सत्यमेव जयते

Central Water Commission

ANNUAL REPORT 2016-2017

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 (2013-14)	200.9 M ha
•	Net Sown Area (2013-14)	141.4 M ha
•	Irrigation Potential Created (upto March 2012)	113.5 M ha
•	Gross Irrigated Area (2013-14)	95.8 M ha
•	Net Irrigated Area (2013-14)	68.1 M ha

HYDRO-POWER

•	Ultimate Hydropower Potential	148701 MW
•	Potential Developed by 31.3.2017 (Installed Capacity of plants above 25 MW)	44478 MW

FROM CHAIRMAN'S DESK

It is our pleasure to bring out this Annual Report of the Central Water Commission (CWC) for the year 2016-17. The report gives an insight into the organisation structure, functions and activities of CWC highlighting the contribution made in the development 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 2016-17. 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 2016-17, CWC provided design consultancy for DPR preparation and project construction in respect of 61 water resources development projects in India and neighbouring countries namely Afghanistan, Bhutan and Nepal. We have undertaken techno-economic appraisal of water resources development projects leading to acceptance of 40 projects comprising of 19 major & medium irrigation projects, 1 drinking water project and 20 flood control projects by the Advisory Committee of MoWR,RD&GR. In view of the goal of providing "Har Khet Ko Pani", CWC has undertaken rigorous monitoring of irrigation projects as well as scrutiny of release proposals which resulted in release of funds to 69 major and medium irrigation projects to the tune of Rs. 3308 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. Flood Forecasting service at 23 new stations has been started during 2016-17. The timely issue of 6239 flood forecasts (with 95.34 % accuracy) during the monsoon period of 2016 has helped concerned authorities / society in effective flood fighting and relief.

CWC has always worked for providing quality service to the nation in the field of water resources development and management. The National River Water Quality Laboratory, CWC, New Delhi is now accredited by National Accreditation Board for Testing and Calibration Laboratories (NABL) in accordance with Standard ISO/IEC 17025-2005 in the discipline of testing.

The dedicated effort and hard work of the officers and staff of CWC is the key behind above achievements. CWC is committed to provide full support to the State Governments in all aspects related to planning, design, construction, operation and management of water resources projects in an efficient, sustainable and technically sound manner.

(S. Masood Husain)
Chairman, CWC

HIGHLIGHTS OF THE YEAR 2016-17

❖ DESIGNS

- CWC provided design consultancy to States / Project Authorities for 61 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 observations, at 954 sites in different basins spread over the entire country.
- The National River Water Quality Laboratory, CWC, New Delhi has been 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.
- Provided Flood Forecasting Service at 199 flood forecasting stations (including 48 inflow forecasting stations) spread over 19 major river basins. During the flood season 2016, 6239 flood forecasts (4969 level forecast and 1270 inflow forecasts) were issued, out of which 5948 (98.1%) 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

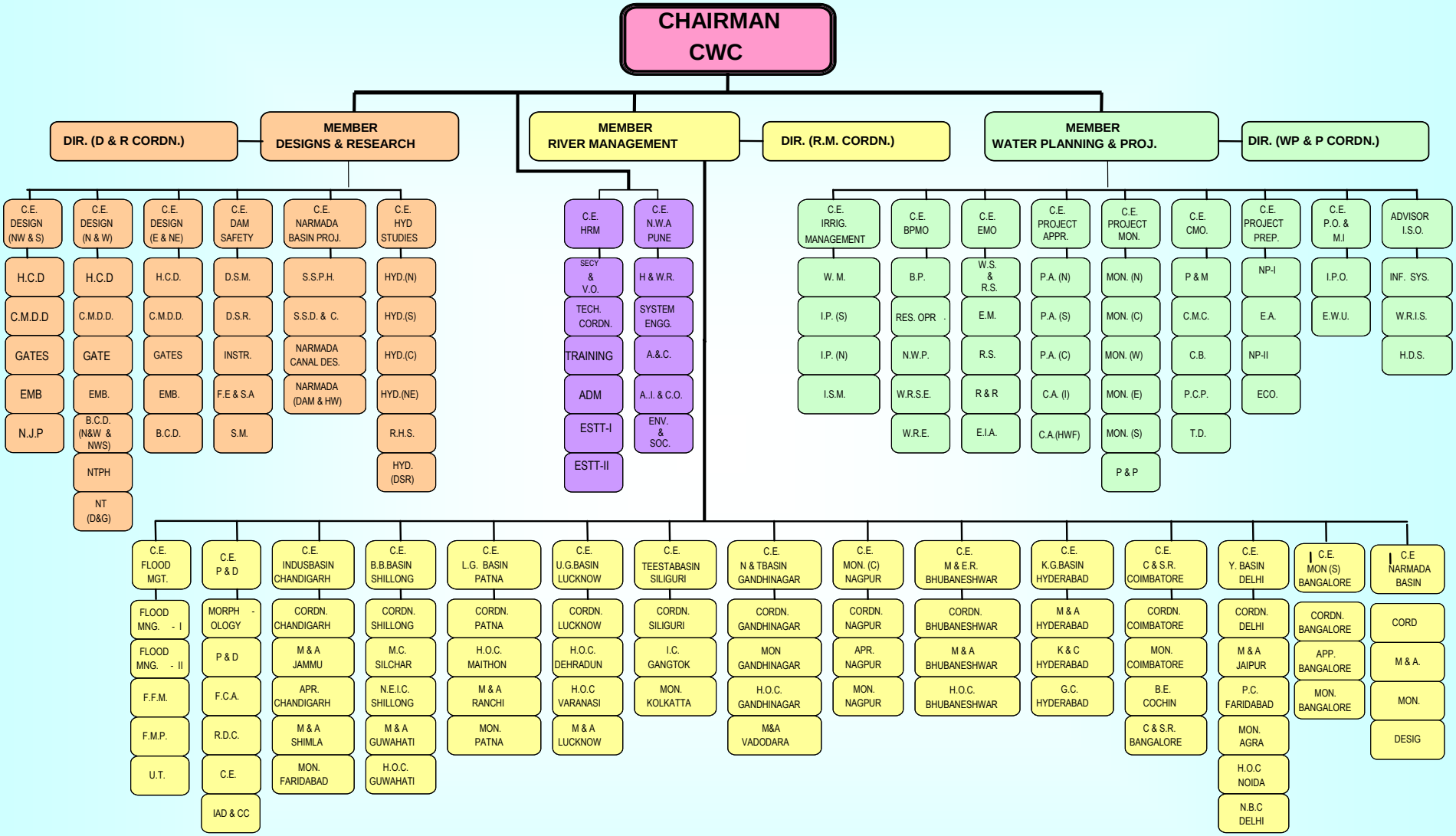
- During the year 2016-17, 63 major / medium irrigation projects were under appraisal in CWC. 40 projects comprising 19 major / medium irrigation projects 1 drinking water project and 20 flood control projects were accepted by the Advisory Committee.
- Monitored 47 Irrigation projects under General Category 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. 3308 crore of Central Grant under AIBP programme to 69 Major and Medium Irrigation Projects were undertaken.
- Provided technical assistance to MoWR in Inter-State water disputes resolution process in respect of Cauvery Water Dispute, Mandovi Water Dispute, Krishna Water Dispute and Vamsadhara Water Dispute.

❖ HRM

- National Water Academy, CWC, Pune conducted 30 training programmes during 2016-17 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 2067.

C O N T E N T S

Organogram of Central Water Commission



CHAPTER-I

AN OVERVIEW

1.1 HISTORY OF CWC

Central Water Commission (CWC), an apex organization in the country in the field of Water Resources came into existence as "Central Waterways, Irrigation and Navigation Commission" vide Department of Labour Resolution No. DW 101(2) dated 05.04.1945. In the year 1951, it was renamed as "Central Water and Power Commission" (CW&PC) after its merger with the "Central Electricity Commission". Following the changes in the Ministry of Agriculture and Irrigation, in the year 1974, Water Wing of CW&PC was separated as "Central Water Commission", which continues till date. At present Central Water Commission functions as an "Attached Office" of the 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.

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.

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 incumbents to the posts of Chairman and Members of Central Water Commission during the year 2016-17 were:

1.	**Chairman**, CWC	:	Sh. G.S. Jha	(01-04-2016 to 31-01-2017)
			Sh. Narendra Kumar	(02-03-2017 to 31-03-2017)
2.	**Member** (D&R)	:	Sh. G.S. Jha	(01-04-2016 to 31-01-2017)
			Sh. N. K. Mathur	(20.02.2017 to 31.03.2017)
3.	**Member** (RM)	:	Sh. Narendra Kumar	(01-04-2016 to 02-03-2017)
			Sh. Pradeep Kumar	(20.03.2017 to 31.03.2017
4.	**Member** (WP&P)	:	Sh. S. Masood Husain	(01-04-2016 to 31-03-2017)

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.

1.5 Important Schemes and Programmes

Accelerated Irrigation Benefits Programme

The 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).

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 priority projects 21

projects, having least bottlenecks, have been planned to be completed by June 2017. The remaining projects are to be completed in phases upto December 2019.

Central Grant totalling to Rs. 3307.998 Crores has been released to 69 Projects under PMKSY-AIBP during 2016-17. Since its inception, the cumulative total Central Loan Assistance / Grant provided to States under AIBP is Rs. 58,878.59 Crores till 31.03.2017 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 proposal for the period 2017-20 is under consideration in the Ministry. An outlay of Rs. 6357 Crore has been kept for the period.

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.

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. Water Quality Assessment Authority and Monitoring System
iv. Strengthening of Monitoring Unit in CWC

v. 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.

Since Feb 2015, the India-WRIS portal is being maintained by a team of experts at India-WRIS Centre, CWC HQ, Sewa Bhawan, New Delhi.

The progress of activities under India-WRIS upto March 2017 is as under:

- Command boundaries and canal layer refinement for 1700 MMI projects have been completed.
- Crop Area Assessment study for forty five (45) AIBP commands for assessing gap in irrigation potential & actual utilization has been completed.
- Imparted training to 30 CWC officers from various field officers regarding Crop area assessment study using remote sensing technique to assess the gap in irrigation potential and actual utilization.
- PMP Atlas integration has been completed.
- As per provision of Hydro-Meteorological Data Dissemination Policy 2013 (MoWR), all unclassified data of CWC G&D stations has been made available on India-WRIS website. Uploading of unclassified H.O. data of CWC upto March 2015 has been completed.
- Reservoir module for monitoring of 91 reservoirs have been operationalized.
- The work for updation of river, water body layer and town layer has been initiated.

- Development of a more user friendly version 5.0, planned to be launched by Aug'17 has been initiated.
- Preparation of MIS for obtaining data from States for preparation of compilation of MMI projects by Project Monitoring Oganisation has been initiated.

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.

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 has been completed. During 2015-16, the work for modernization and renovation of remaining floors was awarded to National Projects Construction Corporation Ltd (NPCC). The work for 7th Floor (South Wing) has been completed in the year 2016-17. The work for 6th floor (South Wing) is in advanced Stage of completion whereas works on 5th and 4th Floor has been initiated.

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 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.

1.7.3 CWES Bio-Data information System :

Bio-data Information System for Central Water Engineering Service (CWES) officers is operational to facilitate CWES officers to upload their bio-data and to mention about their achievements in the field of water resources. The CWES bio-data information system can be accessed through CWC web-site. CWC officers can log in to system with

their employee ID as login code and unique passwords to view and edit their records. The information can also be viewed by common public.

1.7.4 GPF information System:

GPF information System is an online system in which each official of CWC can view his /her last uploaded GPF statement by logging on to their system and entering their passwords.

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. Continued measures are taken for improving progressive use of Hindi for official purpose. The Official Language Implementation Committee of the 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.

Following initiatives in regard to progressive use of Hindi in this year were taken:

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.
2. Four Hindi workshops were organized at Central Water Commission (Headquarter) to generate awareness about Hindi, and to give practical knowledge of the Official Language provisions and incentive schemes etc. A total of 185 (one hundred eighty five) officials participated in these workshops.
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 14 to 28 September 2016 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 2016-17 were awarded to the Field Offices of Central Water Commission situated in regions, A, B and C i.e to Narmada Basin Organisation, Bhopal, Tapi Circle, Surat &Upper Brahmaputra Division, Dibrugarh respectively. Raj Bhasha Shield for Directorates and Sections at HQs were awarded to River Management Coordination 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 2016-17 are as under:

- CWC Football Team participated in the Inter-Ministry Football Tournament during 2016-17 and stood at Runners-up position.
- Shri Suresh Naidu, Sr. Computer, CWC won Bronze Medal in the Men Single category of the Inter-Ministry Carom Tournament 2016-17
- Shri Ashish Yadav, Sr. D'man, CWC won Bronze Medal in the Inter-Ministry Chess Tournament 2016-17
- CWC Athletics Team won the March-Past Trophy in the Inter Ministry Athletics Meet 2016-17.
- Shri Pradeep Kumar, Director, CWC won 3 medals, namely, Silver Medal in Javelin Throw, Bronze Medal in Shot Put and Bronze Medal in Discuss Throw, in the Delhi State Masters Athletics Championship during 2016-17.

1.12 Employees Strength under various categories:

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

Table 1.1

Representation of OBC, SC & ST Officials in Different Grades (As on 1.1.2017)

Category	No. of Filled Posts	No. of SCs	No. of STs	No. of OBCs
Group A	575	91	34	65
Group B	1106	154	63	184
Group C	1071	233	71	234
Total	**2752**	**478**	**168**	**483**

Table 1.2

Representation of PWD (OH/VH/HH) Officials in Different Grades (As on 1.1.2017)

Category	Orthopedic Handicapped (OH)	Visually Handicapped (VH)	Hearing Handicapped (HH)	TOTAL
Group A	-	-	5	5
Group B	1	6	18	25
Group C	9	5	5	19
Total	**10**	**11**	**28**	**49**

1.13 Citizen's Charter for CWC

As per the guidelines issued by Department of Administrative Reforms & Public Grievances (AR&PG), a Task Force under the Chairmanship of Member (WP&P), CWC and Chief Engineer (BPMO), CWC as Member-Secretary & Nodal Officer was constituted for formulating Citizen's Charter for CWC. The Citizen's Charter was finalized with the concurrence of 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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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 1123 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 433 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;

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.

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 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.

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

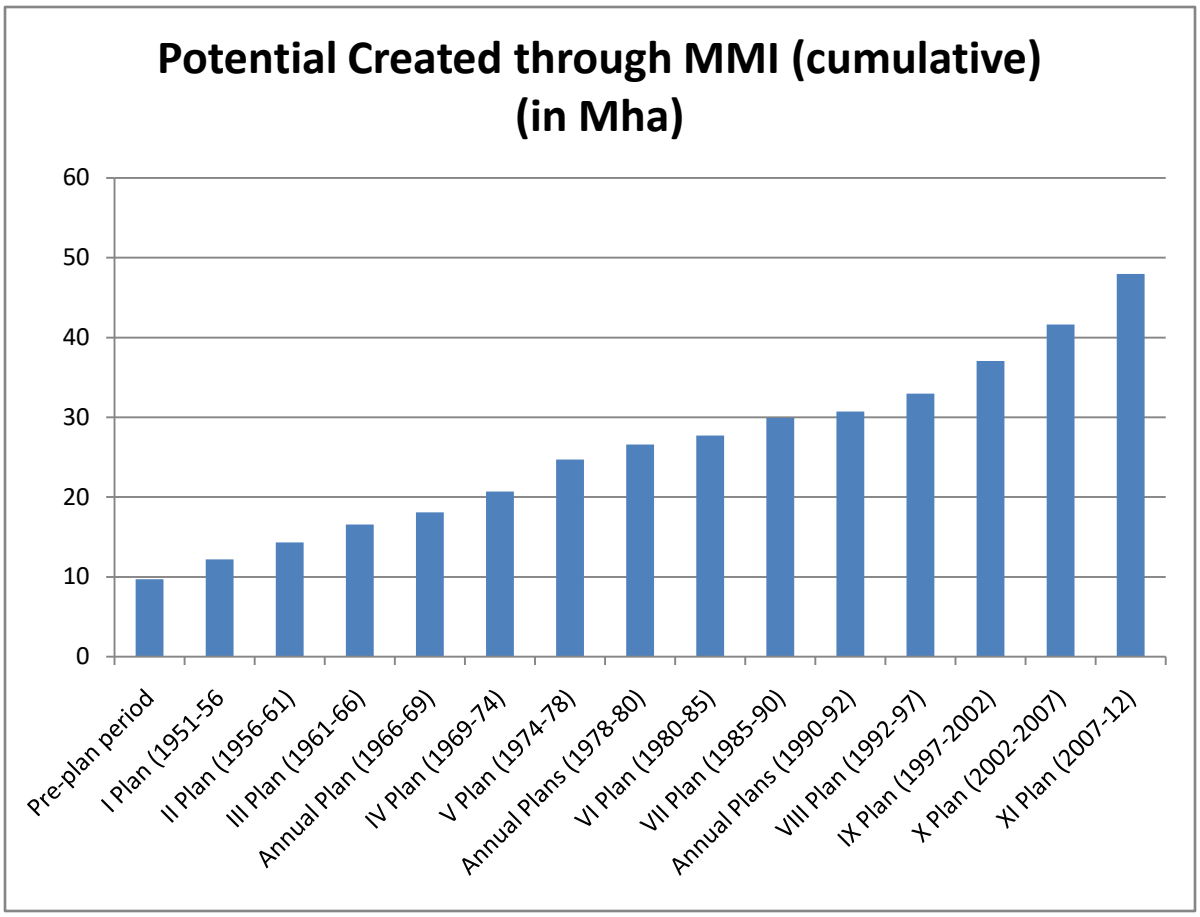

Fig 2.1 Growth of Irrigation Potential Created through Major and Medium Irrigation Project during Pre-Plan and Plan Period (Cumulative)

Table 2.1

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

(Thousand ha.)

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.)
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	Chattisgarh	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
21	Punjab	3000.00	2542.48	62.19	2574.67	109.72	2684.39

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.)
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: Planning Commission

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: Planning Commission

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)

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

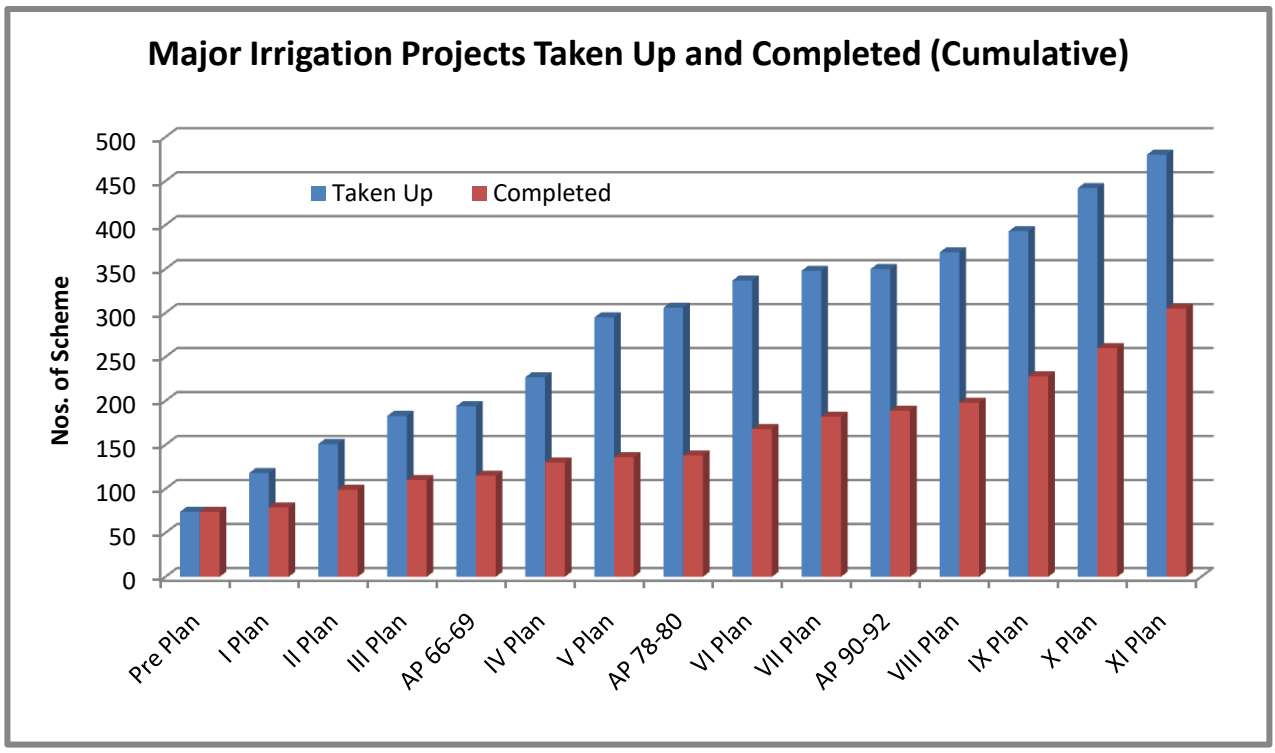

Fig 2.2 Major Irrigation projects taken up and completed (Cumulative)

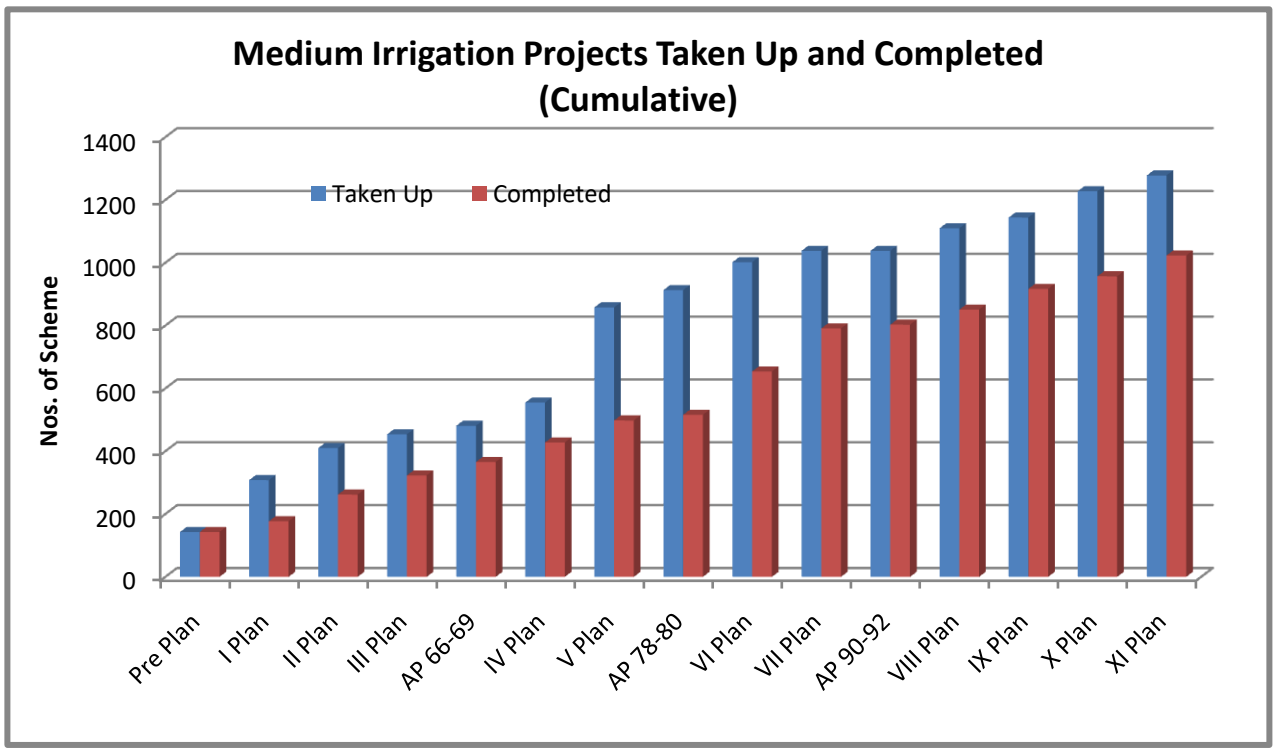

Fig 2.3 Medium Irrigation projects taken up and completed (Cumulative)

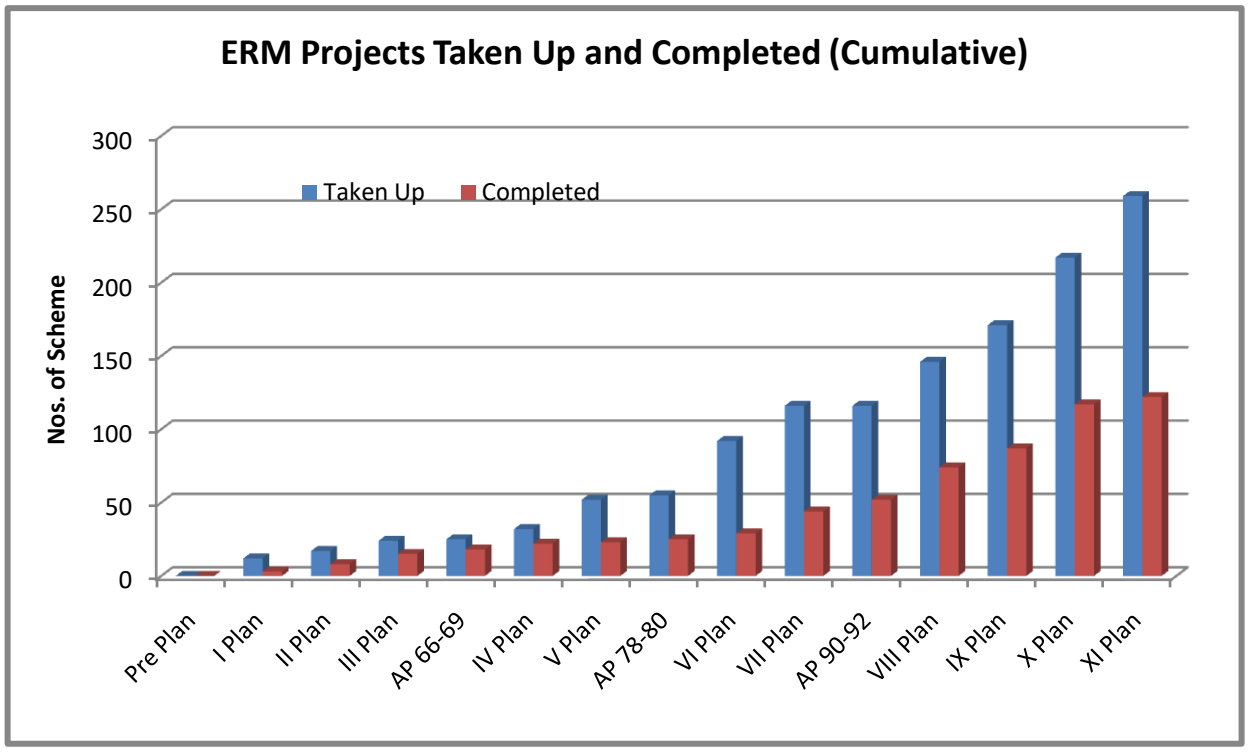

Fig 2.4 Modernization of ERM Projects taken up and Completed (Cumulative)

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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 related 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 detailed below in Table 3.1.

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	19
5.	Ganga/Brahmaputra/Meghna/Barak Basin	440
6.	Godavari Basin	75
7.	Indus Basin	24
8.	Krishna Basin	53
9.	Mahanadi Basin	39
10.	Mahi Basin	13
11.	Narmada Basin	28
12.	Pennar Basin	8
13.	Sabarmati Basin	13
14.	Subernarekha Basin	12
15.	Tapi Basin	18

S. No.	Name of Basin	No. of Sites
16.	Teesta Basin	11
17.	West Flowing Rivers from Tadri to Kanyakumari	27
18.	West flowing rivers from Tapi to Tadri	21
19.	West flowing rivers of Kutchh and Saurashtra including Luni	15

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

In addition to this, Central Water Commission has opened 720 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.

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.

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 55 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 406 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. The National River Water Quality Laboratory, CWC, New Delhi has been 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.

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.

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 like to 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.

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 199 flood forecasting stations, of which 151 are level forecasting and 48 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. 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

3.2.1 Flood Forecasting Performance during 2016

Due to early rainfall and consequent flooding in Assam, the Flood Bulletin Service in Brahmaputra Basin was started from 21st April 2016 ahead of the designated flood season.

During the flood season 2015, 6239 flood forecasts (4969 level forecasts and 1270 inflow forecasts) were issued out of which 5948 (95.34%) 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 base 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 was extensively used for formulating forecasts for new inflow stations this year. Using this methodology, 1-day/ 3-day advisory inflow forecasts were issued for 14 such new inflow forecasting stations.

During the year, the rainfall condition was also kept on watch in areas not covered by Flood Forecasting Network. Advisory were also issued to States in case of extreme rainfall events. In this connection, advisory was issued to the State Governments of Maharashtra, Karnataka, Telangana and Andhra Pradesh in September in view of forecast for heavy to very heavy rainfall with isolated extremely heavy rainfall. Another advisory inflow forecast for lakes surrounding Chennai was issued to the Govt. of Tamil Nadu in November in the backdrop of Very Severe Cyclonic Storm "Vardah".

3.2.2 Significant Flood Situations during 2016

During the flood season of 2016, out of 151 level forecasting sites, Unprecedented Flood Situation (where the Highest Flood level (HFL) attained during the flood season exceeded their respective previous HFL) was witnessed at 4 stations viz., Ballia (Ballia, Uttar Pradesh), Gandhighat (Patna, Bihar), Hathidah (Patna, Bihar) and Bhagalpur (Bhagalpur, Bihar), all on river Ganga.

High Flood Situation (where peak level had attained within 0.5m of previous HFL) was experienced at 18 stations. Among these 5 stations were on River Brahmaputra viz., Dibrugarh (Assam), Neamatighat (Jorhat, Assam), Tezpur (Sonitpur, Assam) and Goalpara (Assam) and Dhubri (Assam); 3 stations were on river Ganaga viz., Dighaghat (Patna, Bihar), Kahalgaon (Bhagalpur, Bihar) and Ghazipur (Uttar Pradesh)

and one each on River Desang (Nanglamoraghat, Sibsagar, Assam), River Kopili (Kampur, Nagaon, Assam), River Jia-bharali (NT Road Crossing, Sonitpur, Assam), River Beki (Beki Road Bridge, Barpeta, Assam), River Sankosh (Golokganj, Dhubri, Assam), River Mahananda (Jhawa, Katihar, Bihar), River Kosi (Kursela, Katihar, Bihar), River Sone (Maner, Patna, Bihar), River Burhi Gandak (Khagaria, Bihar) and River Rapti (Balrampur, Uttar Pradesh).

3.2.3 Flood Bulletins

Central Water Commission (CWC) has been issuing Daily Flood Bulletins and Special Flood Bulletins during flood season every year based on the information collected from affected State Governments and field formations of CWC. During the year 2016, 245 daily bulletins (once daily), 58 Orange Bulletins for High Flood Situation (Twice daily) and 81 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.

3.2.4 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 2016.

3.2.5 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.

3.2.5.1 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). Further 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).

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. As on date there are 3 Earth Receiving Stations (ERS) in the country at New Delhi, Jaipur and Burla. A total of 22 Modelling centres have been installed in the country till the end of XI Plan. These Modelling Centres are located at Agra, Asansol, Bhubaneswar, Bhusaval, Burla, 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 12th Plan (2012-17) telemetry system was planned to be installed at 629 stations. The establishment of six Modelling Centres (MCs) at Bengaluru, Bhopal, Chennai, Gangtok, Jammu and Lucknow was also planned. Out of this, Telemetry system has been installed at 64 stations. The installations of telemetry system at remaining stations are in progress. The data in respect of all these 629 stations will be received at ERS, New Delhi (installed under XI plan) and subsequently shall be sent to respective Modelling Centres through VSAT. Further, establishment of Modelling Centre at Chennai has been completed. Establishment of Modelling Centre at remaining five locations is in progress.

3.2.5.2 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 December 2016, out of 19 river basins mathematical modelling has been completed for 3 river basins namely Godavari, Mahanadi and Tapi and development of mathematical models for remaining river basins is under progress.

During 2016, 20 inflow and 1 level forecast stations have been operationalized using mathematical models. Out of these, 1-day/ 3-day advisory inflow forecasts were issued at 14 inflow forecasting stations including Poondi Satyamurthy reservoir during "Vardah" cyclone in November 2016.

3.2.5.3 Web-based system for forecast dissemination

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

3.2.6 Flood Damage Statistics

Central Water Commission compiles annual flood damage data based on data received from State Government. The damage data up to 2012 has been finalized and published. Tentative data for 2013, 2014. 2015 and 2016 is under confirmation from States.

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 this 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.

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 2016-17 to States for areas other than Ganga basin is given in Table 3.2.

Table 3.2

State-wise fund released under Flood Management Programme during 2016-17		
Sl No.	Name of State	Amount released (Rs. in Crore)
1	HP	50.00
2	J&K	40.56
3	Nagaland	23.13
4	West Bengal	12.61
5	Arunachal Pradesh	23.69
Total		149.99

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 large quantity of silt/sediment being carried and deposited in its downstream reaches. The special 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.

A provision of Rs. 15.60 Crores was sanctioned by MoWR for the 12th Plan under the Plan Scheme "R&D Programme in Water Sector" for the works related to morphological studies. The morphological studies of 15 rivers (Ganga, Sharda, Rapti, Kosi, Bagmati, Yamuna, Bramhaputra, Subansiri, Pagladiya, Krishna, Tungbhadra, Mahananda, Mahanadi, Hoogli, & Tapti) by using Remote Sensing technology have been awarded to various IITs /NITs on consultancy basis. The institute-wise status of these studies is given below:

Sl. No.	Institute	Name of Rivers	Status	Anticipated Completion Date
1.	IIT Roorkee	Ganga, Sharda, Rapti	Draft Final Report Submitted	March, 2017 (may be extended to June,2017)
2.	IIT Delhi	Kosi, Bagmati, Yamuna	Interim Report Submitted	September 2017
3.	IIT Guwahati	Bramhaputra, Subansiri, Pagladiya	Interim Report Submitted	March, 2018
4.	IIT Madras	Krishna, Tungbhadra	Interim Report Submitted	March, 2018
5.	IIT Kharagpur	Mahananda, Mahanadi, Hoogly	Interim Report Submitted	March, 2018
6.	SVNIT Surat	Tapi	Draft Final Report Submitted	March, 2017 (extension up to June, 2017 received)

3.5 Coastal Erosion

The Indian coastline is extending to a length of about 7516 km (as per NHO). Almost all the maritime States/UTs are facing coastal erosion problem in 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 (CRCPMP)

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 into 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

Specialist Institute	Study Performed
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 are under review by PoE and CWPRS, Pune.

It is also proposed to host the data and analysis of the climate change affected parameters in the coastal areas, on web-based Water Resources Information System (INDIA-WRIS) of the Ministry. 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 are under implementation with loan from ADB. The revised completion time for Tranche-1 projects is 30th June 2017.

Under Tranche-1, action has been also taken in the State of Karnataka to identify the prospective projects for Tranche-2. 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, 14 meetings of CPDAC have been held. The last meeting was held on 27th and 28th February 2014 at Goa.

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)

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)" during the XII-Plan (2012-17). 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 coast of above work is Rs 896.05 Lakh. An advance payment of Rs 233.77 Lakh has also been released to IIT Madras in November, 2016. A

Project Monitoring Committee (PMC) has also been constituted for the purpose. The Project Executor (IIT Madras) has submitted the Inception Report.

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)

3.6 River Management Activities and Works Related to Border Areas

The Government of India has approved the continuation of "River Management Activities and Works related to Border Areas (RMBA)" a Central sector scheme under Central Plan amounting to Rs. 740.00 core during XII Plan period (2012-17) for taking up following continuing and new activities:

Sl. No.	Activity	Amount (Rs. in Crore)
1	Hydrological observations and flood forecasting on common border rivers with neighbouring countries	82.16
2	Investigation of WR projects in neighbouring countries	115.74
3	Pre-construction activities for WR projects on common border rivers	100.00
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	397.10
5	Activities of Ganga Flood Control Commission (GFCC)	45.00
	Total	**740.00**

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 as given below-

(Rs. in Lakh)

Sl. No.	Particular of the scheme	Estimated cost	Fund released upto March 16	Amount released during 2016-17	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 2016-17
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**	

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.

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 to be revised by the State Government and submitted to CWC for appraisal. The revised report is awaited.

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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.

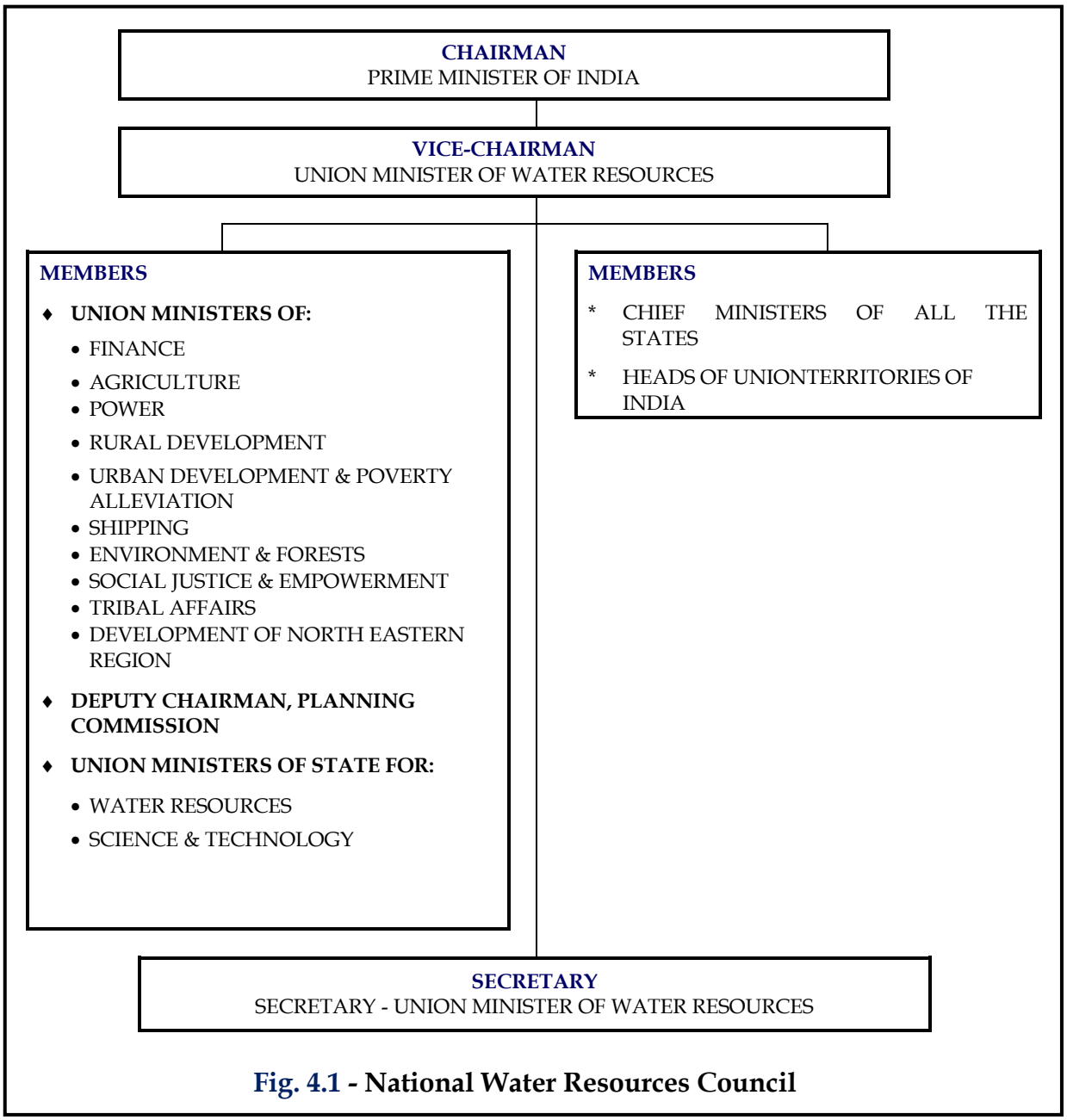

Fig. 4.1 - National Water Resources Council

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. The "National Water Policy – 2012" was adopted by the National Water Resources Council in its 6th meeting held in December 2012.

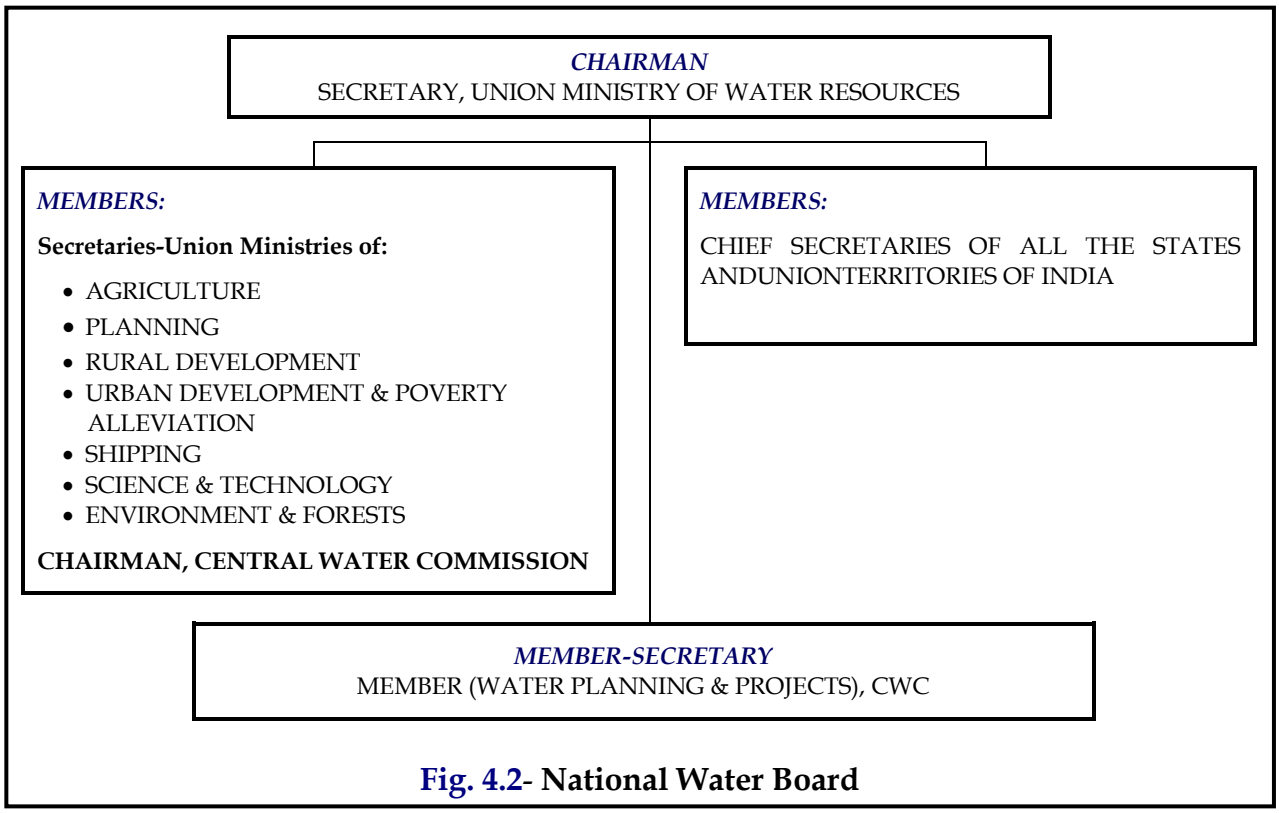

Fig. 4.2- National Water Board

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

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

4.4.1 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.

Accordingly, the bill has been revised and the Draft National Water Framework Bill 2016 has been sent to all the State Governments and Union Territories for their comments. The concerned State Governments are being pursued to support the Bill.

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.

The bill is under examination. To finalize the draft, an Expert Group has been constituted in the Ministry to further review the bill and finalize it. Director (NWP) is attending the meetings of the Group.

4.5 Integrated Water Resources Management - Guidelines

The National Water Policy emphasizes the need for adopting river basin as basic hydrological unit for planning of water resources in the country. CWC is actively involved in aspects related to holistic approach towards development and management of water resources considering river basin as 'hydrological unit'. National Water Mission also highlights the importance of principles of Integrated Water Resources Management (IWRM). In this regard, draft guidelines on 'Integrated Water Resources Development and Management' were prepared by CWC and the same have been circulated to all State Govts/UTs, Field Offices of CWC and other Union Ministries for comments/observations. The guidelines were discussed in a workshop on IWRM organized by World Bank in Feb, 2015. The guidelines have been finalized after wide consultation with States, various stakeholders and international experts. The guidelines are available on CWC website.

4.6 Basin Planning studies and Related Issues

4.6.1 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 has been started in Aug 2016. Most of the requisite data for the study have been collected and compiled. The software (Arc-GIS and ERDAS Imagine) have been installed in CWC HQ and in the field offices. A review workshop was held during 5-9 Dec 2016 under the chairmanship of Chairman, CWC to review and monitor the progress of work in field units. and resolve the doubts being faced. The study is likely to be completed in July 2017.

4.6.2 Preparation of IWRM Plan for Brahmani-Baitarani under Indo-Australia Cooperation

Government of India and Australia have entered into a Memorandum of Understanding (MoU) in November 2009 for enhancing cooperation on Water Resources Development and Management through the sharing of policy and technical experiences. The MoU was later extended in September, 2014. The present MoU has a validity of 5 years. A Joint Working Group (JWG) comprising of members from the two countries has been constituted for the purpose. CWC is

represented by Director (Basin Planning) as one of the members of JWG from Indian side.

During the first meeting of the JWG held in November, 2010, it was decided to undertake study for preparation of IWRM Plan for Brahmani-Baitarani. During the 2nd meeting of JWG held in May, 2013, an action plan was agreed between India and Australia. As per the action plan, the IWRM Plan for Brahmani-Baitarani Basin was to be jointly prepared by India (CWC) and Australia (CSIRO, Australia) by involving all the stakeholders, using Australian modelling platform/software i.e. eWater Source.

During the 3rd meeting of JWG held at New Delhi on 19.01.2015, the need for intensive training of the Indian officials on the eWater software was felt and it was decided that the training of the officials of State and Central Government may be done and the prototype of Brahmani Basin developed by CSIRO officials may be used for the training purposes.

Accordingly, a training programme on eWater Source Software being used for preparation of IWRM Plan was held at NWA Pune from 11th to 16th May, 2015 where Brahmani prototype model was discussed and participants were directed to prepare prototype model of IWRM Plan for Baitarani Basin. Advance training programme was conducted from 31st August to 4th September, 2015 at TERI University, Vasant Kunj, New Delhi. A visit to the projects sites on Baitarani river basin along with CWC G&D sites at Champua and Anandpur was undertaken by CWC officers with State Government officials during the period from 2.11.2015 to 3.11.2015. MoWR,RD&GR / CWC officers also held meetings with Engineer-in-Chief, WRD Government of Odisha and Principal Secretary (WR) , Government of Odisha to discuss the roadmap of IWRM studies of Brahmani-Baitarani basin on 4th November, 2015.

Later, discussion was held with the team from CSIRO, Australia during 23-25 Feburary 2016 in New Delhi. The outline for the report preparation and various scenarios, including climate change scenario, to be generated for the Brahmani-Baitarani basin were finalised during the discussion. Based on above, the Rainfall-Runoff modelling and River System (Demand) Modelling for Baitarani River Basin generated earlier have been modified and refined. The study has since been completed and the report has been published in September 2016.

4.6.3 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 palusible 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 likely to completed by the end of Dec 2017.

4.6.4 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 study is to be taken up by global tendering for which the process has been initiated. The Terms of Reference (ToR) for the studies have been finalized. The Expression of Interest has been called from interested consultants/ firms. It is expected the process for awarding of consultancy will be completed by the end of October 2017.

4.7 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 64 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 2016-17, eight (8) Water Balance Reports were examined by CWC and comments were sent to NWDA.

4.8 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. Later on, a full-fledged Climate Change Directorate has been earmarked in CWC under P&D Organization of RM Wing of CWC in June, 2010.

CWC has prepared "Inventory of Glacial Lakes/Water Bodies in the Himalayan Region of Indian River Basins" through National Remote Sensing Centre, Hyderabad (NRSC) and started monitoring of these glacial lake water bodies on monthly basis during monsoon season from 2011 onwards. This monitoring is continuing during 12th Five Year Plan (2012-2017).

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 2016-17, 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.

MoWR,RD&GR/CWC has entered into an agreement to undertake a study on "Operational Research to Support Mainstreaming of Integrated Flood Management under Climate Change" through technical assistance with the Asian Development

Bank (ADB) in order to meet the objective of strengthening the protection and resilience of flood prone areas in India. The study was completed in December 2015.

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 29 meetings of JOC have taken place. The last meeting (29th meeting) was held in New Delhi on 29th September 2016 in which the actual releases made from Rihand reservoir during 2015-16 were discussed and the operation plan for 2016-17 was finalized.

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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 Detailed Project Reports of water resources development projects prepared by different agencies is also carried out in this Wing.

Major activities of D&R Wing comprise of:

1. Planning and design of water resources and hydropower projects.
2. Hydrological studies.
3. Review of safety aspects of existing dams and its monitoring.
4. Technical appraisal of multipurpose river valley projects.
5. Coordination of research, development and training.
6. Attending to distressed structures as applicable to design aspects.
7. Assisting MoWR in various design issues involved in international and Trans Boundary Projects.

5.2 Planning and Design of Water Resources Projects

5.2.1 Details of Design Organisations of CWC

The following three design organisations cater to specific requirements and attend to special design related problems of the water resources projects located in different regions of the country:

1. Design (North & West) Organisation

2. Design (North-West & South) Organisation

3. Design (East & North-East) Organisation

Each of the above organisations have specialised Directorates such as Hydel Civil Design (HCD), Concrete & Masonry Dam Design (CMDD), Embankment Design (EmbD), Gates Design (GD) and Barrage & Canal Design (BCD) etc.

Additionally, Narmada Basin Project Organization with four specialized Directorates is responsible for providing detailed design consultancy services for the projects of Sardar Sarovar Narmada Nigam Ltd. (SSNNL), Government of Gujarat and Narmada Valley Development Authority (NVDA), Government of Madhya Pradesh. The details of activities assigned to various Cell / Directorate under Narmada Basin Project Organisation is as under:

A. Sardar Sarovar Power House Design Directorate (Navagam Design Cell)

Navagam Design Cell (Now, Sardar Sarovar Power House Design (SSPH) Directorate) was created in CWC under Member (D&R), CWC exclusively for designs of Navagam Dam Project and its appurtenant works. The project envisages construction of 1210m long and 163m high (above deepest foundation) concrete gravity dam across the main Narmada River. The Unit-III of the project involves mainly works in regard to the Canal Head Power House (CHPH), underground River Bed Power House (RBPH) and Garudeshwar weir. The planning, civil design and preparation of construction of drawings for CHPH and RBPH of Sardar Sarovar dam have been completed. All the five units of 50 MW each of CHPH and six units of 200 MW each of RBPH have been commissioned. Presently the Directorate is involved in design and issue of drawings for the construction of Garudeshwar Weir project.

The proposal for approval by Sardar Sarovar Narmada Nigam Ltd. (SSNNL) for continuation of Navagam Design Cell (Now SSPH Dte.) for consultancy works of Narmada Basin Projects for the period from 01-04-2015 to 31-03-2017 is under consideration of Government of Gujarat.

In addition to above work, this directorate is also entrusted to provide detailed design consultancy services for Rani Avanti Bai Lodhi Sagar Project (M.P), Chinki Multipurpose Project (M.P), Halon Irrigation Project (MP) and Man Project. (M.P)

B. Narmada Design Cell

The Memorandum of Understanding (MoU) between Central Water Commission and Narmada Valley Development Authority (NVDA), Government of Madhya Pradesh for design and consultancy services of Narmada Basin Projects was signed on 18-06-2004 initially for a period of two years w.e.f. 01-03-2004 to 28-02-2006 with the provision for further extension with mutual consent between CWC and NVDA. Subsequently, MoU have been renewed/signed in spells of two years. The revised estimate for the period of two years w.e.f. 01.03.2015 to 29.02.2016 has already been submitted to NVDA. The design consultancy work on dams and head works, hydro-mechanical design aspects, canal components of different water resources projects of Madhya Pradesh under Narmada Valley Development Authority on river are being carried out by three Directorates under the NBP Unit viz. ND&HW, NHMD and NCD.

I. Narmada Dam and Head Works (ND&HW) Directorate:

Narmada Dam and Head Work Design Directorate is responsible for, providing design consultancy services such as finalising the layout studies, detailed designs and drawings along with specifications for dam and headwork components of Narmada projects being executed by NVDA. The Directorate is also involved in preparation of guidelines for initial commissioning, testing and operation of completed projects.

II. Narmada Hydro Mechanical Design (NHMD) Directorate:

The NHMD Directorate, CWC at New Delhi has been providing design consultancy (primarily offering design, drawings, technical specifications as well as scrutinizing & vetting of construction drawings & design) in respect of Hydro Mechanical component of the projects in Narmada Basin executed by NVDA.

III. Narmada Canal Design (NCD) Directorate:

Narmada Canal Design Directorate is responsible for providing design consultancy services for above said Narmada Projects being executed by NVDA, which broadly covers planning and preparation of detailed design/drawings for cross drainage works viz. drainage siphon, drainage culvert and super passage head regulator, cross regulator, canal escape, aqueduct etc., scrutiny and vetting of design and drawings of NVDA Project and specific problems of canals of Narmada Valley.

5.2.2 Design Consultancy carried out by Design Organisations

Design consultancy work in respect of 61 projects has been carried out in the design organisations of D&R Wing during the year 2016-17 as under:

Sl. No.	Category	No. of Projects
1.	Projects at construction stage.	28
2.	Projects at investigation and planning stage (for which detailed project reports are being prepared)	15
3.	Projects with special problems	18
	Total	**61**

This includes 7 foreign projects, 1 in Afghanistan and 4 in Bhutan and 2 in Nepal. The list of above National & International Projects is at **Annexure 5.1**.

Some of the important projects, which are presently being designed/ handled in D&R Wing are as follows:

Projects at Construction Stage

1. Salma Dam Project, Afghanistan

The Salma Dam project is being funded by Government of India as an aid to Afghanistan for rehabilitation and reconstruction. The work is entrusted by Ministry of External affairs (MEA) to M/s Water and Power Consultancy Services (India) Ltd. (WAPCOS), who are carrying out construction and related works including detailed tendering and design. Technical consultancy and design inputs, as and when necessary are being provided by CWC to WAPCOS. The design of various hydro civil components of the project i.e. power intake component and pressure shaft steel liner and tunnels and part of the power house civil structure have already been vetted / examined and released to WAPCOS. Consultancy services are being provided as and when referred by the project authority / WAPCOS.

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

Punatsangchhu-I H.E. Project envisages construction of a concrete gravity type dam, 130m high above the deepest foundation and 240.0 m long at the top. The overall length of the spillway section of the dam is 120.0 m comprising of seven nos. of sluice spillway bays, each of 8 m width with crest elevation at El.1166.0 m to pass

simultaneously Probable Maximum Flood of 11500 cumec + GLOF of 4300 cumec. The length of the concrete non-overflow section on both sides of dam would be about 120.0 m. The dam would provide a gross pondage of 24.92 MCM and live pondage of 12.38 MCM between MDDL 1195m and FRL 1202m to enable the power station envisaged under the project, to cater to dilurnal variations in power requirements. The project has an installed capacity of 1200 MW and construction of the project is underway.

3. 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 29 km downstream of the Wangdue Bridge and 3 km downstream of TRT outfall of PHEP-I on Wangdue Tshirang National Highway. The dam comprises of seven sluice blocks and five non-overflow blocks. The length of the dam is 213.00m. The top of dam is at El.846.00 m with FRL at El. 843.00 m and MDDL at El.825.00 m. Seven sluices of gate size 8 m (w) x 13.2 m (H) have been provided at EL.797.00 m 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.

4. 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. 57 Nos. of specification drawings have been issued to Project Authority.

5. Arjun Sahayak Pariyojana, Uttar Pradesh.

This project envisages diversion of surplus water available at Lahchura dam through feeder canal to Arjun dam and then from Arjun dam to Kabrai dam and Chandrawal dam to augment inflows into three reservoirs Arjun, Kabrai and Chandrawal. Design consultancy in respect of raising the height of Kabrai dam, design and drawing work related to right side extension of Kabrai dam along revised alignment is under progress. The work envisages construction of irrigation outlet structure.

6. 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. Works of construction drawings are to be taken up for which specification drawings have been issued.

7. Kharkai Barrage under Subarnarekha M.P.P. Jharkhand

11 Nos. construction drawings have been issued during the period. Scrutiny of 74 Nos. Construction stage drawings of Hydro-mechanical equipments have also been completed.

8. Kalisindh Dam Project, Rajasthan

Construction of dam completed under Phase-I, Phase-II of Project is being dealt as and when referred.

9. Tehri H.E.Project & Koteshwar H. E. Project, Uttarakhand

The Project has been commissioned. The various post commissioning issues of Tehri Dam Project and Koteshwar H.E.Project are being dealt as and when referred.

Projects at DPR Stage

1. Par-Tapi-Narmada Link Project(Consists 6 nos. proposed Dams in project), 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. Revisions in the DPR will be carried out as per the suggestion of the project authority due to any modification in the design parameters.

2. Sapta Kosi & Sun Kosi 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) unit 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. Two 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.

3. 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 in 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 receipt of data from project authority / WAPCOS Ltd, 44 Nos. of DPR drawings and 8 Nos. of designs have been prepared and issued to WAPCOS Ltd in June, 2016. Detailed preliminary comments on the draft DPR have been issued in December, 2016.

4. 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. Design discharge per unit is 51.00 cumec. 37 DPR drawings and design chapter prepared by this 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.

5. Comprehensive Flood Protection Works of Jhelum and its Tributaries, Ph-II

10 Nos. Drawings pertaining to River embankments along with Design chapter were prepared and issued.

6. Kishanganga HE Project

Revised Cost Estimate (RCE) of this project has been received from CEA for examination which is under Progress. In this regard, Revised Head loss clearance for Power Potential studies was issued to CEA and in respect of hydro-mechanical equipment final comments have been issued.

Special Problems Projects

1. Kohira Dam Project, Bihar

Study of problem related to leakages from Spillway bay of Kohira Dam, Kaimoor, Bihar.

2. Minimata (Hasdeo) Bango Project , Chattisgarh :

Shifting of Canal for extraction of coal deposit is under examination. In this proposal of canal through embankment as well as canal on trough of concrete piers is being examined. Preliminary planning done and interim report prepared. Based upon result of field investigations by the Project Authorities, details planning and design would be carried out. Project Authorities requested to expedite the field investigation

3. Salauli Dam, Goa

State Government of Goa requested to carry out the stability analysis for earth dam of Salauli composite dam.

4. Jeori Small H.E.Project (SHEP)

Jeori Small HEP (9.6MW) has been proposed in the close vicinity of Head Race Tunnel of (NJHPS) Nathpa Jhakri Hydro Power Scheme (1500 MW). GM, Civil (Design) SJVNL (Satlej Jal Vidhyut Nigam Limited) informed Director, HCD (NW&S) Dte., CWC about the matter for safeguarding the HRT of NJHPS as HRT of the Jeori SHEP proposed to pass over and above the HRT (Head Race Tunnel) of NJHPS. CWC examined the documents submitted by SJVNL and conveyed its views regarding location of Weir and Water conductor system of Jeori SHEP.

5. River Jhelum Flood Mitigation

The work for preparation of DPR for "Mitigation of floods in River Jhelum" was entrusted to a committee formed during the year. A mathematical model was proposed and based on the result, the DPR is being prepared by CWC proposing work such as dredging of river Jhelum in certain reaches and raising of banks of river Jhelum.

6. 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 and Bihar is being monitored.

7. Indira Sagar Project, Madhya Pradesh

The damaged slotted roller bucket type of Energy Dissipation Arrangement re-designed with Ski-jump bucket. One drawing for the re-designed Ski-jump reinforcement issued to Project Authorities.

8. Shyamari Medium Project, Madhya Pradesh

State Government of Madhya Pradesh requested for suggestions regarding fixation of foundation level of earth dam of Shayamri Medium Project of Madhya Pradesh.

9. Runj Medium Irrigation Project, Madhya Pradesh

State Government of Madhya Pradesh requested for suggestions regarding fixation of foundation level of earth dam of Runj Medium Irrigation Project of Madhya Pradesh.

10. Shelgaon Barrage Medium Project, Maharashtra

To change the position of the trunnion of the radial gate, which got submerged in water. Project authorities have submitted preliminary design and drawings of the modified arrangement which required shifting of stop log to new location upstream side into the piers. Designs and drawings are under examination to offer suggestions for modified design changes. Project site was visited for suggestion to Project Authorities regarding modification in pier shape due to raising of trunnion

11. Kanupur Irrigation Project, Odisha

Gravel Layers below the constructed earth dam has been noticed. Solution for the same to avoid seepage through gravel layer is under study.

12. Hirakud Dam, Odisha

For increasing the design flood, layout of additional spillways on Left flank of Hirakud dam was cleared.

13. Subarnarekha Main Canal Irrigation Project, Odisha

Design of slope protection including lining from RD 7950m to 8840m of Subarnarekha Main Canal Irrigation Project.

14. Rajasthan Feeder, Indira Gandhi Main Canal and Sirhind Feeder, Punjab

Relining proposal of Rajasthan Feeder Canal (from RD 179 to RD 496) and Sirhind Feeder Canal (from RD 119.7 to RD 447.927) has been examined. Also the sites have been visited by CWC Officers and draft report prepared and submitted to MoWR,RD&GR

15. 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 when it was filled only upto 4.0m below the FRL. State Government of Rajasthan has requested to suggest rehabilitation/restorations measures of Garada Earth Embankment Dam, Bundi (Rajasthan).

16. Kanka River in Sikkim

Land slide dam and formation of artificial lake on Kanka River in Sikkim was visited and report on stability of land slide dam was submitted.

17. Jhelum Tamak HEP

The proposal of providing longitudinal connectivity of river at Jhelum Tamak HEP site was examined with respect to its engineering planning and design aspect and suitable modifications have been offered to the Project Authority.

18. Giri HE Project, H.P.

Site inspection of the Intake gate, HRT (including Marar Adit) Disc valve chamber, surge Shaft and Power House and discussion with the Project authorities regarding the repair of Disc valve seal of the project.

5.2.3 Technical Examination of Project by Design Organisations

The technical appraisal of DPR/PFR of irrigation and multipurpose projects in respect of hydropower component, gravity dam component, embankment, 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 of each component of the projects are issued to appraisal unit of CWC after technical examination of DPRs.

The civil components in DPR of Hydro-Electric Projects are also technically examined in D&R Wing. Other aspects of Hydro Electric Projects are appraised in Central Electricity Authority. Techno-Economic Clearance to the projects is also accorded by Central Electricity Authority.

During 2016-17, DPRs of 87 Nos. projects submitted by the project authorities were technically examined in CWC. Out of this 82 Nos. DPRs of projects were received from 20 Nos. States and 05 Nos. projects were received from Nepal (2), Indo-Nepal (2) and Bhutan (1). 34 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.

A list of projects for which technical examination has been completed or under examination is as follows:

Hydro-Electric Projects (33 nos.) :

Sl. No.	Name of the State	Project's Name
1	Arunachal Pradesh	Kamala H.E.Project (1800 MW)
2	Arunachal Pradesh	Subansiri Lower H.E.Project (RCE) (2000 MW)
3	Arunachal Pradesh	Subansiri Upper H.E.Project (1800 MW)
4	Arunachal Pradesh	Magochu H.E.Project
5	Arunachal Pradesh	Oju H.E.Project (8x231.5+28)MW
6	Bhutan	Sankosh H.E.Project (2560 MW)
7	Himachal Pradesh	Thana Plaun H.E. Project (191MW) (Level-I Clearance)
8	Himachal Pradesh	Nakthan H.E.Project (460MW)
9	Himachal Pradesh.	Dugar H.E. Project (449MW)
10	Himachal Pradesh	Reoli Dugli H.E.Project Stage – I (420+9.2MW) (Level-I Clearance)
11	Himachal Pradesh	Bajoli Holi H.E.Project (180MW)
12	Himachal Pradesh	Luhri H.E.Project (210 MW) Stage-I
13	Himachal Pradesh	Miyar H.E.Project (3x40 MW)
14	Himachal Pradesh	RCE of Parbati Stage -II H.P.Project
15	Himachal Pradesh	RCE of Parbati Stage- III H.P.Project

Sl. No.	Name of the State	Project's Name
16	Jammu & Kashmir	Kiru H.E. Project (624MW)
17	Jammu & Kashmir	Kwar H.E. Project (560MW)
18	Jammu & Kashmir	Bursar H.E.Project (800MW)
19	Jammu & Kashmir	Kirthai Stage-I H.E. Project (390MW**)**
20	Jammu & Kashmir	Kirthai Stage-II H.E. Project (990MW**)**
21	Jammu & Kashmir	Kishanganga H.E.Project (Revised Cost Ecstimate)
22	Jammu & Kashmir	Sawalkot H.E.Project (1856MW)
23	Meghalaya	Mawphu (Stage-II) H.E.Project (8x231.5+28)MW Survey & Investigation Stage)
24	Meghalaya	Myntdu Leshka Stage –II H.E.Project, 140 MW (Pre DPR)
25	Meghalaya	Umangot H.E.Project
26	Manipur	Loktak Downstream H.E.Project (2x33)MW
27	Uttarakhand	Goriganga IIIA H.E.Project (165MW)
28	Uttarakhand	Tiuni Plasu H.E.Project (72 MW)
29	Uttarakhand	Sirkari Bhyol Rupsiyabagar H.E.Project (168 MW)
30	Uttarakhand	Proposal for longitudinal connectivity of Jelum-Tamak H.E.Project(108 MW)
31	Uttarakhand	Bokang Bailing H.E.Project (330MW)
32	West Bengal	Turga Pumped Storage Project
33	West Bengal	Teesta Low Dam Project, Stage –I & II (Combined), 81 MW, (Pre DPR)

Irrigation Projects (43 nos.) :

Sl.No	Name of the State	Project's Name
1	Andhra Pradesh	B.R.R.Vamsadhara Irrigation Project
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

Sl.No	Name of the State	Project's Name
3	Andhra Pradesh	Chinkalapudi Lift Irrigation Scheme
4	Andhra Pradesh	Narayanpuram Anicut Project
5	Assam	Amreng Irrigation Project
6	Assam	Assam Integrated Flood Bank & Erosion Risk Management Project (Kajiranga)
7	Assam	Assam Integrated Flood Bank & Erosion Risk Management Project (Palasbasi)
8	Assam	Flood Management of River Subansiri along with river training works on both bank embankment
9	Bihar	Burhi Gandak None-Baya Link Project
10	Bihar	Kosi-Mechi Interstate Link Project
11	Bihar	Restoration and lining works of Western main canal and Ara main canal & its system
12	Chhattisgarh	DPR of Arpa Bhaisajhar Barrage Project on Arpa river
13	Chhattisgarh	Rajiv Samoda Nisda Phase-II
14	Haryana	Mewat Feeder Canal
15	Haryana	Proposal of ERM of surface Irrigation Schemes in Haryana (12 Volumes)
16	Indo-Nepal	Indo-Nepal Link Canal 1.25 KM, Tanakpur Barrage-NHPC
17	Jharkhand	Burhai Reservoir Project
18	Jharkhand	Kanhar Barrage Project
19	Karnataka	Singatalur Lift Irrigation Project
20	Karnataka	Yettinahole Flood Water Diversion Project
21	Madhya Pradesh	Mohanpura Major Irrigation Project
22	Madhya Pradesh	ERM of Sanjay Sarovar (Upper Wainganga) Project
23	Maharashtra	Lower Tapi Project
24	Maharashtra	Mithi River Development Works
25	Nepal	Rehabilitation work of Koshi Pump Canal distribution system (Under Indian Grant).

Sl.No	Name of the State	Project's Name
26	Nepal	Mahakali Irrigation Project –IIIrd Phase Mahendranagar, Kanchanpur
27	Odisha	Nabarangapur Irrigation Project
28	Puducherry	Flood Protection Works in Yanam
29	Rajasthan	Rajasthan Water Sector Restructuring Project in Desert Area (RWSRD): **i.** Relining of IGF RD 496 to 671 & IGMN RD 0 to 200
30	Rajasthan	**ii.**DPR of ERM Works in IGMN StageI Excluding KSL
31	Rajasthan	**iii.**DPR to Rehabilitate Water-logged Area of IGMN Stage-I
32	Rajasthan	**iv.**DPR of Diversion of Drinking Water Supply in IGNP
33	Rajasthan	Rajasthan Water Sector Livelihood Improvement Program (RWSLIP): **i.** Rehabilitation and modernization of Bhakra Canal System
34	Rajasthan	**ii.** Rehabilitation of distributaries and minors of Gang Canal System
35	Rajasthan	**iii.** Renovation of Left Canal, "Right Main Canal, Narwali Distributory & Chhinch Distributory"of Mahi Project
36	Rajasthan	**iv.** Renovation of Distributory and Minors of Gurgaon Main Canal Irrigation System
37	Rajasthan	Feasibility Report on Eastern Rajasthan Canal Project
38	Uttarakhand	Project report on "Strengthening renovation and modernization of existing Baur and Haripura Dam
39	Uttar Pradesh	Badaun Lift Canal Irrigation Project
40	Uttar Pradesh	Flood protection works on right bank of Ganga from Kalyanpur-Bithoor Road to Ganga Barrage

Sl.No	Name of the State	Project's Name
41	Uttar Pradesh	Techno economic appraisal of project estimate for construction of parallel left marginal bund and associated works for modern city project
42	Uttar Pradesh	Bhaunrat Dam Irrigation Project
43	Uttar Pradesh	Bhitaura Pump Canal

Multi Purpose Projects (11 nos):

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	Indo-Nepal	Pancheshwar M.P.Project (6720MW)
5	Indo-Nepal	Sapta- Kosi & Sun-Kosi Multi Purpose Project
6	Jammu & Kashmir	Bursar Multipurpose Project
7	Jammu & Kashmir	Ujh Multi Purpose Project
8	Himachal Pradesh	Renuka Multi Purpose Project
9	Madhya Pradesh	Chinki Multi Purpose Project
10	Madhya Pradesh	Sher-Shakkar-Machirewa Complex Project
11	Rajasthan	Parwan Multipurpose 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 2016-17, 165 projects were under technical examination in HSO from hydrological studies point of view. Out of this, 76 projects have been cleared and the suggestion for improvement were conveyed to the project authorities for 48 projects. 25 projects are still under examination whereas examination of 16 projects were discontinued due to various reasons.

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 4 projects were carried out by CWC during the year 2016-17.

1. Ichari Dam Project, Uttarakhand
2. Asan Dam Project, Uttarakhand
3. Maneri Bahali Dam Stage-I, Uttarakhand
4. Mala Prabha Dam Project, Karnataka

(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.

(e) 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, A special training was conducted by HSO, CWC on the topic "Hydrological Aspects in Project Planning and Preparation of DPR" during 21-25 November, 2016 in which 24 officers from all over the India participated.

(f) Study of Salinity Ingress Problem in Coastal Areas of Coastal States / UTs

PMO requested MOWR/CWC to study the salinity ingress problem in coastal areas of costal States/ UTs of the country and to suggest necessary remedial measures. In this regard, a Technical Committee has been constituted under the chairmanship of Chairman, Central Water Commission with the members from specialised organizations of Government of India, State Government and UTs. Three meetings of the Committee have been held on 30th September and 27th November, 2014 and 29th April, 2016. The draft report on "Salinity ingress problem in coastal areas of costal States/ UTs of the country" has been prepared and circulated to the concerned States/UTs in December, 2016 for comments and updates. The same had been received and incorporated in the report which is under finalization.

5.4 Dam Safety Aspects

Dam Safety Organization is looking after issues related to Dam Safety aspects which can be broadly categorized as under:

- Maintenance of National Register of Large Dams.
- Convening meeting of 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.

During 2016-17, Guidelines for providing warning under sudden release from dam particularly hydro projects have been prepared by CWC. On the basis of the Guidelines, an SOP for the flood alarm was notified by NDMA and was circulated to all States for implementation.

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, 2017 there are 5701 large dams in the country, out of which 5254 are completed and 447 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.

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 37th meeting of NCDS was held on 17.02.2017 at Haridwar.

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. DRIP involves rehabilitation of about 217 dam projects (comprising 242 dams)in seven States i.e. Madhya Pradesh, Orissa, Kerala, Tamil Nadu Karnataka, Jharkhand(DVC) and Uttarakhand (UJVNL) at an estimated cost of Rs. 2100 Crore. In addition, DRIP also involves institutional strengthening (for dam safety) of all participating States as well as at central level in Central Water Commission.

Project has become effective from 18th April 2012, and is to be implemented over a period of six-years. 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 31.03.2017 is highlighted as below:

- Central Water Commission has hired the services of an Engineering and Management Consultant (M/s EGIS EAU, France), and consultant has been mobilized since 24th December 2013.
- Project Screening Templates of 217 dam projects have been approved by the World Bank.
- Tender Documents of 200 dam projects have been approved and 192 dam projects works have been awarded.
- Training programs with focus on DRIP implementation were initiated well in advance for building up in-house technical capabilities of participating states. 74 (Forty six) trainings conducted by the CPMU, wherein about 2571 officials trained on different aspects of DRIP implementation.
- Dam Health and Rehabilitation Monitoring Application (DHARMA) is web-based asset management software tool to support the effective collection and

management of authentic health data for all large dams in India. Three static data modules out of total seven modules have been launched for implementation. Work on the development of Asset Management Tool is in advanced stage.

- Several guidelines and manuals are also being developed under the project with the guidance of specialists working in the respective fields in close coordination with expert committees. Total of sixteen guidelines and manuals encompassing different facets of dam design, construction, operation, maintenance and rehabilitation are envisaged.
- Three National Dam Safety Conferences has been organized, first at IIT Madras (24-25th Mar, 2015), second at IISc, Bangalore (12-13th Jan, 2016) and third at Roorkee (18-19th Feb, 2017). About 450 delegates participated in third conference at Roorkee. In total, 74 technical papers were received and out of them 36 papers were presented during the conference. A parallel exhibition was also organised during the conference wherein Thirty Five (35) organisations participated.
- Capacity building of various academic institutes has also been taken up under the central component of DRIP Plan Scheme. In this context, MoU has been signed with IIT Madras and IISc Bangalore in January 2017 for capacity building in 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. In particular, these academic institutions have agreed to develop required facilities to provide consultancy services to State Implementing Agencies as well as training programmes in dam safety related areas.
- The study titled "Seismic Hazard Assessment for South India" has been awarded to IIT Roorkee in March, 2016. The study will be completed in 18 months. The study area under South Indian region will consists of States namely Kerala, Tamil Nadu, Madhya Pradesh and Odisha. The Interim Report of the study has been submitted by Department of Earthquake Engineering, IIT Roorkee. A proposal for similar study titled "Seismic Hazard Assessment of North and North East India" to be conducted by CWPRS, Pune with the intent to cover the rest of India including North and North East Region is under active consideration in CWC.
- Central Water Commission has received "CBIP Award 2016" for promoting Health and Safety of Large Dams under DRIP.
- So far 16 (sixteen) meetings of Technical Committee for DRIP have been held. World Bank has also completed ninth of its Review Missions, wherein road blocks as well as way forward in project implementation have been discussed.

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.

5.4.4 Consultancy Services on Instrumentation in Hydraulic Structures

Detailed Project Report / Compliance Report of five river valley projects in various states namely West Bengal, Arunachal Pradesh, Himachal Pradesh and Jammu & Kashmir have been examined and cleared with respect to instrumentation aspect.

During the year, following consultancy services were given towards planning and preparation of instrumentation specification/ construction drawings/vetting of drawings/preparation of instrumentation chapter for DPR purpose.

(i) Vetting of Instrumentation Drawing:

- Overflow section (Block No. 7) of Halon Concrete Dam (Irrigation) Project. M.P.

(ii) Preparation of Instrumentation Drawings for projects under construction:

- Rockfill Dam at RD (+67m) of Garudeshwar Weir Project, Gujrat.
- Five number Instrumentation construction drawings of Punatsangchhu-II HE Porject, Bhutan.

(iii) Preparation of Instrumentation Drawings for projects at DPR stage:

- Ten number preliminary Instrumentation drawings of Kirthai HE Project, Jammu & Kashmir.

5.4.5 Technical Examination of Projects for Seismic and Foundation Aspects

Detailed Project Reports of 18 Nos. of river valley projects in various States namely, Meghalaya, Manipur, Himachal Pradesh, Uttarakhand, Jammu & Kashmir, Arunachal Pradesh, West Bengal and from neighbouring countries Bhutan and Nepal were examined with respect to geological investigations related to foundation engineering and seismic aspects. Twelve numbers of DPRs have been cleared and compliance from the project authorities is awaited for the remaining projects.

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 2016-17, 31st meeting of NCSDP was held on 23rd June, 2016, 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 Bursar H E Project, J&K has been examined and cleared. Further, GLOF Study in respect of Saptkosi H E Project, Nepal & Sunkosi H E Project, Nepal is under progress in CWC.

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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 2016-17, 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	
			2015-16	2016-17
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	41.857	29.160
		In % of Designed Live Storage	27	18
		In % of last 10 Years Average Live Storage	136	91
	On September, 30th (End of Monsoon)	In BCM	95.693	117.111
		In % of Designed live Storage	61	74
		In % of last 10 Years Avg. live Storage	77	97

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 last meeting of the panel was held on 10.9.2014.

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.

In addition to above, CWC has been collecting information related to sedimentation of reservoirs from the State Governments also and publishing the same in form of a compendium titled "Compendium of Silting of Reservoirs in India". The compendium was last published in the Year 2015 incorporating information in respect of 243 reservoirs in the country.

6.3.2 Capacity Survey using Remote Sensing Technique

The "Estimation of Sedimentation in Reservoirs using Remote Sensing Technique" was taken up under the sanctioned scheme "Research & Development Programme in Water Sector" during 11th Five Year Plan.

The details of important studies carried out during 2016-17 is as under:

i.) Satellite Remote Sensing based Reservoir Sedimentation Assessment Study (In-house) in respect of Ghatprabha Reservoir (Karnataka) has been completed.

ii.) The work for Sedimentation Assessment of 30 reservoirs using Remote Sensing Technique was awarded to MERI Nashik. After preliminary investigation MERI Nashik has indicated that Nine (09) reservoirs are feasible for the study. The consultant has submitted final reports for 09 (Nine) reservoirs in July 2016. The final reports have been circulated to all concerned.

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 2016-17, the Post Project Performance Evaluation studies of following five major/medium irrigation projects have been completed.

i. Krishnagiri Medium Irrigation Project, Tamilnadu,
ii. Jayakwadi Stage-I Irrigation Project, Maharashtra,
iii. Salandi Irrigation Project, Odisha,
iv. Bhimsagar Irrigation Project, Rajasthan,
v. Som-Kamla-Amba Irrigation Project, Rajasthan.

The Post Project Performance Evaluation studies of "Giri Medium Irrigation Project, Himachal Pradesh" is ongoing.

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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 1495 projects have been considered and accepted by the Advisory Committee of Ministry of Water Resources on Irrigation, Flood Control and Multipurpose projects till March 2017.

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 2016-17, 44 major/ multipurpose projects (36 new & 8 revised) have been appraised up to 31st March 2016. Out of that, 10 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 2016-17 is shown at **Fig-7.1**

7.3 Appraisal of Medium Irrigation Projects

During the year 2016-17, 19 medium projects (16 new & 3 revised) have been appraised in field units of CWC. Out of that, 7 medium projects (6 new & 1 revised) 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.

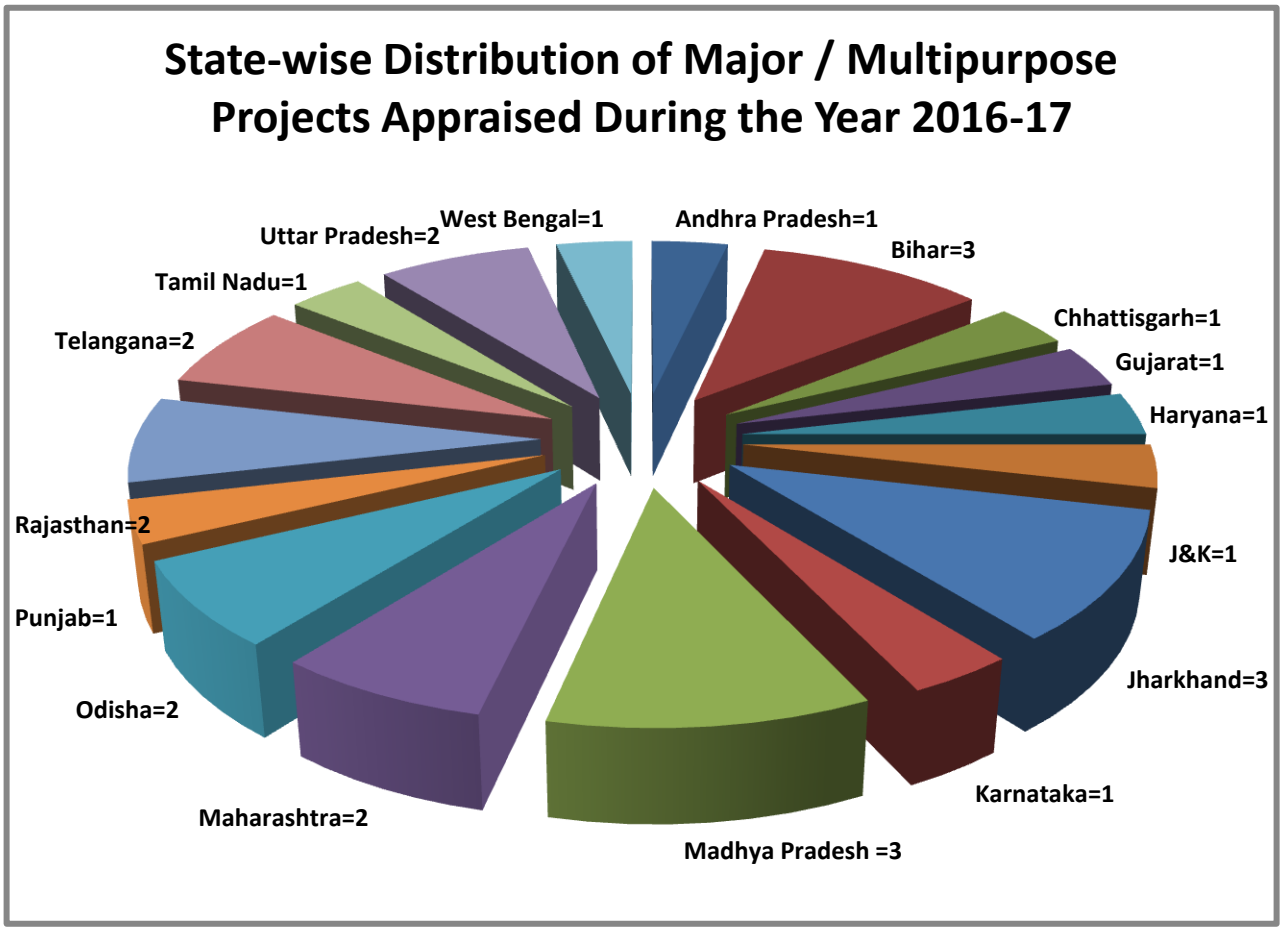

Fig. 7.1 State-wise distribution of major irrigation / multipurpose projects under appraisal during 2016-17

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 2016-17, following review meetings were hosted by the Project Appraisal Organization in which issues related to projects were resolved:

i)	2nd Review meeting by Chairman	01.04.2016 in CWC, New Delhi
ii)	3rd Review meeting by Chairman	18.05.2016 in CWC, New Delhi
iii)	4th Review meeting by Chairman, CWC	25.10.2016 in CWC, New Delhi

7.5 Meeting of the Advisory Committee

During year 2016-17, the Advisory Committee of MoWR,RD&GR, under the Chairmanship of Secretary (WR) accepted 40 projects comprising 19 Major & Medium Irrigation / Multipurpose projects, 1 drinking water project (Damanganga-Pinjal Project - Maharashtra) and 20 Flood Control schemes in 4 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 2016-17 envisages annual irrigation benefits to 30, 64,021 hectare in the 10 States of the country. The Flood Control Scheme, accepted during 2016-17 envisages protection to the population of about 19,07,195 persons & area of about 3,21,551 hectares in the states of Assam, Bihar, Jharkhand, Punjab and Uttar Pradesh. Pie Chart showing State-wise distribution of 19 Nos. major & medium irrigation / multipurpose projects accepted by the Advisory Committee during the current year is enclosed as **Fig. 7.2**

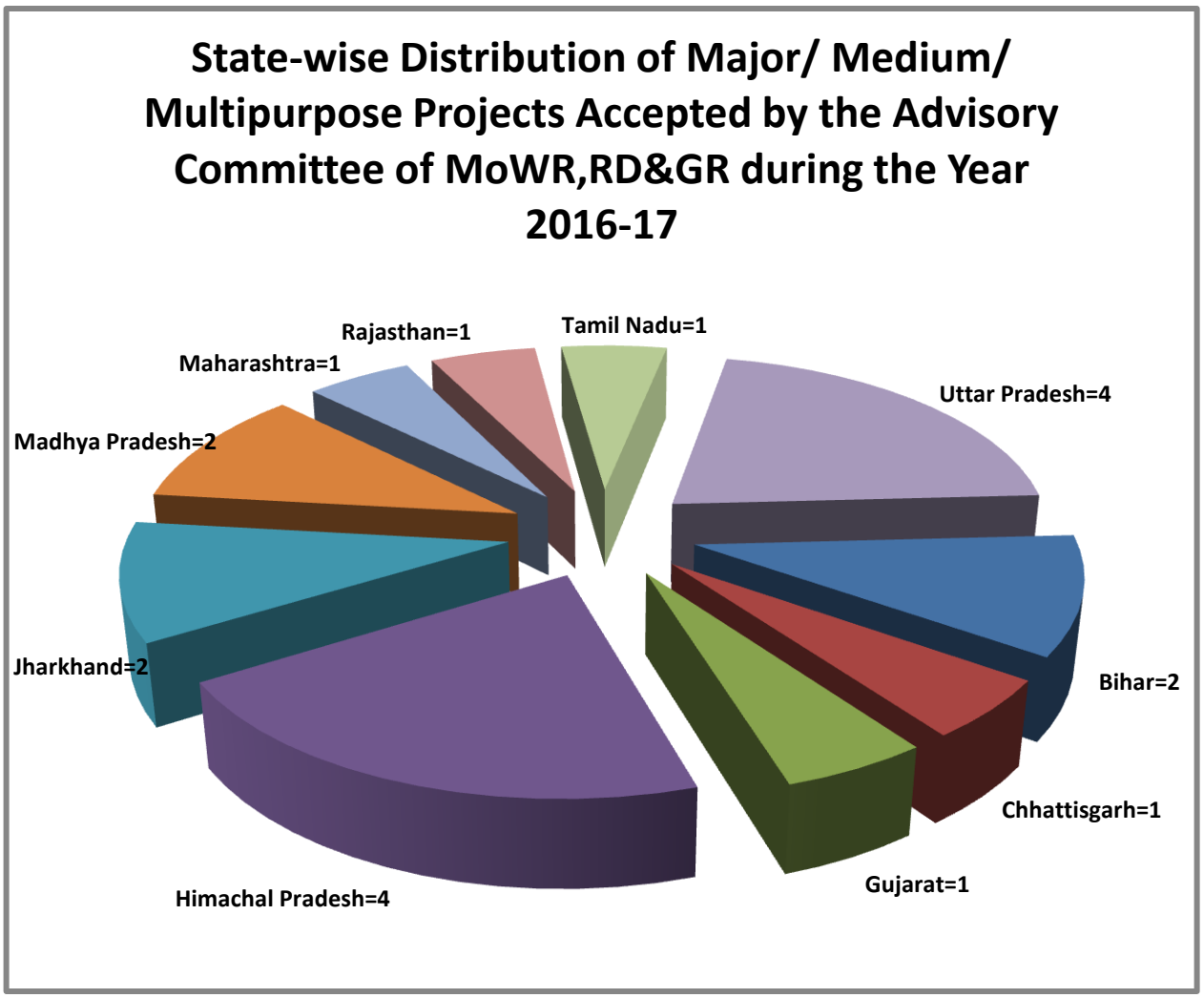

Fig. 7.2

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 2016-17. 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 2016-17, CEA has accorded TEC to 4 Nos. Hydro-Electric Projects having total installed capacity of 2284 MW.

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

7.7 National Projects

Government of India is implementing 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. Goshikhurd and Shahpur Kandi projects have been provided grant amounting to Rs. 2987.94 crore and Rs. 26.04 crore, respectively, up to March, 2017. 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 2017. 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 2016. The Indirasagar Polavaram Irrigation Project started receiving funding under the scheme of National Project during 2014-15 and an amount of Rs. 3349.70 Crore has been released upto March 2017. 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 and their report is awaited.

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, out of which, 2501 water bodies have been completed till date. 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.

During the year 2016-17, proposals for RRR of 639 Water Bodies were received in CWC from various States namely, Chhattisgarh (37), Rajasthan (36), Tamil Nadu (97), Telangana (102), Andhra Pradesh (238), Kerala (1), Madhya Pradesh (61) and Gujarat 67). Out of these, a total of 345 proposals from Himachal Pradesh (1), Andhra Pradesh (100), Tamil Nadu (97), Telangana (147) costing Rs. 280.17 Crore have been recommended to the Ministry for approval of Empowered Committee for inclusion under RRR of water bodies scheme. However, no new proposal was included for

funding during the year 2016-17. The observations / comments of CWC on remaning proposals were sent to the State Governments for compliance.

During the XII Plan period, the Empowered Committee (EC) of MoWR,RD&GR, in its five (5) meetings, has accepted the inclusion of proposals in respect of 1354 water bodies costing Rs 1025.87 crore located in 9 States for funding under the scheme of RRR of Water Bodies. The State-wise details of proposals accepted by Empowered Committee till March 2017 are as under:

Sl No	State	No. of Water Bodies	Estimated Cost (Rs. in crore)
1.	Odisha	760	361.52
2.	Uttar Pradesh	74	83.41
3.	Meghalaya	9	11.43
4.	Uttarakhand	5	12.51
5.	Madhya Pradesh	134	198.31
6.	Tamil Nadu	154	78.11
7.	Rajasthan	32	89.69
8.	Manipur	4	65.44
9.	Telangana	182	125.45
	Total	**1394**	**1025.87**

During the year 2016-17, two proposals for release of fund (1st Instalment of Central Assistance for 2016-17) to Odisha (Rs. 20.05 Cr for 760 Water Bodies) and Rajasthan (Rs. 8.66 Cr for 32 Water Bodies) were forwarded to the Ministry. However, no fund was released to any State during 2016-17. During the XII Plan, Central Grant totalling to Rs. 264.67 crore has been released to 8 States under the RRR of Water Bodies Scheme till March 2017. So far, works of 1236 water bodies have been taken up by the States with a target of restoration of CCA of 1,01,265 ha. Out of this, works on 685 water bodies have been completed and CCA of 63,981 Ha have been restored.

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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 2016-17, 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**.

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 2016-17 is as under:

S. No.	Item	Target	Achievement
1	General Monitoring by Regional Offices	47	8
2	AIBP Monitoring by Regional Offices	149	155

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.

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.

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.

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 2016-17, MoWR,RD&GR has identified 99 priority projects amongst the 149 ongoing projects under AIBP for early completion. Out of these priority projects 21 projects, having least bottlenecks, have been planned to be completed by June 2017. The remaining projects are to be completed in phases upto December 2019.

Central Grant totalling to Rs. 3307.998 Crores has been released to 69 Projects under PMKSY-AIBP during 2016-17. Since its inception, the cumulative total Central Loan Assistance / Grant provided to States under AIBP is Rs. 58,878.59 Crores till 31.03.2017 to 297 projects.

As reported by the State Governments 8.86228 Mha of additional irrigation potential has been created under AIBP since the start of the scheme till March, 2016.

8.3 Assessment of Irrigation Potential created under AIBP

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.

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. Processed Cartosat imageries of all the 13 projects were hosted by NRSC by 6th February 2014 (Sept-Dec. 2013) for satellite based online monitoring of AIBP projects using BHUVAN web services (SatAIBP) with online User Manual.

As per the inputs received, during meeting on SatAIBP, from CWC field units, the present Cartosat imageries hosted in 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. CWC/MoWR should request ISRO/NRSC/DoS for high resolution imageries and to the Cost Committee for its reasonable rate, as the present cost of imageries are very high. The cost issue of high resolution imageries for use of CWC for online monitoring purpose should either be free or at an en-block discounted rate, as it is being used for monitoring of irrigation

project being implemented by the State Governments in the country. This issue of need of high resolution imageries and en-block discount in cost of processed imageries for all the on-going AIBP projects also need to be taken up to an appropriate forum during the Mid Term Plan Review in view to take up the projects on a national scale covering about 10 Million Ha of Irrigation Potential spread across different States in India by XII Plan.

Four of the pilot projects were fully digitized for their executed project networks and remaining are partially digitized, under progress and persuasion for want of minor/ sub-minor-wise design lengths and corresponding designed irrigation potentials (IPs) as well as IPs through direct outlets (Dos) from main/branch/distributaries from the project authorities/State Governments.

CWC has now decided to extend Cartosat satellite based information in implementing online monitoring of more on-going AIBP Projects using BHUVAN-AIBP portal developed exclusively for online monitoring by signing formal MoU with NRSC. Accordingly, NRSC has been requested for the updated MoU for the same so as to enable us to process for the procurement of more imagery required for the ongoing projects and new time windows for the pilot projects with more facilities in the Bhuvan portal.

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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, 28 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 13 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

A study was conducted on "Employment Generation in Major & Medium Irrigation Projects for Operation & Maintenance during 2005-06 to 2009-10". After scrutiny of data of 87 Major & Medium Irrigation Projects collected as per format from the various State Water Resources Departments/Projects, 64 Major & Medium Irrigation Projects with requisite information have been considered for the preparation of report. The data analysis and compilation of the report is under progress.

9.5 Other Activities

- Budgetary Rate of equipment in respect of the Kalez Khola Hydro-Electric Project, West Sikkim was provided to Sikkim Investigation Division, CWC, Gangtok Sikkim.
- Feasibility of construction schedule with equipment planning of U/S cofferdam of Pancheshwar Multipurpose Project (India & Nepal) was analyzed and views were conveyed to Project Authorities.

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CHAPTER-X

INTER-STATE MATTERS

10.1 Inter-State River Water Disputes

CWC provides technical assistance to MoWR to settle water related disputes among the States amicably through negotiation. During the year, a number of references on implementation of Final Order of Cauvery Water Disputes Tribunal, Krishna Water Disputes Tribunal–I & II and Godavari Water Disputes Tribunal raised by States of Karnataka, Telangana, Tamil Nadu, Andhra Pradesh, Maharashtra and Madhya Pradesh were examined and comments/views of CWC were communicated to concerned authorities.

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(ISM) Directorate is the secretariat for Supervisory Committee. 8 meetings of the Supervisory Committee have been held so far. Out of this, 3 meeting namely, 6th, 7th and 8th were held during 2016-17.

During the 6th meeting Committee held on 19.9.2016, the Committee felt that pending constitution of independent regulatory mechanism, CWC can take up the task of credible data collection protocol. The related cost in this regard will be shared by the basin States. A Technical Committee under Chairman, CWC with members from basin States was constituted for discussion and decision on data acquisition protocol, methodology, mechanism and instrumentation. The Technical Committee after holding three meetings has submitted its report giving its recommendations on the aforesaid aspects.

In the 7th meeting of the Committee held on 19/9/2016, as there was no consensus, the Chairman of the Supervisory Committee on Cauvery having taken into account the daily inflows into the reservoirs of Karnataka, drinking water requirement of the people of Karnataka and the requirement of Samba crop in Tamil Nadu and also the significant deficit in rainfall from June onwards as brought out by IMD during the current and previous year, decided to ask the State of Karnataka to release water at the rate of 3000 cusecs per day for 10 days from September 21, 2016 till September 30, 2016. The Chairman of the Committee also asked the State of Tamil Nadu to release water proportionately to Union Territory of Puducherry.

During the 8th meeting held on 17/2/2017, constitution of a Group of Experts to deal with the issue of distress sharing was discussed in view of gaps in the CWDT order which has not prescribed any definite formula for sharing of distress. The States were requested to give their comments on the constitution and functions of the Group of Experts. Puducherry conveyed its consent for the formation of the Group whereas views of other basin States are still awaited. The reminders have been issued to other basin States on 21/3/2017 and 30/03/2017 to convey their comments urgently. Comments from Government of Tamil Nadu & Kerala have been received, while reply of Government of Karnataka is still awaited.

During the water year since 1st June, 2016 to 31st March, 2017, 67.84 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 to the Hon'ble Supreme Court Judgement dated 28/02/2013 in the matter of Original Suit No. 1 of 2006, State of A.P vs Maharashtra & Others on Babhali Barrage issue, MoWR,RD&GR vide O.M. dated 24th October 2013, constituted a three members Supervisory Committee with the following composition:

(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

The committee constitution was modified during 2016-17 to include the representative of Telangana.

Powers and functions of the Committee as laid down by Hon'ble Court is 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.

Till March 2016, Four meetings of Supervisory Committee on Babhali Barrage were held on 27.02.2014, 30.06.2014, 17.10.2014 and 4.2.2015. During 2016-17, the 5th meeting of Supervisory Committee on Babhali Barrage was held on 23.06.2016 at New Delhi. During the meeting the Committee authorized a group of officers consisting of Executive Engineer, UGD, CWC, Hyderabad, Superintending Engineer, Govt. of Telangana, Pochampad and Executive Engineer, Nanded Irrigation Division(N), Govt. of Maharashtra, Nanded to be present at the Barrage for opening of Gates on 1.7.2016. The representative of the State of Telangana and Maharashtra both agreed joint inspection by technical officers of both the States in the month of December as per time schedule mutually acceptable to ascertain water utilization for various purposes.

No further meeting was held thereafter during the year 2016-17. However, as per direction of Member (WP&P), CWC and Chairman of Supervisory Committee on Babhali Barrage, the gates were lowered on 29.10.2016 and 0.6 TMC was released on the 1st March, 2017 in the presence of above officers nominated by the Committee.

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 on 19.01.2017 by MoWR, RD & GR for resolution of the Mahanadi River Water Dispute. Negotiation Committee comprises of members from Basin States and concerned Ministries of Central Government, CWC, IMD and NIH with specified Terms of Reference. The first meeting of the Negotiation Committee was held on 28.02.2017. The decision / outcome of the first meeting of Negotiation Committee are as under

- It was suggested that the State of Chhattisgarh and other basin States might, if they consider necessary, send Para wise comments on the complaint filed by State of Odisha to the Committee Secretariat before the next meeting of Committee, tentatively fixed for 18.04.2017
- The Committee decided to collect requisite data for assessment of yield of the basin at various points and requirement of basin States. It was decided that all co-basin States would submit required data in the format decided in the meeting by 30.03.2017. The analysis and conclusion of the study would be prepared by NIH Roorkee.

Reminders have been issued by CWC to Basin States on 21.3.2017 and 30.03.2017 to expedite submission of desired information. The date for 2nd Meeting of Negotiation Committee is tentatively fixed for 18.04.2017.

10.1.4 Vansadhara River Water Dispute:

The State of Orissa filed a complaint as envisaged 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. Hon'ble Tribunal delivered its judgement in the I.A. No. 1 of 2010 on 17th December, 2013, allowing the Government of Andhra Pradesh to construct the Side Channel Weir along with the ancillary works as proposed and has, inter-alia, directed for constitution of a 3 member Supervisory Flow Management and Regulation Committee on River Vansadhara. Govt. of Odisha has filed SLP No. 3392/2014 and stay application against interim order of VWDT dated 17.12.2013. Matter is subjudice in the Supreme Court.

In December 2016, MoWR, RD & GR has requested CWC to send views /comments and material on the issue raised by State of Odisha before VWDT regarding of maintainability of the reference of the complaint filed by the State of Andhra Pradesh as according to State of Odisha no efforts were made by Central Government for negotiated settlement on the complaint filed by the State of Andhra Pradesh. In this regard, CWC has indicated that no procedure is prescribed in the Act and rules made there under for Central Government to come to the conclusion that water dispute cannot be settled by negotiations. It is left to the discretion of the Central Government to arrive at such conclusion. The Central Government if so desires may convene one or more inter-State meetings to come to such conclusion. The Central Government if so desires may take into account the efforts made by party States themselves to settle the disputes by negotiations as mentioned in their respective Complaints. The Central Government if so desires may take into account the judgements of the Supreme Court in the Writ Petition/Original Suits filed by Party States on the disputes/issues raised in

the Complaints either after submission of the Complaints or before to arrive at such conclusion. The Central Government if so desires may take into account the negotiations conducted by it in the pre-Complaint stage between the party States on the same water disputes to arrive at such conclusion. The Central Government if so desires may take into account a combination of aforesaid factors to arrive at such conclusion.

10.2 Guidelines for determination of inter-state aspects in project appraisal

The guidelines to be followed to determine whether inter-state aspects are involved in a water resources project and the procedure to be followed within Central Water Commission for clearance from inter-state angle were approved by CWC and circulated to all concerned in 1996. Subsequently, Ministry of Water Resources issued guidelines in January 2006 for giving techno-economic clearance to projects in a basin where an inter-state water disputes tribunal has been constituted to examine inter-state allocation of water and related issues in a basin. These guidelines are generally followed by CWC for examination of DPR/Preliminary reports/ DPR for ERM of projects.

It has been long felt the need for adoption of a clear approach for examination of projects in river basin/sub-basins where no tribunal award or valid inter-state agreement is available or where no tribunal has been constituted. Accordingly above guidelines were modified and discussed in 190th CWC Commission Meeting. In the meeting, it was decided to collect the views of State governments on draft modified guidelines before their consideration in the Commission Meeting. Accordingly modified guidelines were sent to all the Principal Secretaries of States/UTs in November, 2015 for their views /comments. After continuous persuasion with State Governments comments on draft modified guidelines have been received from the States of Punjab, Madhya Pradesh, Bihar, Kerala and Andhra Pradesh. The matter is being pursued with other States for submission of views/ comments.

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, 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. 1839.13 Crore up to March, 2017 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. 1839.13 Crore is as under:

Status of Contribution of Fund as on 31.03.2017

(in Crore Rs.)

Period	Total Expen-diture	Share Due			Share Received			Balance Share		
		MP	UP	Bihar	MP	UP	Bihar	MP	UP	Bihar
Up to 31.03.16	1778.23	889.12	444.56	444.56	949.22	409.96	419.05	60.11 (+)	34.60 (-)	25.51 (-)
During 2016-17	60.90	30.45	15.22	15.22	56.40	-	4.50	25.95 (+)	15.22 (-)	10.72 (-)
Total as on 31.03.17	1839.13	919.56	459.78	459.78	1005.62	409.96	423.55	86.06 (+)	49.82 (-)	36.23 (-)

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.

The 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. Water Resources Department, 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 Water Resources Department, 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 the75th 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.

As per decision taken in the 75th meeting of the Executive Committee, a meeting was held on 6.2.2017 under the chairmanship of the Member (WP&P), CWC. During the meeting an alternate proposal for cost apportionment of Dam between Power and Irrigation component was proposed. During the meeting, the Representatives of Government of Madhya Pradesh reiterated their stand that the benefit generated due to production of power generation in Power houses should not be considered in the cost apportionment of the Bansagar Dam as considered in the draft report. Further a proposal for O&M setup of the Bansagar Control Board was also discussed during the meeting. It was decided that the O&M setup may comprise of one Division and four Sub-Divisions. Out of four Sub-Divisions, two Sub-Divisions will be electrical and mechanical department whereas the remaining two Sub-divisions will be civil department. The cost of the O&M will be assessed accordingly.

10.3.2 Betwa River Board

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

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

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

The Rajghat Dam with appurtenant structures has been constructed across river Betwa to provide irrigation facility to 1.38 lakh Ha in Uttar Pradesh and 1.21 lakh Ha in Madhya Pradesh with power generation of 45 MW 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. The project was completed in June 2005.

The O&M cost of the project is to be shared by states. 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 2016-17 is as under:

(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	11.1376
2007-08	9.30	4.65	4.65	6.65	11.40	1.24	10.5521
2008-09	13.50	6.75	6.75	6.755	4.50	1.72	14.8462
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	5.79	20.055
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	22.1266
2016-17	34.00	17.00	17.00	13.00	10.00	0.59	23.5932

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 2016-17. The three units of Power House have been tested and commissioned during 1999-2000. Power generation was 620.32 lakh units during 2016-17.

The 15th Board 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 89th meeting of the Executive Committee was held on 9.2.2016. No meeting of Board / EC was held during 2016-17.

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.

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 87th and 88th meetings of the Committee were held on 28.04.2016 and 20.03.2017 respectively 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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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, 17 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.

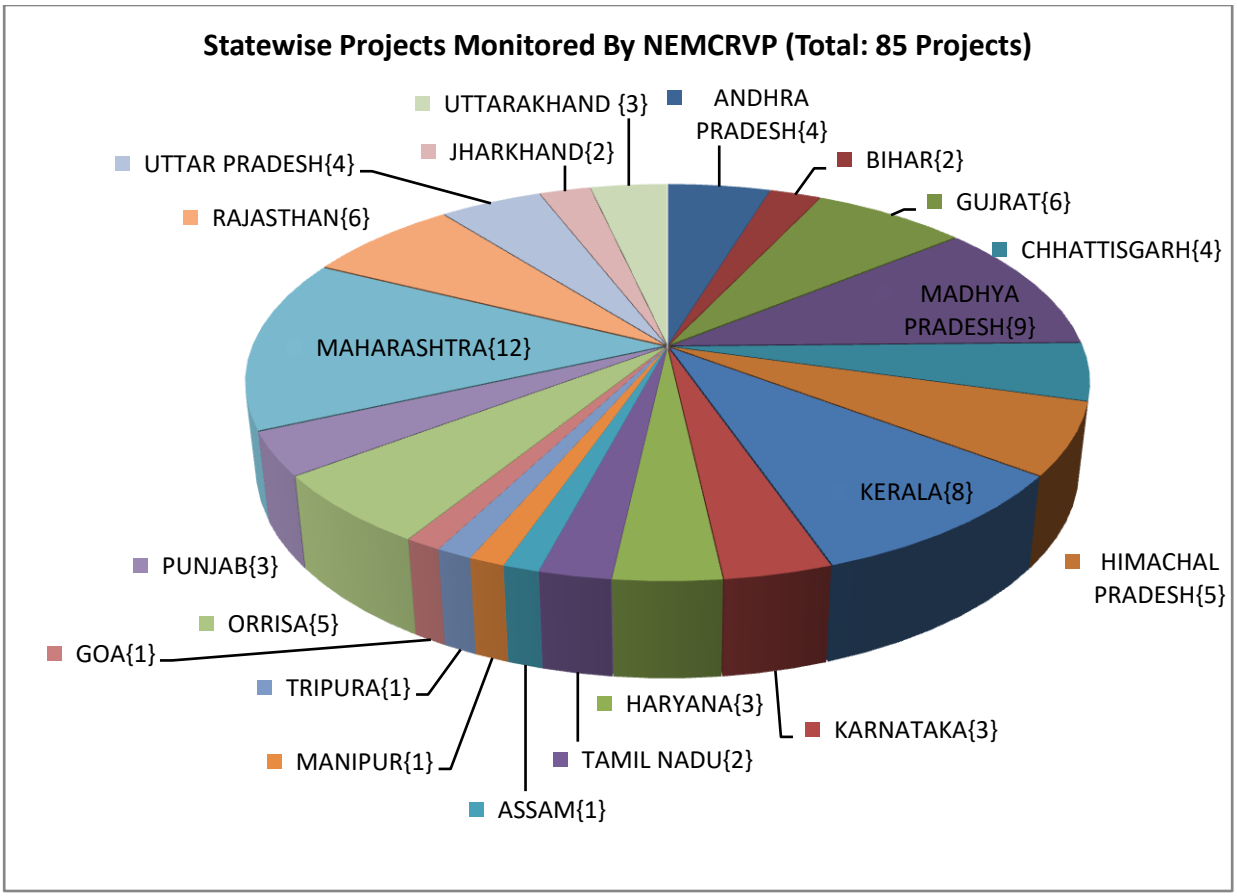
Statewise Projects Monitored By NEMCRVP (Total: 85 Projects)
UTTARAKHAND {3}
ANDHRA PRADESH{4}
JHARKHAND{2}
BIHAR{2}
UTTAR PRADESH{4}
GUJRAT{6}
RAJASTHAN{6}
CHHATTISGARH{4}
MADHYA PRADESH{9}
MAHARASHTRA{12}
KERALA{8}
HIMACHAL PRADESH{5}
PUNJAB{3}
ORRISA{5}
GOA{1}
TRIPURA{1}
HARYANA{3}
KARNATAKA{3}
MANIPUR{1}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

Fig.1

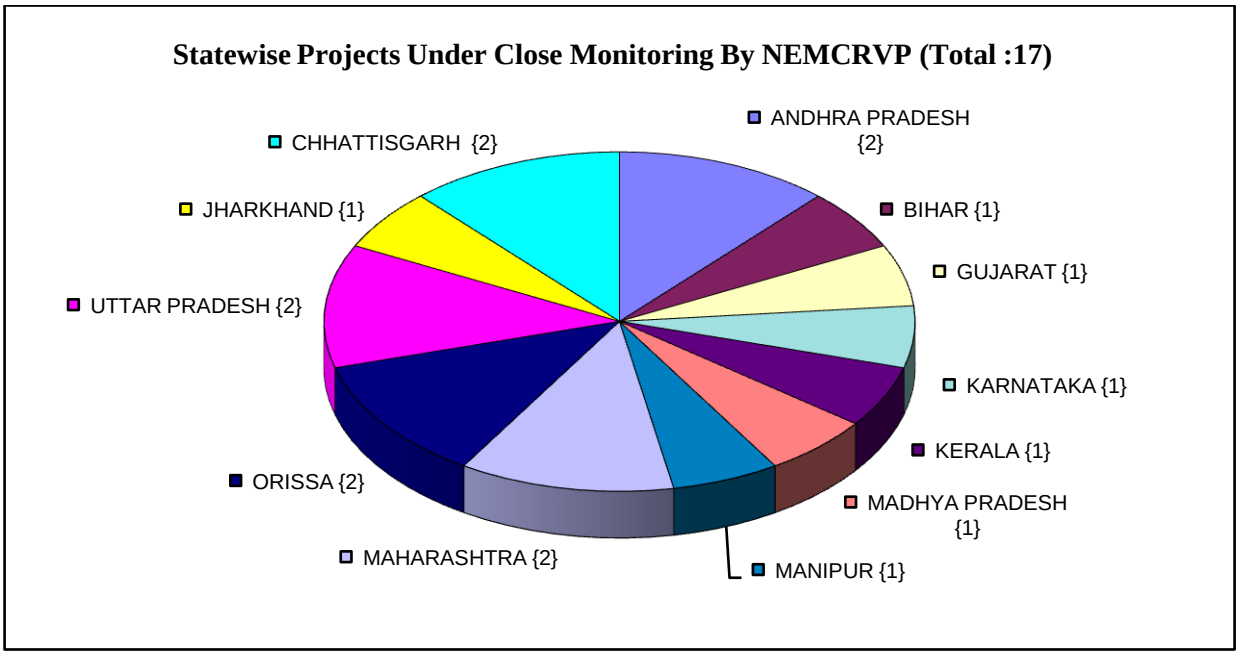
Statewise Projects Under Close Monitoring By NEMCRVP (Total :17)
ANDHRA PRADESH {2}
CHHATTISGARH {2}
JHARKHAND {1}
BIHAR {1}
GUJARAT {1}
UTTAR PRADESH {2}
KARNATAKA {1}
KERALA {1}
ORISSA {2}
MADHYA PRADESH {1}
MAHARASHTRA {2}
MANIPUR {1}

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. The Committee has visited 58 projects which include all the closely monitored projects and held 63 meetings since 1990.

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.

The progress achieved by the NEMCRVP is being brought out annually in Annual Report giving details of visits and meetings. The directions given to concerned State and project authorities for implementing the environmental safeguards are highlighted in the Annual Report. Status Reports on environmental and related aspects is also presented in the Annual Reports. Various publications have been published for creating balanced scientific awareness in public about river valley projects & environmental concerns in India. It is working to establish the BIS standards with respect to the Environmental Management of the river valley projects.

The latest status of the implementation of the environmental safeguards of the projects have been sought from the Chairmen of the State Level Environmental Monitoring Committee for consideration of National Environmental Monitoring Committee for appropriate action in the matter. The information received in respect of 12 Projects has been received and compiled.

11.3 Conservation of Rivers- National Ganga River Basin Authority (NGRBA)

The Ministry of Environment & Forests in exercise of powers conferred by Environment (Protection) Act. 1986, has constituted the National Ganga River Basin Authority

(NGRBA) on 20.2.2009 as an empowered planning, financing, monitoring and coordinating authority for abatement of pollution and conservation of the river Ganga. Six Meetings of NGRBA have been held so far. The last meeting was held on 4.7.2016.

Further consequent to constitution of National Council for reuventaion, protection and Management of river Ganga (reffered as National Ganga Counci, the NGRBA has been dissolved with erect from 7.10.2016.

11.3.1 Constitution of Empowered Steering Committee (ESC) of (NGRBA)

An Empowered Steering Committee of NGRBA under the chairmanship of Secretary, MoEF has been constituted. Secretaries of Department of Expenditure (Ministry of Finance), Ministry of Urban Development, Ministry of Water Resources, Ministry of Power, Department of Science and Technology, Planning Commission and Chief Secretaries of Uttarakhand, Uttar Pradesh, Bihar, Jharkhand, West Bengal and Chairman of Central Pollution Control Board, Central Water Commission, Additional Secretary & Financial Advisor (MoEF) are Members of the Committee. Mission Director (NGRBA) is the Member Secretary of the Committee.

Chief Engineer (EMO) has been nominated for attending the meetings of Empowered Steering Committee of NGRBA.

11.3.2 Functions of the Empowered Steering Committee of NGRBA

(i) To consider, appraise and sanction project proposals related to activities of NGRBA.
(ii) To consider release of funds for the projects approved.
(iii) To monitor progress of work.
(iv) To facilitate coordination between the Centre and States and between NGRBA and various Central Ministries.
(v) To report to the NGRBA and its Standing Committee from time to time.

The Empowered Steering Committee (ESC) of National Ganga River Basin Authority (NGRBA) constituted by Ministry of Environment & Forests, Government of India as an empowered planning, financing, monitoring and coordinating authority for effective abatement of pollution and conservation of the river Ganga. Chairman, CWC is the Member of the Committee. Till now ESC of NGRBA conducted six meetings. The last meeting of ESC of NGRBA was held on 20.11.2012.

11.4 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 year 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 studies are expected to be completed in duration of one to two years from the date of signing the agreement. The Expression of Interest (EOI) for conducting the studies have been obtained and firms have been shortlisted. The RFP document for the study has been finalized and is under consideration in the Ministry.

11.5 Other Important Activities Related to Environment Management

1. In compliance of NGT Bhopal order dated 12.1.2016, A Committee was constituted by CWC on 08.03.2016 to work out the details, after consulting the respective States, for improving irrigation efficiency in Bansagar dam command so that saved resources can be utilized for continuous operations of one of the turbine which in turn would allow the minimum flow in the river Son downstream of Bansagar dam. The Committee has completed the study and the report has been submitted to NGT, Bhopal

11.6 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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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, etc.

(c) Monitoring of physical and financial progress of externally aided projects and fixing of arbitrators for resolving disputes in the execution of projects.

12.1.2 Techno- Economic Appraisal & Clearance of Projects

Two major projects proposed for JBIC (JICA) assistance and one major project proposed for ADB assistance were under appraisal in CWC during 2016-17. Details of the project are given in Table 12.1 and 12.2.

Table 12.1
Projects proposed for JICA Assistance

SI. No.	Name of Project	Estimated cost (in crore Rs.)
1.	Rajasthan Water Sector Livelihood Improvement Project (RWSILIP).	2576.86
2.	Rajasthan Water Sector Restructuring Project in Desert Area (RWSRPD).	3009.16

Table 12.2
Major projects proposed for Asian Development Bank Assistance

SI.No.	Name of Project	Estimated cost (in crore Rs.)
1.	Karnataka Integrated and Sustainable Water Resources Management Investment Programme (KISWRMIP)Tranche-II	3593.90

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 ending Mar 2017
1.	Andhra Pradesh Water Sector Improvement Project	7897-IN	IBRD (USD)	Aug 2010	Jul 2018	NA	NA	USD 450.60	USD 290.51

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 ending Mar 2017
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 52.00
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 36.23
4.	Uttar Pradesh Water Sector Restructuring Project (UPWSRP), Phase-II	5298-IN	IDA (XDR)	Oct 2013	Oct 2020	NA	NA	XDR 239.40	XDR 60.21

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.

Table 12.4
External Assistance to Project (JICA)

SI. No.	Name of Project	Loan Agreement No.	Loan Period		Estimated Cost	Total Assistance	Assistance utilized ending Mar 2017 (in JPY)	Remarks
			Starting Date	Closing Date	As per agreement (Rs. in Crore)			
1.	Rengali Irrigation Project, Ph-2	IDP-244	March 2015	March 2026	3603.67	JPY 32378.00	JPY 641.10	
	Rengali Irrigation Project, Ph-2	IDP-244A	March 2015	March 2026		JPY 1581.00	JPY 89.23	
2.	AP Irrigation and Livelihood Improvement Project	IDP 181	March 2007	July 2017	1137.70	JPY 23974.00	JPY 14426.52	

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.

The main devices for assistance are loans, grants, policy dialogue, technical assistance and equity investments.

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 12.5
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 25.84
2.	Assam Integrated Flood and River Bank Erosion Risk Management Investment Program	2684-IND	May 2011	July 2017	NA	USD 48.50	USD 35.01
3.	Karnataka Integrated and Sustainable Water Resources Management Investment Program-I	3172-IND	May 2015	March 2019	NA	USD 31.00	USD 5.11
4	Orissa Integrated Irrigated Agriculture and water Management Investment Program Tranche-2	3394-IND	June 2016	Sept. 2018	NA	USD 120.00	USD 13.06
5.	Climate Adaptation in Vennar Sub Basin in Cauvery Delta Project	3394-IND	July 2016	June 2021	NA	USD 100.00	USD 7.09

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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:

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 10 times and the last meeting was held in December, 2015 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

b) Forward the approved DPR to respective Governments for acceptance

The last (14th) 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 January, 2015 at New Delhi. Based on the review, JTE recommended extension to tenure of JPO-SKSKI for another 24th months i.e. upto 28th February, 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 was subsequently extended upto February, 2017. Keeping in view the work is still under progress, the process for further continuation of the office is under consideration.

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. To get these issues solved, it was decided during the 3rd meeting JCWR held in 2008, to set up Pancheshwar Development Authority (PDA) at the earliest for the development, execution and operation of Pancheshwar Multipurpose Project. Recently, Pancheshwar Development Authority (PDA) has been 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. The draft final DPR of the project has been submitted by the WAPCOS Limited in November, 2016. The draft final DPR of Pancheshwar Multipurpose project has been circulated currently for comprehensive examination and appraisal.

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.
c) To review the progress of work vis-à-vis the programme laid down.
d) To recommend the releases to be made to the Royal Govt. of Bhutan on the basis of progress achieved/likely to be achieved after discussion/random general checks.
e) To look into any other specific point related to the scheme which may crop up from time to time.

The 32nd meeting of Joint Expert Team (JET) was held on 15-16 September, 2016 at Shillong.

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 6 times and the last meeting was held on 19th – 20th February, 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 10th meeting of Expert Level Mechanism is proposed to be held during April 12th -13th, 2016 at New Delhi.

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 IP 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.

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.

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 2015. 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 five major components:

i. Hydrological Observations Monitoring System
ii. Irrigation Census
iii. Water Quality Assessment Authority and Monitoring System
iv. Strengthening of Monitoring Unit in CWC
v. 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.

Since Feb 2015, the India-WRIS portal is being maintained by a team of experts at India-WRIS Centre, CWC HQ, Sewa Bhawan, New Delhi.

The progress of activities under India-WRIS upto March 2017 is as under:

- Command boundaries and canal layer refinement for 1700 MMI projects have been completed.
- Crop Area Assessment study for forty five (45) AIBP commands for assessing gap in irrigation potential & actual utilization has been completed.
- Imparted training to 30 CWC officers from various field officers regarding Crop area assessment study using remote sensing technique to assess the gap in irrigation potential and actual utilization.
- PMP Atlas integration has been completed.
- As per provision of Hydro-Meteorological Data Dissemination Policy 2013 (MoWR), all unclassified data of CWC G&D stations has been made available on India-WRIS website. Uploading of unclassified H.O. data of CWC upto March 2015 has been completed.
- Reservoir module for monitoring of 91 reservoirs have been operationalized.
- The work for updation of river, water body layer and town layer has been initiated.
- Development of a more user friendly version 5.0, planned to be launched by Aug'17 has been initiated.
- Preparation of MIS for obtaining data from States for preparation of compilation of MMI projects by Project Monitoring Oganisation has been initiated .

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

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.

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.

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 these sites due to paucity of required manpower.

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 and 2016. 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 October, 2016, cloud free data of 398 GL/WBs was available. Amongst these, 168 GL/WBs have shown decrease in water spread area, 105 have shown increase, 125 have not shown any significant charge (+/-5%). 50 out of 168 have decreased by more than 20% and 51 out of 105 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 coast of above work is estimated to be Rs 896.05 Lakh. An advance payment of Rs 233.77 Lakh has also been released to IIT Madras in Nov, 2016. A Project Monitoring Committee (PMC) was also constituted and after the deliberations of the 1st Meeting of Project Monitoring Committee (PMC), held in Dec, 2016, the procurement of Equipment is under progress by IIT Madras, Chennai. The Project Executor (IIT Madras) has submitted the Inception Report (first deliverable).

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

The activity has been continued during the XII Plan under the component "Data bank & Information System— Upgradation and Modernization of I.T. in CWC" costing Rs 105 Crore of the Plan Scheme "Development of Water Resources Information System". In

the course of operation of the plan scheme, SMD has procured hardware, software and networking items. It has also provided for maintenance of IT items at CWC Head Quarter.

The activities undertaken under the above component during the year 2016-17 are as under:

i) Procurement/ Supply of T&P Items such as Servers, Laptops, Computers, Printers, UPS, Scanners, Networking security appliances etc.
ii) Maintenance of IT Items at CWC (Hq).
iii) Procurement/ Supply of IT Items Consumables.
iv) Establishment of LAN to newly renovated 7th Floor & 6th Floor of Sewa Bhawan (S).
v) Management of AMC of IT hardware, software & LAN.
vi) Spill over Works of "Development of Web Based Software Application for online Management of e-Bhagirath Magazines."
vii) Development of Workflow based System and Dashboard for Project Appraisal Management System (ePAMS).
viii) Work related to Implementation of e-office in CWC (HQ) and regional offices in phases.
ix) Work related to re-designing of CWC Website complying with Guidelines for Indian Government Website.
x) Implementation of Web Based Human Resources Management System (eHRMS) in CWC.
xi) Management of APAR Management System, Engineering Drawings Software, ERS Management System, e-procurement Portal, Circular/ Tender Portal etc.

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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.

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 of CWC are also conducted by National Water Academy at Pune.

15.2.1 Progress of Training Activities

Since its inception in the year 1988, NWA has conducted a total of 560 training programmes up to March 2017 and trained total 13619 officers. During the year 2016-17, 30 training programs were conducted at National Water Academy, CWC, Pune. 850 officers have been trained in these programs with 2067 man-weeks of training.

The important activities of NWA during the year 2016-17 are as under:

i) Two training programs for officials of Flood Warning Section, Royal Government of Bhutan were conducted during July 2016 (one from 18-22 July 2016 and another during 25-29 July 2016).

ii) Cadre Training Programs: NWA regularly conducts Induction Training Program for newly appointed Central Water Engineering Group 'A' Officers of CWC. Over the years, the program has been enriched with new contents. The Core Area Training Program for the Middle level CWES officers have been conducted on the topics of Design and Research; River Management; and Basin Planning Management. In addition, programs are organized for the CWES officers on the various topics like application of RS-GIS, Soft Skills etc. During this financial

year, the 29th Induction Training Program of 26 week duration for newly appointed Central Water Engineering Group 'A' Officers of CWC was conducted. A Total 17 Group 'A' CWES Officers participated in this program.

iii) 2 Weeks Core Area Training (CAT) on Basin Planning Management for middle level CWES officers was conducted during the period from 22nd August to 2nd September 2016.

iv) Distance Learning Programs as Regional Training Centre of WMO: Being recognized as Regional Training Centre of WMO in 2012, NWA successfully conducted two programs on Basic Hydrological Sciences for Asian Region Countries in this year in which 79 officers were trained. The program was widely acclaimed by WMO and the participating officers.

v) Management Development Program for senior officers of DRIP was conducted during 25-29 April 2016. This series program for Non Technical Officers of MoWR, RD&GR and CWC officers was conducted during 16-20 August 2016.

vi) ToT Program on Climate change was conducted during 25-27 July 2016. Second such program for media personnel was conducted during 28-29 July 2016.

The list of training courses, workshops and seminar organised / conducted / coordinated by Training Unit of CWC and by NWA during 2016-17 are given at **Annexure - 15.1 and Annexure - 15.2** respectively.

15.2.2 Other Important Activities at NWA

- As per directives issued by the office of PMO, the Swachhata Pakhwada was celebrated at NWA during 16-31 March 2017. Certain activities including cleaning of water bodies and cleanliness campaign were organized.
- All India WALMI/ IMTI Meet – 2016 under the Chairmanship of Dr. S.K. Srivastava, Chief Engineer, NWA was held at National Water Academy on 23rd June 2016
- 22nd Meeting of the Advisory Board of NWA was held at NWA on 23rd December 2016 under the Chairmanship of Shri G.S. Jha, Chairman, CWC.
- The Software Development and Modeling Centre at NWA was inaugurated by Shri Ghanshyam Jha, Chairman, CWC on 23rd December 2016.

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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 2016-17, 11 new complaints/cases were taken up for investigation. Final decision was taken in respect of 16 cases. The break-up of vigilance/disciplinary cases in respect of different category of officers and staff is as follows:-

Sl. No.	Particulars	Category of Officers/Staff			
		Gr. 'A'	Gr. 'B'	Gr. 'C' (including cases of erstwhile Gr. 'D')	Total
a)	No. of cases pending at the beginning of the year	22	13	14	49
b)	No. of cases added during the year	5	5	1	11
c)	No. of cases disposed of during the year	10	5	1	16
d)	No. of cases pending at the end of the year	17	13	14	44

Out of the 16 cases disposed of, officials in 2 cases were awarded major penalty.

16.2 Observation of Vigilance Awareness Week

The vigilance Awareness week was observed in CWC Headquarter and all its field offices during 31.10.2016 to 5.11.2016

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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
10	Standing Technical Advisory Committee (STAC) to the Governing Council for CSMRS, New Delhi.	Member (D&R)	Chairman

Sl. No.	Name of Committees/Boards/Panel of Experts/Technical Groups etc.	Representation of CWC	
		Officer	Position in Committee
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
23	Brahmaputra Board	Member(RM)	Member
24	Standing Committee of Brahmaputra Board	Member(RM)	Member

Sl. No.	Name of Committees/Boards/Panel of Experts/Technical Groups etc.	Representation of CWC	
		Officer	Position in Committee
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
43	Ghaggar Standing Committee	Member(RM)	Chairman
44	Yamuna Standing Committee	Member(RM)	Chairman
45	Upper Yamuna River Board	Member(WP&P)	Chairman

Sl. No.	Name of Committees/Boards/Panel of Experts/Technical Groups etc.	Representation of CWC	
		Officer	Position in Committee
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
61	Empowered Joint Group meetings (EJG) (for monitoring of implementation of Hydro-power projects in Bhutan).	Member (D&R)	Permanent Invitee

Sl. No.	Name of Committees/Boards/Panel of Experts/Technical Groups etc.	Representation of CWC	
		Officer	Position in Committee
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 fund and carry out the 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.

Following activities were performed by INCSW during 2016-17:

- 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 12.30 Crore has been released to these schemes up to March 2017.
- The 4th meeting of INCSW was held under the Chairmanship of Chairman, CWC on 27.03.2017 at New Delhi. The Vision 2025 Document for Research and

Development in Water Resources prepared by INCSW was presented during the meeting. The matter related to constitution of India Irrigation Forum [IIF] and organisation of Micro Irrigation Conference in Aurangabad in January 2019 were also discussed during the meeting.

- INCSW in collaboration with ICID organised one day special event on INDIA IRRIGATION FORUM during the India Water Week 2016. The event was huge success with participation from Asian Development Bank, FAO, IWMI, World Bank.
- A special R&D session of Indian National Committee of Surface Water (INCSW) was organised on 5th September 2016 at New Delhi. The Principal Investigators and Researchers of ongoing research schemes under INCSW attended the session alongwith other experts in the sector. The session also deliberated on various aspects namely, role of R&D in water sector in developed countries; requirement of environmental flows in water resources projects and water conflict management.
- An Interactive Session on Storm Water Hydraulics was organised by INCSW on 02.12.2016 at New Delhi. Prof Hager, Professor, Department of Civil Environment & Geomatics Engineering, ETH, Zurich, Switzerland delivered a lecture on "Mega Tsunamis in the water reservoirs and Impulse Wave in the laboratory" and Prof. S. Majumdar, Retd. Emeritus Professor, Delhi Technological University presented on the topic "River Behaviour near Hydraulic Structures" during the session.
- An Innovation Session on "Evaporation Control from Reservoirs using Floating Solar Panels" was organized by INCSW in collaboration with TERI and M/s YELLOW Tropus Pvt Ltd. on 21.12.2016 at New Delhi. The session highlighted the water savings and energy production on the idle water surface areas.
- A seminar was organised on "Second Green Revolution: Role of Irrigation and Drainage" by INCSW in association with ICID on the occasion of ICID Foundation Day on 24.06.2016 at New Delhi. The seminar was attended by many distinguished international delegates.
- Member Secretary, INCSW represented India in 2nd World Irrigation Forum and 67th IEC Meeting of ICID held during November 6-12, 2016 at Ching Mai, Thailand.

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. 69 meetings of TAC of NIH has been held so far. The last meeting was held 21.7.2016 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. 42 meeting of Working Group of NIH has been held so far. The last meeting was held during 19th to 20th March, 2015 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. The jurisdiction of Farakka Barrage Project has also been extended 40 Km on upstream and 80 Km on downstream of Farakka Barrage for carrying out the erosion protection works of River Ganga. 112th meeting of TAC of FBP was held from 17th and 18th November 2016 at Farakka, West Bengal.

17.2.4 Standing Technical Advisory Committee of CSMRS

The Standing Technical Advisory Committee (STAC) was constituted under the Chairmanship of Member (D&R), CWC for providing an overall perspective and guidance in technical scrutiny of research schemes being undertaken at CSMRS. The STAC is composed of 11 members drawn from various public sector institutions and is headed by Member (D&R), CWC. 31 meetings of STAC has been held so far. The last meeting of STAC was held on 17.4.2015 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 16 Sectional Committees of WRDC and 13 Sectional Committees of CEDC. FE&SA and CMDD (NW&S) are the Nodal Directorates in CWC dealing with works of WRDC & CEDC of Bureau of Indian Standards, respectively at CWC.

Since Chairman, CWC is the Chairman of WRDC, the approval of draft codes and amendments to BIS Codes for adoption and printing are processed in CWC and approval of Chairman is communicated to BIS. During the current year 21 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 01.04.2016 to 31.03.2017. 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.	राजभाषा कार्यान्वयन समिति की 123वीं बैठक से संबंधित सामग्री का मुद्रण	हिन्दी अनुभाग	15	450
2.	दूरभाष निदेशिका (हिन्दी) के.ज.आ.	हिन्दी अनुभाग	104	1500
3.	राजभाषा कार्यान्वयन समिति की 124वीं बैठक से संबंधित सामग्री का मुद्रण	हिन्दी अनुभाग	27	30
4.	राजभाषा कार्यान्वयन समिति की 124वीं बैठक से संबंधित सामग्री का मुद्रण	हिन्दी अनुभाग	40	30
5.	Printing of Rules & Syllabus for departmental examinations for Engineering Officers of CWC	Estt. I	36	100
6.	हिन्दी पखवाड़ा-2016 के उपलक्ष्य में अध्यक्ष, केन्द्रीय जल आयोग की अपील	राजभाषा विभाग	1	400
7.	राजभाषा कार्यान्वयन समिति की 125वीं बैठक से संबंधित सामग्री का मुद्रण	हिन्दी अनुभाग	17	35

Sl. No.	Name of the Job	Nodal Agency	No. of composed pages	No. of copies
8.	Printing of Legal Instrument on Rivers in India, Volume-III, Part-I	ISM Dte.	226	100
9.	Printing of Bilingual Internal Telephone Directory 2016	TD Dte.	62	500
10.	Printing of Masking Sheets	TD Dte.	4	2000
11.	Printing of Study Report in pursuance of NGT Order (as per the directions of Nation Green Tribunal)	EIA Dte.	72	15
12.	Printing of APAR Forms of Group 'A' Officers	Estt. I	16	500
13.	Printing of Legal Instrument on Rivers in India, Volume-III, Part-II	ISM Dte.	352	100
14.	Printing of Slip Books	PCP Dte.	1	20000
15.	Printing of Slip Pads	PCP Dte.	1	40000
16.	राजभाषा कार्यान्वयन समिति की 126वीं बैठक से संबंधित सामग्री का मुद्रण	हिन्दी अनुभाग	15	30
17.	Printing of APAR Report Forms for Group 'A' Officers	Estt. I	16	200
18.	Printing of revised guidelines for submission, appraisal and acceptance of irrigation and multipurpose projects, 2017	PA (C)	64	20
19.	Printing of Pay Bill Central	A/Cs III	4	2000
20.	केन्द्रीय जल आयोग की राजभाषा कार्यान्वयन समिति की 127वीं बैठक के कार्यवृत्त का मुद्रण	राजभाषा विभाग	15	30

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 2015 was brought out in April 2015 and is available on the website of CWC. The publication for the year 2017 is under finalisation.

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 January 2016.

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 2016 containing data up to 2012-13 was brought out in July 2016. The publication for the year 2017 containing data up to 2013-14 is under preparation.

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 April 2013 and is available on the website of CWC.

18.3 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: 3 Issues (Jan-Mar 16, Apr-Sep 16 & Oct-Dec 16)
2. Bhagirath (Hindi) Journal- 5 Issues (Jul-Dec 15, Jan-Mar 16, Apr-Jun-16, Jul-Sep 16 & Oct-Dec 16)

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, 2016 to March, 2017.

18.4 Microfilming / Scanning of Documents

The Microfilming Unit of CWC undertakes microfilming of drawings and scanning of documents for preservation as well as wide dessimination. The following jobs were completed during the year 2016-17:

- Verification of 20,000 Scanned Microfilm drawings.

- Archieving of 10 Nos. old Bhagirath Journals (English / Hindi)
- Scanning of Newspapers clippings related to water sector published in 16 Newspaper/periodicals and circulation through CWC website for wide dissemination

18.5 Mass Awareness Activities:

The mass awareness acitivity undertaken by CWC during the period from 1st April, 2016 to 31st March, 2017 are as under:

- CWC has conducted mass awareness programme on water conservation in tribal areas organised at the following places
  (i) JoidaTaluk, Bangalore, Karnataka on 18.03.2017.
  (ii) Zari village, Daman district, UT of Daman & Deu on 21.03.2017
  (iii) Paderu, Visakhapatnam, Andhra Pradesh on 27.03,2017.

- The Central Water Commission under guidance of Ministry of Water Resources, River Development and Ganga Rejuvenation has organized a seminar "Dr. Bhimrao Ambedkar – Multi-purpose Development of Water Resources and Present Challenges" on 19th April 2016 at NDMC Convention Center, New Delhi.

- CWC participated in 36th India International Trade Fair (IITF) - 2016 at Pragati Maidan, New Delhi from 14th to 27th November, 2016 on the theme "Pradhan Mantri Krishi Sinchai Yojna". CWC undertook the work for erection of the pavilion of Ministry of Water Resources, River Development and Ganga Rejuvenation. CWC also setup a stall in the pavilion demonstrating different exhibitory materials viz. Working models, translates, banners, posters etc.. A working model of size 6m x 3m on the theme "Har Khet Ko Pani" was also installed which was the central attraction of the pavilion. The interactive quiz shows and pantomime shows were also arranged for the visitors, especially for children during the IITF-2015. The pavilion was inaugurated on 14.11.2016 by Shri Sanjiv Balyan, Hon'ble Minister of State for Water Resources.

- The Central Water Commission under guidance of Ministry of Water Resources, River Development and Ganga Rejuvenation has organized a seminar "Marching Ahead on Dr. Ambedkar's Path of Water Resources Management for Inclusive Growth" on 6th December 2016 CWC Auditorium, New Library Building, R. K. Puram, New Delhi.
- A Workshop on "Piped Irrigation Network " was organised by CWC during 16-17 March, 2017 at CWC Auditorium, New Delhi

- The Jal Manthan - 3 was organized on 13th January 2017 at Vigyan Bhawan, New Delhi. CWC has provided technical support for ornaisation 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, Representatives of Non-Governmental Organisations and Farmers.

- The Ministry of Water Resources, River Development & Ganga Rejuvenation has launched "Jal Kranti Abhiyan" in June 2015 with a view to promote and increase water conservation in the country. The main aim of the abhiyan was to consolidate water conservation and management in the country through a holistic and integrated approach involving all stakeholders making it a mass movement. The Abhiyan will end in March 2018. CWC coordinated activities under the Jal Gram component of the Abhiyan in 21 States/UTs in the country. In this regards, 740 water stressed villages were identified in various district in CWC coordinated States/UTs as Jal Grams for ensuring optimal and sustainable provision of water with effective involvement of stakeholders. In addition, CWC has organized 2 workshop/training in the country during 2016-17 under the MoWR,RD&GR Plan Scheme "Information, Education and Communication (IEC)".

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Annexure – 5.1

List of Consultancy Projects in D&R Wing during the Year 2016-17

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
Gujarat	
4	Garudeshwar Weir Project
Jharkhand	
5	Kharkai Barrage under Subarnarekha M.P. Project
6	Icha Dam Under Subarnarekha M.P.Project
Karnataka	
7	Donimalai Iron Ore Tailing Dam
Madhya Pradesh	
8	Lower Goi Project (Shaheed Bheema Nayak Sagar Project)
9	Pench Diversion Project
10	Gulab Sagar Mahan Project
11	Halon Irrigation Project
Manipur	
12	Dholaithabi barrage Project
Meghalaya	
13	New Umtru H.E. Project
14	Ganol H.E.Project
Mizoram	
15	Tuirial H.E. Project
Odisha	
16	Anandpur Barrage Project
17	Chheligada Irrigation Project
Rajasthan	
18	Lhasi Medium Irrigation project

Sl. No.	Name of Project
19	Isarda Major Project
20	Kalisindh Dam Project
Uttar Pradesh	
21	Arjun Sahayak Pariyojna
22	Kanhar Irrigation Project
Uttarakhand	
23	Tapovan Vishnugad Project - NTPC
24	Tehri & Koteshwar H. E. Project
25	Lakhwar Multi Purpose Project
Afghanistan	
26	Salma Dam Project
Bhutan	
27	Punatsangchu Stage-I H.E. Project
28	Punatsangchu Stage-II H.E. Project
DPR Stage Projects	
Assam	
1	Rukani Sonai Irrigation Project
Chattisgarh	
2	Hasdeo Bango (Minimata) Right Bank Canal Diversion Project
Jammu & Kashmir	
3	Ujh Multipurpose Project (DPR)
4	Kirthi (Stage-II) H.E.Project
5	Kishanganga HE Project
6	Plan for comprehensive flood management of river Jhelum and its tributaries
7	Comprehensive Flood Protection Works of Jhelum and its Tributries, Ph-II
Mizoram	
8	Tiwang H.E.Project
Orissa	
9	Hirakund Dam
Sikkim	
10	Kalezkhola H.E. Project(DPR)
Uttarakhand	
11	Lakhwar M.P.Project

Sl. No.	Name of Project
NWDA (Gujarat & Maharashtra)	
12	Par-Tapi-Narmada link Project (DPR)
Nepal	
13	Sapta Kosi & Sunkosi Multi Purpose Project (DPR)
14	Pancheshwar Multipurpose Project
Bhutan	
15	Kuri Gongri H. E. Project
Sp. Problem Projects	
Bihar	
1	Kohira Dam, Kaimoor leakages from Spillway bay
Chattisgarh	
2	Minimata (Hasdeo) Bango Project
Goa	
3	Salauli Dam - Stability analysis
Himachal Pradesh	
4	Jeori Small H.E.Project
Jammu & Kashmir	
5	Mitigation of floods in river Jhelum
Jharkhand	
6	North Koel Project
Madhya Pradesh	
7	Indira Sagar Project - Re-designed of Energy Dissipation Arrangement
8	Shayamri Project
9	Runj Medium Irrigation Project
Maharashtra	
10	Shelgaon Barrage Medium Project
Odisha	
11	Kanupur Irrigation Project
12	Hirakund Dam – Provision of Additional Spillways
13	Subarnrekha Main Canal Irrigation Project - Slope Protection measures for Right Bank
Punjab	
14	Rajasthan Feeder, Indira Gandhi Main Canal and Sirhind Feeder
Rajasthan	

Sl. No.	Name of Project
15	Rehabilitation of Garada Dam
Sikkim	
16	Land slide dam on Kanka River in Sikkim
Uttarakhand	
17	Longitudinal connectivity of Jelum Tamak HE Project
18	Giri H.E Project

Annexure-7.1

List of the Irrigation / Multipurpose Projects Accepted by the Advisory Committee of MoWR,RD&GR during 2016-17

Sl. No.	Project Name	State	Major/ Medium	Est. Cost (Rs. in Crore)	Irrigation Benefits (in Ha)
1	Arjun Sahayak Pariyojna	Uttar Pradesh	Major, Revised	2593.93 (PL 2015)	59,485
2	Sulwade Jamphal Kanoli Lift Irrigation Scheme	Maharastra	Major, New	2374.46 (PL 2014-15)	52,720
3	Kosi-Mechi Intra-State Link Project	Bihar	Major. New	4900.00 (PL 2015-16)	2,10,516
4	Sardar Sarovar Narmada Project	Gujarat	Major, 3rd RCE	54772.94 (PL 2014-15)	17,92,000
5	Revised Cost Estimate of Nadaun Area Medium Irrigation Project	Himachal Pradesh	Medium, Revised	156.31 (PL 2015)	6,471
6	Ken Betwa Link Project (Phase-I)	Uttar Pradesh	Major, New	18057.08 (PL 2015-16)	6,35,661
7	Bhaunrat Dam Project	Uttar Pradesh	Medium, New	612.78 (2015-16)	16,000
8	Project for Providing Irrigation Facilities to 15 Villages of Babina Block	Uttar Pradesh	Medium, New	246.8433 (PL 2015-16)	4,400
9	Burhai Reservoir Project	Jharkhand	Major, New	1520.87 (PL 2016-17)	33,500
10	Bateswarsthan Ganga Pump Canal Scheme, Phase-I	Bihar	Major, RCE	828.80 (PL 2015-16)	27,603
11	Arpa Bhaisajhar Barrage Project	Chhattisgarh	Major, New	1141.90 (PL 2014-15)	25,000
12	Pawai Irrigation Project	Madhya Pradesh	Medium, New	261.54 (PL 2009)	9,952
13	Chandrakeshar Dam Project	Madhya Pradesh	Major, ERM	15.63 (PL 2015)	5,000

Sl. No.	Project Name	State	Major/ Medium	Est. Cost (Rs. in Crore)	Irrigation Benefits (in Ha)
14	Rajasthan Water Sector Restructuring Project For Desert Area (RWSRPD)	Rajasthan	Major, ERM	3009.16 (PL 2016)	1,72,988
15	Grand Anicut Canal System	Tamil Nadu	Major, ERM	2298.75 (PL 2014-15)	1,00,191
16	Sukhahar Medium Irrigation Project	Himachal Pradesh	Medium, ERM	153.8 (PL 2015)	5,572
17	Medium Irrigation Project to various Pachayats of Jwalamukhi area of district Kangra	Himachal Pradesh	Medium, New	194.474 (PL 2016)	5,957
18	Renukaji Dam Project	Himachal Pradesh	Multipurpose (Drinking Water & Power)	4596.76 (PL 2015-16	-
19	North Koel Reservoir Project	Bihar & Jharkhand	Major, RCE	2391.37 (PL 2016-17)	1,11,521

Annexure - 7.2

List of the Flood Control Schemes Accepted by the Advisory Committee of MoWR,RD&GR during 2016-17

Sl. No.	Project Name	State	Est. Cost (in Crore Rs.)	Flood Protection
1	Scheme for protection of Gaura-Saifabad embankment between Km. 3.00 to 4.40 on left bank of River-Ghaghra in district-Basti	Uttar Pradesh	33.9885 (PL 2012)	Area Protected-6435 Ha Population Benefitted-1,30,000 Nos.
2	Scheme for construction of 7nos. Spurs at Km. 12.500, 13.200, 14.200, 15.100, 15.750, 16.200 & 16.600 of Kalwari-Rampur Bund on left bank of river Ghaghra in the district-Basti, UP	Uttar Pradesh	29.5997 (PL 2012)	Area Protected- 15850 Ha Population Benefitted-1,80,000 Nos
3	Protection of Villages Durgapur, Domgaon, Dababeel, Chotonilibari, Debargaon, Dangaigaon, Bhirengaon, Bherbheri, Rowmari, Khagrabari, Sanyashiguri, Uttar-Popragaon and Popragaon from the erosion of River Aie (R/B)	Assam	125.2100 (PL 2014-15)	Area Protected-6200 Ha
4	Assam Integrated Flood and Erosion Risk Management Project-Tranche-II-Estimated Cost: Rs. 53.8195 Cr	Assam	53.8195 (PL 2014-15)	Area Protected- 39600 Ha
5	Rato River Flood Management Scheme	Bihar	109.8400 (PL 2014)	Area Protected- 60 Sq Km. Population Benefitted-50,000 Nos.
6	Protection Work for Villagge Patter Tola to Kamala Kani near U/S Spur No.12	Bihar	57.9520 (PL 2015)	Area Protected-52000 Ha
7	Anti Erosion Work from Hardeotola to Khatti	Bihar	65.6700 (PL 2015)	Area Protected-109.1 Ha
8	Construction of Earthen Bundh fro Ahraulidan (U.P.) Bundh to Guide Bundh of Bettian- Gopalganj Bridge under flood control Division, Thakaraha Camp, District: Gopal Ganj (Bihar)	Bihar	53.8587 (PL 2015)	Area Protected-2100 Ha
9	Sustainable Coastal Protection and Management Investment Programme (SCPMIP), Tranche-II	Karnataka	374.0900	Coastalline of 24 Km Protected

Sl. No.	Project Name	State	Est. Cost (in Crore Rs.)	Flood Protection
10	Assam Integrated Flood & Riverbank Erosion Risk Management Project (Kajiranga Sub-Project) (AIFRERMP) Golaghat District	Assam	125.9950 (PL 2015-16)	Area Protected-6271 Ha Population Benefitted-120 Th. Nos.
11	Assam Integrated Flood and Riverbank Erosion Risk Management Project, Palasbari Reach-Tranche-II (AIFRERMP)	Assam	74.9574 (PL 2015-16)	Area Protected- 60 Th. Ha Population Benefitted-Approximately 60 Th. Nos.
12	Assam Integrated Flood and River Bank Erosion Risk Management Project for Gumi and its Downstream Area-Tranche-II (AIFRERMP)	Assam	74.3762 (PL 2015-16)	Area Protected -38700 Ha Population Benefitted-3 Lakh Nos.
13	Project Proposal for Swan River Flood Management and Integrated Land Development Project Starting From Punjab Boundry (D/S of Santokhgarh Bridge) to its Confluence Point with River Sutlej at U/S Thana Bridge Near Sri Anandpur Sahib including D/S Flood Protection Works in District Roopnagar	Punjab	210.2300 (PL 2014)	Area Protected -776 Ha Population Benefitted-367900 Nos. in 47 villages
14	Scheme for Raising & Strengthening of Kharagpur Shahpur Sopai Bund on Left of River-Ghaghra & Right Bank of River Kuwano in District-Gorakhpur	Uttar Pradesh	37.4956 (PL 2013)	Area Protected -8217 Ha Population Benefitted-10 Th. Nos.
15	Project Estimate for Consideration of Pumping Station for Drainage of Flood Water from Protected Side Near Tarkulani Regulator at Km. 30.300 of Maluni Bund on Left Bank of River Rapti in Distt. Gorakhpur	Uttar Pradesh	38.1500 (PL 2013)	Area Protected -2838 Ha Population Benefitted-32 Th. Nos.
16	Project estimate of construction of ring bund for protection work of Sitabdiara village (Birth Place of lok Nayak Jaiprakash Narayan)	Bihar	92.3123 (PL 2015)	Area Protected -315 Ha Population Benefitted-12600 Nos.
17	Project estimate of construction of ring bund for protection work of Sitabdiara village (Birth Place of lok Nayak Jaiprakash Narayan) and village group of Ibrahimabad-Naubrar in district Ballia	Uttar Pradesh	40.4976 (PL 2013)	Area Protected -5340 Ha Population Benefitted-57170 Nos.

Sl. No.	Project Name	State	Est. Cost (in Crore Rs.)	Flood Protection
18	Protection of Kolbari and Lolity area from the erosion of river Brahmaputra (Construction of three Nos. of Spurs and a Check Dam)	Assam	34.6466 (PL 2014-15)	Area Protected -10800 Ha Population Benefitted-100000 Nos.
19	Construction of anti-erosion works in between km 0.00 to km 7.30 of left bank of river Ganga near Mathar Diara (Munger Ghat to Tikarampur) in the districts of Begusarai, Khagaria and Munger (Bihar)	Bihar	56.0562 (PL 2015)	Area Protected -3000 Ha Population Benefitted-200,000 Nos.
20	Counstruction of Marginal Bund on Left Bank of River Ganga from Jajmau Bridge to Shuklaganj old bridge from Km. 0.000 to Km 5.000	Uttar Pradesh	134.6000 (PL 2014)	Area Protected -3000 Ha Population Benefitted-287525Nos.

Annexure - 7.3

The list of H.E Project accepted by TEC during 2016-17

Sl No.	Project Name	State	Capacity (MW)
1.	Lower Kopilli	Assam	120
2.	Kiru	J&K	624
3.	Turga PSP	West Bengal	1000
4,	Kwar	J&K	540
Total			2284

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) 2011-12(NIL) 2012-13(405.00) 2014-15(NIL) 2015-16(NIL) 2016-17(NIL) Total= 2987.94	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) 2011-12(NIL) 2012-13(NIL) 2014-15(NIL) 2015-16(NIL) 2016-17(NIL) Total= 26.036	Project is under execution.
3.	Teesta Barrage, West Bengal	1) 9.23 lakh 2) 1000 MW 3) Barrage	2009-10(NIL) 2010-11(81.00) 2011-12(97.20) 2012-13(NIL) 2014-15(NIL) 2015-16(NIL) 2016-17(NIL) 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.
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

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
6.	Kishau, HP/ Uttarakhand	1) 0.97 Lakh 2) 600 MW 3) 1.04 MAF	-	Under appraisal in CWC/CEA.
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.			

Sl. No.	Name of the Project	1) Irrigation (Ha) 2) Power (MW) 3)Storage (MAF)	Year-wise Central Assistance released under Scheme of National Project (in crores Rs.)	Status
12.	Kulsi Dam Project, Assam	1) 22,000 ha. 2) 55 MW 3) 0.28 MAF	-	Under appraisal in CWC/CEA.
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(590.00) 2016-17(2514.70) Total = 3354.70	Project is under execution.

Annexure - 8.1

State-Wise and Project-Wise List of Projects under General Monitoring - Target & Achievements of Monitoring Visits during 2016-17

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	i) 17-18.05.2018 ii) 13-14.02.2017	Issued Issued
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		
7	2-Bateswar Asthan Ganga Pump Canal Phase-I -IS	Major	26.09.2016	Issued
	Batane Reservoir Project -			
	TOTAL- 02			
GUJARAT				
8	1-Und-II	Medium	17-02.20`7	
	Total-01			
HIMACHAL PRADESH				
9	1-Phina Singh Irrigation Project	Medium	22.06.2016	Issued

Sl. No	State/Project Name	Major/ Medium/ ERM	Date of Visit	Status of Report
10	2-Nadaun Area Medium Irrigation Project	Medium	23.06.2016	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		
	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	22.9.2016	Issued
31	9-Urmodi Irrigation Project	Major		
32	10-Tembhu Lift Irrigation Project	Major		
33	11-Bodwad Parisar Sinchan Yojna	Major	22.06.2016	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		
	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	Medium		

Sl. No	State/Project Name	Major/ Medium/ ERM	Date of Visit	Status of Report
	Drinking Water Project			
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 by(FU)	**47**	**8**	**7**

Annexure - 8.2

State-Wise and Project-Wise List of Projects under AIBP - Target & Achievements of Monitoring Visits during 2016-17

Sl. No	State/Project Name	Major/ Medium/ ERM	Date of Visit	Status of Report
	ANDHRA PRADESH			
1	Yerrakalva Res.	Med.	14.07.2016	Issued
2	Tadipudi LIS	Maj.	25.04.2016	Issued
3	Pushkara LIS	Maj.	i) 26.04.2016 ii) 23.03.2017	Issued
4	Gundlakdamma	Maj.	i) 13.07.2016 ii) 15.03.2017	Issued Issued
5	Thotapally Barrage	Maj.	i) 04-08.07.2016 ii) 18.02.2017	Issued Issued
6	Tarakarama thirtha Sagaram	Med.	i) 04-08.07.2016 ii) 18.2.2017	Issued Issued
7	Musurumilli	Med.	24.03.2017	
8	Indira Sagar (Polavaram)	Maj.		
	Maddigedda Res. Project		16.07.2016	Issued
	TOTAL=08			
	ASSAM			
9	Dhansiri	Maj.	i) 05.05.2016 ii) 17.10.2016 iii) 02.11.2016 iv) 18.02.2017	Issued
10	Champamati	Maj.	i) 29.04.2016 ii) 23.08.2016	Issued
11	Borolia	Med.	i) 03.05.2016 ii) 23.03.2017	Issued
12	Burhi Dihing lift	Med.		
	Mod. Of Jamuna-ERM			
	TOTAL=04			
	BIHAR			
13	Western Kosi	Maj.		
14	Durgawati	Maj.	18.05.2016	Issued
	Bansagar			
15	Batane	Med.		
16	Punpun	Maj.	20.05.2016	Issued

Sl. No	State/Project Name	Major/ Medium/ ERM	Date of Visit	Status of Report
	Eastern Kosi Canal System-ERM			
	TOTAL=04			
	CHHATISGARH			
17	Kelo Project	Maj.	23-25.06.2016	Issued
18	Kharung	ERM		
19	Sutiapat	Med.	23-25.06.2016	Issued
20	Maniyari Tank (ERM)	Maj	23-25.06.2016	Issued
	TOTAL=04			
	GOA			
21	Tillari	Maj.	18.05.2016	
	TOTAL=01			
	GUJARAT			
22	Sardar Sarovar	Maj.	i) 25-26.10.2016 ii) 25-27.05.2016 iii) 21-23.02.2017	i) 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.	17-18.05.2016	
29	Tral Lift	Med.	17-18.05.2016	Issued
30	Mod. Of Dadi Canal	ERM		
31	Mod. Kandi Canal	Med		
32	Prakachik Khows Canal	Med.	19.05.2016	Issued
33	Mod. Of Ahji Canal	ERM		
34	Restoration & Mod. Of Main Ravi Canal	ERM	25.05.2016	Issued
	TOTAL=09			

Sl. No	State/Project Name	Major/ Medium/ ERM	Date of Visit	Status of Report
	JHARKHAND			
35	Gumani	Med.		
36	Sonua	Med.		
37	Surangi	Med.		
38	Upper Sankh	Med.		
39	Panchkhero	Med.		
40	Subernarekha Multipurpose	Maj	25-27.05.2016	Issued
	TOTAL=06			
	KARNATAKA			
41	Upper Krishna St.I	Maj.		
42	Malaprabha	Maj.		
43	Karanja	Maj.	09.05.2016	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		
50	Bhima LIS	Maj.	i) 11.05.2016 ii) 18-19.01.2017	i) Issued
51	Guddada Malapura Lift	Med		
52	Upper Tunga Irrigation Project	Major	i) 05.05.2016 ii) 18-19.01.2017	i) Issued
53	Sri Rameswar Irrigation	Major	06.05.2016	Issued
54	NLBc System Project(New ERM)	ERM	29-31.12.2016	
	TOTAL=14			
	KERALA			
55	Muvattupuzha	Maj.	26.04.2016	Issued
56	Karapuzha	Med.	28.04.2016	Issued
57	Kanhirapuzha	ERM		
58	Chitturpuzha	ERM		
	TOTAL=04			

Sl. No	State/Project Name	Major/ Medium/ ERM	Date of Visit	Status of Report
	MADHYA PRADESH			
59	Indira Sagar Unit II (Ph I &II)	Maj.	10.05.2016	Issued
	Indira Sagar Canal Ph. III		11.05.2016	Issued
	Indira Sagar Unit IV		12.05.2016	Issued
	Indira Sagar Unit V		10.05.2016	Issued
	Bansagar Unit-II			
60	Sindh Phase II	Maj.	13.05.2016	Issued
61	Mahi	Maj.	i) 15.05.2016 ii) 10.01.2017	i) Issued
62	Bariarpur LBC	Maj.	15.05.2016	Issued
63	Bawanthadi	Maj.		
64	Mahan	Maj.		
65	Omkareshwar Ph - I	Maj.		
	Omkareshwar, Ph.-II		13.05.2016	Issued
	Omkareshwar, Ph.-III		14.05.2016	Issued
	Omkareshwar, Ph.-IV		15.05.2016	Issued
66	Bargi Diversion Ph - I	Maj.	10.05.2016	Issued
	Bargi Diversion Ph -I I		10.05.2016	Issued
	Bargi Diversion Ph -I I I		10.05.2016	Issued
	Bargi Diversion Ph-IV		10.05.2016	Issued
67	Pench Div-I	Maj.	07-08.05.2016	Issued
68	Upper Beda	Maj.		
69	Punasa lift	Maj.		
70	Lower Goi	Maj.		
71	Jobat	Med		
72	Sagar(Sagad)	Med.	10.05.2016	Issued
73	Singhpur	Med.	11.05.2016	Issued
74	Sanjay Sagar (Bah)	Med.	09-11.05.2016	Issued
75	Mahuar	Med.	13.05.2016	Issued
	TOTAL=17			
	MAHARASHTRA			
76	Gosikhurd [NP]	Maj.		
77	Waghur	Maj.	i) 21.09.2016 ii) 20.05.2016	i) Issued ii) Issued
78	Upper Manar	Med.		
79	Upper Pen Ganga	Maj.	28.04.2016	Issued

Sl. No	State/Project Name	Major/ Medium/ ERM	Date of Visit	Status of Report
	Bawanthadi [IS]		i) 13.05.2016 ii) 16.01.2017	i) Issued
80	Lower Dudhna	Maj.	i) 14.05.2016 ii) 16.12.2016	i) Issued
	Tillari		18.05.2016	Issued
81	Warna	Maj.	01.06.2016	Issued
82	Punad	Maj.		
83	Lower Wardha	Maj.	i) 14.05.2016 ii) 17.01.2017	i) Issued
84	Khadakpurna	Maj.	19.05.2016	Issued
85	Dongargaon	Med.	23.05.2016	Issued
86	Gul	Med.		
87	Bembla	Maj.	24-25.05.2016	Issued
88	Uttermand	Med.		
89	Sangola Branch Canal	Maj.	19.05.2016	Issued
90	Tarali	Maj.	17.05.2016	Issued
91	Dhom Balakwadi	Maj.	16.05.2016	Issued
92	Morna (Gureghar)	Med.	31.05.2016	Issued
93	Arjuna	Med.	20.05.2016	Issued
94	Lower Pedhi	Maj.		
95	Upper Kundalika	Med	28.04.2016	Issued
96	Wang Project	Med	31.05.2016	Issued
97	Lower Panzara	Med	i) 22=23.09.2016 ii) 18.05.2016	i) Issued ii) Issued
98	Aruna	Med	21.05.2016	Issued
99	Krishna Koyana Lift	Maj.	18.05.2016	Issued
100	Naradave (Mahammadwadi)	Med	23.05.2016	Issued
101	Gadnadi	Med	22.05.2016	Issued
102	Kudali	Med	30.05.2016	Issued
	Nandur Madhmeshwar Ph-II		i) 17.05.2016 ii) 04-05.07.2016	i) Issued ii) Issued
	TOTAL=27			
	MANIPUR			
103	Khuga	Maj.		
104	Thoubal	Maj.	i) 12.05.2016 ii) 25.08.2016 iii) 21-23.02.2017	Issued

Sl. No	State/Project Name	Major/ Medium/ ERM	Date of Visit	Status of Report
105	Dolaithabi Barrage	Med.	i) 12.05.2016 ii) 26.08.2016 iii) 12-14.12.2016 iv) 21-23.02.2017	Issued
	TOTAL=03			
	ORISSA			
106	Upper Indravati(KBK)	Maj.	i) 26.04.2016 ii) 04.08.2016	i) Issued ii) Issued
107	Subernarekha	Maj.	i) 20.05.2016 ii) 09-11.03.2017	i) Issued ii) Issued
108	Rengali	Maj.		
109	Anandpur Barr./ Integrated Anandpur Barr.	ERM	23.06.2016	Issued
110	Lower Indra(KBK)	Maj.	i) 28-29.04.2016 ii) 11.02.2017	i) Issued ii) Issued
111	Lower Suktel(KBK)	Maj.	29.04.2016	Issued
112	Telengiri(KBK)	Maj.	13.05.2016	Issued
113	RET Irrigation(KBK)	Med.	i) 14.05.2016 ii) 11.02.2017	i) Issued
114	Kanupur	Maj.	24.06.2016	Issued
115	Chheligada Dam	Med.		
116	Rukura-Tribal	Med	i) 05.05.2016 ii) 06.08.2016	i) Issued ii) Issued
	TOTAL=11			
	PUNJAB			
117	Shahpur Kandi dam (N.P)	Maj.	21.12.2016	Issued
118	Kandi Canal Extension (Ph.II)	ERM	i) 11.05.2016 ii) 20.07.2016 iii) 14.02.2017	i) Issued ii) Issued iii) Issued
119	Rehabilitation of Ist Patiala Feeder and Kotla Branch Project	ERM	i) 06.05.2016 ii) 19.07.2016 iii) 15.02.2017	i) Issued ii) Issued iii) Issued
120	Relining of Rajasthan Feeder Cannal & Sirhind Feeder	ERM		
	TOTAL=04			

Sl. No	State/Project Name	Major/ Medium/ ERM	Date of Visit	Status of Report
	RAJASTHAN			
121	IGNP Stage-II	Maj.		
122	Narmada Canal	Maj.	23-24.05.2016	Issued
123	Mod. of Gang Canal	ERM	09-11.06.2016	Issued
	TOTAL=03			
	TELANGANA			
124	Indiramma FFC of SRSP	ERM	06.04.2016	Issued
125	SRSP St.II	ERM	i) 18.05.2016 ii) 09.03.2017	i) Issued
126	Ralivagu	Med.	i) 25.04.2016 ii) 20.02.2017	i) Issued ii) Issued
127	Gollavagu	Med.	i) 25.04.2016 ii) 21.02.2017	i) Issued ii) Issued
128	Mathadivagu	Med.	i) 27.04.2016 ii) 07.02.2017	i) Issued ii) Issued
129	Peddavagu at Jagannathpur	Med.	i) 26.04.2016 ii) 08.02.2017	i) Issued ii) Issued
130	J. Chokka Rao LIS	Maj	i) 17-18.05.2016 ii) 13-14.02.2017	i) Issued ii) Issued
131	Neelwai (Peddavagu)	Med.	i) 25.04.2016 ii) 20.02.2017	i) Issued
132	Sri Komaram Bheem	Med.	i) 26.04.2016 ii) 08.02.2017	i) Issued ii) Issued
133	Palemvagu	Med.	i) 13.07.2016 ii) 13.02.2017	i) Issued ii) Issued
134	Rajiv Bhima LIS	Maj	10.03.2017	Issued
	TOTAL=11			
	TRIPURA			
135	Manu	Med.		
136	Gumti	Med.		
137	Khowai	Med.		
	TOTAL=03			
	UTTAR PRADESH			
138	Saryu Nahar NP	Maj	07-10.03.2017	
139	Bansagar Canal	Maj.	25-27.04.2016	Issued
140	Mod. of Lachhura Dam	ERM		

Sl. No	State/Project Name	Major/ Medium/ ERM	Date of Visit	Status of Report
141	Improving Irr. Intensity of Hardoi Branch System	ERM		
142	Madhya Ganga Canal Ph-II	Maj.	i) 05-06.05.2016 ii) 10-12.04.2017	i) Issued
143	Kachnoda Dam	Maj.		
144	Arjun Shyak	Maj.	02-03.05.2016	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**	**155**	**118**

Annexure - 8.3

State-Wise and Project-Wise List of Inter-State Projects to be Monitored by CWC (HQ) during 2016-17

Sl. No.	Name of Project	Major/ Medium/ ERM	States	Remarks
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 2016-17

Sl. No.	Name of the State	Target	Achievement
1	A.P.	8	13
2	Assam	4	9
3	Bihar	4	2
4	Chattisgarh	4	3
5	Goa	1	1
6	Gujarat	1	3
7	Himachal Pradesh	3	0
8	J&K	9	4
9	Jharkhand	6	1
10	Karnataka	14	7
11	Kerala	4	2
12	M.P.	17	22
13	Maharashtra	27	32
14	Manipur	3	7
15	Odisha	11	15
16	Punjab	4	7
17	Rajasthan	3	2
18	Telangana	11	20
19	Tripura	3	0
20	U.P.	8	5
21	West Bengal	4	0
	Total	**149**	**155**

Annexure - 8.5

Details of Completed Projects Under AIBP as on 31.03.2017

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
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

Sl. No	State/Project Name	Year of Inclusion	Year of
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
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

Sl. No	State/Project Name	Year of Inclusion	Year of
65.	Maskinallah	2002-03	2003-04
66.	Votehole	2007-08	2008-09
67.	Gandorinala	2001-02	2010-11
68.	Ghatparbha		
	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
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

Sl. No	State/Project Name	Year of Inclusion	Year of
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		
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

Sl. No	State/Project Name	Year of Inclusion	Year of
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		
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 - 15.1

Training Program by Training Dte. HQ during 2016-17

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 "Disciplinary Proceeding" conducted through ISTM	16-19 May, 2016	New Delhi	25
2.	Training to Officers of regional offices of CWC on "Use of satellite pictures for review of AIBP-Project"	6-10 June, 2016	New Delhi	7
3.	Training to Officers of regional offices of CWC on "Use of satellite pictures for review of AIBP-Project"	13-17 June, 2016	New Delhi	6
4.	Training on "Glacial Lake Monitoring"	15-17 June, 2016	New Delhi	6
5.	हिन्दी कार्यशाला	16 June, 2016	New Delhi	45
6.	Training to Officers of regional offices of CWC on "Use of satellite pictures for review of AIBP-Project"	20-24 June, 2016	New Delhi	11
7.	Implementation of "Bhavishya Software"	23 June,, 2016	New Delhi	10
8.	Implementation of "Bhavishya Software"	24 June, 2016	New Delhi	10
9.	Basic Computer Training including MS Word, Excel & Power Point etc	28-29 June, 2016	New Delhi	17
10.	Data Validation Tools of e-SWIS Software	4-5 July, 2016	New Delhi	12
11.	Basics of Information Security conducted through C-DAC, NOIDA	14-15 July, 2016	New Delhi	25
12.	Application Software (Auto-CAD)	27-29 July, 2016	New Delhi	10

Sl. No.	Topics of Program	Date	Venue	No. of Participants
13.	हिन्दी कार्यशाला	12 August, 2016	New Delhi	45
14.	MIKE 11- Modeling for Flood Routing/Dam Break/GLOF	17-18 August, 2016	New Delhi	9
15.	Basic Computer Training including MS Office, Excel & Power Point etc.	22-23 August, 2016	New Delhi	15
16.	Software Bases on FEM Analysis used for Stability of Embankment of Concrete Dams	12-14 September, 2016	New Delhi	9
17.	Application Software (STAAD- PRO)	15-16 September, 2016	New Delhi	19
18.	Training on "Ethics in Public Governance" through IC Centre for Governance.	24-28 October, 2016	Panchagani Maharashtra	15
19.	"Level-4 training for Hydromel Officers"	7-11 November, 2016	New Delhi	24
20.	Project Hydrology- Hydrological Aspects in Planning and Preparation of DPR	21-25 November, 2016	New Delhi	24
21.	Workshop on File Management and Office procedure	22 November, 2016	New Delhi	26
22.	Workshop on Conduct rules and Disciplinary Proceedings	23 November, 2016	New Delhi	24
23.	हिन्दी कार्यशाला	2 December, 2016	New Delhi	42
24.	Seminar," Marching Ahead on Dr. Ambedkar's Path for Water Resources Management" at CWC Auditorium, New Delhi.	6 December, 2016	New Delhi	151
25.	“Capability Building Training on e-office "for MoWR, RD&GR Officers.	4-2, January, 2017	CWC(HQ), New Delhi	21
26.	"Capability Building Training on e-office"for MOWR, RD&GR Officers.	11-9January, 2017	CWC(HQ), New Delhi	32
27.	Training Program on ""Implementation of e-procurement"	19-18January, 2017	TCIL-Bhawan, New Delhi	10

Sl. No.	Topics of Program	Date	Venue	No. of Participants
28.	Training programme on " Bhavishya)"online pension payment tracking system)"	23 January, 2016	New Delhi	45
29.	Training Course on" Command Area Development & Water Management (CAD & WM) Activities "under PMKSY Scheme.	8-7February, 2017	Coimbatore	22
30.	Training Program on" Basic of Computers along with Online Monitoring of Public Grievances, Court Cases, Pension, Bhavishya.	10-9February, 2017	Hyderabad	16
31.	Training programme on Bhavishya (Online Pension Sanction&Payment Tracking System).	17 March, 2017	CWC(HQ)	30
32.	हिन्दी कार्यशाला	23 March, 2017	New Delhi	28
B. In-House Training Program in Field Office				
33.	Training Program on "MIKE Software for Flood forecasting"	14-16 December, 2016	Gandhi Nagar, Gujarat	26
34.	Training Program on Subordinate Ministerial Cadre Officials Working under YBO, CWC, New Delhi	19-23 December, 2016	YBO, CWC, New Delhi	20
C. Programme Organized by Other Organization				
35.	Training Program on "e-Granthalaya Software" organized by NIC.	4 April, 2016	New Delhi	6.
36.	Online basic course on "Comprehensive Natural Disaster Risk Management Frame work" organized by National Institute of Disaster Management (NIDM) New Delhi。	15 August - 25 September, 2016	New Delhi	4
37.	Training Programme on "Incorporation Gender Concerns in Public Policy" Organized by Indian Institute of Public Administrations (IIPA)	5-7 September, 2016	IIPA, New Delhi	1

Sl. No.	Topics of Program	Date	Venue	No. of Participants
38.	Training course on "Surface and Sub-Surface Assessment of Rock Mass" organized by CSMRS	24-25 October, 2016	New Delhi	2
39.	Training Course on "Geotechnical Investigation for Earth and Rock fill Dam" at CSMRS, New Delhi.	16-18 November, 2016	New Delhi	1
40.	Training programme on "Ground Water Management and Artificial Recharge Under Jal Kranti Abhiyan" Organized by CGWB, West Central Region, Ahmedabad	23 January, 2017	Ahmedabad (Gujrat)	4
41.	"Central Line Ministries Training Program-S 2 Level" organized by National Institute for Smart Govt. (NISG),New Delhi.	7 February,2017	New Delhi	3
42.	Training course on "Geotechnical Investigations for river Valley projects" organized by CSMRS	17 February, 2017	New Delhi	1
43.	Training programme in the use of CLimate Change Adaptation Guidelines for Coastal Protection and Management in India under Climate Resilient Coastal Protection and Management Project (CRCP&MP) organised by CRCPMP	20-22 February, 2017	Hotel Ballal Residence, Manglore	2
44.	Workshop on "Seismic Aspect of Dam Design-Issues and Challenge Organized by CBIP.	28 April 2016	New Delhi	8
45.	International Seminar on "Application of Potentially Important Jute Geotextiles" Organized by National Jute Board, Ministry of Textiles.	22-23 June, 2016	New Delhi	4
46.	Review-cum-Training Workshop Organized by National Spatial Data Infrastructure (NSDI) Division.	6-8 July, 2016	IIT, Kharagpur	2

Sl. No.	Topics of Program	Date	Venue	No. of Participants
47.	Workshop on "Sexual Harassment of women at workplace for officer/staff" organized by ISTM.	18-19 August, 2016	ISTM,New Delhi	1
48.	Participation in 7th Annual Conference on "Dredging in India" Organized by India Infrastructure, Mumbai.	23-24 August, 2016	Mumbai	2
49.	All India Seminar on" Achieving Water Security in Jharkhand" Organized by The Institutions of Engineers (India), Jharkhand State Centre.	3-4 September, 2016	Ranchi	1
50.	"Two Days National Conference & Exhibition, "Survey India 2016 " Organized by Survey and Mapping Association (SAMA), New Delhi.	7-8 September, 2016	New Delhi	3
51.	IWRS-Seminar on Health Rivers-Ecosystem Benefits & Prosperty Organized by IWRS- Luck now Centre.	19-20 September, 2016	Lucknow	3
52.	Two days IWRS workshop on "Water Governance" Organized by IWRS, Roorkee, CWC and Deptt. of WRD &M, IIT, Roorkee.	19-20 September, 2016	नई दिल्ली	110
53.	Conference on "Governance Frame Work for Harmonizing Water- Energy Usage" organized by The Associated Chambers of Commerce and Industry of India (ASSOCHAM),New Delhi.	21 September, 2016	Hotel TAJ, New Delhi	5,
54.	National Seminar on "Reforms in Water Sector- Implication for Sustained Water and Food Security" organized by CBIP, CWC, WRD, Goyt. of Maharashtra, Maharashtra Water Resource Regulatory Authority, ICAR and ICID.	22-23 September, 2016	Hotel Conrad, Mangaldas Road Pune-411001, Maharashtra	6

Sl. No.	Topics of Program	Date	Venue	No. of Participants
55.	National Workshop on "Dam Rehabilitation- Trends and Practices" organized by CW&PRS in association with IGS, Pune.	13-14 October, 2016	CWPRS, Pune	1
56.	International Seminar on "Reliable Data Acquisition system for Integrated Water Resources Management" Organized by CWPRS, Pune.	7-8 November, 2016	Pune	5
57.	6th Asian Regional Conference-Geosynthetics Asia-2016" Organized by CBIP, New Delhi	7-11 November, 2016	CBIP, New Delhi	8
58.	International Conference on "Recent Advances in Rock Engineering patronized by Ministry of Mines Goyt. of India and DS&T	16-18 November, 2016	Bengaluru	3
59.	10th World Aqua Congress International Conference" organized by Aqua Foundation, New Delhi	24-25 November, 2016	New Delhi	3
60.	Annual Conference on Strategies for Ensuring 24x7 Power Awards Ceremony organized by Council of Power Utilities, Janakpuri, New Delhi.	25th November, 2016	New Delhi	3
61.	National Workshop on "Challenges in Irrigation Management for Flood Security" organized by IWRS and WRDM,IIT Roorkee..	26-27 November, 2016	Roorkee	3
62.	"2nd Annual National Submit Sustainable Water and Sanitation" organized by Nispana Innovative Platforms Pvt. Ltd., Bangalore	1-2 December, 2016	New Delhi	1
63.	Symposium on "Challenges in Development of Water Resources, Power & Renewable Energy Sectors" followed by " CBIP Day Celebrations 2017" organized by CBIP.	29 December, 2016	New Delhi	11

Sl. No.	Topics of Program	Date	Venue	No. of Participants
64.	PG Diploma Course in Water Resources Development at IIT Roorkee for academic session-2016-2017	Academic Session, 2016-2017	IIT, Rorrkee	2
65.	" JAL MANTHAN Program" organized by NWDA	13 January,2017	Vigyan Bhawan,New Delhi	89
66.	Conference on " Water Challenges in India- Knowledge sharing and exchange of experience" organized by DHI (India) Water and Enviornment Pvt. Ltd.,New Delhi.	8-9 February, 2017	New Delhi	8
67.	dlroW xE retaW" ni detapicitraP yb dezinagro "2017 ecnerefnoC ,.dtl .tvP aideM iahbusaJ & hcetmehC noitibihxE yabmoB ta iabmuM tsaE dnuorG	15 February, 2017	Mumbai	1
68.	Seminar on" Leakage Detection Systems in Dams" organized by council of power utilities	16 February, 2017	New Delhi	2
69.	Workshop on "Arsenic problems in Ground Water and its remediation in Ganga Basin" organised by CGWB	7 March, 2017	Scope Complex New Delhi	50
70.	Basin level workshop on "Stratergic Basin Planning for Ganga River in India	2 March, 2017	Hyatt Regency Hotel, Kolkata	4
71.	Conference on "Sediment Management in Indian Rivers" organised by MoWR, RD&GR.	17 March, 2017	CSMRS, New Delhi	49
72.	Workshop on "To formulate a uniform protocol and Methodology/approach for River Basin Studies" organised by Ministry of Environment,Forest and Climate Change(A-Division),New Delhi.	25 March,2017	Shillong	1

Training / Workshops Abroad

Sl. No.	Topics of Program	Date	Venue	No. of Participants
1	Hands on hydro-meteorological and hydrological service straining and exposure to scientific method applied to rainfall forecasts for flood and water availability forecasting Organized by Bureau of Meteorology, Australian Goyt.	29 May – 26 July 2016	Australia	1
2	International Short -Course on Resilience and Adaptations to Climate Change for Sustainable Management of Tidal Areas	1 – 6 August, 2016	Taiwan	1
3	Knowledge Co-creation program on "Integrated Basin Management for Sustainable use and Preservation of Water Resources (Lakes, Rivers and Coastal Water)" under technical cooperation program, Govt. of Japan.	15 August - 15 October, 2016	Japan	1
4	Attending Knowledge Co-Creation Program on 'Integrated Water Resources Management (B)'	28 August – 17 September, 2016	Japan	1
5	Bilateral meetings and site visit under India –EU Water Partnership	04-10 September, 2016	Europe	1
6	Attending program on "Disaster Risk Reduction" to be held at Singapore Under Singapore Co – operation .	26- 29 September, 2016	Singapore	1
7	Visit of Indian delegation for the Site Visit of "Ganga Barrage Project" in Pangsha (Bangladesh) and meeting with Bangladesh Officers.	24- 28 October, 2016	Bangladesh	4
8	Participation in 2nd WIF and 67th IEC meeting of ICID at Thailand	06- 12 November 2016	Thailand	1

Sl. No.	Topics of Program	Date	Venue	No. of Participants
9	International training program on Climate Change Adaptation Strategies at Singapore Under Singapore Co –operation program.	14-18 November, 2016	Singapore	1
10	Deputation abroad for Training Programme on 'Water Resources Management in Rural Area and Integrated Water Resource Management on Irrigation and Drainage'	27 November – 17 December, 2016	Japan	10
11	Training Program on"Water Resources Management in Rural Area and IWRM on Irrigation and Drainage Organised by JICA(Japan)	10-27 January,2017	Japan	8

Annexure - 15.2

Details of Training Programs completed by National Water Academy, Pune till March 2017

Sr. No	Details of the Programs	Dates	Duration in weeks	Number of officers Trained	Man-weeks of training
1	28th ITP Program for Newly recruited Asst. Directors/AEEs of CWC	7 Dec 2015 – 3 Jun 2016	9	32	288
2	Management Development Program for senior officers of DRIP.	25-29 Apr 2016	1	17	17
3	Digital Surface Modeling	20 Jun - 1 Jul 2016	2	26	52
4	Financial Procedures and Works Management	21-22 Jun 2016	0.4	35	14
5	Training cum Workshop on Water Resources for NGOs and Media Personnels	28-29 Jun 2016	0.4	14	5.6
6	Training Module for Ministerial Cadre.	11-15 Jul 2016	1	12	12
7	Surface and Watershed Modelling for Flood Management (RoGB)	18-22 Jul 2016	1	9	9
8	Overview of Flood Forecasting for Officials of Flood Warning Sections (for RoGB)	25-29 Jul 2016	1	9	9
9	Creation of Awareness about Water Conservation	21 Jul 2016	0.2	67	13.4
10	Training of Trainers (ToT) Program on "use of Climate Change adaptation guidelines for Coastal Protection and Management in India" (under CRCP&MP).	25-27 Jul 2016	0.6	50	30

Sr. No	Details of the Programs	Dates	Duration in weeks	Number of officers Trained	Man-weeks of training
11	Workshop on "use of Climate Change adaption guidelines for Coastal Protection and Management in India"-(under CRCP&MP)	28-29 Jul 2016	0.4	22	8.8
12	Use of Advanced Softwares in Designs of WRS.	1-5 Aug 2016	1	39	39
13	Management Development Program for Non Technical Officers.	16-20 Aug 2016	1	22	22
14	Scenario of Water Resources Sector of India	30 Aug 2016	0.2	56	11.2
15	Command Area Development for CWES Officers.	22 Aug - 2 Sep 2016	2	25	50
16	Water Budgeting for the officials of WALMIs/ IMTIs	13-15 Sep 2016	0.6	19	11.4
17	Rainfall Runoff Modeling, Flood Routing and Inundation Mapping with Open Source GIS.	19-30 Sep 2016	2	42	84
18	29th ITP for newly recruited Asst. Directors of CWC.	3 Oct 2016 - 31 Mar 2017	26	17	442
19	River Basin Planning and Management, Best Practices & Development & Data Acquisition and Analysis	19-30 Sep 2016	1	16	16
20	Stratetic Issues in Water Resources Sector.	17-21 Oct 2016	1	31	31
21	Over of water resources sector of India	7-11 Nov 2016	1	18	18
22	Water Quality Monitoring and Assessment	21-25 Nov 2016	1	40	40

Sr. No	Details of the Programs	Dates	Duration in weeks	Number of officers Trained	Man-weeks of training
23	Induction Training Program for newly recruited Junior Engineers of CWC	28 Nov - 9 Dec 2016	2	34	68
24	Orientation Program for newly recruited AD-II/SDE	19-30 Dec 2016	2	38	76
25	Distance Learning Program in Hydrology : Basic Hydrological Sciences for Professionals from RA-II (Asian) countries in association with World Meteorological Organizations	19 Dec 2016 - 3 Feb 2017	7	38	266
26	Application of RS-GIS`	2-13 Jan 2017	2	24	48
27	Rainfall Ruoff Modelling	16-27 Jan 2017	2	27	54
28	River Basin Planning & Management, Best Practices & Development and Data Acquisition & Analysis	13-17 Feb 2017	1	15	15
29	Distance Learning Program in Hydrology : Basic Hydrological Sciences for Professionals from RA-II (Asian) countries in association with World Meteorological Organizations	27 Feb - 15 Apr 2017	7	41	287
30	Irrigation Project Monitoring and Management using RS - GIS	20 -31 Mar 2017	2	15	30
	Total		**78.8**	**850**	**2067.4**

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PHOTO GALLERY

28th Induction Training Programme (ITP) for newly recruited CWES (Gr.A) Officers at NWA Pune

3rd National Dam Safety Conference during 18-19th February 2017 at IIT Roorkee

A seminar "Dr. Bhimrao Ambedkar – Multi-purpose Development of Water Resources and Present Challenges" on 19th April 2016 at NDMC Convention Center, New Delhi to celebrate 125th Birth Anniversary of Dr. Ambedkar

A seminar "Marching Ahead on Dr. Ambedkar's Path of Water Resources Management for Inclusive Growth" on 6th December 2016 CWC Auditorium, New Library Building, New Delhi on the Occasion of death Anniversary of Dr. Ambedkar.

Participation in 36th India International Trade Fair (IITF) - 2016 at Pragati Maidan, New Delhi from 14th to 27th November, 2016

A Workshop on "Piped Irrigation Network "during 16-17 March, 2017 at CWC Auditorium, New Delhi