Works in Village Ghrivi under OSP PH-III Project

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. The 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 PMKSY-AIBP, during 2015-16, MoWR,RD&GR has identified 99 priority projects amongst the 149 ongoing projects under AIBP for early completion. Under the dedicated funding mechanism that is 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 18 projects have been reported completed by June 2017 apart from some peripheral works. 28 projects are scheduled for completion by June 2018 and remaining projects are targeted to be completed by December 2019. A list of 18 projects reported as complete is given at Annexure - 8.6

Central Grant totalling to Rs. 3596.61 Crores has been released to 52 Projects under PMKSY-AIBP during 2017-18. Since its inception, the cumulative total Central Loan Assistance / Grant provided to States under AIBP/PMKSY-

AIBP is Rs. 62507.25 Crores till 31.03.2018 to 297 projects.

As reported by the State Governments 9.61105 Mha of additional irrigation potential has been created under AIBP since the start of the scheme till March, 2017.

8.3 Assessment of Irrigation Potential created under AIBP

8.3.1 Use of Satellite Technology

To supplement the existing monitoring mechanism by providing authentic and objective data base on existing irrigation infrastructure, it was felt necessary to utilize the Remote Sensing Technique for the assessment of Irrigation Potential Creation in AIBP assisted projects. At the instance of Planning Commission, pilot studies of two projects i.e. Upper Krishna in Karnataka and Teesta Barrage in West Bengal were carried out successfully using Satellite Data by NRSA Hyderabad. The study results of the assessment were found satisfactory and compared well with ground realities.

In view of importance and utility of results arising out of pilot study, it was decided by Planning Commission to take up the projects on a national scale covering about 10 Million Ha. of Irrigation Potential spread across different states in India. In first phase, the assessment of Irrigation Potential Creation through mapping of irrigation infrastructures to monitor the progress was assigned to NRSA, Hyderabad in respect of 53 on-going AIBP assisted projects covering area of 5447.743 Th. Ha during 2007-08. The study has been completed during 2009-10. It provides the critical gap areas for further effective monitoring.

Mathadivagu Dam Spillway

In the second phase, the assessment of irrigation potential of 50 AIBP projects using cartosat satellite data covering an area of 851.428 Th Ha has been completed by NRSC, Hyderabad during 2013-14. All the 50 reports have been submitted by NRSC, Hyderabad along with a Summary Report and deliverables agreed as per MOU for work awarded to NRSC for the 50 projects spread over 14 states.

It was proposed to build in-house capacity in CWC to carry out this study on regular basis each year for selected projects, which would supplement the existing monitoring mechanism, put in place a web enabled online monitoring system for all the projects being monitored at central level under General, Vigorous or AIBP Category by the end of 2nd year of the XII plan i.e. by 2013-14. Accordingly, 13 projects on pilot basis were identified for the in house practice. The satellite based online monitoring of these projects were carried out using BHUVAN web services (SatAIBP) wherein processed Cartosat imageries of all the 13 projects were hosted by NRSC. During studies, it was observed that the Cartosat imageries hosted on Bhuvan Portal by NRSC though partially supplement the existing monitoring mechanism by providing authentic and objective data base for canal network up to distributaries, yet not suitable for identification of small minors, gaps and structures etc. due to its low resolution.

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

Mathadivagu Dam Spillway

BISAG has agreed to make a GIS based application for the monitoring of 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 an MIS/GIS based application for water bodied included for funding under RRR scheme. The mobile application shall have facility for capture of the geo-tagged photographs/videos of such water bodies.

8.3.2 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 studies. TOR is being finalised by State in consultation with the Union Ministry of Water Resources, River Development and Ganga Rejuvenation.

Dharamasagar Tank Spillway and Intake Channel at Gangaram Pump House of J Chokka Rao Project

8.3.3 Impact Assessment of AIBP

In the wake of substantial expenditure by the Government towards creation of irrigation potential in the country, there

is a need for a holistic assessment of the extent of actual benefits realized under the same. Such a study will assess the changes that can be attributed to a particular intervention, such as a project, programme or policy both the intended ones as well as ideally the unintended ones. The objective of the study is to conduct a critical evaluation of the performance of 10 AIBP projects selected from 5 regions. The study will also help in identifying gaps in the implementation structure of AIBP towards its overall streamlining.

In this regard, Towards achieving the same, Union Ministry of Water Resources, River Development and Ganga Rejuvenation has awarded the work by for undertaking impact assessment studies of 10 completed projects from 5 regions of the country to Academy of Management Studies (AMS). The list of 10 completed projects selected for the impact assessment study is given at Annexure - 8.7. The draft pilot report in respect of one project namely, "Hindon Krishi Doab Project, Uttar Pradesh" has been submitted by the Academy of Management Studies (AMS).

Peddavagu, Jagannathpur Project

Canal Syphon On Rajam Branch Canal of Thotapally Project

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CHAPTER-IX

CONSTRUCTION EQUIPMENT PLANNING AND MANAGEMENT

9.1 Construction Equipment Planning and Management

CWC is actively involved in various aspects of construction equipment planning and management which involves techno-economic appraisal of project reports from Plant Planning angle, consultancy in equipment planning, assistance in procurement of equipment and spare parts, contract management and preparation of cost estimates.

9.2 Project Appraisal

During the year, 32 project reports of Irrigation, Power and Multipurpose projects of various states of the country were technically examined from plant planning angle. Out of these 15 projects reports were accepted from plant planning angle. In respect of the remaining 17 nos. of project reports, the observations/comments were conveyed to the project authorities for compliance and further review.

9.3 Consultancy

A proposal for preparation of Chapter "Construction Methodology and Equipment Planning" in respect of Kuri Gongri Hydro Electric Project, Bhutan (2640 MW) is under consideration in CWC.

9.4 Manpower Planning

The 11th study report on "Employment Generation in Major and Medium irrigation projects during Operation & Maintenance stage" for 5 years from 2005-06 to 2009-10 is in finalisation stage. In this regard, two meetings of the Advisory Group of Manpower Planning under the Chairmanship of Chief Engineer (CMO), CWC was held on 19.12.2017 and 16.01.2018 to discuss the draft study report and finalized the study report respectively.

9.5 Other Activities

- **Mangdechhu Hydro-Electric Project, Bhutan:** The issue related to applicability of equipment insurance

charges for Rate Analysis of various item of works of River Valley Projects was examined and advice / clarifications were provided to MHEP Authority, Bhutan.

- **Reconstitution of Advisory Group on Manpower Planning:** The Advisory Group on Manpower Planning has been reconstituted vide order dated 4th October, 2017.
- **Farraka Barrage Project:** Director, CMC has been included as a member of a "Team of Officer" constituted by the MoWR, RD & GR to assess the unserviceable Items/materials under Farraka Barrage Project (FBP) and propose a mechanism for their disposal.

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CHAPTER-X

INTER-STATE MATTERS

10.1 Inter-State River Water Disputes

CWC provides technical assistance to MoWR,RD&GR to settle water related disputes among the States amicably through negotiation. During the year 2017-18, 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 have been given in subsequent paras.

10.1.1 Cauvery River Water Disputes - Monitoring of the implementation of Final Order of Cauvery Water Dispute Tribunal(CWDT)

As per final order of CWDT, The State of Karnataka is to make available 192 TMC at Inter-State Contact Point at Billigundullu by specifying monthly schedule.

As per the Ministry of Water Resources Notification dated 22nd May, 2013, a Supervisory Committee has been constituted. The role of the Committee is to give effect to the implementation of the Order dated the 5th February, 2007 of the Tribunal. The Committee consists of the following, namely:

(a)	Secretary, Ministry of Water Resources, Government of India	Chairman, ex-officio
(b)	Chief Secretaries to the Governments of Karnataka, Tamil Nadu, Kerala and the Union Territory of Puducherry or his duly nominated representative	Members, ex-officio
(c)	Chairman, Central Water Commission	Member, ex-officio
(d)	Chief Engineer, IMO, Central Water Commission	Member-Secretary

Inter-State Matters-1(ISM-1) Directorate, CWC is the secretariat for Supervisory

Committee. Eight (8) meetings of the Supervisory Committee have been held till March, 2017. No meeting of the Committee was held during 2017-18.

As per Final Order of CWDT CWC is analysing inflow, outflow, withdrawal and storage data of reservoirs of Cauvery basin on regular basis and presenting the report to the concerned authorities from time to time.

During the water year since 1st June, 2017 to 31st March, 2018, 115.59 TMC of water passed through Billigundulu Site against 187 TMC of water as per CWDT Final order.

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

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

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

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

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

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

ii) The Committee shall ensure that;

a) Maharashtra maintains Babhali 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 Babhali Barrage 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 Babhali Barrage does not exceed 2.74 TMC of which only 0.6 TMC forms the common submergence of Pochampad Reservoir & Babhali Barrage.

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

e) Maharashtra releases 0.6 TMC of water to 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 2017-18. However, as per direction of Member (WP&P), CWC and Chairman of Supervisory Committee on Babhali Barrage, the opening and lowering of the gates at the beginning and end of monsoon period and releasing of the water on 1st March as per the order of the Supreme Court were carried out during 2017-18.

10.1.3 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 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 parties 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.

10.1.4 Vansadhara River Water Dispute:

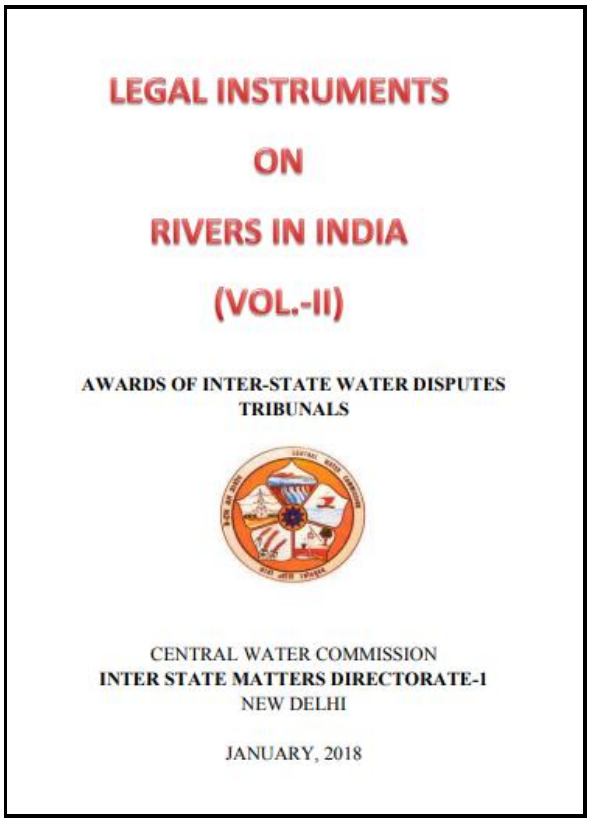
The State of Orissa filed a complaint under Section 3 of the Inter-State River Water Disputes Act, 1956 with the Ministry of Water Resources, Government of India on 14.2.2006 seeking constitution of an Inter-State Water Disputes Tribunal and to refer the water dispute between the State of Orissa and Andhra Pradesh in respect of inter-State river Vansadhara and its valley for adjudication to it. 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.

10.2 Updation and Reprinting of Legal Instruments on Rivers in India (Vol. II)

The "Legal Instruments on Rivers in India Volume-II" contains decisions of Inter State Water Disputes Tribunal which are published in Official Gazette and are in operation by concerned States. Subsequently, Cauvery Water Disputes Tribunal and Krishna Water Disputes Tribunal-II have submitted their reports and decisions to Central Government. Therefore, the said Volume-II has been revised and updated in 2013. As on date, interim and final report and decision of Vansadhara Water Disputes Tribunal and Further Report and modified decision of Krishna Water Disputes Tribunal-II have also become available. Keeping above in view, "The Legal Instruments on Rivers in India"—Vol. II, 2013 has been further updated and revised. The above mentioned document has also been uploaded in January, 2018 on the CWC Website for reference of stakeholders. Copies of the "The Legal Instruments on Rivers in India—Volume II (2018)" have

also been distributed to concerned stakeholders.



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 is being executed by Water Resources Department(WRD), 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 is being 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. 1906.26 Crore up to

March, 2018 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. 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. 1.5 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 31.03.2017 of Rs. 1906.26 Crore is given in Table 10.1.

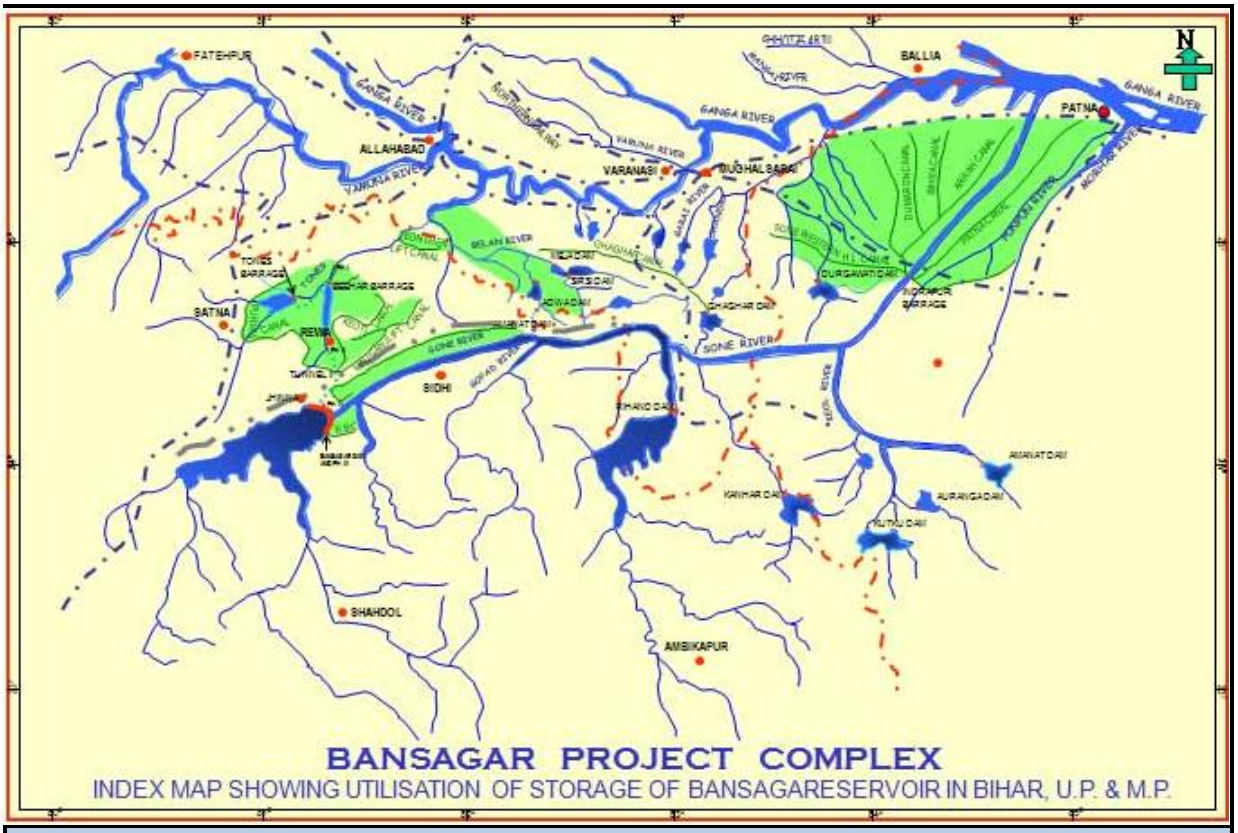
All 18 nos. spillway blocks have completed up to crest level (RL 326.4M). Non over flow blocks on either side upto top elevation at RL 347 M have been completed. All irrigation sluices, spillway bridge, saddle dams, rock fill dam upto RL 347 have been completed.

The dam at its full height has submerged 336 villages. Approximately 1.5 lakh PAPs of 54,686 families have been affected. Total 58,753.40 hectare land is coming under submergence, out of which 37,090.40 hectare is private land; 17185 hectare is revenue land and 4478 hectare is forest land. The private land of 37,090.40 hectare has been fully acquired along with the property compensation. Development of residential plots in required numbers in model villages have already been done and handed over to the PAPs. R&R Programme has been implemented based on norms approved by the Executive Committee and orders issued by Government of Madhya Pradesh; Comprehensive R&R policy for the project has been finalized and implemented.

Table 10.1
Status of Contribution of Fund as on 31.03.2018

(in Crore Rs.)

Period	Total Expen-diture	Share Due			Share Received			Balance Share		
		MP	UP	Bihar	MP	UP	Bihar	MP	UP	Bihar
Up to 31.03.17	1839.13	919.56	459.78	459.78	1005.62	409.96	423.55	86.06 (+)	49.82 (-)	36.23 (-)
During 2017-18	67.13	33.57	16.78	16.78	64.62	-	2.50			
Total on 31.03.18	1906.26	953.13	476.56	476.56	1070.24	409.96	426.05	117.11 (+)	66.61 (-)	50.52 (-)



Map of Bansagar Project Complex

The last (75th) meeting of the Executive Committee of Bansagar Control Board was held on 9.1.2017. The details of important aspects discussed during the meeting are given below:

Finalisation of the Reservoir Operation Manual of Bansagar Dam

In the 63rd meeting of the Executive Committee (EC) held on 9.1.2002, the draft resolution of constitution of committee as finalized by the Ministry of Water Resources (MoWR) was approved by the Executive Committee (EC). The constitution was accordingly, notified by the MoWR vide letter No. 15/5/2001-MI/BM dated 8.3.2002.

Subsequently, the Draft Bansagar Reservoir Regulation Manual has been prepared and circulated to all the three co-basin States for their comments/views. WRD, Government of Madhya Pradesh observed that rule curve levels of draft Bansagar Reservoir Regulation Manual were of static nature and desired that it should be of dynamic nature.

To incorporate the issues raised by the WRD, Government of Madhya Pradesh, the Executive Committee decided that, two curves viz. Lower and Upper Guide Curve could be developed and Engineer-in-charge of Reservoir Regulation may operate the reservoir within these two rule curve levels which would give the flexibility in reservoir operation.

The Draft Guidelines for Reservoir Regulation of Bansagar Dam has been modified as per decision taken in the 74th meeting of Executive Committee. The Reservoir Operation Manual was approved in the 75th meeting of the Executive Committee.

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 Engineer-in-Chiefs 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 2.6.2015 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/observations.

The views/comments of three co-basin States on the above report were received. The views/comments on the report from all the three co-basin Stats were found to be divergent in nature,

and, as a result, the report of the Committee could not be finalized.

During the 75th meeting of EC, it was decided that a meeting of Engineer-in-Chiefs 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. Thereafter a meeting of Principal Secretaries of WRD of three co-basin States may also 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 6.2.2017 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 21.7.2017 to discuss the conclusions/decisions emerged in the meeting held on 6.2.2017 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, another meeting was held on 9.3.2018 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.

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.

Rajghat Dam

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 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 Government of Uttar Pradesh and Madhya Pradesh for expenditure to be incurred by Betwa River Board for the period from 2005-06 to 2017-18 is given in Table 10.2.

Table 10.2
Status of Contribution made by Government of Uttar Pradesh and Madhya Pradesh for Expenditure to be incurred by Betwa River Board for the Period from 2005-06 to 2017-18
(Amount Rs. in crore)

Year	Budget Allocation	Share of M.P Govt.	Share of U.P Govt.	Contribution made by U.P Govt.	Contribution made by U.P Govt.	Revenue received	Yearly Expenditure
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

The Executive Committee desired that a model set up for the Joint River Board may be formulated on the lines of Tungabhadra Board. Accordingly a draft MoU was prepared and sent to party States for the comments/views. The comments/views received from the party States have different opinion/views in this context. In view above difference, the MoU could not be drafted.

The dam submerges 38 villages in Uttar Pradesh and 31 villages in Madhya Pradesh. State compensation in Madhya Pradesh area is completed. In Uttar Pradesh, the District Administration, Lalitpur had paid the land compensation of 25 villages and for balance 2 villages the lands properly are being acquired through mutual negotiation by the Betwa River Board.

The reservoir (FRL371.00) filled up to 371.00M during the year 2017-18. The three units of Power House have been tested and commissioned during 1999-2000. Power generation was 582.00 lakh units during 2017-18.

Last (15th) meeting of the Betwa River Board was held on 30.04.2015, under the Chairmanship of Sushri Uma Bharti, Honrable Minister of Water Resources, River Development & Ganga Rejuvenations. The 90th meeting of the Executive Committee was held on 29.8.2017. No meeting of Board was held during 2017-18.

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 the 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.

26th and 27th meetings of the Ghaggar Standing Committee were held on 21.03.2011 and 03.09.2013 respectively under the Chairmanship of Member (RM) and minutes were circulated among the members. Efforts are being made to hold the 28th meeting of the Committee. The Finalization of agenda in consultation with the concerned co-basin states is under progress.

10.3.4 Sahibi Standing Committee

The Sahibi Standing Committee was constituted in 1978 to oversee the implementation of all the elements of the master plan and to ensure that regulation of flows at control points is carried out in best interest of the concerned parties. The Members of the Committee are from Northern Railway, Irrigation Department of the States of Haryana, Rajasthan and NCT of Delhi. The 15th meeting of the Committee was held on 18.07.1995.

10.3.5 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 89th meeting of the Committee were held on 15.09.2017 under the chairmanship of Member (RM), CWC. The minutes of the meeting were finalized and circulated among the members of the committee.

10.3.6 Committee on Special Remedial Works for Flood Protection Embankment on rivers Sutlej and Ravi

Committee on Special Remedial Works for flood protection embankment on rivers Sutlej and Ravi was constituted in December 1989 by the Ministry of Water Resources under Chairmanship of Chief Engineer(Flood Management), Central Water Commission to technically examine proposals for counter protective works on the river Sutlej and Ravi submitted by the Government of Punjab after verification of development in the field and to monitor the utilization by Punjab of the Central Assistance utilized for such works by periodic inspection of ongoing and completed works.

The Members of the Committee are from Ministry of Water Resources, Central Water and Power Research Station, Pune, Central Water Commission, Ministry of Defense and Irrigation Department of the State of Punjab. The Committee was enlarged during 1996 by co-opting members from Border Security Force, Central Public Works Department and Ministry of Home Affairs at request of Ministry of Home Affairs.

The 32nd and 33rd meetings of the Committees were held at Amritsar on 01.12.2011 and 22.02.2013.

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Regional Conference of Southern States on Water Resources held on 20.02.2018 at Hyderabad.

CHAPTER-XI

ENVIRONMENTAL MANAGEMENT OF WATER RESOURCES PROJECTS

11.1 Environment Management

The Environmental Management Organisation of CWC is involved in monitoring of implementation of environmental safeguards in water resources projects, Studies related to Environmental Impact assessment (EIA) of water resources projects, and compilation of information related to rehabilitation & resettlement of project affected people.

11.2 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 selected 85 projects located in 21 States (Fig.1). Out of these 85 selected projects, 18 are under close monitoring (Fig.2).

11.2.1 Constitution of NEMCRVP

Member (WP&P), CWC, is the Chairman of NEMCRVP. The representatives from Ministries of Agriculture & Cooperation, Environment & Forests, Water Resources, Tribal Affairs, and Planning Commission & CWC are members of the Committee. The Chief Engineer (EMO), CWC is the Vice Chairman and Director (EM), CWC is the Member Secretary. Environmental Management Directorate, CWC, functions as secretariat of NEMCRVP.

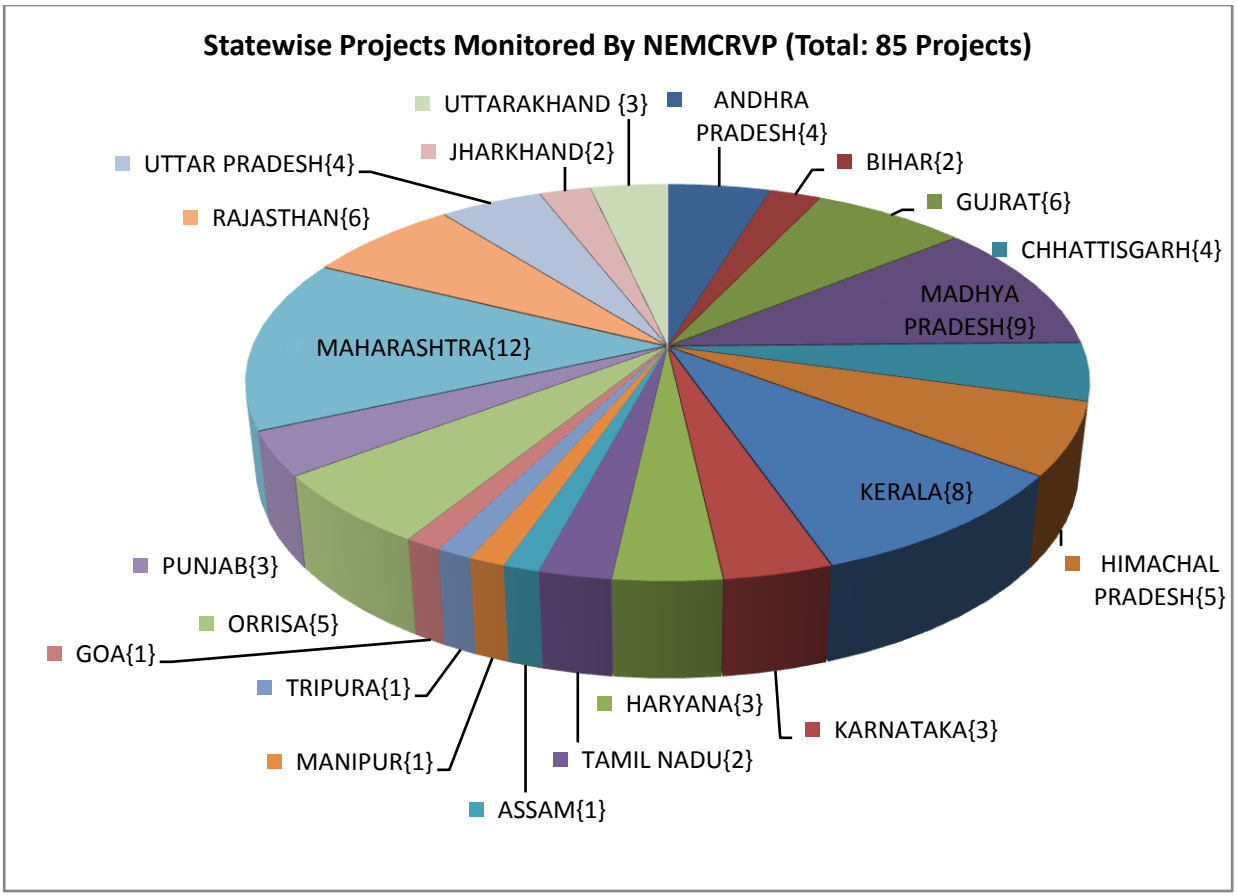
Statewise Projects Monitored By NEMCRVP (Total: 85 Projects)
UTTARAKHAND {3}
ANDHRA PRADESH{4}
UTTAR PRADESH{4}
JHARKHAND{2}
BIHAR{2}
RAJASTHAN{6}
GUJRAT{6}
CHHATTISGARH{4}
MADHYA PRADESH{9}
MAHARASHTRA{12}
KERALA{8}
HIMACHAL PRADESH{5}
PUNJAB{3}
ORRISA{5}
GOA{1}
TRIPURA{1}
HARYANA{3}
KARNATAKA{3}
MANIPUR{1}
TAMIL NADU{2}
ASSAM{1}

Fig.1

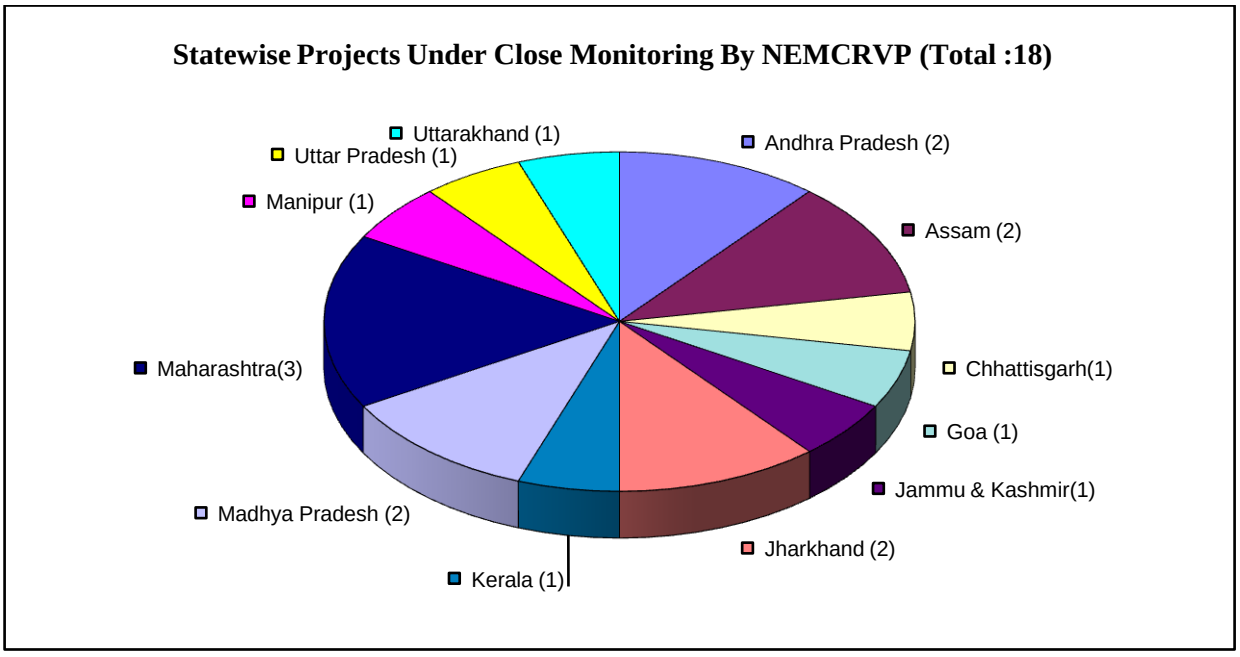
Statewise Projects Under Close Monitoring By NEMCRVP (Total :18)
Uttarakhand (1)
Andhra Pradesh (2)
Uttar Pradesh (1)
Manipur (1)
Assam (2)
Maharashtra(3)
Chhattisgarh(1)
Goa (1)
Jammu & Kashmir(1)
Madhya Pradesh (2)
Jharkhand (2)
Kerala (1)

Fig.2

11.2.2 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.

During 2017-18, the Committee visited Polavaram and Musurumulli Projects in Andhra Pradesh during 01-04 May, 2017. The Committee also held its 64th Meeting at Vijayawada. During the meeting senior officers from Government of Andhra Pradesh namely, Principal Secretary, Water Resources Department(WRD), Government of Andhra Pradesh, Engineer-in-Chief(WRD) were also present. The Monitoring Reports were sent to Principal Secretary, WRD, Government of Andhra Pradesh for compliance.

It encourages the constitution of State Environmental Monitoring Committee (SEMCs) and Project Environmental Management Committee (PEMCs) and monitors the activities of these committees. As a result of the above, 20 States have already constituted SEMCs under the Chairmanship of Secretary; State Water Resources/ Irrigation Department. PEMCs have been constituted for 68 out of 85 projects selected by NEMCRVP. In addition to this, 48 additional PEMCs have also been constituted for the other projects. PEMCs play a vital role in the implementation of environmental safeguards stipulated for the project. Chief Engineer (EMO)/Director (EM), CWC is the Member of the SEMCs whereas Regional Chief Engineer, CWC is the Special Invitee to these Committees. Director (Appraisal & Monitoring) of the concerned Regional Office of CWC represents CWC in PEMCs.

11.3 Environmental Impact Assessment (EIA)

CWC undertakes Environmental Evaluation Studies of completed Water Resources projects to assess the environmental changes that occurred during and post construction phases of the projects. It also include study of impact of the project on Resettlement and Rehabilitation; socio-economic status, agriculture, irrigation and drainage, bio-diversity, land environment, public health, water environment including groundwater, etc.

During the period 2017-20, it has been decided to undertake study of Environmental (including social) impacts of following six water resources projects.

1. Ukai Project, Gujarat
2. Durgawati Irrigation Project, Bihar
3. Eastern Koshi Canal Project, Bihar
4. Paralkot Dam Project, Chhattisgarh
5. Sutiyapat Project, Chhattisgarh
6. Tawa Project, Madhya Pradesh

The Expression of Interest for conducting the studies was published and the Consultants for the studies were shortlisted. Later, The Project Management Committee under the chairmanship of Chief Engineer(EMO), CWC has decided to take up study only for three projects namely, (i) Ukai Project (ii) Eastern Koshi Canal Project and (iii) Tawa Project. The process for awarding the projects through consultancy is under progress.

11.4 Resettlement & Rehabilitation

Resettlement of people displaced by creation of reservoirs is a complex task. It involves the shifting of people to new sites from familiar sites, which they have used for a long time. Also, the compulsory acquisition of land for water resources projects generally displace large number of people who are socially & economically backward through submergence of their lands or properties for project sites. Thus, there is a need to avoid large scale displacement, particularly of tribal population, and in case of unavoidable displacement, their comprehensive Resettlement & Rehabilitation (R&R) has become one of the central issues of the development process itself. Accordingly, Department of Land Resources, Ministry of Rural Development Government of India had issued a National Rehabilitation and Resettlement Policy (NRRP) 2007 which provides basic minimum facility to the displaced families. Recently, the Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Act, 2013 has been passed in Parliament and implemented w.e.f. 01.01.2014. The Act is having better provision of Land Acquisition as well as Rehabilitation and Resettlement of Project affected people.

CWC is compiling salient features of Rehabilitation & Resettlement Data of Major /Medium, existing/on-going water resources projects based as the information received from various State Governments. Till now the information received from State Governments related to *490* Major and Medium Irrigation Projects have been compiled and brought out this publication in March, 2015.

CWC is also compiling of information on Submergence, R&R Issues of Major &

Medium Projects monitored by field organizations of CWC and also as per the information received from various State Governments. Till now, the information received in respect of **92** Major and Medium Irrigation Projects have been compiled.

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Seminar on "Nature for Water – Exploring Nature Based Solution to Water Challenges" on the occasion of World Water Day organized by Central Water Commission on 22.03.2018 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 projects. The Ministry of Water Resources 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:-

(a) Providing assistance to the State Governments for preparation of project proposal for getting external assistance for water sector projects.

(b) Techno-economic examination of the projects posed for external assistance and coordination with State and concerned departments/ministries such as CGWB, MoEF & CC, etc.

12.1.2 Techno- Economic Appraisal & Clearance of Projects

During 2017-18, 1 Nos. Concept Note and 2 Nos. DPRs of externally aided irrigation project has been appraised in CWC. The details of these three projects are given in Table 12.1.

Table 12.1
Projects Appraised in CWC during 2017-18

SI. No.	Name of Project	Funding Agency	Estimated cost (in crore Rs.)
1.	Land and Water Resources Development and Management Project for Livelihood Improvement in Mizoram.	**JICA**	1229.90
1.	Modernisation of Vijayanagara Channels in Tungabhadra Project under Karnataka Integrated and Sustainable Water Resources Management Investment Program (KISWRMIP), Tranche-2	Asian Development Bank	456.63
2.	Restoration and lining work of Western Main Canal and Ara Main Canal and its System.	Asian Development Bank	3272.49

12.2 The World Bank Assistance

The World Bank continues to be the primary source of external assistance in the water resources sector. The World Bank assistance is in the form of credit or loan. The World Bank financing policies for irrigation projects change from time to time. Initially it financed individual irrigation projects and then changed to financing composite projects in which a group of Major, Medium and Minor irrigation projects were financed under a single credit/loan agreement. It then started financing Water Resources Consolidation Projects in which irrigation sector of the whole State was involved under one credit/loan agreement. Now the policy of World Bank has shifted to finance Water Sector Restructuring Projects in which the emphasis is on irrigation sector reforms of the whole State.

12.2.1 Water Sector Restructuring Projects

Water Sector Restructuring Project is the latest concept in water resources development and management and are the latest generation irrigation projects being financed by World Bank. Water Sector Restructuring Projects are planned with the objective to take care of water sector reforms, proper implementation of state water policy, creation of apex water institutions and strengthening of multi sector water resources and environment capacity. At

present five such projects are being taken up with the assistance of The World Bank in the State of Rajasthan, Madhya Pradesh, Uttar Pradesh, Maharashtra and Andhra Pradesh.

The main objectives of Water Sector Restructuring Project are:-

1. To set up an enabling institutional and policy frame work for water sector reform in the State for integrated water resources management.
2. To strengthen the capacity for strategic planning and sustainable development and management of the surface and ground water resources.
3. To initiate irrigation and drainage sub-sector reforms in the State to increase the productivity of irrigated agriculture through improved surface irrigation system performance and strengthened agriculture support services involving greater participation of users and the private sector in service delivery.

12.2.2 On-going Credits / Loans Agreements

There are four projects under The World Bank funding. The assistance utilized is given in Table 12.3.

Table 12.3
External Assistance to Projects (World Bank)

Sl. No	Name of Project	Credit No/Loan No.	Agency	Time Slice		Est. Cost (Million)		Assistance (in Millions)	
				Starting month	Closing month	Total as per SAR	Latest	Total	Utilized upto Sept.17
1.	Andhra Pradesh Water Sector Improvement Project	7897-IN	IBRD (USD)	Aug 2010	Jul 2018	NA	NA	USD 450.60	USD 329.67
2.	Dam rehabilitation and Improvement Project	7943-IN	IBRD (USD)	Dec 2011	Jun 2018	NA	NA	USD 139.65	USD 0.44
	Dam rehabilitation and Improvement Project	4787-IN	IDA (XDR)	Dec 2011	Jun 2018	NA	NA	XDR 93.02	XDR 82.79

Sl. No	Name of Project	Credit No/Loan No.	Agency	Time Slice		Est. Cost (Million)		Assistance (in Millions)	
				Starting month	Closing month	Total as per SAR	Latest	Total	Utilized upto Sept.17
3.	West Bengal Accelerated Development of Minor Irrigation	8090-IN	IBRD (USD)	Dec 2011	Dec 2017	NA	NA	USD 30.00	USD 1.22
	West Bengal Accelerated Development of Minor Irrigation	5014-IN	IDA (XDR)	Dec 2011	Dec 2017	NA	NA	XDR 78.20	XDR 50.88
4.	Uttar Pradesh Water Sector Restructuring Project (UPWSRP), Phase-II	5298-IN	IDA (XDR)	Oct 2013	Oct 2020	NA	NA	XDR 239.40	XDR 84.21

12.3 Japan Bank of International Cooperation Assistance

In water resources sector JBIC (JICA) provides financial assistance to major, medium and minor irrigation projects in the form of loans with the objective of increasing production of agriculture by mainly funding construction of civil works in the irrigation system. The main components of these projects are as follows:-

- Construction of civil works
- Training
- Consulting Services
- Agriculture Intensification Programme
- On-farm development.

12.3.1 On-going Agreements

There are two ongoing projects under JICA funding. The assistance utilized is given in Table 12.4.

12.4 Asian Development Bank

Asian Development Bank (ADB) in partnership with its developing member countries and other stakeholders, help create a world in which everyone can share in the benefits of sustained and inclusive growth. Whether it be through investment in infrastructure, health care services, financial and public administration systems, or helping nations prepare for the impact of climate change or better manage their natural resources, ADB is committed to helping developing member countries evolve into thriving, modern economies that

are well integrated with each other and the world.

12.4.1 On-going Agreements

There is five on-going projects under ADB funding. The assistance utilized is given in Table 12.5.

Table 12.4
External Assistance to Project (JICA)

SI. No.	Name of Project	Loan Agreement No.	Loan Period		Estimated Cost	Total Assistance	Assistance Utilized upto Sep 2017 (in JPY)
			Starting Date	Closing Date	As per Agreement (Rs. in Crore)		
1	AP Irrigation and Livelihood Improvement Project	IDP 181	March 2007	July 2017	1137.77	JPY 15129.95	JPY 15129.95
2.	Rengali Irrigation Project, Ph-2	IDP-244	March 2015	March 2026	3603.67	JPY 32378.00	JPY 1040.78
	Rengali Irrigation Project, Ph-2	IDP-244A	March 2015	March 2026		JPY 1581.00	JPY 197.86
3.	Rajasthan Water Sector Livelihood Improvement Project (I)	IDP-259	March 2017	July 2024	--	JPY 13145.00	0
4	Rajasthan Water Sector Livelihood Improvement Project (I)	IDP-259A	March 2017	July 2024	--	JPY 580.00	0

Table 12.5
External Assistance to Project (ADB)

SI. No.	Name of Project	Loan Agreement No.	Loan Period		Estimated Cost	Total Assistance (USD)	Assistance utilized ending Mar 17
			Starting Date	Closing Date	As per agreement (Rs. Millions)		
1.	Sustainable Coastal Protection Management Investment Program-I	2679-IND	August 2011	June 2017	NA	USD 47.37	USD 23.45
2.	Assam Integrated Flood and River Bank Erosion Risk Management Investment Program	2684-IND	May 2011	July 2017	NA	USD 48.50	USD 38.81
3.	Karnataka Integrated and Sustainable Water Resources Management Investment Program-I	3172-IND	May 2015	March 2019	NA	USD 31.00	USD 9.64
4	Orissa Integrated Irrigated Agriculture and water Management Investment Program Tranche-2	3394-IND	June 2016	Sept. 2018	NA	USD 120.00	USD 27.64
5.	Climate Adaptation in Vennar Sub Basin in Cauvery Delta Project	3394-IND	July 2016	June 2021	NA	USD 100.00	USD 13.90

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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. The Ministry 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 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:

11th Meeting of India-Nepal Joint Committee on Inundation and Flood Management (JCIFM) held in April, 2017 at Kathmandu.

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 7 times so far and last meeting was held on 24-25 January, 2013. 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 is 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 five times so far and the last meeting was held on 26th May 2016 at New Delhi in which all outstanding technical issues between the two countries was 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. The JCIFM has met 11 times and the last meeting was held in April, 2017 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 Respected Honourable Prime Minister of Nepal to India in December 1991 on preparation of Detailed Project Report (DPR) of Sapta Kosi High Dam Multipurpose project. The JTE was constituted, with Member (RM), CWC as Team Leader from 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 Sapta Kosi High Dam and Sun Kosi Multipurpose Projects

15th meeting of the India-Nepal Joint Team of Experts (JTE) on Sapta Kosi High Dam Multipurpose Project and Sun Kosi Storage-cum-Diversion Scheme held in September, 2017 at Kathmandu.

b) Forward the approved DPR to respective Governments for acceptance

The last (15th) meeting of the India-Nepal Joint Team of Experts (JTE) on Sapta Kosi high dam Multipurpose Project and Sun Kosi storage-cum-diversion scheme was held in September, 2017 at Kathmandu. Based on the review, JTE recommended extension of tenure of JPO-SKSKI for another 30 months from 1st March 2017.

13.2.1 Status of projects jointly implemented by India and Nepal

I. **Sapta Kosi High Dam Multipurpose Project & Sun Kosi Storage-cum Diversion Scheme, Indo-Nepal**

Field investigation studies and preparation of DPR for Sapta Kosi 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 Sapta Kosi 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. 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 maily due to local disturbances.

II. **Pancheshwar Multipurpose Project**

A Joint Project Office (JPO-PI) involving India and Nepal was set up in December, 1999 to jointly take up investigations & studies and to prepare Detailed Project Report (DPR) of 5600 MW Pancheshwar Multipurpose Project. Most of the parameters of the proposed project have been agreed upon by both the countries. Hower, some issues between India and Nepal remained unresolved. Accordingly, both sides prepared their own draft DPR for Pancheshwar Multipurpose Project in January, 2003. Later, as per decision taken during the 3rd meeting JCWR held in 2008, the Pancheshwar Development Authority (PDA) was constituted vide MoWR O.MNo.Z-14012/3/2013-Ganga/2302-2314 dated 7th August, 2014 for preparation of mutually acceptable DPR and execution of Pancheshwar Multipurpose Project. All the project parameters are to be finalized by PDA. Five meetings of the Governing Body (GB) of the PDA have been held.

A Detailed Project Report (DPR) of Pancheshwar Multipurpose Project was prepared by Pancheshwar Development Authority (PDA) through M/s WAPCOS Ltd. The draft DPR was furnished by PDA to the Government of Nepal and Government of lndia in December, 2016 for their observations/ comments, before putting up to the Governing Body of PDA for approval. Later as per decision taken by the Governing Body of PDA in December 2016, a Team of Experts (ToE) was constituted by Government of lndia and Government of Nepal to deliberate on the various observations/ comments furnished by both the sides and resolve the issues towards finalisation of the DPR. Two meetings of the ToE have been held.

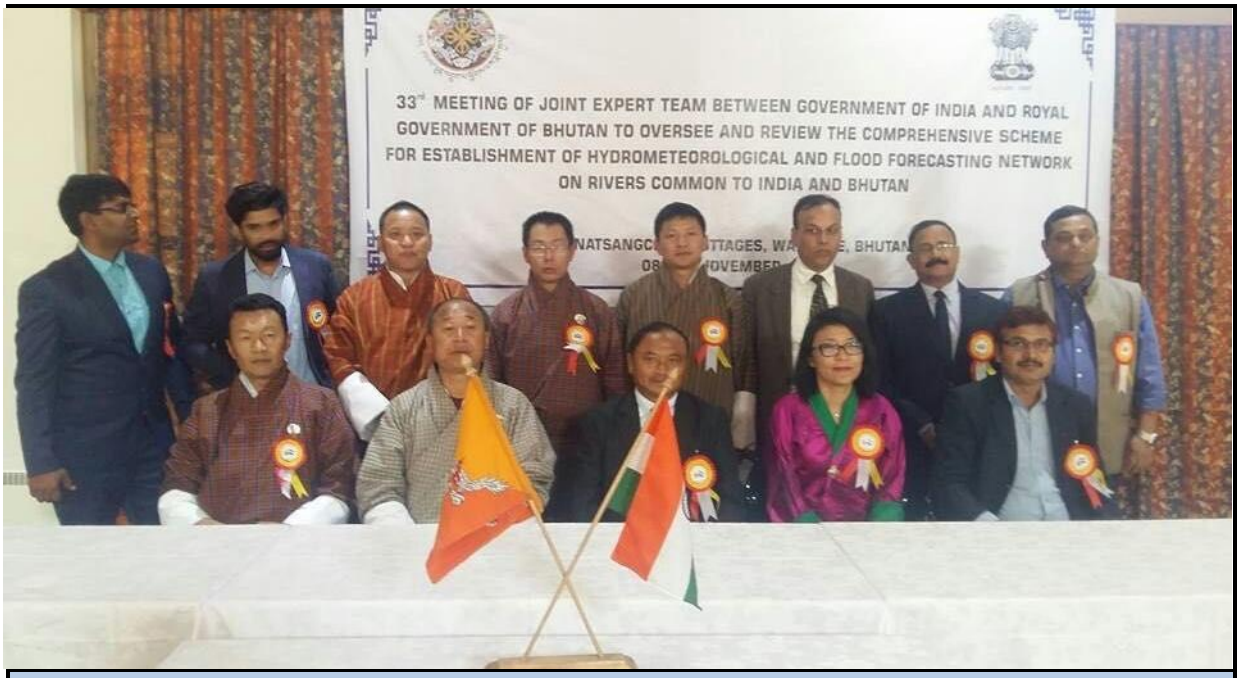
13.3 Cooperation with Bhutan

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 are as follows :

a) To formulate programme for the Five- Year Plan for continuation of / improvement in the ongoing scheme under operation.

b) To formulate year-to-year programme of work within the overall plan as per (i) above.



33rd Meeting of Joint Expert Team (JET) of officials from the Governments of India and Royal Government of Bhutan held during 8th & 9th November, 2017 at Wangdue, Bhutan.

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.

During 2017-18, the 33rd meeting of Joint Expert Team (JET) was held on 8th – 9th November, 2017 at Wangdue, Bhutan.

A Joint Group of Experts (JGE) on Flood Management headed by the 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 the 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 had met 7 times and the last meeting was held on 19th – 20th April, 2017 at Thimpu Bhutan.

7th Meeting of India Bhutan Joint Group of Experts (JGE) on Flood Management held on 19th – 20th April, 2017 at Thimpu 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, four 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 in Januray 2016.

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 an 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 from 1st June to 15th October every year, which is utilized in the formulation of flood forecasts by the Central Water Commission. On expiry of the above MoU in 2007, the revised MoU was signed on 05-06-2008.

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 Joint Secretary level officer. The 11th meeting of Expert Level Mechanism was held during 26th - 27th, March 2018 in Hangzhou, China.

An MoU was signed between both the countries on 16th December 2010 as per which Chinese side will provide Hydrological Information of the Langqen Zangbo/Sutlej River in Flood Season to India and the Indian side will provide the Chinese side information regarding data utilization in flood forecasting and mitigation. This MoU expired in 2015 and new MoU was signed on 6th November, 2015. Further,

another MoU was signed between both the countries on 20th May, 2013 wherein Chinese side agreed to provide hydrological information of Yarlung Zangbu/ Brahmaputra River in flood season to India.

In accordance with the MoU for 'Strengthening Cooperation on Trans-border Rivers' signed on 23rd October 2013, the two sides revised the Implementation Plan upon the provision of hydrological information of Yaluzangbu / Brahmaputra signed on 30th May, 2013 for providing of hydrological information changing the data provision period from 1st June-15th October every year to 15th May-15th October of relevant year, from 2014, during the 8th meeting of India-China Expert Level Mechanism on trans-border rivers held at New Delhi from June 24-27, 2014. This revised Implementation Plan was signed in Beijing on June 30, 2014 during the Visit of Hon'ble Vice President of India to China.

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. During 2017-18, one 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 (66th, 67th & 68th) during 2017-18 in May 2017, October 2017 and February 2018.

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 2017. 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 saving lives and properties.

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CHAPTER-XIV

WATER RESOURCES DATA MANAGEMENT

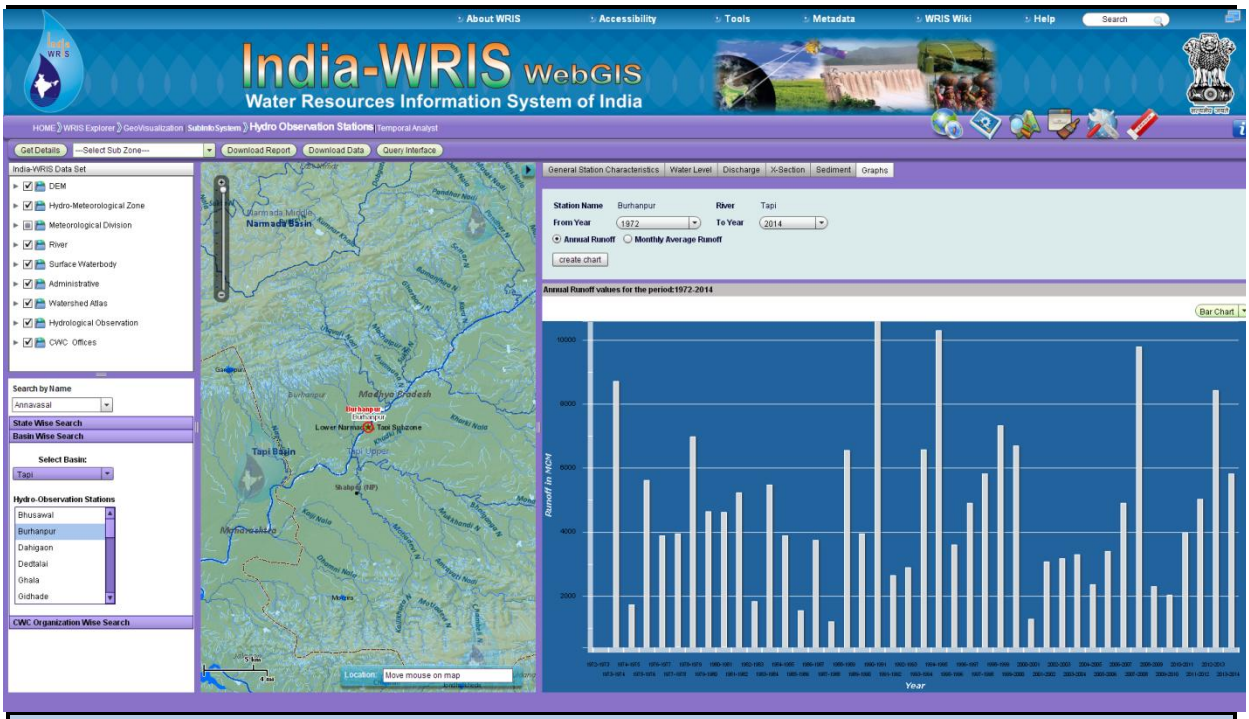
14.1 Development of Water Resources Information System (DWRIS)

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 has jointly undertaken the work of development of Water Resources Information System (DWRIS) during 11th plan. The estimated cost of the project was Rs. 78.3164 Crores. The MoU was signed between CWC and ISRO during the month of December 2008 and the project was to be completed in 4 yrs time period i.e. upto December 2012. The project comprises of 30 major GIS layers (viz. River network, basins, canal network, water bodies, hydro meteorological network, administrative layers etc.) of the country at a scale of 1: 50000. The first full version of website of INDIA WRIS has been launched on 07 Dec, 2010 in New Delhi by Hon'ble Minister Water Resources. Five versions of website of India-WRIS have been launched so far. The version 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.



Dissemination of Hydrological Data through WRIS Explorer under India-WRIS

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. During the year 2017-18, The MIS for obtaining data from States for preparation of compilation of MMI projects by Project Monitoring Oganisation has been completed and hosted on CWC website. Refinement and updation layers in respect of rivers, watershed and water bodies are under progress.

In order to maintain and update such a large volume of water resources data at national level, it has been planned to establish a new setup "National Water Information Centre (NWIC)" under the Ministry. Proposal for creation of NWIC is under process in MoWR, RD & GR

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. India from river basin point of view 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.

Discharge Observation at CWC Site using ADCP

Central Water Commission is operating a network of 878 Hydrological Observation (HO) stations in different river basins of the country to collect (i) water level, (ii) discharge, (iii) water quality, (iv) silt and (v) selected meteorological parameters including snow observations at key stations. In addition to above, it also operates 76 exclusive meteorological observations stations in carious basins in the country. The hydrological data collected from sites are scrutinized, validated and published in the form of Water Year Book, Water Quality Year Book and Sediment Year Book, etc. by CWC.

Telemetry System Installed at CWC HO Site at Rudraprayag

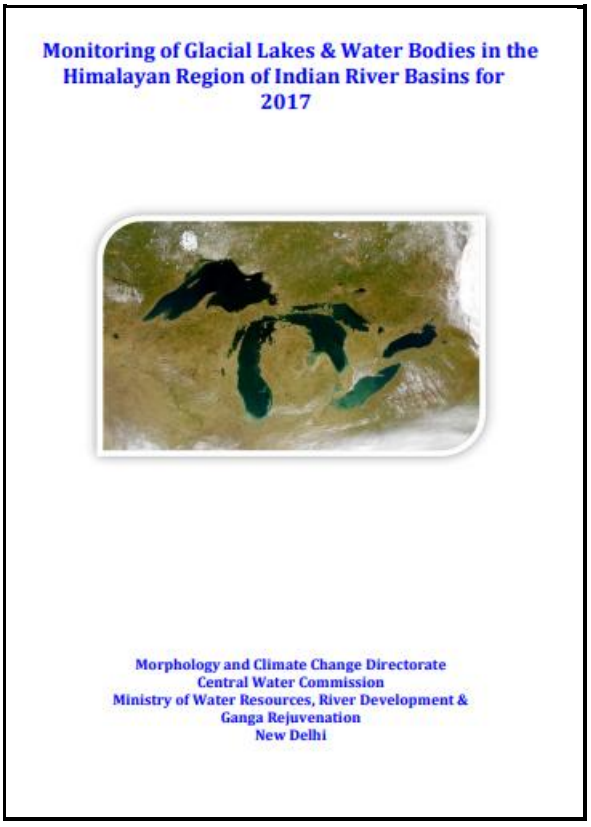
In order to address the data requirement of the country more precisely and in better scientific manner, Central Water Commission has also opened 720 new sites in various parts of the country during XII Plan period. However, measurement of few parameters with

reduced frequency is being done at some these sites due to paucity of required manpower.

14.3.2 Monitoring of Glacial Lakes/Water Bodies in Himalayan Region

Glacial lakes are common in the high elevation of Glacierised 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 leads to flash floods in the downstream reaches of lakes, called as 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 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, a MoU with NRSC, Hyderabad was signed 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 and 2017. Monitoring reports were prepared and sent to Brahmaputra & Barak Wing, Indus Wing and Flood Management Wing of MoWR, RD&GR and concerned field offices of CWC.



As per the Monitoring Report of 2017, cloud free data of 417 GL/WBs was available during the monsoon period of 2017. Amongst these, 151 GL/WBs have shown decrease in water spread area,

149 have shown increase, 117 have not shown any significant charge (+/-5%). 37 out of 151 have decreased by more than 20% and 60 out of 149 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 in the XII-Plan (2012-17) period for creation of "Coastal Management Information System (CMIS)" has been approved by Ministry of Water Resources, Government of India under the Plan Scheme "Development of Water Resources Information System (DWRIS)", which is to be implemented by CWC. 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 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 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 has been signed in Oct, 2016 among CWC, IIT Madras and respective States/UTs (Kerala, Tamil Nadu and Puducherry) for establishment of one coastal data collection site in each participating State/UT over a period of 2 years. The total cost of above work is Rs 896.05 Lakh. The work is to be completed by March 2019.

Matter is also pursued with National Institute of Oceanography (NIO) Goa for implementation of CMIS in States of Goa and Southern Maharashtra (for three sites) and with CWPRS for implementation of CMIS in States of Gujarat and Maharashtra (for two sites).

14.5 Computerisation Activities in CWC

An effort was initiated by Central Water Commission to adopt advancement in the field of Information Technology through sanctioned plan scheme i. e. Upgradation and Modernization of IT in CWC. The works undertaken were essential for full implementation of CWC's IT vision and involve activities that are in natural progression to the activities initiated under earlier plan scheme.

During the period 2017-20, the activity has been continued as the component "Data bank & Information System—Upgradation and Modernization of I.T. in CWC" of the Plan Scheme "Development of Water Resources Information System". The existing IT resources in CWC have been regularly maintained and upgraded in order to match with the technological development in the field of Information Technology. Further, to promote e-governance activities in CWC, several IT applications are being developed/ implemented in coordination with various stakeholders.

The Software Management Directorate, CWC is entrusted with the work of management of IT hardware/ software at Head CWC (HQ) and extending IT services to CWC officers. The major achievements in this regard during 2017-18 are as under:

i) Procurement/ Supply of T&P Items such as Servers, Laptops, Computers, Printers, UPS, Scanners, Networking security appliances etc, as and where required.

ii) Maintenance of IT Items at CWC (Hq).

iii) Procurement/ Supply of IT Items Consumables.

iv) Management of AMC of IT hardware, software & LAN.

v) Implementation of e-Office Lite (eFile) software in CWC which is a Mission Mode Project under the National e-Governance Program (NeGP) developed by MeitY.

vi) Implementation of Smart Performance Appraisal Report Recording Online Window (SPAROW) for CWES Gr.'A' officers in CWC.

vii) Shifting of CWC website from shared environment of NIC to Cloud of National Data Center under NIC/NICSI (change of URL from cwc.nic.in to cwc.gov.in)

viii) Work related to Design, Development and Maintenance of CWC website as per GIGW guidelines is at the active stage.

ix) IT support was provided to upkeep the CWC Work Charged Recruitment System (Online Job Portal Application) for the SWA recruitment process taken up by the various field offices.

x) Extension of LAN to 4th Floor & 2nd Floor of Sewa Bhawan (S) due to ongoing renovation and modernization work taken up by the PCP.

xi) Work related to tendering process at TCIL Portal for implementation of e-procurement in all offices of CWC which includes procurement of digital signatures and conducting trainings related to e-publishing and e-procurement.

xii) Bulk NIC email account management required for e-Office Implementation

xiii) Development / Customization of CWC-Intra software for Stationary & Complain Management in CWC (HQ)

xiv) Work related to various e-Governance Activities.

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First National Workshop on Coastal Management Information System at Chennai on 27.2.2018

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 water related fields. 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 some of the National level seminars, conferences, workshops etc. 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.

One Week Study Tour to Israel for 29th Induction Training Program officers organized in the month of November 2017

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 NWAs 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 Organisation (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 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

The Training Unit of CWC at Headquarter organizes / conducts / coordinates various training courses, workshops and seminar. The list of events organised / conducted / coordinated by Training Unit of CWC during 2017-18 is given at Annexure - 15.1.

Further, since its inception in the year 1988, NWA has conducted a total of 612 training programmes up to March 2018 and trained total 15157 officers. During the year 2017-18, 42 training programs were conducted at National Water Academy, CWC, Pune. 1248 officers have been trained in these programs with 1812 man-weeks of training. The list of training courses, workshops and seminar organised / conducted / coordinated by NWA during 2017-18 is given at Annexure - 15.2. The important activities of NWA during the year 2017-18 are as under:

i) Training Program cum Workshop on Water Conservation and Management for Panchayati Raj functionaries (21st April 2017). 53 representatives from various Panchayati Raj Institutions participated in this workshop.

ii) Two Weeks Induction Training Program for newly recruited Junior Engineers of CWC (15-26 May 2017) was conducted during which 43 officers attended the training. During the year, two more programs of three weeks duration were also conducted, 1st during 26th Dec. 2017 to 12th January 2018 for 47 officers and 2nd during 5th to 23rd March 2018 for 51 officers.

iii) Training on "Design of Typical Structures" for Officers of Government of Haryana at HIRMI (3-7 July 2017).

iv) As Regional Training Centre of WMO, one Distance Learning Programs on Basic Hydrological Sciences for Asian Region Countries was conducted from 16.10.2017 to 30.11.2017 in which 60 officers have been trained. Second such program started from 19th March 2018 and will continue upto 4th May 2018. About 75 participants are participating in this program.

v) Management Development Program for Non Technical

Officers of MoWR, RD&GR and CWC was conducted from 28.08.2017 to 01.09.2017 in which 18 officers were trained.

vi) Training on "Climate change impact, mitigating measures, modeling tools GCM, RCM" (28th August 2017 to 1st Sept. 2017) in which 13 officers participated.

vii) Training on "More Crop Per Drop - Bridging IPC/ IPU Gap, Role of PIM" (11th to 22nd September 2017.

viii) Training on "Dam Safety, Portfolio Management and Risk Assessment" (25th September 2017 to 6th October 2017).

ix) Training cum Workshop on "App/Software Development" (26th to 29th December 2017).

x) Multi-stakeholder Meeting for Development of River Basin Management Plan for Tapi Basin in Technical Collaboration with EU (20th February 2018).

xi) Training cum Workshop on "Fish Pass Design" (21st to 22nd February 2018).

xii) Training on "Trans-boundary Water Resources - Conflict to Co-operation"(5th to 9th March 2018).

xiii) One week study tour to Israel for 29th Induction Training Program officers was organized in the month of November 2017.

15.4 Other Important Activities at NWA

- "Swachhta Hi Sewa" Campaign was organized at National Water Academy, CWC, Pune on 28th September 2017.
- The NWA, Pune is identified as a Partner Agency for implementing "Neeranchal Watershed Project. Accordingly, NWA participated in the meeting held at YASHDA, Pune on 18th November 2017 chaired by Secretary, Water and Soil Conservation Department, Government of Maharashtra for chalking out a detailed Action Plan with respect to the capacity building and training. A detailed presentation was made by NWA regarding it's possible role in the capacity building and training.
- The Vigilance Awareness Week was organized during 30th October 2017 to 4th November 2017. A workshop on the subject of Vigilance Week i.e. "Eradicate Corruption: To take the nation forward" was organized on 30th October 2017 in which officers of National Water Academy, CWC, Pune and Upper Krishna

Division, CWC, Pune participated.

- The Communal Harmony Campaign Week was observed at NWA during 19-25 November 2017. During the week, Essay Competition was organized in which the officers and staff of NWA, Pune and Upper Krishna Division, CWC, Pune and also participants of ongoing training program participated. Cash Prizes were distributed to the winners. As such, the Communal Harmony Fund was also collected and sent to Secretary, National Foundation for Communal Harmony, New Delhi.

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Workshop on "Eradicate Corruption: To Take the Nation Forward" organized on 30th October 2017 at National Water Academy, CWC

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 2017-18, 16 new complaints/cases were taken up for investigation. Final decision was taken in respect of 12 cases. The break-up of vigilance/disciplinary cases in respect of different category of officers and staff is given in Table 16.1.

16.2 Observation of Vigilance Awareness Week

The vigilance Awareness week was observed in CWC Headquarter and all its field offices during 30.10.2017 to 4.11.2017

Table 16.1
Status of Vigilance/ Disciplinary Cases in CWC

Sl. No.	Particulars	Category of Officers/Staff			
		Gr. 'A'	Gr. 'B'	Gr. 'C' (including erstwhile Gr. 'D')	Total
a)	No. of cases pending at the beginning of the year	17	13	14	44
b)	No. of cases added during the year	10	5	1	16
c)	No. of cases disposed of during the year	12	7	1	20
d)	No. of cases pending at the end of the year	15	11	14	40

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Activities of CWC during Swachhta Pakhwada 2018

CHAPTER-XVII

REPRESENTATION OF CENTRAL WATER COMMISSION IN VARIOUS COMMITTEES

17.1 Committees Represented by CWC Officers

Chairman, Central Water Commission and Members 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 below:

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	Member (D&R)	Member
4	High Powered Steering Committee for Implementation National Projects.	Member (D&R)	Sp. Invitee
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
9	Governing Council for Central Soil & Materials Research Station.	Chairman, CWC Member (D&R)	Member Member

Sl. No.	Name of Committees/Boards/Panel of Experts/Technical Groups etc.	Representation of CWC	
		Officer	Position in Committee
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	Committee of International Commission on large dams, India (INCOLD)	Member (D&R)	Member
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
22	Brahmaputra High Powered Review Board	Chairman, CWC Member(RM)	Member Pmt. Invitee

Sl. No.	Name of Committees/Boards/Panel of Experts/Technical Groups etc.	Representation of CWC	
		Officer	Position in Committee
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
41	Governing Body of NERIWALM	Chairman, CWC	Member
42	Sahibi Standing Committee	Member(RM)	Chairman

Sl. No.	Name of Committees/Boards/Panel of Experts/Technical Groups etc.	Representation of CWC	
		Officer	Position in Committee
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 Sapta Kosi 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
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

Sl. No.	Name of Committees/Boards/Panel of Experts/Technical Groups etc.	Representation of CWC	
		Officer	Position in Committee
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

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 (INC-SW) is an apex body to promote, coordinate and support R&D works related to Surface Water in India. INC-SW 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 Agr., WALMIs, IIT, 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 Ministry of Water Resources (MoWR). The secretariat support to INC-SW 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 to work as Indian office of ICID and other international bodies.

At present, 92 research schemes (with total outlay of Rs. 23.73 Crore) are being coordinated by CWC which are under progress in various organizations in the country with funding from the MoWR, RD&GR under the R&D Programme. A total amount of Rs 12.32 Crore has been released to these schemes up to March 2018.

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. 70 meetings of TAC of NIH has been held so far. The last meeting was held 1.9.2017 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 the Members of the Surface Water Group and Chief Engineer (P&D) is the Member of the Hydrological Observations and Instrumentation Group. 43 meeting of Working Group of NIH has been held so far. The last meeting was held during 8th to 9th February, 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. 113th meeting of TAC of FBP was held during 21st -22nd December 2017 at Farakka, West Bengal.

Inspection Visit & 113th Meeting of TAC of FBP held during 21st -22nd Dec 2017 at Farakka, West Bengal

During the year 2017, the jurisdiction of Farakka Barrage Project has also been restored to 12.5 Km on upstream and 6.9

Km on downstream of Farakka Barrage for carrying out the erosion protection works of River Ganga.

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. 32 meetings of STAC has been held so far. The last meeting of STAC was held on 30.8.2017 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. The Chairman, Central Water Commission is presently the Chairman of Water Resources Division Council (WRDC).

CWC is represented by its officers of the rank of Chief Engineer and Director in the 17 Sectional Committees of WRDC and 13 Sectional Committees of CEDC. FE&SA and CMDD (NW&S) are the Nodal Directorates in CWC dealing with works of WRDC & CEDC of Bureau of Indian Standards, respectively at CWC.

Since Chairman, CWC is the Chairman of WRDC, the approval of draft codes and amendments to BIS Codes for adoption and printing are processed in CWC and approval of Chairman is communicated to BIS. During the current year 7 draft standards 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) is a non-governmental organisation with representation from more than 80 countries, with headquarters at New Delhi. 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. CWC is associated with various activities of ICID. 8 officers of CWC have been nominated for various work bodies of ICID for the professional development and knowledge exchange.

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CHAPTER –XVIII

PUBLICITY AND PUBLICATION

18.1 Activities of Publication Division

The Offset Press in the Publication Division of Technical Documentation Dte. carried out various printing jobs for CWC & MOWR. The press also carried out binding/trimming works for Publications and Reports etc. which were completed during the period from 01.04.2017 to 31.03.2018. Some of the noteworthy and important Publications relating to Water Resources and administrative aspects of Central Water Commission which were brought out during the above period are mentioned below:

Sl. No.	Name of the Job	Nodal Agency	No. of composed pages	No. of copies
1.	भगीरथ पत्रिका (हिन्दी) जनवरी-मार्च 2017	भगीरथ (हिन्दी) अनुभाग	64	500
2.	भगीरथ पत्रिका (हिन्दी) अप्रैल-जून 2017	भगीरथ (हिन्दी) अनुभाग	60	500
3.	भगीरथ पत्रिका (हिन्दी) जुलाई-सितम्बर 2017	भगीरथ (हिन्दी) अनुभाग	56	500
4.	भगीरथ पत्रिका (हिन्दी) अक्टूबर-दिसम्बर 2017	भगीरथ (हिन्दी) अनुभाग	60	500

Sl. No.	Name of the Job	Nodal Agency	No. of composed pages	No. of copies
5.	Bhagirath (English) January-March 2017	Bhagirath (English) Section	64	500
6.	Bhagirath (English) April-June 2017	Bhagirath (English) Section	56	250
7.	Bhagirath (English) July-Sept. 2017	T.D. Dte.	58	500
8.	Printing of payable of central	DDO-II	4	4000
9.	केन्द्रीय जल आयोग की राजभाषा कार्यान्वयन समिति की 128वीं बैठक की कार्यसूची व अन्य दस्तावेजों का मुद्रण	राजभाषा विभाग	25	16
10.	Printing of guidelines for submission, appraisal and acceptance of irrigation and multipurpose project 2017	PA(C)	64	1000
11.	सरकारी कामकाज़ मूल रूप से हिन्दी में करने के लिए वर्ष 2016-17 के दौरान हिन्दी में किए गए कार्य का विवरण के संबंध में प्रपत्र का मुद्रण	राजभाषा विभाग	3	600
12.	Printing of Report on Musurumulli Project by National Environmental Monitoring Committee for River Valley Project	Environment Management Dte.	16	21
13.	Printing of Polavaram Project by National Environmental Monitoring Committee for River Valley Project	Envirnomen t Management Dte.	41	21
14.	Printing of the meeting notice and Agenda Note of the Coastal Protection and Development Advisory Committee	Coastal Management Dte.	20	30

Sl. No.	Name of the Job	Nodal Agency	No. of composed pages	No. of copies
15.	Printing of Agenda Note for the 15th CPDC Meeting	Coastal Management Dte.	20	15
16.	Printing of Draft Report of the Sub-Committee of CPDAC on Coastal Data Collection	Coastal Management Dte.	133	2
17.	Printing of CWC Telephone Directory (English)	TD Dte.	86	500
18.	हिन्दी दिवस के अवसर पर अध्यक्ष, केन्द्रीय जल आयोग की अपील का मुद्रण	राजभाषा विभाग	1	100
19.	Printing of Minutes of the 15th CPDAC Meeting	Coastal Management Dte	28	40
20.	Printing of Indus Water Treaty 1960	Indus Wing	87	100
21.	राजभाषा कार्यान्वयन समिति की 129वीं बैठक से संबंधित सामग्री का मुद्रण	राजभाषा विभाग	15	25
22.	Printing of CWC Annual Report (English) 2015-16	TC Dte.	215	200
23.	Printing APAR Forms of CWES Group-A Officers	Estt.I	240	20
24.	Printing of Slip pads	PCP	20	1000
25.	Printing of CWC Annual Report (English) 2014-15	TC Dte.	205	200
26.	Printing of Project Completion Report of MMI Project	P&P Dte.	18	50
27.	Printing of Guidelines for Monitoring of Irrigation Projects and Preparation of status report	P&P Dte.	48	50
28.	Printing of Guidelines for DPR Preparation of ISBIG project	P&P Dte.	40	50

Sl. No.	Name of the Job	Nodal Agency	No. of composed pages	No. of copies
29.	Pr.inting of official note on presidential reference on PTAA 2004	Office of Dy. Comm (INDUS)	218	20
30.	केन्द्रीय जल आयोग की राजभाषा कार्यान्वयन समिति की 130वीं बैठक की कार्यसूची व अन्य दस्तावेजों का मुद्रण	राजभाषा विभाग	27	30
31.	लेखन सामग्री एकक का सामग्री भेजने संबंधी फार्म का मुद्रण	लेखन सामग्री एकक	1	150
32.	Printing of "Legal Insturments on Rivers in India" Volume II	ISM Dte.	150	100
33.	केन्द्रीय जल आयोग की राजभाषा कार्यान्वयन समिति की 131वीं बैठक की कार्यवाही व अन्य दस्तावेजों का मुद्रण	राजभाषा विभाग	17	25
34.	Printing APAR Report of Group A Officers	Estt.II Sec.	16	100

18.2 Activities of Information System Organisation

The Information System Organisation, CWC brings out various publications on statistics related to water resources development and management and related aspects. The details of publication are as under:

i. Water and Related Statistics

The publication titled "Water and Related Statistics" is brought out by CWC on biennial basis. The important information included in the publication is as under:

- Rainfall in different meteorological sub-divisions of the country.
- Water resources potential in the river basins of India, basin-wise, storages in India.
- Month wise storage position of important reservoirs.

- State-wise ultimate irrigation potential, basin-wise hydrological observation Stations of Central Water commission.
- Resources Utilization including Plan-wise/ State-wise Potential created, Potential Utilised, Achievements of Irrigation Potential of Major & Medium Irrigation Projects. (Surface Water).
- Production Related performances & Economic Efficiency.
- State- wise and Plan-wise Financial Expenditure on Major and Medium irrigation as well as Minor irrigation.
- Status of Coverage of Rural Habitations Under Rural Water Supply
- Details of Projects approved by Empowered Committee for inclusion under Repair Renovation and Restoration (RRR) of Water Bodies during XII Plan
- Funds released to States during XII Plan scheme of Repair Renovation and Restoration (RRR) of Water Bodies
- Flood Forecasting Information & performance of various flood forecasting stations in India

The last publication for the year 2017 was brought out in March 2017

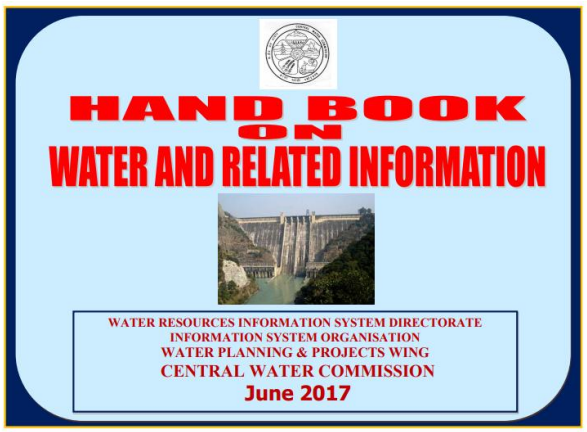
ii. Hand Book on Water and Related Information

The publication titled 'Hand Book on Water and Related Information" is brought out by CWC on annual basis which inter-alia provides the following information:

- Rainfall in different Meteorological Sub-Divisions of the country
- List of new Projects under Appraisal in CWC
- List of Projects accepted by Advisory Committee of MoWR
- List of Irrigation Projects Accepted By Planning Commission
- Number of Major, Medium and ERM Irrigation Projects by State
- Achievements of Bharat Nirman on Irrigation Potential Creation including Minor Irrigation by State
- Central Loan Assistance (CLA)/Grant Releases on Major, Medium, ERM Projects under AIBP

- Project-wise Irrigation Potential Created (IPC) under AIBP
- Details of Declared National Projects
- Details of Ongoing Externally Aided Irrigation Projects
- Central Releases Under the Command Area Development and Water Management Programme by State
- Physical Progress of Flood Management Works under Flood Management Programme by State
- Number of Water Users' Associations (WUAs) Formed and Area covered by State
- State Wise Water Rate for Flow Irrigation and Lift Irrigation

The last publication was brought out in June 2017.



iii. Integrated Hydrological Data Book:

Hydrological Data for non-classified basins collected from the observation sites of CWC are compiled in the Hydrological Data Directorate of ISO for inclusion in the publication entitled "Integrated Hydrological Data Book". The publication contains the following information:

- Salient features of all non-classified basins relating to location, drainage area, soil characteristics, type of industries, principal minerals etc. average annual run off, seasonal flow of water into river basin, water quality parameters etc.
- Description of Different River Basins,
- Gauge & Discharge details of Water at different locations of River Basins,
- Sedimentation Statistics,
- Water Quality Statistics
- Land Use Statistics

The publication for the year 2017 containing data up to 2013-14 was brought out in June 2017.

iv. Financial Aspects of Irrigation Projects in India (Periodicity 5 Year)

This publication is brought out every five year and contains information on Financial Aspects related to irrigation

projects at All India, States/UTs & Union Government 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 by State
- 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 last publication was brought out in December 2015 and is available on the website of CWC.

v. Financial Aspects of Flood Control, Anti Sea Erosion and Drainage Projects (Periodicity 5 years):

This publication provides the following information:

- 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 last publication was brought out in April 2013 and is available on the website of CWC.

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

This publication provides the following information:

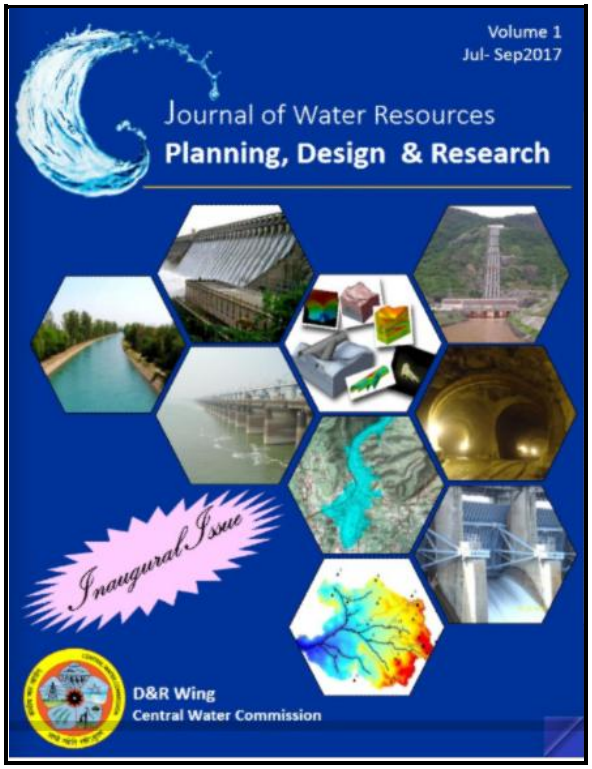
- Water Rates, Revenue and Operational Expenses.
- Financial Performance of Irrigation Projects in India
- State/UT's wise flow and lift Irrigation rates for all crops.
- State/UT's wise water rates (flow & lift) for specific crops viz paddy, wheat, sugarcane, cotton etc.

- Crop in Revenue assessed and Realised for State/UT's

The last publication was brought out in March 2017 and is available on the website of CWC.

18.3 E-Journal of CWC

Central Water Commission has started publication of E-Journal titled "Journal of Water Resources - Planning, Design & Research" from the year 2017-18. The inaugural issue of the E-Journal was launched by Chairman, CWC on 26.09.2017. The E-Journal is available on the website of CWC. Three volumes of journal for the period of July to September 2017, September to December 2017 and January to March 2018 were published during 2017-18.



18.4 Publication of Journals / bulletins

CWC publishes several technical and semi-technical journals and publications in the field of Water Resources development. 'Bhagirath' a quarterly semi-technical journal, both in English and in Hindi were published separately during the year as follows:

1.	Bhagirath (English) Journal	4 Issues (Jan-Mar 17, Apr-Jun-17, Jul-Sep 17& Oct-Dec 17)
2.	Bhagirath (Hindi) Journal-	3 Issues (Jan-Mar 17, Apr-Jun-17, Jul-Sep 17)

CWC is publishing Administrative News Bulletin on monthly basis to highlight activities on CWC. 12 issues of CWC Administrative News Bulletin were brought during April, 2017 to March, 2018.

18.5 Microfilming / Scanning of Documents

The Microfilming Unit of CWC undertakes microfilming of drawings and scanning of documents for preservation as well as wide dissemination. The following jobs were completed during the year 2017-18:

- Archiving of Bhagirath Journals in Digital form
- Scanning of Newspapers clippings related to water sector

published in 16 Newspaper/periodicals and circulation through CWC website for wide dissemination

18.6 Mass Awareness Activities:

The mass awareness acitivity undertaken by CWC during the period from 1st April, 2017 to 31st March, 2018 are as under:

- On the occasion of birthday celebration of Dr. Ambedkar Jayanti a one day seminar on "Jal Diwas-2017" was organized by Central Water Commission under the guidance of Ministry of Water Resources,RD&GR on 14.04.2017 on the topic "Waste Sector Reforms-Role of Central Organizations" at New Delhi. About 150 participants including 75 participants from CWC attended the seminar.
- A programme was organised by CWC in Lalitpur District of Uttar Pradesh on 28th April, 2017 for launching of "Mission Bundelkhand" by the Ministry of Water Resources, RD&GR to extend the Central support in a greater way for water conservation activities in the Bundelkhand region of Madhya Pradesh and Uttar Pradesh.
- The Jal Manthan - 4 was organized on 28th - 29th July 2017 at Vigyan Bhawan, New Delhi. CWC has provided technical support for organization of the said event. Various aspects related to Water Resources Management in the country discussed during the Conference. The Conference was attended by participants from Ministry of Water Resources, River Development & Ganga Rejuvenation and its Organizations, Various Central Ministries dealing with water, Officials from State Governments and Representatives of Non-Governmental Organizations.
- Central Water Commission, in coordination with IIT, Roorkee, organized a two days workshop on "Morphology Study of river Ganga, Sharda and Rapti using Remote Sensing Techniques" on 18.09.2017 at New Delhi.
- The India Water Week-2017 on "Water and Energy for Inclusive Growth" was held during 10th October to 14th October, 2017 at Vigyan Bhawan, New Delhi. CWC has provided technical support for organization of the said event.
- CWC participated in 37th India International Trade Fair (IITF) - 2017 at Pragati Maidan, New Delhi from 14th to 28th November, 2017. CWC setup a stall in the pavilion demonstrating different exhibitory materials viz. Working models, translates, banners, posters etc..

- The "International Dam Safety Conference-2018" was organized jointly by the Central Water Commission (CWC), Kerala Water Resources Department (KWRD), Kerala State Electricity Board (KSEB), National Institute of Technology, Calicut (NITC) and College of Engineering, Trivandrum (CET) during 23rd and 24th January 2018 at Thiruvananthapuram.

- The "All India Water Quiz-2018" was organized by Central Water Commission. The final programme of quiz was held on 5.02.2018 at New Delhi. The theme of quiz was "Water Resources of the Country". Children from many schools from around the country took part in quiz. Hon'ble Minister of State (WR,RD & GR) was the Chief Guest of the prize giving ceremony of the quiz.

Seminar on "Waste Sector Reforms-Role of Central Organizations" on "Jal Diwas-2017" organized by Central Water Commission on 14.04.2017 at New Delhi.

Jal Manthan - 4 organized on 28th - 29th July 2017 at Vigyan Bhawan, New Delhi

Two days workshop on "Morphology Study of river Ganga, Sharda and Rapti using Remote Sensing Techniques" on 18.09.2017 at New Delhi

"All India Water Quiz-2018" organized by Central Water Commission

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Annexure – 5.1

List of Consultancy Projects in D&R Wing during the Year 2017-18

Sl. No.	Name of Project
	Construction Stage Projects
Andaman & Nicobar Islands	
1	Khudirampur Nallah Water Supply Scheme
Andhra Pradesh	
2	Indira Sagar (Polavaram) Project
3	Manuguru Open Cast Flood Protection Embankment
Chhatisgarh	
4	Arpa Bhaisajhar Barrage Project (Arpa river)
Gujarat	
5	Garudeshwar Weir Project
Himachal Pradesh	
6	Phina Sigh Medium Irrigation Project
Jharkhand	
7	Kharkai Barrage under Subarnarekha M.P. Project
8	Icha Dam Under Subarnarekha M.P.Project
Karnataka	
9	Donimalai Iron Ore Tailing Dam
Madhya Pradesh	
10	Lower Goi Project (Shaheed Bheema Nayak Sagar Project)
11	Pench Diversion Project
12	Halon Irrigation Project
Manipur	
13	Dholaithabi barrage Project
Meghalaya	
14	New Umtru H.E. Project
15	Ganol H.E.Project
Odisha	

Sl. No.	Name of Project
16	Anandpur Barrage Project
17	Chheligada Irrigation Project
18	Raising of height of Embankment of Tata Steel Project at Kalinganagar
Rajasthan	
19	Parwan Project
Uttar Pradesh	
20	Arjun Sahayak Pariyojna
21	Kanhar Irrigation Project
Uttarakhand	
22	Tapovan Vishnugad Project - NTPC
23	Tehri & Koteshwar H. E. 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	
Assam	
1	Rukmani Sonai Irrigation Project
2	Sonai Irrigation Project
Chattisgarh	
3	Hasdeo Bango (Minimata) Right Bank Canal Diversion Project
Jammu & Kashmir	
4	Ujh Multipurpose Project (DPR)
Jharkhand	
5	Eight nos. medium and three nos. minor projects for taking up preparation of DPR.
Maharashtra	

Sl. No.	Name of Project
6	Intra State Link Projects.i.Daman Ganga (Val/Vagh)-Vaitarna-Godavari (Kadva-Dev) link.ii.Daman Ganga (Ekdare)-Godavari link
Orissa	
7	Hirakund Dam
Rajasthan	
8	Isarda Major Project
Sikkim	
9	Kalezkhola H.E. Project
NWDA (Gujarat & Maharashtra)	
10	Par-Tapi-Narmada link Project
Nepal	
11	Sapta Kosi Multi Purpose Project
12	Sunkosi Multi Purpose Project
13	Pancheshwar Multipurpose Project
Sp. Problem Projects	
Bihar	
1	Kohira Dam, Kaimoor leakages from Spillway bay
Chattisgarh	
2	Sikasar Project
Himachal Pradesh	
3	Giri HE Project
Jharkhand	
4	North Koel Project
Madhya Pradesh	
5	Indira Sagar Project - Re-designed of Energy Dissipation Arrangement
6	Shayamri Project
7	Runj Medium Irrigation Project
Maharashtra	
8	Temghar Project
Odisha	

Sl. No.	Name of Project
9	Kanupur Irrigation Project
10	Hirakund Dam – Provision of Additional Spillways
11	Subarnrekha Irrigation Project
12	Deo Irrigation Project
Punjab	
13	Ranjit Sagar Dam (Stability Analysis)
Rajasthan	
14	Rehabilitation of Garada Dam
Uttar Pradesh	
15	Rihand Dam
Uttarakhand	
16	Vishnugad Pipalkoti HE Project
West Bengal	
17	Farakka Barrage Project
NWDA (Madhya Pradesh / Uttar Pradesh)	
18	Ken Betwa Link Project, Phase-1

Annexure-7.1

List of the Irrigation / Multipurpose Projects Accepted by the Advisory Committee of MoWR,RD&GR during 2017-18

Sl. No.	Project Name	State	Major/ Medium	Est. Cost (Rs. in Crore)	Irrigation Benefits (in Ha)
1	Modernisation of Ranbir Canal Project.	J&K	Major, Revised	195.24 (PL 2015-16)	55,418
2	Rajasthan Water Sector Livelihood Improvement Project (RWSLIP)	Rajasthan	4 Major, 42 Medium & 92 Minor	2783.60 (PL 2016)	4,24,696
3	Rehabiltaion, Renovation and Modernisation of various Didtributaries system along with allied works in Punjab (UDBC)	Punjab	Major, ERM	1112.34 (PL Aug 2015)	4,72,000
4	Andhra Pradesh Irrigation and Livelihood Improvement Project Phase – II (APILIP-II)	Andhra Pradesh	Major	2000.00 (PL 2016)	CCA-1,55,910 AI-1,67,459
5	Kanhar Barrage Project	Jharkhand	Major, New	1908.84 (Pl 2016-17)	CCA-53,283 AI-53,283
6	Varkhede-Londhe Barrage Medium Project,	Maharashtra	Medium, New	526.64 (PL 2016-17)	CCA- 9,428 AI-7,919
7	Modernization of Nizamsagar Project-Main Canal and Distributory system including repairs to CM & CD works.	Telengana	Major, ERM	920 (PL 2016-17)	CCA-93,618 AI-1,05,076
8	Parwan Major Multi-Purpose Irrigation Project	Rajasthan	Major, New	6398.78 (2014)	CCA-2,01,000 AI-1,22,019

Annexure - 7.2

List of the Flood Control Schemes Accepted by the Advisory Committee of MoWR,RD&GR during 2017-18

Sl. No.	Project Name	State	Est. Cost (in Crore Rs.)	Flood Protection
1	Project for flood protection work at km. 9.00 to km 15.00 of damaged Elgin Bridge-Charsari bund on the left bank of river Ghaghara in dist.Gonda (U.P.)	Uttar Pradesh	97.3500 (Sept, 2016)	Area Protected 13,893 Ha & Population benefitted 1,31,894
2	Construction of Embankement from Jahnwi chowk to Ismailpur on left bank of river Ganga in Bhagalpur District	Bihar	42.4218 (PL 2016)	Area Protected 40600 Ha & Population benefitted 200000
3	Revised estimate for the project construction of pumping station for drainage of flood water from protected side near Tarkulani regulator at KM. 30.00 of Maluni Bund on Left bank of river Rapti in Distt. Gorakhpur	Uttar Pradesh	40.6066 (PL 2017)	Area Protected 2,838 Ha & Population benefitted 32,000
4	Gap closure of B.K.G. Right Embankment from Km. 69.24 to KM 74.63 & KM 86.3 to Km. 87.37 with constuction of five nos. sluice between Km 69.24 to Km 90.53 with protection work at the junction of Right Embankment of Western Gangi River and B.K.G. Right Embankment	Bihar	40.5850 PL 2016)	Area Protected 36,000 Ha & Population benefitted 30,000
5	Protection work of left edge of river Ganga from Kewala village to Bagmara village in a length of 5200 m	Bihar	66.2580 (PL 2015)	Area Protected 55,000 Ha & Population benefitted 60,000

Annexure - 7.3

List of H.E Project accepted by TEC during 2017-18

Sl No.	Project Name	State	Capacity (MW)
1.	Loktak D/S HEP	Manipur	66
2.	Sankosh HEP	Bhutan	2585
3.	Dibang MPP	Arunachal Pradesh	2880
Total			5531

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 crores Rs.)	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 Total= 3154.53	Project is under execution.
2.	Shahpur Kandi, Punjab	1) 0.37 lakh 2) 168 MW 3) 0.012MAF	2009-10= 10.80 2010-11= 15.236 Total= 26.036	Project is under execution. Central Assistance of Rs. 29.85 Cr. also provided under AIBP prior to declaration of National Project.
3.	Teesta Barrage, West Bengal	1) 9.23 lakh 2) 1000 MW 3) Barrage	2010-11= 81.00 2011-12= 97.20 Total= 178.20	Project is under execution.
4.	Renuka, HP	1) Drinking water 2) 40 MW 3) 0.404 MAF	-	Under appraisal in CWC/CEA. One–time special grant of Rs 446.96 Cr was provided as per order of Hon'ble Supreme Court
5.	LakhwarVyasi, Uttarakhand	1) 0.34 lakh 2) 420 MW 3) 0.325 MAF	-	Project is accepted for investment for an amount of Rs. 3966.51 Cr by Investment Clearance Committee of MoWR, RD & GR
6.	Kishau, HP/ Uttarakhand	1) 0.97 Lakh 2) 600 MW 3) 1.04 MAF	-	Under appraisal in CWC/CEA.

Sl. No.	Name of the Project	1) Irrigation (Ha) 2) Power (MW) 3)Storage (MAF)	Year-wise Central Assistance released under Scheme of National Project (in crores Rs.)	Status
7.	Ken Betwa, Madhya Pradesh	1) 6.35 lakh 2) 78 MW 3) 2.18 MAF	-	DPR for Phase – I with estimated cost of Rs. 18057.08 crore (2015-16 PL) was accepted in 129th meeting of TAC held on 08.07.2016 subject to statutory clearance. DPR of Phase-II is under appraisal in CWC.
8.	Bursar, J&K	1) 1 lakh (indirect) 2) 1230 MW 3) 1 MAF	-	Under appraisal in CWC/CEA.
9.	Gyspa Project, HP	1) 0.50 lakh ha 2) 300 MW 3) 0.74 MAF	-	DPR under preparation by Govt. of Himachal Pradesh.
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) 0.32 lakh 2) 212 MW 3) 0.82 MAF	-	#
	# Project was agreed "In Principal" by the Advisory Committee of MoWR, RD & GR in its 131st Meeting held on 17.11.2016. However, due to issue of large submergence by the project, It was decided that a team shall visit the project site and explore the alternate options with reduced submergence/displacement along with minimum loss of power and irrigation benefits, so that the potential of east flowing river may be fully utilised, as envisaged in Indus Water Treaty. Accordingly, A team was constituted in December, 2016. The Team submitted its report in May, 2017 with suggestion for reduction in Full Reservoir Level of Dam by 6m. The DPR is being modified as per the report of the team.			
12.	Kulsi Dam Project, Assam	1) 22,000 ha. 2) 55 MW 3) 0.28 MAF	-	Under appraisal in CWC/CEA.

Sl. No.	Name of the Project	1) Irrigation (Ha) 2) Power (MW) 3)Storage (MAF)	Year-wise Central Assistance released under Scheme of National Project (in crores Rs.)	Status
13.	Noa-Dehang Dam Project, Arunanchal Pradesh	1) 3605 ha. 2) 71 MW 3) 0.26 MAF	-	Under appraisal in CWC/CEA.
14.	Upper Siang, Arunanchal Pradesh	1) Indirect 2) 9750 MW 3) 1.44 MAF 4) Flood moderation	-	DPR under preparation
15.	Saryu Nahar Pariyojna, 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 Total = 1221.585	Project is under execution.
16.	Indirasagar Polavaram, Andhra Pradesh	1) 4.68 lakh ha 2) 960 MW 3) 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 Total = 5364.70	Project is under execution. Central Assistance of Rs. 562.47 Cr. also provided under AIBP prior to declaration of National Project.

Annexure - 8.1

State-Wise and Project-Wise List of Projects under General Monitoring - Target & Achievements of Monitoring Visits during 2017-18

Sl. No	State/Project Name	Major/ Medium/ ERM	Date of Visit	Status of Report
ANDHRA PRADESH/ TELANGANA				
1	1-Peddagedda Reservoir Project-AP	Medium	--	--
2	2-Godavari Lift Irrigation Scheme-TS	Major	15.06.2017	--
3	3- KLRS Pulichintala Project &Krishna Delta Modernization Scheme including Pulichintala Dam Project (New)-AP	Major	--	--
4	4-Pulivendula Branch Canal-AP	Major	--	--
5	5-Tungabhadra high level canal stage -II-AP	Major	--	--
	TOTAL- 05			
BIHAR				
6	1-North Koel Reservoir-IS	Major	28-29.08.2017	Issued
7	2-Bateswar Asthan Ganga Pump Canal Phase-I -IS	Major	--	--
	TOTAL- 02			
GUJARAT				
8	1-Und-II	Medium	--	--
	Total-01			
HIMACHAL PRADESH				
9	1-Phina Singh Irrigation Project	Medium	01.09.2017	Issued

Sl. No	State/Project Name	Major/ Medium/ ERM	Date of Visit	Status of Report
10	2-Nadaun Area Medium Irrigation Project	Medium	02.09.2017	Issued
	TOTAL-02			
JHARKHAND				
11	1-Ajoy BarrageProject	Major	--	--
12	2-Dhansinghtoli Res. Project	Medium	--	--
13	3-Katri Res.Project	Medium	--	--
14	4-Nakti Res. Project	Medium	--	--
15	5-PunasiRes.Project	Medium	--	--
16	6-Kans Reservoir	Medium	--	--
	TOTAL-06			
KARANATAKA				
17	1-Hirehalla	Medium	--	--
18	2-Amarja	Medium	--	--
19	3-Bennathora	Major	--	--
20	4-Lower Mullamari	Medium	--	--
21	5-Sri Rameshwara Lift Irrigation	Major	--	--
	TOTAL-05			
KERALA				
22	1-Idamalayar Irri. Project	Major	02.03.2018	Issued
	TOTAL-01			
MAHARASHTRA				
23	1-Wakod Irrigation Project	Medium	--	--
24	2-Kirmiri Darur Lift Irrigation Scheme	Medium	--	--
25	3-Sonapur Tomta Lift Irrigation Scheme	Medium	--	--

Sl. No	State/Project Name	Major/ Medium/ ERM	Date of Visit	Status of Report
26	4-Chilhewadi Irrigation Project	Medium	--	--
27	5-Haranghat Lift Irrigation Scheme	Medium	--	--
28	6-Kamani Tanda Medium Irrigation Project	Medium	--	--
29	7-Ghungshi Barrage Medium Irigation Project	Medium	--	--
30	8-Shelgaon Barrage project	Medium	--	--
31	9-Urmodi Irrigation Project	Major	--	--
32	10-Tembhu Lift Irrigation Project	Major	--	--
33	11-Bodwad Parisar Sinchan Yojna	Major	14.11.2017	Issued
34	12-Maharashtra Water sector Improvement Project (MWSIP) (World Bank Aided)-ERM	Major	--	--
35	13- Purna Barrage (Ner Dhamana) Irrigation Project.	Medium	--	--
36	14-Upper Pravara	Major	15-16.11.2017	Issued
	TOTAL-14			
MEGHALAYA				
37	1-Rongoi Valley	Medium	--	--
	Total-01			
NAGALAND				
38	1-D'zuza irrigation scheme	Medium	--	--
	TOTAL_01			
RAJASTHAN				
39	1-Takli Irrigation Cum Drinking Water Project	Medium	--	--

Sl. No	State/Project Name	Major/ Medium/ ERM	Date of Visit	Status of Report
40	2-Gagrin Irrigation Project	Medium	--	--
41	3-Piplad Irrigation Project	Medium	--	--
42	4-Lhasi Irrigation Project	Medium	--	--
	TOTAL-04			
UTTAT PRADESH				
43	1-Bhupali Pump Canal	Major	--	--
44	2-Kanhar Irrigation Project	Major	--	--
45	3-Restoring capacity of Western Gandak Canal system – ERM	Major	--	--
	TOTAL-03			
WEST BENGAL				
46	1-Beko Irrigation scheme	Major	--	--
47	2-Khairabera Irrigation Scheme	Major	--	--
	Total-02			
	Monitoring Target	**47**	7	6

Annexure - 8.2

State-Wise and Project-Wise List of Projects under AIBP - Target & Achievements of Monitoring Visits during 2017-18

Sl. No	State/Project Name	Major/ Medium/ ERM	Date of Visit	Status of Report
	ANDHRA PRADESH			
1	Yerrakalva Res.	Med.	12.04.2017	Issued
2	Tadipudi LIS	Maj.	11.04.2017	Issued
3	Pushkara LIS	Maj.	(i) 23.06.2017 (ii) 24.01.2018	(i) Issued (ii) --
4	Gundlakdamma	Maj.	06.05.2017	Issued
5	Thotapally Barrage	Maj.	(i) 23.05.2017 (ii) 16.10.2017	(i) Issued (ii) --
6	Tarakarama thirtha Sagaram	Med.	(i) 22.05.2017 (ii) 14.10.2017	(i) Issued (ii) --
7	Musurumilli	Med.	(i) 24.06.2017 (ii) 25.01.2018	(i) Issued (ii) --
8	Indira Sagar (Polavaram)	Maj.	--	--
	Maddigedda Res. Project		14.04.2017	Issued
	TOTAL=08			
	ASSAM			
9	Dhansiri	Maj.	30.06.2017	Issued
10	Champamati	Maj.	23-24.05.2017	Issued
11	Borolia	Med.	23.06.2017	Issued
12	Burhi Dihing lift	Med.	--	--
	Mod. Of Jamuna-ERM		--	--
	TOTAL=04			
	BIHAR			
13	Western Kosi	Maj.	--	--
14	Durgawati	Maj.	(i) 15-16.06.2017 (ii) 16-17.01.2018	(i) Issued (ii) Issued
	Bansagar		--	--

Sl. No	State/Project Name	Major/ Medium/ ERM	Date of Visit	Status of Report
15	Batane	Med.	--	--
16	Punpun	Maj.	(i)14.06.2017 (ii) 18.01.2018	(i) Issued (ii) --
	Eastern Kosi Canal System-ERM		--	--
	TOTAL=04			
	CHHATISGARH			
17	Kelo Project	Maj.	12-13.04.2017	Issued
18	Kharung	ERM	11.05.2017	Issued
19	Sutiapat	Med.	--	--
20	Maniyari Tank (ERM)	Maj	11.05.2017	Issued
	TOTAL=04			
	GOA			
21	Tillari	Maj.	(i) 8.9.2017 (ii) 23-26.11.2017	(i) Issued (ii) --
	TOTAL=01			
	GUJARAT			
22	Sardar Sarovar	Maj.	21-23.08.2017	Issued
	TOTAL=01			
	HIMACHAL PRADESH			
23	Shahnehar Irr. Project	Maj.	--	--
24	Sidhata	Med.	--	--
25	Balh Vally (Left Bank)	Med.	--	--
	TOTAL=03			
	JAMMU & KASHMIR			
26	Mod. of Ranbir Canal*	ERM	--	--
27	Mod. of New Pratap Canal*	ERM	--	--
28	Rajpora Lift	Med.	--	--

Sl. No	State/Project Name	Major/ Medium/ ERM	Date of Visit	Status of Report
29	Tral Lift	Med.	13.04.2017	Issued
30	Mod. Of Dadi Canal	ERM	--	--
31	Mod. Kandi Canal	Med	--	--
32	Prakachik Khows Canal	Med.	07.06.2017	Issued
33	Mod. Of Ahji Canal	ERM	--	--
34	Restoration & Mod. Of Main Ravi Canal	ERM	12.04.2017	Issued
	TOTAL=09			
	JHARKHAND			
35	Gumani	Med.	--	--
36	Sonua	Med.	--	--
37	Surangi	Med.	--	--
38	Upper Sankh	Med.	--	--
39	Panchkhero	Med.	--	--
40	Subernarekha Multipurpose	Maj	Jun, 2017	--
	TOTAL=06			
	KARNATAKA			
41	Upper Krishna St.I	Maj.	--	--
42	Malaprabha	Maj.	--	--
43	Karanja	Maj.	(i) 10-11.10.2017 (ii) 07-08.03.2018	(i) -- (ii) Issued
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.	--	--
49	Restoration Bhimasamundra Tank	ERM	--	--

Sl. No	State/Project Name	Major/ Medium/ ERM	Date of Visit	Status of Report
50	Bhima LIS	Maj.	(i) 10-11.10.2017 (ii) 08-09.03.2018	(i) Issued (ii) Issued
51	Guddada Malapura Lift	Med	--	--
52	Upper Tunga Irrigation Project	Major	(i) 16-17.11.2017 (ii) 18-19.01.2018	(i) Issued (ii) --
53	Sri Rameswar Irrigation	Major	(i) 20-21.06.2017 (ii) 14.02.2018	(i) Issued (ii) --
54	NLBc System Project(New ERM)	ERM	(i) 07-09.08.2017 (ii) 10-11.01.2018 (iii) 22.02.2018	(i) Issued (ii) Issued (iii) Issued
	TOTAL=14			
	KERALA			
55	Muvattupuzha	Maj.	06.10.2017	Issued
56	Karapuzha	Med.	27.09.2017	Issued
57	Kanhirapuzha	ERM	--	--
58	Chitturpuzha	ERM	--	--
	TOTAL=04			
	MADHYA PRADESH			
59	Indira Sagar Unit II (Ph I &II)	Maj.	12.012.2017	Issued
	Indira Sagar Canal Ph. III		12.12.2017	Issued
	Indira Sagar Unit IV		13.12.2017	Issued
	Indira Sagar Unit V		13-14.07.2017	Issued
	Bansagar Unit-II		21-22.08.2017	Issued
60	Sindh Phase II	Maj.	12-13.05.2017	Issued
61	Mahi	Maj.	30.08.2017	Issued
62	Bariarpur LBC	Maj.	--	--
63	Bawanthadi	Maj.	--	--
64	Mahan	Maj.	23-24.08.2017	Issued
65	Omkareshwar Ph - I	Maj.	--	--
	Omkareshwar, Ph.-II		20.12.2017	Issued
	Omkareshwar, Ph.-III		20.12.2017	Issued

Sl. No	State/Project Name	Major/ Medium/ ERM	Date of Visit	Status of Report
	Omkareshwar, Ph.-IV		(i) 10-11.07.2017 (ii) 27-28.12.2017	(i) -- (ii) Issued
66	Bargi Diversion Ph - I	Maj.	14.12.2017	Issued
	Bargi Diversion Ph -I I		(i) 03.08.2017 (ii) 14.12.2017	(i) -- (ii) Issued
	Bargi Diversion Ph -I I I		02.08.2017	Issued
	Bargi Diversion Ph-IV		14.12.2017	Issued
67	Pench Div-I	Maj.	26-27.12.2017	Issued
68	Upper Beda	Maj.	--	--
69	Punasa lift	Maj.	--	--
70	Lower Goi	Maj.	--	--
71	Jobat	Med	--	--
72	Sagar(Sagad)	Med.	09.09.2017	Issued
73	Singhpur	Med.	14-15.05.2017	Issued
74	Sanjay Sagar (Bah)	Med.	(i) 7-8.04.2017 (ii)8.9.2017	(i) -- (ii) Issued
75	Mahuar	Med.	05.05.2017	Issued
	TOTAL=17			
	MAHARASHTRA			
76	Gosikhurd [NP]	Maj.	--	--
77	Waghur	Maj.	28.08.2017	Issued
78	Upper Manar	Med.	--	--
79	Upper Pen Ganga	Maj.	--	--
	Bawanthadi [IS]		(i) 18.05.2017 (ii) 06.02.2018	(i) Issued (ii) --
80	Lower Dudhna	Maj.	23.01.2018	Issued
	Tillari			
81	Warna	Maj.	--	--
82	Punad	Maj.	4.1.2018	--
83	Lower Wardha	Maj.	30-31.05.2017	Issued
84	Khadakpurna	Maj.	21-22.08.2017	Issued

Sl. No	State/Project Name	Major/ Medium/ ERM	Date of Visit	Status of Report
85	Dongargaon	Med.	(i) 25-26.04.2017 (ii) 01.12.2017	(i) Issued (ii) Issued
86	Gul	Med.	--	--
87	Bembla	Maj.	--	--
88	Uttermand	Med.	--	--
89	Sangola Branch Canal	Maj.	14.04.2017	Issued
90	Tarali	Maj.	--	--
91	Dhom Balakwadi	Maj.	--	--
92	Morna (Gureghar)	Med.	26.09.2017	Issued
93	Arjuna	Med.	8.11.2017	Issued
94	Lower Pedhi	Maj.	(i) 7-8.04.2017 (ii) 10.08.2017 (iii) 08.02.2018	(i) Issued (ii) Issued (iii) Issued
95	Upper Kundalika	Med	23-24.08.2017	Issued
96	Wang Project	Med	27.09.2017	Issued
97	Lower Panzara	Med	31.05.2017	Issued
98	Aruna	Med	19.01.2018	Issued
99	Krishna Koyana Lift	Maj.	15-16.11.2017	
100	Naradave (Mahammadwadi)	Med	(i) 14.04.2017 (ii) 30.05.2017 (iii) 19.01.2018	(i) Issued (ii) -- (iii) Issued
101	Gadnadi	Med	9.11.2017	Issued
102	Kudali	Med	19.06.2017	Issued
	Nandur Madhmeshwar Ph-II		(i) 30.05.2017 (ii) 05.01.2018	(i)Issued (ii) Issued
	TOTAL=27			
	MANIPUR			
103	Khuga	Maj.	--	--
104	Thoubal	Maj.	09-10.08.2017	Issued
105	Dolaithabi Barrage	Med.	09-10.08.2017	Issued
	TOTAL=03			
	ORISSA			

Sl. No	State/Project Name	Major/ Medium/ ERM	Date of Visit	Status of Report
106	Upper Indravati(KBK)	Maj.	(i) 24 - 25.04.2017 (ii) 14.05.2017	(i) Issued (ii) --
107	Subernarekha	Maj.	(i) 10-11.07.2017 (ii) 27-28.12.2017 (iii) 28.02.2018	(i) Issued (ii) Issued (iii) Issued
108	Rengali	Maj.	11.04.2017	
109	Anandpur Barr./ Integrated Anandpur Barr.	ERM	(i) 23.08.2017 (ii) 29.01.2018	(i) Issued (ii) --
110	Lower Indra(KBK)	Maj.	13.05.2017	Issued
111	Lower Suktel(KBK)	Maj.	--	--
112	Telengiri(KBK)	Maj.	29.05.2017	Issued
113	RET Irrigation(KBK)	Med.	(i) 24.04.2017 (ii) 13.05.2017 (iii) 09.03.2018	(i) Issued (ii) Issued (iii) --
114	Kanupur	Maj.	(i) 24.08.2017 (ii) 30.01.2018	(i) Issued (ii) Issued
115	Chheligada Dam	Med.	--	--
116	Rukura-Tribal	Med	10.04.2017	Issued
	TOTAL=11			
	PUNJAB			
117	Shahpur Kandi dam (N.P)	Maj.	18.05.2017	Issued
118	Kandi Canal Extension (Ph.II)	ERM	04.08.2017	Issued
119	Rehabilitation of Ist Patiala Feeder and Kotla Branch Project	ERM	03.08.2017	Issued
120	Relining of Rajasthan Feeder Cannal & Sirhind Feeder	ERM	--	--
	TOTAL=04			
	RAJASTHAN			
121	IGNP Stage-II	Maj.	--	--

Sl. No	State/Project Name	Major/ Medium/ ERM	Date of Visit	Status of Report
122	Narmada Canal	Maj.	(i) 27-29.06.2017 (ii) 8-9.11.2017	(i) – (ii) --
123	Mod. of Gang Canal	ERM	--	--
	TOTAL=03			
	TELANGANA			
124	Indiramma FFC of SRSP	ERM	(i) 03.07.2017 (ii) 05.03.2018	(i) Issued (ii) --
125	SRSP St.II	ERM	16.06.2017	Issued
126	Ralivagu	Med.	(i) 20.04.2017 (ii) 04.12.2017	(i) Issued (ii) --
127	Gollavagu	Med.	(i) 19.04.2017 (ii) 04.12.2017	(i) Issued (ii) --
128	Mathadivagu	Med.	21.04.2017	Issued
129	Peddavagu at Jagannathpur	Med.	(i) 08.06.2017 (ii) 04.12.2017	(i) Issued (ii) --
130	J. Chokka Rao LIS	Maj	(i)15.06.2017 (ii) 26.02.2018	(i) Issued (ii) --
131	Neelwai (Peddavagu)	Med.	(i) 20.04.2017 (ii) 04.12.2017	(i) Issued (ii) --
132	Sri Komaram Bheem	Med.	(i) 09.06.2017 (ii) 05.03.2018	(i) Issued (ii) --
133	Palemvagu	Med.	17.04.2017	Issued
134	Rajiv Bhima LIS	Maj	(i) 29.05.2017 (ii) 20.11.2017	(i) Issued (ii) --
	TOTAL=11			
	TRIPURA			
135	Manu	Med.	--	--
136	Gumti	Med.	--	--
137	Khowai	Med.	--	--
	TOTAL=03			
	UTTAR PRADESH			

Sl. No	State/Project Name	Major/ Medium/ ERM	Date of Visit	Status of Report
138	Saryu Nahar NP	Maj	(i) 13.04.2017 (ii) 11-14.09.2017 (iii) 1-3.2.2018	(i) Issued (ii) Issued (ii) --
139	Bansagar Canal	Maj.	(i) 16-19.05.2017 (ii) 26-28.12.2017	(i) Issued (ii) Issued
140	Mod. of Lachhura Dam	ERM	--	--
141	Improving Irr. Intensity of Hardoi Branch System	ERM	--	--
142	Madhya Ganga Canal Ph-II	Maj.	10-11.04.2017	Issued
143	Kachnoda Dam	Maj.	--	--
144	Arjun Shyak	Maj.	12.04.2017	Issued
145	Restoring Cap of Sarda Sahayak [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**	**141**	**111**

Annexure - 8.3

State-Wise and Project-Wise List of Inter-State Projects to be Monitored by CWC (HQ) during 2017-18

Sl. No.	Name of Project	Major/ Medium/ ERM	States
1	Subernarekha Multipurpose Irrigation Project	Major	Jharkhand (Orissa,W.B)
2	Western Kosi Canal	Major	Bihar (Jharkhand)
3	Batane Irrigation Project	Medium	Bihar (Jharkhand)
4	Bansagar Canal (UP)	Major	Uttar Pradesh (M.P)
5	Indira Sagar Polavaram	Major	Andhra Pradesh (Orissa)
6	Dudhganga project	Major	Karnataka (Maharashtra)
7	Subernarekha Irrigation Project	Major	Orissa (Jharkhand)
8	Rajasthan Feeder Canal	Major	Rajasthan (Punjab)
9	Sardar Sarovar (Narmada)	Major	Gujarat (Rajasthan)
10	Narmada Project	Major	Rajasthan (Gujarat)
11	Bawanthadi (IS)	Major	Maharashtra (M.P)
12	Tillari #	Major	Goa (Maharashtra)
13	Bansagar Canal (MP)	Major	M.P (Uttar Pradesh)

Annexure - 8.4

State-wise Summary of Monitoring Visits to projects under AIBP - Targets and Achievements during 2017-18

Sl. No.	Name of the State	Target	Achievement
1	Andhra Pradesh	8	12
2	Assam	4	3
3	Bihar	4	4
4	Chhattisgarh	4	3
5	Goa	1	2
6	Gujarat	1	1
7	Himachal Pradesh	3	-
8	Jammu & Kashmir	9	3
9	Jharkhand	6	1
10	Karnataka	14	11
11	Kerala	4	2
12	Madhya Pradesh	17	23
13	Maharashtra	27	27
14	Manipur	3	2
15	Odisha	11	16
16	Punjab	4	3
17	Rajasthan	3	2
18	Telangana	11	19
19	Tripura	3	-
20	West Bengal	4	-
21	Uttar Pradesh	8	7
	TOTAL	149	141

Annexure - 8.5

Details of Completed Projects under AIBP

Sl. No	State/Project Name	Year of Inclusion in AIBP	Year of Completion
	ANDHRA PRADESH		
1.	Sriramsagar St.I	1996-97	2005-06
2.	Cheyyeru(Annamaya)	1996-97	2003-04
3.	Priyadarshini Jurala	1997-98	2006-07
4.	Somasila	1997-98	2006-07
5.	Nagarjunsagar	1998-99	2005-06
6.	Madduvalasa	1998-99	2005-06
7.	Gundalavagu	2000-01	2006-07
8.	Maddigedda	2000-01	2006-07
9.	Vamsdhara St-II Ph I	2003-04	2008-09
10.	Veligallu	2006-07	2008-09
11.	Alisagar LIS	2006-07	2006-07
12.	Guthpa LIS	2006-07	2008-09
13.	Swarnamukhi	2005-06	2008-09
	ASSAM		
14.	Pahumara	1996-97	2008-09
15.	Hawaipur	1996-97	2006-07
16.	Rupahi lift	1996-97	2001-02
17.	Kallonga @	1996-97	2006-07
18.	Boradikarai	1997-98	2004-05
19.	Mod. of Jamuna Irr.	2001-02	2008-09
20.	Intg. Irr. Scheme in Kallong Basin	1997-98	2006-07
	BIHAR		
21.	Upper Kiul	1996-97	2006-07
22.	Orni Reservoir	1997-98	2006-07

Sl. No	State/Project Name	Year of Inclusion in AIBP	Year of Completion
23.	Bilasi Reservoir	1997-98	2000-01
24.	Sone Modernisation	1998-99	2008-09
25.	Restoration of Kosi Barrage and its appurtenants for sustaining created irrigation Potential	2008-09	2010-11
	CHHATISGARH		
26.	Hasdeo Bango	1997-98	2006-07
27.	Shivnath Diversion	1997-98	2002-03
28.	Jonk Diversion	1999-2000	2006-07
29.	Barnai	2002-03	2006-07
30.	Mahanadi Res. Pr.	2005-06	2010-11
31	Minimata (Hasdeo Bango Ph. IV)	2007-08	2010-11
31	Koserteda	2002-03	2013-14
	GOA		
33.	Salauli	1997-98	2006-07
	GUJARAT		
34.	Jhuj	1996-97	1999-2000
35.	Sipu	1996-97	1999-2000
36.	Mukteshwar	1996-97	2006-07
37.	Harnav - II	1996-97	1997-98
38.	Umaria	1996-97	1996-97
39.	Damanganga	1997-98	1999-2000
40.	Karjan	1997-98	1999-2000
41.	Sukhi	1997-98	1999-2000
42.	Deo	1997-98	1997-98
43.	Watrak	1997-98	1999-2000
44.	Aji-IV	2000-01	2009-10
45.	Ozat-II	2000-01	2009-10

Sl. No	State/Project Name	Year of Inclusion in AIBP	Year of Completion
46.	Bhadar-II	2002-03	2010-11
47.	Brahmini-II	2000-01	2008-09
	HARYANA		
48	Gurgaon Canal	1996-97	2003-04
49	WRCP	1996-97	2006-07
	HIMACHAL PRADESH		
50	Changer LIS	2000-01	2011-12
	JAMMU & KASHMIR		
51.	Marwal Lift*	1996-97	2006-07
52.	Lethpora Lift*	1996-97	2006-07
53.	Koil Lift*	1996-97	2006-07
54.	Mod. of Kathua Canal	1999-2000	2006-07
55.	Igophey Irr. Pr.	2000-01	2006-07
56.	Mod. of Zaingir Canal	2001-02	2006-07
57.	Mod. Of Martand Canal	2006-07	2010-11
58.	Mod. Of Mav Khul	2006-07	2010-11
59.	Rafiabad High Lift Irr.	2001-02	2010-11
60	Mod. of Babul Canal	1997-98	2011-12
	JHARKHAND		
61.	Latratu	1997-98	2002-03
62.	Tapkara Reservoir	1997-98	2002-03
63.	Kansjore	1997-98	2010-11
	KARNATAKA		
64.	Hirehalla	1996-97	2006-07
65.	Maskinallah	2002-03	2003-04
66.	Votehole	2007-08	2008-09
67.	Gandorinala	2001-02	2010-11
68.	Ghatparbha		

Sl. No	State/Project Name	Year of Inclusion in AIBP	Year of Completion
	KERALA		
69.	Kallada	1996-97	2004-05
	MADHYA PRADESH		
70.	Bansagar Unit-I (Dam)	1996-97	2010-11
71.	Upper Wainganga	1996-97	2002-03
72.	Sindh Phase I	1999-2000	2006-07
73.	Urmil RBC	2000-01	2002-03
74.	Banjar	2000-01	2002-03
	Rajghat Unit - I (DAM)	1998-99	2004-05
	MAHARASHTRA		
75.	Surya	1996-97	2006-07
76.	Bhima	1997-98	2006-07
77.	Upper Tapi	1997-98	2004-05
78.	Upper Wardha	1997-98	2008-09
79.	Wan	1998-99	2005-06
80.	Jayakwadi Stage-II	2000-01	2004-05
81.	Vishnupuri	2000-01	2005-06
82.	Bahula	2000-01	2006-07
83.	Krishna	2002-03	2008-09
84.	Kukadi	2002-03	2008-09
85.	Hetwane	2002-03	2008-09
86.	Chaskaman	2002-03	2008-09
87.	Purna	2006-07	2008-09
88.	Nandur Madhmeshwar -Ph - I	2006-07	2008-09
89.	Wan - II	2006-07	2008-09
90.	Pothra Nalla	2006-07	2008-09
91.	Tajnapur LIS	2006-07	2008-09
92.	Lalnalla	2006-07	2008-09

Sl. No	State/Project Name	Year of Inclusion in AIBP	Year of Completion
93.	Kar	2006-07	2008-09
94.	Arunavati	2006-07	2008-09
95.	Sapan	2007-08	2009-10
96.	Utawali	2006-07	2008-09
97.	Khadakwasla	2002-03	2004-05
98.	Kadvi	2002-03	2004-05
99.	Kasarsai	2002-03	2004-05
100.	Jawalgaon	2002-03	2004-05
101.	Kumbhi	2002-03	2006-07
102.	Kasari	2002-03	2004-05
103.	Patgoan	2004-05	2006-07
104.	Madan Tank	2005-06	2008-09
105.	Shivna Takli	2005-06	2008-09
106.	Amravati	2005-06	2007-08
107.	Chandarbhaga	2007-08	2009-10
108.	Pentakli	2007-08	2009-10
109.	Prakasha Barrage	2007-08	2008-09
110.	Sulwade Barrage	2007-08	2008-09
111.	Sarangkheda	2007-08	2008-09
	ORISSA		
112.	Upper Kolab(KBK)	1997-98	2004-05
113.	Potteru(KBK)	2001-02	2004-05
114.	Naraj Barrage	2001-02	2005-06
115.	Improvement to Sason Canal System*	2002-03	2004-05
116.	Salandi Left Main Canal-Ambahata*	2002-03	2005-06
117.	Improvement to Salki Irrigation*	2003-04	2004-05
118.	Titlagarh St-II(KBK)	1998-99	2008-09
	PUNJAB		

Sl. No	State/Project Name	Year of Inclusion in AIBP	Year of Completion
119.	Ranjit Sagar Dam	1996-97	2000-01
120.	Remodelling of UBDC	2000-01	2006-07
121.	Irr. to H.P. below Talwara	2000-01	2005-06
	RAJASTHAN		
122.	Jaisamand (Modernisation)	1996-97	2000-01
123.	Chhapi	1996-97	2004-05
124.	Panchana	1997-98	2004-05
125.	Bisalpur	1998-99	2006-07
126.	Gambhiri (Modernisation)	1998-99	2000-01
127.	Chauli	1998-99	2006-07
128.	Mahi Bajaj Sagar	1999-2000	2006-07
	TAMILNADU		
129.	WRCP	1996-97	2006-07
	UTTAR PRADESH		
130.	Upper Ganga including Madhya Ganga Canal	1996-97	2003-04
131.	Sarda Sahayak	1996-97	2000-01
132.	Providing Kharif Channel in H.K. Doab	1996-97	2004-05
133.	Rajghat Dam	1996-97	1996-97
134.	Gunta Nala Dam	1996-97	1999-2000
135.	Gyanpur Pump Canal	1999-2000	2001-02
136.	Rajghat Canal	2000-01	2008-09
137.	Mod. Agra Canal	2002-03	2008-09
138.	Jarauli Pump Canal	2003-04	2006-07
139.	Eastern Ganga Canal	1999-2000	2010-11
	UTTARAKHAND		
140.	Tehri	1999-2000	2006-07
	WEST BENGAL		

Sl. No	State/Project Name	Year of Inclusion in AIBP	Year of Completion
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 - 8.6

Details of Projects Reported to be Completed under PMKSY-AIBP as on 31.3.2018

Sl. No	State/Project Name	Year of Inclusion in AIBP	Year of Completion
	ANDHRA PRADESH		
1	Maddigedda	2001-02	2017-18
	CHHATISGARH		
2	Maniyari Tank (ERM)	2011-12	2017-18
3	Kharung(ERM)	2010-11	
	KARNATAKA		
4	Sri Rameswar Irrigation	2014-15	2017-18
	MADHYA PRADESH		
5	Sagar(Sagad)	2011-12	2017-18
6	Singhpur	2011-12	2017-18
7	Mahuar	2013-14	2017-18
	MAHARASHTRA		
8	Bawanthadi [IS]	2004-05	2017-18
9	Lower Panzara	2009-10	2017-18
10	Dongargaon	2005-06	2017-18
11	Warna	2005-06	2017-18
	ORISSA		
12	Upper Indravati(KBK)	1996-97	2017-18
13	Rukura-Tribal	2009-10	2017-18
	PUNJAB		
14	Kandi Canal Extension (Ph.II)	2002-03	2017-18
15	Rehabilitation of Ist Patiala Feeder and Kotla Branch Project	2007-08	2017-18

Sl. No	State/Project Name	Year of Inclusion in AIBP	Year of Completion
	TELANGANA		
16	Gollavagu	2006-07	2017-18
17	Ralivagu	2006-07	2017-18
18	Mathadivagu	2006-07	2017-18

Annexure - 8.7

List of Completed Projects Selected for Impact Assessment Study by Academy of Management Studies

Sl. No	Project Name	State
1	Hawaipur Lift Irrigation Scheme	Assam
2	Jhuj	Gujarat
3	Shah Nehar Irrigation Project	Himachal Pradesh
4	Muskinala	Karnataka
5	Sindh Phase-I	Madhya Pradesh
6	Purna	Maharashtra
7	Upper Kolab Project	Odisha
8	Mahi Bajaj Sagar	Rajasthan
9	Priyadarshani Jurala	Telangana
10	Hindon Krishi Doab Project	Uttar Pradesh

Annexure - 15.1

Training Activities Organised / Coordinated by Training Directorate during 2017-18

Training / Workshops Within Country

Sl. No.	Topics of Program	Date	Venue	No. of Participants
A. In House Program at CWC (H/Q), New Delhi				
1	Training on communication skills conducted through ISTM	6-7 Apr 2018	ISTM, Delhi	25 CWC Officers
2	Training program on "Public Financial Management System (PFMS)" Batch-I(For PD's and DDO's) Batch-II(For PAO's)	29 May 2018	CWC(H/Q), New Delhi	24 CWC Officers in Batch- I 11 CWC officers in Batch-II
3	Training program on "E-Procurement" conducted through TCIL	08-09 Jun 2017	TCIL, New Delhi	10 CWC officers
4	Training program on "Flood Modeling Activities"	12-13 Jun 2017	CWC H/Q), New Delhi	13 CWC officers
5	हिंदी कार्यशाला	22 Jun 2017	New Delhi	30
6	Training Program on "PFMS" in two batches for Program Division	10 Jul 2017	CWC H/Q), New Delhi	12 officers (Batch -1) 14 officers (Batch-II)
7	Training course on "Application Software AUTO-CAD".	17-18 Jul 2017	New Delhi	10 CWC officers
8	Training Program on e HRMS-Manav Sampada Software.	26 Jul 2017	CWC (H/Q), New Delhi	15 CWC Officers
9	Training Program on "Application Software (Math CAD)"	28 Jul 2017	CWC (H/Q), New Delhi	8 CWC Officers
10	Training Program on "e-Office Implementation" in CWC.	10-11 Aug 2017	CWC (H/Q), New Delhi	22 CWC Officers
11	Training Program on 'RTI" for CWES Officers.	11 Aug 2017	CWC (H/Q), New Delhi	49 CWC Officers
12	Training Program on Updating of Court Cases at "Legal Information, Management & Briefing System(LIMBS)	18 Aug 2017	CWC (H/Q), New Delhi	43 CWC Officers
13	हिंदी कार्यशाला	09 Sep 2017	नई दिल्ली	47 प्रतिभागी

Sl. No.	Topics of Program	Date	Venue	No. of Participants
14	Half day Workshop on Stress Management " in CWC(Hq)	22 Sep 2017	CWC (H/Q) New Delhi	35 CWC Officers
15	Training Program on "e-HRM- Manav Sampda Software" in three batches in CWC (HQ).	30 Oct to 01 Nov 2017	New Delhi	58
16	Training Program on "e-HRM- Manav Sampda Software" in CWC(HQ)	02 Nov 2017	New Delhi	19
17	Training Program on "e-HRM- Manav Sampda Software" in CWC(HQ)	03 Nov 2017	New Delhi	24
18	Training on "Team Building and leadership" conducted by CWC through ISTM.	06 to 07 Nov 2017	ISTM, New Delhi	25 CWC Officers
19	Training course on "Project Hydrology –Hydrological Aspect in Planning & preparing of DPR."	06 to 10 Nov 2017	New Delhi	23 (13 CWC + 10 State Officers)
20	Basic computer training including M.S Office ,Excel & PowerPoint etc. including advance tools in MS Office & Excel	13 to 14 Nov 2017	New Delhi	17
21	Basic computer training including M.S Office, Excel & Power point etc. including advance tools in MS Office & Excel.	27-28 Nov 2017	New Delhi	17
22	"हिन्दी कार्यशाला"	30 Nov2017	नई दिल्ली	64 प्रतिभागी
23	Training course on "Project Hydrology –Use of Statistics in Hydrology" at CWC (HQ).	06 to 10 Dec 2017	New Delhi	15 CWC Officers
24	Workshop on "Flow-3D (R) CFD software of Dam Breakage analysis and other applications in Water and Environmental."	11 to 12 Dec 2017	New Delhi	07 CWC Officers
25	Training Program on "Remote Sensing & GIS" at CWC (HQ).	14 to 15 Dec 2017	New Delhi	19 CWC Officers.
26	Training on "Ethics & Value in Public Governance" conducted through ISTM	18 to 19 Dec 2017	ISTM	23 CWC Officers
27	Training programme on "Application Software (HEC-RAS)".	18-19 Jan 2018	CWC (H/Q), New Delhi	16 CWC Officers

Sl. No.	Topics of Program	Date	Venue	No. of Participants
28	Training on "Emotional Intelligence for Cutting Edge Leadership" conducted through ISTM	29-30 Jan 2018	ISTM	16 CWC Officers
29	Training program on "E-Procurement" conducted through TCIL	08-09 Feb 2018	TCIL, New Delhi	9 CWC Officers
30	Workshop on " Reservoir Operation"	27 Feb 2018	CWC (H/Q), New Delhi	13 CWC Officers
31	"हिन्दी कार्यशाला"	16 Mar 2018	नई दिल्ली	50 प्रतिभागी
B. In-House Training Program in Field Office				
32	Training Programme on Bacteriological analysis of River water sample	13-15 Sep 2017	Coimbatore	18 CWC officers
33	Training Programme on "Stream Gauging Techniques" in C&SRO.	19-22 Sep 2017	CSRC,CWC, Bangalore	25 CWC Officials
34	Training Program on "e-Swiss & Data Base Management" in Krishna & Coordination Circle, CWC.	13 to 14 Nov 2017	Hyderabad	40 CWC Officials
35	Training program on "e-SWIS & Data Base Management"	15 to 17 Nov 2017	Hyderabad	40 CWC Officials
36	Training Program on "Standard Module for Ministerial Cadre of sub ordinate service" at KGBO, CWC, Hyderabad.	21-23 Nov 2017	Hyderabad	20
37	Training Program on "Stream Gauging" for officials/staff of SHD-Shimla & IBO, CWC, Chandigarh.	27-28 Nov 2017	Chandigarh	40 CWC Officials
38	Training Program on "Stream Gauging, Snow Hydrology & telemetry for officers of IBO & UGBO involved in snow Hydrology Studies."	28-29 Nov 2017	Chandigarh	27 CWC officials
39	Training course on "MIKE-II" for the officers of B&BBO, CWC, Shillong.	30 Nov to 01 Dec,2017	Guwahati	20
40	Training Program on "Delineation of Water shed by Arc GIS for HO sties in a Basin " at KG Bhawan ,CWC, HYD.	04 to 06 Dec 2017	Hyderabad	25
41	Training Course on "Microsoft word, Excel & PowerPoint & their Advanced Tools".	08-11 Jan 2018	C&SRO, CWC, Coimbatore	25 CWC Officers/ Officials

Sl. No.	Topics of Program	Date	Venue	No. of Participants
42	Training program on "Methodology of Hydrology observation related equipments and collection of WQ and Sedimentation Samples & its analysis" in respect of NTPO, Gandhi Nagar	29-31 Jan 2018 1-3 Feb 2018 5-6 Feb 2018 8-10 Feb 2018	Gandhi Nagar	134 (including 31 state officers)
43	Training program on" Preparation and Appraisal of DPR for Coastal Protection & Flood Protection work under FMP" at Coimbatore	8-9 Mar 2018	Coimbatore	23 CWC Officers
C. Programme Organized by Other Organization				
44	Training program on leadership and management in the field of water resources	24-28 Apr 2017	IIM Ahmadabad	20 officers
45	Training program on "Public financial management system (PFMS) batch-I (for PD"s and DDO"s)	29 May 2017	CWC H/Q), New Delhi	24 officers (Batch -1) 11 officers (Batch-II)
46	Various Advance Courses for Working Professional under the PCR Scheme for Studying along with the regular students of IIT Delhi (1st Semester of 2017-18) commencing on 24th July 2017.	Commencing from 24 Jul 2017	IIT, Delhi	6 CWC Officers
47	Participation in a Capability Building Program(CPB) on "e Office" organized by NIC e-office Project Division, New Delhi	21-23 Aug 2017	DMRC Building, Shastri Park, New Delhi	15 CWC Officers
48	Participation in a Capability Building Program(CPB) on "e Office" organized by NIC e-office Project Division, New Delhi	11-12 Sep 2017	DMRC Building, Shastri Park, New Delhi	18 CWC Officers
49	Participation in a Capability Building Program(CPB) on "e Office" organized by NIC e-office Project Division, New Delhi	13-14 Sep 2017	DMRC Building, Shastri Park, New Delhi	20 CWC Officers
50	Training Programme on "GeM & GFR's 2017"conducted through NIFM.	18-19 Sep 2017	NIFM, Faridabad	03 CWC Officials
51	Training course on "Gem & GFRs 2017" conducted through National institute of Financial Management (NIFM).	03-04 Oct 2017	NIFM, Faridabad	2 CWC officers

Sl. No.	Topics of Program	Date	Venue	No. of Participants
52	Training course on "GeM&GFRs-2017" conducted by CWC through NIFM, Faridabad.	23 to 24 Oct 2017	NIFM, Faridabad	1 CWC Official
53	Participation in a Capability Building Programmes (CBP) on "e-office" organized by NIC e-office Project Division, New Delhi.	23 to 25 Oct 2017	DMRC Building Shastri Park, New Delhi	20 CWC Officers
54	Training course on "GST" conducted by CWC through NIFM, Faridabad.	25 to 27 Oct 2017	NIFM, Faridabad	1 CWC Official
55	Training Programme on "Finance for Non – Finance Executive" organized by IIM, Kolkata	02 to 06 Dec 2017	IIM, Kolkata	1 CWC Officer
56	Organizing Specific program (OSP) for Central water commission on "Ethics and values in Public Governance" in ISTM, New Delhi	18 to 19 Dec 2017	ISTM, New Delhi	23 CWC Officers
57	Participation in a Three Days Programme on "Training of Trainers (ToT)" organized by NDMA in collaboration with United Nations International Strategy of Disaster Reduction office of Northeast Asia & Global Education and Training Institute (UNISDR-GETI).	18 to 20 Dec 2017	VIgyan Bhawan, New Delhi	02 CWC Officers
58	International Conference on "Underground Excavations in Difficult Ground Conditions, Issues and Challenges" organization by Indian National Group of ISRM, CBIP and Delhi Chapter of Indian Geotechnical society (IGS).	27 - 28 Apr 2017	CBIP Building, New Delhi	2 CWC Officers
59	Participation in two days conference on "Indus Water Treaty (IWT)" organized by Global Counter Terrorism Council (GCTC), New Delhi	16-17 Jun 2017	Constitutional Club, Rafi Marg, New Delhi	4 CWC officers
60	Conference on " Swachh Jal Swachh Bharat" organized by Advance Water Digest Pvt. Ltd.	21 Jul 2017	New Delhi	3 CWC officers

Sl. No.	Topics of Program	Date	Venue	No. of Participants
61	Workshop on "Morphological Study of Rivers Ganga, Sharda and Rapti using Remote Sensing Techniques" organized by Dept. of Civil Engineering, IIT Roorke in association of CWC, New Delhi	18-19 Sep 2017	CWC, Auditorium, New Delhi	22 CWC Officers
62	Participation "ISO TC 113 GROUP Meeting" organized by BUREAU of INDIAN STANDARDS.	08-13 Oct 2017	Noida	6 CWC officers
63	Participation in "INDOROCK-2017:7thIndian Rock Conference" organized by ISRMTT in association with CSMRS & WAPCOS	25 to 27 Oct 2017	Hotel Radisson Blu, Dwarka, New Delhi	4 CWC Officers
64	Participation in "3rd World Congress Disaster Management (3rd WCDM)" organized by Disaster Management Initiatives and Convergence Society(DMICS	06 to 10 Nov 2017	DMICS, Visakhapatnam	5 CWC Officers
65	Participation in Conference on "IX World Aqua Congress-International conference" organized by Aqua Foundation.	09 to 10 Nov 2017	Aqua Foundation, New Delhi	1 CWC Officer
66	Participation in Conference on "India Industry Water and FICCI Awards-2017" organized by Federation of Indian Chamber of Commerce & Industry (FICCI), New Delhi.	28 Nov 2017	"FICCI" Federation House, New Delhi	05 CWC Officers
67	Two Days conference on "PPP Model for Waste to Energy" organized by Confederation of Indian Industry (CII), Gurgaon.	30 Nov to 01 Dec 2017	Grand Hotel Vasant Kunj, New Delhi	02 CWC Officers
68	Participation in "National Public Procurement Conclave 2017" organized by Confederations of India Industry (CII) in Partnership with Govt. e-Marketplace (Gem) at India Habitat Center ,New Delhi.	11 to 12 Dec 2017	India Habitat Center ,New Delhi	02 CWC Officers

Sl. No.	Topics of Program	Date	Venue	No. of Participants
69	Participation in "Geospatial Technology & Big Data for Sustainable River Management" organized by IORA Ecological Solution & Digital Globe.	21 Dec 2017	Hotel Claridges, New Delhi	01 CWC Officer
70	Participation in one week course on "Managing Floods & Droughts in a Changing Climate organized by Department of Civil Engineering, Jamia MIllia Islamia(Central University) Delhi..	15-20 Jan 2018	New Delhi	3 CWC Officers
71	Role of Laboratory Investigation in Rock Engineering organized by CSMRS.	18-19 Jan 2018	CSMRS, New Delhi	3 CWC Officers
72	Water Ex Gujarat World Conference-2018 Organized by Jasubhai Media Pvt. Ltd., Mumbai	23 Jan 2018	Ahmadabad	1 CWC Officer
73	Seminar on "Flow 3D (R) CFD Software in Water & Environmental Application"	29 Jan 2018	New Delhi	24 CWC Officers
74	National Workshop on "Modern Technique in Flow Measurement "Organized by CWPRS.	06-08 Feb 2018	Pune	3 CWC Officers
75	Participation in a Workshop on" NATM & TBM Tunneling including Risk Management "Organized by CBIP.	06-08 Feb 2018	CBIP, New Delhi	06 CWC Officers
76	Participation in "Two days National Conclave on the Brahmaputra River Basin" Organized by Gauhati University.	12-13 Feb 2018	Guwahati	02 CWC Officers
77	Participation in 3rd National "Bhujal Manthan" Organized by CGWB.	16-17 Feb 2018	Nagpur	7 CWC Officers
78	Workshop on "Abrasive Erosion in Hydro Plants" organized by Alternate Hydro Energy Centre(AHEC), IIT Roorkee	23-24 Feb 2018	IIT Roorkee	2 CWC officers

Sl. No.	Topics of Program	Date	Venue	No. of Participants
79	Participation in Conference in " Command Area Development"(CAD) Organised by MoWR,RD&GR(CAD WM Wing)	12-13 March,2018	CWC Auditorium, New Delhi	49 officers
80	Participation in" World Water Submit-2018 Organized by Energy & Environment Foundation.	22/3/2018	Convention Centre, Parliament Street, New Delhi	5 CWC Officers

Training / Workshops Abroad

Sl. No.	Topics of Program	Date	Venue	No. of Participants
1	Training Course on "Morphological Modelling using Delft 3D" organized by UNESCO-IHE Delft, Neither land	18-22 Sep 2017	Neitherland	1 CWC Officer
2	Country focused training course on "Integrated Water Management "	26 Nov 2017 to 16 Dec 2017	Japan	7 CWC Officers
3	Country focused training course on "Integrated Water Management "	21 Jan 2018 to 10 Feb 2018	Japan	2 CWC Officers
4	Co- creation program for "Flood Disaster Risk Reduction"	1 Jan 2017 to 15 Sep 2018	Japan	1 CWC Officer
5	Visit of 20 officials from the Ministry to attend the one week exposure training.	26-30 Nov 2017	Israel	20 CWC Officers
6	visit of Indian delegation for follow up visit to Australia for further cooperation between India and Australia	5-8 Dec 2017	Australia	1 CWC Officer
7	IUCN Regional Workshop on Water Governance and Diplomacy ,Bangkok	22-23 Dec 2017	Bangkok	1 CWC Officer

Annexure - 15.2

Details of Training Programs undertaken by National Water Academy, Pune during 2017-18

Sr. No	Details of the Programs	Dates	Duration in weeks	Number of officers Trained	Man-weeks of training
1	Training Program cum workshop on water conservation & Management for Panchayati Raj Functionaries	21-04-2017	0.2	53	10.6
2	Induction Training Program for newly recruited JEs of CWC	15-05-2017 to 26-05-2017	2	43	86
3	Use of Advanced Software in design of water resources structures	05-06-2017 to 09-06-2017	1	19	19
4	Water Governance	19-06-2017 to 23-06-2017	1	32	32
5	Increasing Water Use Efficiency in Irrigation Sector	03-07-2017 to 07-07-2017	1	8	8
6	Design of Typical structures for Goct of Haryana officers at HIRMI	03-07-2017 to 07-07-2017	1	11	11
7	Training-cum-Workshop on Water Conservation, River Cleanliness and purification of water resources	05-07-2017 to 06-07-2017	0.4	48	19.2
8	Database Management and its application in Water Resources Sector	10-07-2017 to 14-07-2017	1	32	32
9	Training-cum-Workshop on Scenario of Water Resources in India for School Teachers	19-07-2017	0.2	31	6.2
10	Training-cum-Workshop on Water Resources management for NGOs and Media Personnels	31-07-2017 to 01-08-2017	0.4	43	17.2
11	Strategic Issues in Water Resources Sector	21-08-2017 to 24-08-2017	1	39	39

Sr. No	Details of the Programs	Dates	Duration in weeks	Number of officers Trained	Man-weeks of training
12	Management Development Program for Non-Technical Officers of CWC and MoWR officers	28-08-2017 to 01-09-2017	1	18	18
13	Overview of water Resources Sector of India for Non-technical officers of MoWR, RD & GR CWC	28-08-2017 to 01-09-2017	1	21	21
14	Climate Change Impact; mitigation measures; modeling tools GCM; RCM	28-08-2017 to 01-09-2017	1	13	13
15	Integrated River Basin Management	04-09-2017 to 08-09-2017	1	24	24
16	"More Crop Per Drop" - Bridging IPC/IPU Gap, Role of PIM	11-09-2017 to 22-09-2017	2	13	26
17	Digital Surface Modeling and Watershed Modeling using RS and GIS	11-09-2017 to 22-09-2017	2	18	36
18	The World Bank Procurement Procedures (Under NHP)	25-09-2017 to 27-09-2017	0.6	56	33.6
19	Dam Safety, Portfolio Management and Risk Assessment (under DRIP)	25-09-2017 to 06-10-2017	2	23	46
20	Training Program on Construction and Contract Management of Water Resource Projects	09-10-2017 to 13-10-2017	1	20	20
21	Training Program on Flood Forecasting using MIKE HYDRO RIVER (MIKE-11) and MIKE OPERATIONS by DHI (Under NHP)	23-10-2017 to 27-10-2017	1	21	21
22	Training Workshop under NHP on “Water Information & Analytics Generation using Free Online Tools” (under NHP)	26-10-2017 to 27-10-2017	0.4	17	6.8

Sr. No	Details of the Programs	Dates	Duration in weeks	Number of officers Trained	Man-weeks of training
23	International Distance Learning Program in Hydrology : Basic Hydrological Sciences in association with World Meteorological Organizations	16-10-2017 to 30-11-2017	7	60	420
24	Orientation Program for newly promoted AD-II of CWC	06-11-2017 to 17-11-2017	2	33	66
25	Environmental, Economic and Social Aspects of Water Resources Projects	13-11-2017 to 17-11-2017	1	21	21
26	Water Quality Assessment and Monitoring	27-11-2017 to 30-11-2017	1	46	46
27	Rainfall-Runoff Modelling using RS-GIS	04-12-2017 to 15-12-2017	2	26	52
28	Workshop on Remote Sensing and Geographical Information System	07-12-2017 to 08-12-2017	0.4	13	5.2
29	e-SWIS (under NHP)	18-12-2017 to 22-12-2017	1	22	22
30	Induction Training Program for JEs	26-12-2017 to 12-01-2018	3	47	141
31	Training-cun-Workshop on "App /Software Development"	26-12-2017 to 29-12-2017	1	22	22
32	Workshop on Interlinking of Rivers	09-01-2018 to 11-01-2018	0.6	34	20.4
33	Water Budgeting	16-01-2018 to 19-01-2018	0.6	42	25.2
34	River Morphology and Sediment Management	29-01-2018 to 02-02-2018	1	10	10
35	Training of Trainers [ToT] Program on Hydrometry and Management of Hydro-meteorological data (Under National Hydrology Project)	12-02-2018 to 16-02-2018	1	24	24

Sr. No	Details of the Programs	Dates	Duration in weeks	Number of officers Trained	Man-weeks of training
36	Advanced Training Program on MIKE HYDRO RIVER (MIKE-11), MIKE FLOOD & MIKE OPERATIONS	12-02-2018 to 16-02-2018	1	23	23
37	Multi-stakeholder Meeting for Development of River Basin Management Plan for Tapi Basin in technical Collaboration with EU	20-02-2018	0.2	20	4
38	Training-cumWorkshop on Fish Pass Design	21-02-2018 to 22-02-2018	0.4	28	11.2
39	Induction Training Program for Newly Recruited JEs - Batch 2	05-03-2018 to 23-03-2018	3	51	153
40	Trans-boundary Water Resources – Conflict to Co-operation	05-03-2018 to 09-03-2018	1	18	18
41	International Distance Learning Program in Hydrology : Advanced Topics in Hydrological, Hydraulic Sciences (7 weeks) **	19-03-2018 to 04-05-2018	2	88	176
42	Training Program on “Ground Water Management & Modeling”	22-03-2018 to 23-03-2018	0.4	17	6.8
	Total		**51.8**	**1248**	**1812.4**

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